AGUA CALIENTE BAND OF CAHUILLA INDIANS
A SOVEREIGN TRIBAL GOVERNMENT

Planning & Development Department
Building and Safety Division
5401 Dinah Shore Drive
Palm Springs, CA 92264
(760) 669-6800

RESIDENTIAL PHOTOVOLTAIC GUIDELINES

Building Codes in Effect: 2013 California Building, Residential, Fire, Energy and Electrical Codes, including Article 690.

NEED A PERMIT FOR YOUR RESIDENTIAL PHOTOVOLTAIC PROJECT?

Tribal staff would like to streamline the permitting process for you. This informational guide provides a standardized outline to help you submit a complete application that will ensure a quick and efficient review process. See the Checklist on the following page to put together your complete application.

Keep in mind that all residential photovoltaic system proposals should fundamentally include adequate component documentation, structural design, attachment methods, weatherproofing details, appropriate clearances for Fire Department access in cases of emergency, and code compliant wiring methods and installation practices.

In order to minimize potential safety hazards and installation problems, plans and supporting documentation must be provided to the Building and Safety Division that show how your proposed photovoltaic project complies with all minimum building codes as adopted and amended by the Tribe.

Planning Division Approval:

All proposed photovoltaic system installations require review and approval from the **Planning Division** to verify minimum conformance with all adopted zoning codes including but not limited to required setbacks, height, and conformance with other local ordinances and standards.

Permit Fees:

Residential photovoltaic system installations require the issuance of a **$725.00 combination permit** (building and electrical) that includes Planning Division review and all plan review, permit issuance, and building inspection fees.

Note: This Fee is due at the time of initial plan review submittal.

USE THIS CHECKLIST TO COMPLETE YOUR APPLICATION

A minimum of **3 sets of complete, wet stamped, plans along with all supporting documentation** is required upon initial plan review submittal. Because of the inherent complexities and potential hazards associated with photovoltaic systems, a California Licensed Electrical Engineer, or a California Licensed Electrical (C-10) Solar (C-46) or A Licensed Engineering Contractor is required to prepare and sign the plans.

In order to expedite the review and approval process, the plans and supporting documentation shall include all of the information presented in this informational guide:

☐ **Site Plan:** Provide a fully dimensioned site plan showing all property lines, buildings, setbacks to property lines and between buildings, and the location of the main electrical service panel along with all associated photovoltaic equipment.

☐ **Roof Plan:** Provide a roof plan showing the location of each photovoltaic panel array, (module locations) all required 3 feet access and smoke ventilation clearances per Tribal Fire Marshal requirements, any roof mounted equipment including mechanical heating and air conditioning equipment and required access thereto, all conduit runs, boxes, inverter location(s), DC and AC disconnect locations, and connection to the existing or proposed electrical service. Roof plans shall also call out the existing roof framing member (rafter) sizes; spacing, span, and roof finish materials including number of layers.

- **Note:** The property owner should strongly consider the condition of the existing roof finish materials for future maintenance purposes, prior to the installation of any new rooftop photovoltaic system. Once the rooftop photovoltaic system(s) are installed, future maintenance (such as a re-roof project) will require an appropriately licensed contractor to provide access to or remove some or all of the attached components on the roof including reinstallation after the work has been completed. Permits are required for re-roof projects and a permit may be required for the reinstallation of the photovoltaic system, or any components thereto. Contact the Building and Safety Division for further information.

☐ **Attachment Details:** Provide pertinent details that show how the proposed rooftop racking system is arranged (including spacing of attachment points in each direction) and how it is connected to the existing roof structure. Racking systems are required to be designed in accordance with Tribal Building Codes for wind exposure and earthquake resistance, along with verification that the additional dead load (weight) on the existing roof structure is acceptable. All proposed racking systems require a California State Licensed "**Engineering Certification**" be provided from an appropriately licensed design professional that indicates compliance with all design requirements in accordance with the Building Code. In addition, an approved **ICC research report** may be submitted for review and consideration.

☐ **Structural Engineering:** Most proposed residential rooftop photovoltaic systems will not require additional engineering beyond the required racking system "Engineering Certification". Industry standards show that these systems are typically 3.5 pounds per square feet in additional weight on average and thus pose a minimal impact on the existing framing and lateral (earthquake and wind) loads. Based on the existing conditions and proposed design, additional structural engineering may be required by the Building and

Safety Division to verify that the proposed system's additional loads do not negatively impact the structure due to additional weight, or for wind/earthquake exposure and design. Proposed photovoltaic installations must fully comply with **2013 CBC 3404.3** and **3403.4** regarding alterations to existing buildings.

☐ **Product Specifications:** Provide product literature for each type of solar panel (module), inverter, junction/combiner box, DC/AC disconnect, grounding and bonding components, load centers, racking system, fastener types, signs, and weatherproofing materials as required for the proposed project. All components shall be UL (or equivalent) listed and labeled for their use and installed as such.

☐ **Electrical Single Line Diagram:** Provide a complete single line diagram showing all electrical equipment and components with a clear installation process. Include all modules, number of strings, types of wiring both exposed and in conduit, junction/combiner boxes, disconnects, inverters, load centers, utility disconnects, existing or proposed electrical service, back feed breakers, bus bar sizes, main service disconnect size, point of connection, and methods of DC and AC grounding as required by the Electrical Code. Specify sizes of conduit, number and type of wiring (USE-2, PV- Wire, THWN-2, etc.) and if disconnects are fused or breaker type.

☐ **Signs and Identification:** Provide a legend showing the location and wording of each permanent sign or play card as required by **Article 690** of the **2013 California Electrical Code.**

☐ **Homeowner's Association Approval Letter:** If the project is located in a community with a Homeowner's Association (HOA), provide a letter from the HOA to verify its application approval by the community council. The letter must be signed and dated by an HOA representative.

Optional Electrical Standard Plan:

In order to effectively streamline the review and approval process, proposed residential photovoltaic systems that generate no more than 10 kW of AC power for single phase 120/240 electrical services no more than 225 amps in size, may use the **A.C.B.C.I. Electrical Standard Plan** for central inverter type installations. A specific site plan (see Page 9) and single line diagram (see Page 10) shall be attached to the Standard Plan along with all required product specifications and documentation as outlined herein.

A QUICKER PROCESS FOR YOU

Please take a moment to review the general comments below. These will help you cover all of the construction details the Tribal Building Official will want to see on your plans. *The goal is to create a quicker process for you.*

General Plan Review Comments:

- List all applicable Codes on the title sheet and include a sheet index.
- Please provide a note stating that the working clearances around the existing electrical equipment as well as the new electrical equipment will be maintained in accordance with **CEC 110.26.**
- Identify any existing mechanical equipment on the roof plan and provide a minimum working clearance of 36" around the entire unit as well as a minimum 24" wide clear access way from the roof scuttle or roof access point. (**CEC 110.26** and **CMC 904.10**)
- The electrical single line diagram must be clear as to the point of interconnection to the service. In order for us to evaluate the design, much more information is needed. Please identify the back fed breaker size on the plans. Show all electrical service gear and amperage rating of bus bars and main breaker size.
- Please note that adequate spacing must be maintained between any plumbing sewer vents extending through the roof and the underside of the photovoltaic panels (6" minimum recommended).
- The **2013 California Residential Code (CRC)** requires that approved smoke and carbon monoxide alarms are installed or retrofitted into the existing dwelling due to the proposed building alteration. The required smoke and carbon monoxide alarms shall be located as required by Code and be hard wired, battery backup, and interconnected unless there is no access to do so, then battery operated alarms are permitted. The building inspector shall field verify that all alarms are installed in accordance with Code prior to project final approval. Please provide a note on the plans to document these requirements. **(CRC R314.1, R315.1)**

Typical Wiring Method Comments:

- Identify that all exposed photovoltaic system conductors on the roof will be USE-2 or Photovoltaic (PV) type wire. Identify wire size for all conductors. (**CEC 690.31B, 338.10 B 4 b, Table 310.16, Table 310.17)**
- Identify that all photovoltaic system conductors will be 90 degree C rated**. (CEC 690.31B, Table 310.16, Table 310.17)**
- Where DC conductors are run inside the building (or attic), they shall be contained in a metal raceway. **(CEC 690.31 E)**

- Identify that all exterior conduit, fittings, and boxes shall be rain-tight and approved for use in wet locations. (**CEC 314.15).**

- Identify conduit support type and spacing per Code. In addition, specify the minimum conduit stand off from finished roof surface **(.5 -3.5 inches**) in order to properly adjust conductor and conduit size for temperature and conduit fill per NEC.

- Line side taps into the bus bars or conductors on the supply side (i.e. between the service entrance conductors and the main over current device downstream of the meter) are not allowed unless verification from the manufacturer is obtained that allows the connection without voiding the listing or warranty. All incoming current from the photovoltaic system must be back fed through a circuit breaker on the load side of the service main breaker. **(CEC 690.64 and Utility Policy)**

- Alterations to listed and labeled equipment are not permitted. Listed or labeled equipment shall be installed and used in accordance with the instructions and specifications included within the listed and labeled equipment **(CEC 110.3 B).**

- Provide a note stating that any conductors exposed to sunlight shall be listed as sunlight resistant. (**CEC 300.6 C1, 310.8 D)**

Typical Sign and Labeling Plan Check Comments:

- Sign information on plan is inadequate; please refer to the attached handout for additional information.

- Provide a label or marking in a visible location near the ground-fault indicator stating: **"WARNING – ELECTRIC SHOCK HAZARD - IF A GROUND FAULT IS INDICATED, THE NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED"**. **(CEC 690.5 C)**

- The photovoltaic system disconnecting means shall be permanently marked to identify it as the **"PHOTOVOLTAIC DISCONNECT FOR UTILITY OPERATIONS"**. **(CEC 690.14 C 2)**

- A warning sign shall be mounted on or adjacent to the disconnecting means and shall state **"WARNING – ELECTRIC SHOCK HAZARD - DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION." (CEC 690.17)**

- A warning sign shall be mounted on all serviceable panels or boxes and shall state **"WARNING – ELECTRIC SHOCK HAZARD. DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION**." **(CEC 690.17)**

- A label or marking shall be provided at the photovoltaic power source (typically at the inverter) indicating the following **(CEC 690.53):**

- **Rated maximum power-point current**
- **Rated maximum power-point voltage**
- **Maximum system voltage**
- **Short circuit current**
- **Maximum rated output current of the charge controller (if installed)-(only applicable to battery systems)**

- At the point of interconnection between the photovoltaic power and the Utility power (typically at the back-fed photovoltaic breaker at the service) a sign or marking shall be provided to identify the **RATED AC OUTPUT CURRENT AND THE NOMINAL OPERATING AC VOLTAGE. (CEC 690.54)**

- A sign shall be provided at the main electrical service stating; **"THIS SERVICE ALSO SERVED BY A PHOTOVOLTAIC SYSTEM" (CEC 705.10)**

- A **DIRECTORY** providing the location of the service disconnecting means and the photovoltaic system DC disconnecting means shall be provided if the two disconnects are NOT at the same location (typically within 10 feet of each other and within sight of each other – with no fences or other barriers between). **(CEC 690.56 B)**

- Identify the signage or labeling specifications. The following standards are recommended:

  - **Red background with white lettering**
  - **3/8" letter height**
  - **All capital letters**
  - **Arial or similar font**
  - **Weather resistant and permanent material (i.e. engraved plastic)**

Typical Grounding and Bonding Comments:

- Indicate that all metallic raceways and equipment shall be bonded and electrically continuous**. (CEC 250.90, 250.96).**

- Indicate that the photovoltaic arrays shall be provided with DC ground-fault protection. **(CEC690.5).**

- The DC grounding electrode conductor shall be sized according to **CEC 250.166.(CEC 690.47B**)

- The DC grounding electrode shall be bonded to the AC grounding electrode and the conductor shall be no smaller than the largest grounding electrode conductor, either AC or DC. **(CEC690.47 C 7)**

- The AC grounding electrode conductor shall be sized according to **CEC 250.66. (And Table 310.15 B 6 for dwellings) (CEC 690.47)**

- Indicate in the notes that grounding bushings are required around pre-punched concentric knockouts on the DC side of the system. **(CEC 250.97)**

- The grounding electrode conductor must be protected from physical damage between the grounding electrode and the panel (or inverter) if smaller than #6 copper wire. **(CEC250.64B)**

- Indicate that the grounding electrode conductor will be continuous, except for splices or joints at bus bars within listed equipment. **(CEC 250.64 C)**

- Identify the existing grounding electrode type (i.e. driven rod, ufer, water pipe, or combination of some or all of the previously mentioned). In existing electrical systems that use only a water piping grounding electrode system, an additional grounding electrode (i.e. driven rod) shall be provided. **(CEC 250.50)**

Overcurrent Protection and Disconnects:

- The sum of the ampere ratings of the main service breaker supplying power to the bus bar from the Utility and the ampere rating of the back-fed breaker supplying power to the bus bar from the photovoltaic source shall not exceed 120 percent of the rating of the bus bar or conductor. **(CEC690.64 B)**

- In systems with panel boards connected in series, the rating of the first over current device directly connected to the output of a utility-interactive inverter shall be used in the 120 percent calculation for all bus bars and conductors**. (CEC 690.64 B 2), (CEC 705.12 D 2)**

- Provide a DC disconnect at the inverter. **(CEC 690.15)**

- Where the main service breaker is downsized, the following shall be provided:

    - **Load calculation:** Please provide the electrical load calculations to show that the downsizing of the main breaker will remain adequate for the loads at the main panel.

    - **Panel Schedule**: Provide a panel schedule of the existing electrical panel indicating all circuit breaker sizes and designations.

    - **Placard**: A permanently affixed metal placard shall be riveted in place for clear visibility inside the electrical panel that states: “The main service breaker has been down sized. No up-sizing is permitted.”

- Provide a note stating that the back fed PV breaker(s) at the main panel will be installed at the opposite end of the bus bar from the main breaker and that a permanent warning label with the following marking will be provided adjacent to the PV breaker(s): **“WARNING – PHOTOVOLTAIC CONNECTION. DO NOT RELOCATE THIS**

OVERCURRENT DEVICE." (CEC 690.64 B 7) Note: this requirement is only applicable when the sum of the over current devices feeding the panel board exceeds 100% of the bus rating.

Typical Structural Review Comments:

- Due to the additional dead load from the photovoltaic panels and related wiring and roof mounted equipment, the capacity of the existing roof framing to support the added dead load is in question. During the plan review, engineering analysis of the existing roof framing to support the added loads may be required. **(CBC 3403.2 & 3403.2.3.2)**

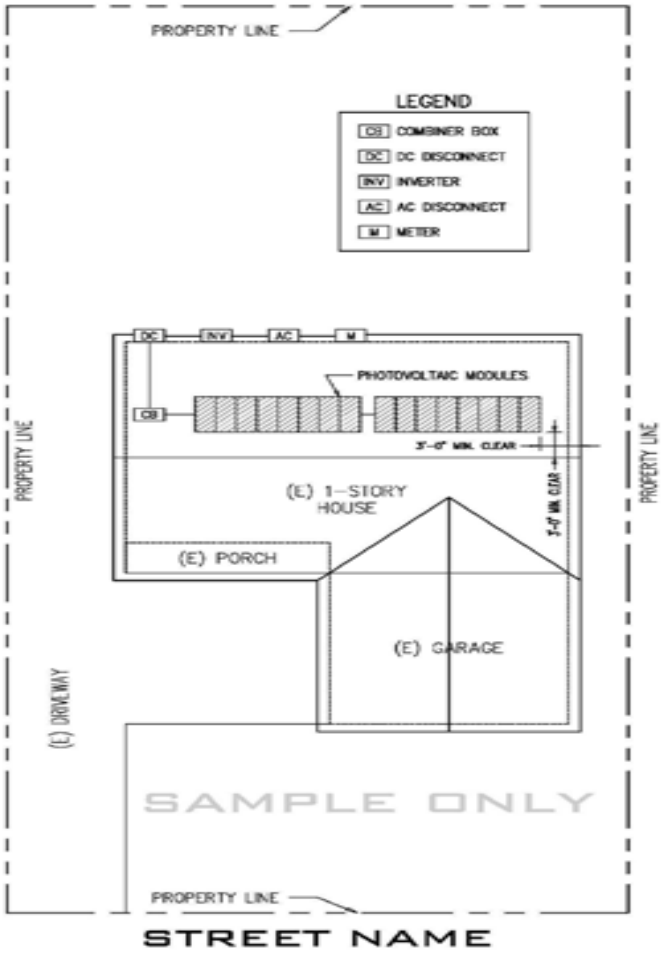
- Where photovoltaic panels are mounted on existing patio covers, a California Registered Professional Engineer must review and report on the existing lateral load carrying structural elements. The Engineer's report is to show that the demand-capacity ratio of the lateral load- carrying structural elements is not exceeded by more than 10%. **(CBC 3403.4 Exception)**

- Provide an engineering analysis for the racking system or other method of attachment, which is stamped and signed by a California Registered Engineer, OR … provide the manufacturer's product "**Engineering Certification"** and cut sheets with a California Registered Engineer's stamp and signature on the cut sheets.

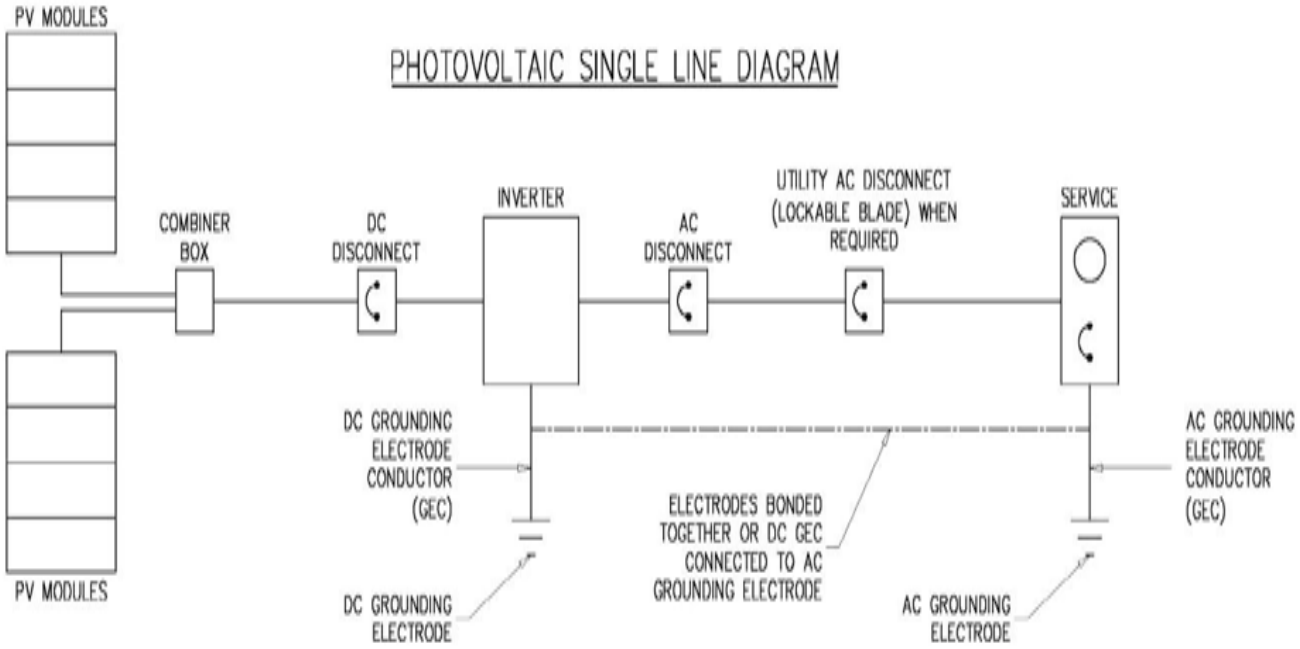
- Provide additional information concerning the roof framing. Provide the rafter size, rafter spacing, rafter span (identify any purlin) and roof slope in the areas supporting the solar panels. Some roof framing members on older homes may NOT be designed to carry the additional load of the solar panels.

- Due to the use of the ballast hold-down system, the Engineer of Record will be required to provide Structural Observation and a report stating that the ballast is installed in full compliance with the design and the approved plans. Provide note on plans concerning Structural Observation requirements. **(CBC 1702.1, 1710)**

TYPICAL SITE PLAN:



TYPICAL SINGLE LINE DIAGRAM:



- ALL WIRING IN A SOLAR PHOTOVOLTAIC SYSTEM SHALL BE IDENTIFIED
- FOR INFORMATIONAL PURPOSES ONLY.