CITY OF MILPITAS
Office of Building Safety
455 E. Calaveras Blvd.
Milpitas, CA 95035
408-586-3240
www.milpitas.gov

SOLAR PHOTOVOLTAIC (RESIDENTIAL)

1. PERMIT INFORMATION

- ❑ The installation or modification of a photovoltaic solar electric system requires a permit.
  - Replacement or upgrading of the electrical panel or service requires a separate electrical permit.

- ❑ A Permit may be issued only to the Building Owner or their Authorized Agent [CRC 105.1].
  - See also *Authorized Agent Sample Letter*.
  - Where the Contractor is acting as the Owner's Authorized Agent, they must be a State of California Licensed Contractor with the proper license classification.

- ❑ If the work is performed by the Building Owner personally or by his/her workers and an inspection indicates the work cannot be completed satisfactorily, then a licensed contractor must perform the work.

- ❑ If the Building Owner hires workers, State Law requires the Building Owner to obtain Worker's Compensation Insurance. Proof of this insurance is required prior to inspection.

2. PLAN REQUIREMENTS

Plans are required to be submitted to and approved by the city to obtain a permit where permit is required. In order to expedite issuance of your permit, submit complete sets of plans. Incomplete submittals will cause delay in the processing of documents and approval of your project.

- ❑ **Plan Requirements.**
  - **Plan Size.** Prepare plans on paper that is at least ledger size (17 inches x 11 inches).
  - **Sets of Plans.** Submit one (1) complete set of plans.
  - **Dimensions.** All drawings shall be fully dimensioned. Plot plans shall have a north arrow.
  - **Revisions.** Once the permit has been issued, any changes in the approved design must be re-approved by the City. If an Architect or Engineer prepared the plans, he or she shall approve the revised plans prior to being submitted to the City for approval. Additional fees will be due for each revision at time of submittal.

- ❑ **Project Information.** On the first sheet of the plans, provide the following information:
  - **Name.** The printed name, address and telephone number of the person who prepared the plans.
  - **Address and Owner.** List the street address of the property and the name of the legal owner of the property.
  - **Description.** A description of the project.
  - **Building Codes.** State the project shall comply with the California Residential Code (CRC), California Electric Code (CEC), and the Milpitas Municipal Code (MMC).

- ❑ **Solar Plans.**
  - Plan view showing location of the PV installation and layout of existing roof framing members that support the system, or site plan if panels are not mounted on the roof.
  - Details on mounting of PV modules, type and number of roof coverings, and subsequent weatherproofing of the roof.
  - Electrical single-line diagram clearly identifying all devices installed in the PV system and indicating total kVA rating of the system.
  - Clearly identify the point of interconnection with the utility supplied wiring system and provide details on main breaker, PV breaker and rating of bussing.
  - Indicate type and size of all conduit and conductors throughout the PV system.

- Provide manufacturer's cut-sheets and installation instructions for all PV modules, mounting systems, combiner boxes (if used), inverters, rapid shutdown devices, and disconnects.
- Provide structural calculations, prepared by a registered California design professional, if the total weight of the photovoltaic system is over five pounds per square foot.
- The installation of the PV system shall conform to the requirements of CEC Article 690 and any other applicable articles or standards.

3. SIGNAGE

❑ **Labels.** All letters in warning signs shall be capitalized and shall be a minimum height of 3/8″ in white on a red background [CEC 690.31(D)(2)]. Fonts shall be Arial or similar. Material used for signage must be weather resistant. It is recommended that UL 969 be used as the standard to determine weather rating. Labels on raceways and other equipment shall be reflective, weather resistant, and suitable for the environment. [State Fire Marshal]

❑ Premises having PV systems shall be identified. The marking (signage) may be placed within the main service disconnect. If the main service disconnect is operable with the service panel closed, the marking should be placed on the outside cover. Marking shall conform to *Figure 1*. [State Fire Marshal]

CAUTION!
SOLAR ELECTRIC SYSTEM CONNECTED

Figure 1.

❑ Marking is required on all enclosures that contain PV system dc circuit conductors including exposed raceways, cable trays, and other wiring methods, as well as the covers or enclosures of pull boxes and junction boxes. Spacing between labels or markings shall not exceed 10 ft. Labels shall be suitable for the environment where they are installed. Marking shall conform to one of the examples in *Figure 2*. [CEC 690.31(D)(2)]

PHOTOVOLTAIC POWER SOURCE

SOLAR PV DC CIRCUIT

Figure 2.

❑ **Disconnecting Means.** Appropriate signage shall be provided to identify the main A/C disconnect for the solar system [State Fire Marshal]. Each PV system disconnecting means shall be permanently marked "PV SYSTEM DISCONNECT" or equivalent. See *Figure 3* for an example. [CEC 690.13]

- For PV system disconnecting means where the line and load terminals may be energized in the open position, the device shall be marked as shown in *Figure 4* or with an equivalent. [CEC 690.13(B)]

PHOTOVOLTAIC SYSTEM AC DISCONNECT

MAX. OPERATING CURRENT: ____ AAC
OPERATING VOLTAGE: ____ VAC

Figure 3.

WARNING

ELECTRIC SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.

Figure 4.

❑ **DC PV Circuits.** A permanent readily visible label indicating the highest maximum dc voltage in a PV system, as shown in *Figure 5*, shall be provided by the installer at one of the following locations [CEC 690.53]:

- DC PV system disconnecting means
- PV system electronic power conversion equipment
- Distribution equipment associated with the PV system

PHOTOVOLTAIC SYSTEM DC DISCONNECT

RATED MAX. POWER-POINT CURRENT: ____ ADC
RATED MAX. POWER-POINT VOLTAGE: ____ VDC
MAXIMUM SYSTEM VOLTAGE: ____ VDC
SHORT-CIRCUIT CURRENT: ____ ADC
CONTROLLER MAX. RATED OUTPUT CURRENT: ____ ADC

Figure 5.

- ❑ **Point of Interconnection.** All interactive system(s) points of interconnection with other sources shall be marked at an accessible location at the disconnecting means as a power source and with the rated ac output current and the nominal operating ac voltage [CEC 690.54]. See *Figure 6* for an example.

PHOTOVOLTAIC POINT OF INTERCONNECTION

RATED AC OUTPUT CURRENT: ____ AMPS
NOMINAL OPERATING AC VOLTAGE: ____ VOLTS

THIS PANEL IS FED BY MULTIPLE SOURCES (PG&E AND SOLAR)

Figure 6.

- ❑ **PV Connected to Energy Storage Systems.** The PV system output circuit conductors shall be marked to indicate the polarity where connected to energy storage systems [CEC 690.55].

- ❑ **Rapid Shutdown.** Buildings with PV systems shall have a permanent label, as shown in *Figure 7*, located at each service equipment location to which the PV systems are connected or at an approved readily visible location and shall indicate the location of rapid shutdown initiation devices.
  - **Rapid Shutdown Switch.** A rapid shutdown switch shall have a label that includes the wording shown in *Figure 8* located on or no more than 3 ft from the switch [CEC 690.56(C)(2)].

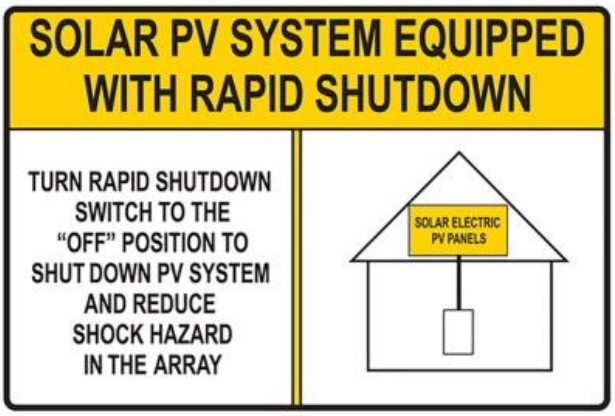

Figure 7.

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

Figure 8.

- ❑ **Identification of Power Sources.** A permanent plaque or directory shall be installed at each service equipment location, or at an approved readily visible location. The plaque or directory shall denote the location of each power source disconnecting means for the building or structure, and be grouped with other plaques or directories for other on-site sources if any. Where multiple sources supply the building, the plaque or directory shall be marked with the words "CAUTION: MULTIPLE SOURCES OF POWER." Any posted diagrams shall be correctly oriented with respect to the diagram's location. [CEC 690.56(A), 690.56(B), 705.10, 710.10]

- ❑ **Multiple Power Sources.** Where two sources, one a primary power source and the other another power source, are located at opposite ends of a busbar that contains loads, a permanent warning label shall be applied to the distribution equipment adjacent to the back-fed breaker from the power source displaying language as shown in *Figure 9* [CEC 705.12(B)(3)(2)].

WARNING
POWER SOURCE OUTPUT CONNECTION —
DO NOT RELOCATE THIS OVERCURRENT DEVICE

Figure 9.

4. INSTALLATION REQUIREMENTS

- ❑ **Codes.** All work shall comply with the California Residential Code (CRC), the California Electrical Code (CEC), the Milpitas Municipal Code (MMC), and other adopted codes as applicable.
  - This document contains informational references to various California codes and the Milpitas Municipal Code, based on the 2022 and 2023 editions of those documents, respectively. For additional, or more specific, information and exceptions, please refer to the codes and standards specific to your project.

- ❑ **Manufacturer's Instructions.** In addition to the applicable codes, photovoltaic (PV) systems shall be designed and installed in accordance with the manufacturer's installation instructions [CRC R324].

- ❑ **Equipment Listing.** Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 or with both UL 61730-1 and UL 61730-2. Inverters shall be listed in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction. Mounting systems listed and labeled in accordance with UL 2703 shall be installed in accordance with the manufacturer's installation instructions and their listings. [CRC R324.3.1]

- ❑ **Roof Penetrations.** Shall be flashed and sealed in accordance with CRC Chapter 9. [CRC R324.4.3]

- ❑ **Access and Pathways.**
  - **Access.** Access and minimum spacing shall be required to provide emergency access to the roof, to provide pathways to specific areas of the roof, provide for smoke ventilation opportunity areas, and to provide emergency egress from the roof [CRC R324.6.]
    - **Exception.** These requirements regarding access and pathways do not apply to roofs with slopes of 2 units vertical in 12 units horizontal (17% slope) or less.
  - **Pathways to Ridge.** Not fewer than two pathways, on separate roof planes from lowest roof edge to ridge and not less than 36 inches wide, shall be provided on all buildings. Not fewer than one pathway shall be provided on the street of driveway side of the roof. For each roof plane with a photovoltaic array, a pathway not less than 36 inches wide shall be provided from the lowest roof edge to ridge on the same roof plane as the photovoltaic array, on an adjacent roof plane, or straddling the same and adjacent roof planes. [CRC R324.6.1]
    - **Location.** Pathways shall be over areas capable of supporting fire fighters accessing the roof, and so located as to minimize obstructions, such as vent pipes, conduit, or mechanical equipment. [CRC R324.6.1]
  - **Setback at Ridge.** For photovoltaic arrays occupying not more than 33% of the plan view total roof area, not less than an 18-inch clear setback is required on both sides of a horizontal ridge. For photovoltaic arrays occupying more than 33% of the plan view total roof area, not less than a 36-inch clear setback is required on both sides of a horizontal ridge. [CRC R324.6.2]
    - **Automatic Sprinkler System.** For buildings equipped with an automatic sprinkler system compliant with NDPA 13D or CRC R313, alternative setbacks in CRC R323.6.2.1 may apply. [CRC R324.6.2.1]
  - **Emergency Escape and Rescue Openings.** Panels and modules may not be placed on the portion of a roof that is below an emergency escape and rescue opening. A pathway not less than 36 inches wide shall be provided to the emergency escape and rescue opening. [CRC R324.6.3]

- ❑ **Overcurrent Protection.** PV system dc circuit and inverter output conductors and equipment shall be protected against overcurrent [CEC 690.9].

- ❑ **AFCI (DC).** PV system dc circuits operating at 80 volts dc or greater between any two conductors shall be protected by a listed PV arc-fault circuit interrupter or other system components listed to provide equivalent protection [CEC 690.11].

- ❑ **Rapid Shutdown.** PV system circuits installed on or in buildings shall include a rapid shutdown function to reduce shock hazard for firefighters [CEC 690.12].
  - **Initiation Device.** The initiation device(s) shall be located at a readily accessible location outside the building [CEC 690.12(C)].

- ❑ **Disconnecting Means.** Means shall be provided to disconnect the PV system from all wiring systems including power systems, energy storage systems, and utilization equipment and its associated premises wiring [CEC 690.13].
  - **Location.** The disconnecting means shall be installed at a readily accessible location [CEC 690.13(A)].

- ❑ **Equipment Grounding and Bonding.** Exposed non-current carrying metal parts of PV module frames, electrical equipment, and conductor enclosures of PV systems shall be connected to an equipment grounding conductor regardless of voltage [CEC 690.43].

5. ADDITIONAL REQUIREMENTS

- ❑ **Smoke/Carbon Monoxide Alarms and Spark Arrestor Inspection.** In all one- and two-family residences, installation and inspection of required smoke alarms, carbon monoxide alarms, and spark arresters must be completed prior to the final inspection. Refer to the *Smoke Alarm, Carbon Monoxide Alarm, and Spark Arrester Certificate* handout for detailed information.

6. INSPECTION PROCEDURES

- ❑ Typically, up to two inspections are required:
  - **Rough.** A rough inspection is required if any work is inside walls or ceilings prior to covering with finish materials.
  - **Final.** A final inspection is required after all work is complete.
    - **Additional Requirements.** Inspection of smoke alarms and carbon monoxide detectors may be performed during the final inspection, or a certificate stating compliance may be provided to the inspector (see *Additional Requirements* above).
- ❑ **Access.** The contractor or owner must provide roof access for all required inspections. Ladders must be OSHA approved, minimum Type I with a 250 lbs. rating, in good condition, and designed for the intended use.

7. QUESTIONS

If you have any questions regarding your project, please contact the Office of Building Safety at (408) 586-3240.