City of Glendale
Community Development Department
Building and Safety Division

PHOTOVOLTAIC PLAN GUIDELINES FOR SINGLE FAMILY & DUPLEX

TITLE SHEET

1. Provide a Table of Contents or sheet legend.
2. **Project Info**: Job address, Legal Information (APN), Owner, Number of Stories
3. **Building Info**: Construction type, Occupancy group, High fire zone (YES/NO), Fire Sprinklers (YES/NO).
4. **Project Scope**: Provide full description (i.e.: KW size, location of installation, etc.). Specify the overall size of the photovoltaic system in kilowatts.
5. **List applicable Codes:** 2019 CBC, 2019 CEBC, 2019 CFC, 2019 CPC, 2019 CMC, 2019 CEC, 2019 CA Energy Code, 2019 CGBC, and City of Glendale's 2020 Code Amendments.
6. **Provide the following Notes on the title sheet:**
    a. Approved smoke alarms are required to be installed per CRC R314, in each sleeping room, outside of each separate sleeping room, and at each story including habitable basement. Battery-operated alarms are acceptable for photovoltaic installations.
    b. Approved carbon monoxide alarms are required to be installed per CRC R315, outside of each separate sleeping room, and at each story including habitable basement. Battery operated devices are acceptable for photovoltaic installations.
    c. Applications for which no permit is issued within 365 days following the date of application shall automatically expire. Contact the Building and Safety plan check for request for extension prior to expiration.
    d. "Every permit issued shall become invalid unless work authorized is commenced within 180 days, a successful inspection is not obtained within 180 days, or if work is suspended or abandoned for a period of 180 days. Permits which have become invalid shall pay a renewal fee. Contact the Building and Safety inspection for request for extension prior to expiration.

SITE PLAN

1. Complete plot plan showing yard setbacks, easements, lot dimensions, all attached or detached structures, distances between buildings, size of building, driveway width dimension.
2. Photovoltaic systems may not be installed on unpermitted structures. Contact Building and Safety for records request in advance to verify. Go to City of Glendale Property Information Web page: https://csi.glendaleca.gov/csipropertyportal/ or contact Building & Safety at 818-548-3200.
3. Equipment installed within interior setback shall be screened from public view **(zoning ordinance).**
4. Equipment installed on building wall adjacent to driveway shall not encroach into required minimum driveway width of 9'- 0" **(zoning ordinance).**
5. Equipment installed in garage shall not encroach into required parking stall clearance **(zoning ordinance)**.
6. Obtain City Arborist approval for any protected trees on the lot or within 20' of the lot. If none, provide the following note on the site plan: "There are no Oak, Bay and/or Sycamore trees on this lot or within 20 feet of the lot". For questions, please contact City arborist technician (Katherine Williams) kwilliams@glendaleca.gov.

ROOF PLAN

1. Specify existing roofing material. Roof covering for new and reconstruction shall be a minimum Class 'B' roof assembly, Class "A" in areas of High Fire Hazard Zone.
2. Rooftop-mounted photovoltaic panel systems shall have the same fire classification as the required roof assembly per R324.4.2.
3. Coordinate all locations of roof vents on roof plans.
4. Provide module and equipment layout. Specify overall square footage area of roof and percentage of roof that will be covered by the PV array(s).
5. Identify roof pitch.
6. Locations of DC conductors. 2019 CRC, "R324.7.3 Locations of DC conductors. Conduit, wiring systems, and raceways for photovoltaic circuits shall be located as close as possible to the ridge or hip or valley and from the hip or valley as directly as possible to an outside wall to reduce trip hazards and maximize ventilation opportunities. Conduit runs between sub arrays and to DC combiner boxes shall be installed in a manner that minimizes the total amount of conduit on the roof by taking the shortest path from the array to the DC combiner box. The DC combiner boxes shall be located such that conduit runs are minimized in the pathways between arrays. DC wiring shall be installed in metallic conduit or raceways when located within enclosed spaces in a building. Conduit shall run along the bottom of load bearing members."
7. Demonstrate roof access and pathways per 2019 CRC section R324.6 and 2019 CFC section 1204. Specify 36" pathway below an emergency escape and rescue opening per R324.6.2.2. See Section R326.4 for alternate compliance requirements.

STRUCTURAL

1. Provide roof framing plan and cross section identifying rafter, size, spacing and spans. Specify intermediate supports, exterior walls, interior bearing partitions and load path to foundation.
2. Provide module, racking and anchor layout on the roof plan.
3. Specify anchor fastener horizontal spacing and attachment into rafter, and lag screw type, diameter, embedment depth (5/16" diameter with 2.5" embedment).
4. For arrays supported by **2x4 rafters**, horizontal rail anchor attachments shall be staggered and not exceed 48" on center, unless structural calculations are provided, and plans are stamped by a California-licensed civil or structural engineer. **Provide the following note on the plans**:
    a. "Maximum span is 9'- 9" for (1-3/4" x 3-3/4") 2x4 rafter spaced at 24" on center. Maximum span is 8'- 0" for (1-1/2" x 3-1/2") 2x4 rafter spaced at 24" on center. Maximum horizontal rail anchor attachment is 48" on center and attachments are to be staggered **OR** provide structural calculations and California-licensed civil or structural engineer to stamp and sign plans."
5. Identify roof sheathing and roof covering material.
6. Provide adequate structural details for mounting methods, hardware, attachment, supports, roof penetration, flashing and water proofing of solar energy systems. All roof penetrations shall be sealed using approved methods and products to prevent water leakage.
7. Racking and mounting hardware are required to be installed in accordance with the manufacturer's installation instructions. Provide applicable manufacturer span tables. Anchor attachment spacing must be equal to or less than specified values in span tables.
8. See **structural checklist** for elements that require approval and calculations from a California-licensed civil or structural engineer.
9. Structural engineering, from a California licensed civil or structural engineer, is required for roof systems that do not comply with conventional requirements per 2019 CBC 2308.7, 2019 CRC Chapter 8 and California Solar Permitting Guidebook PV Toolkit Document 5. Certain non-conventional mounting elements may need structural engineering design to justify use.

10. **The following note and signature by the designer or contractor are required on the plans when structural calculations and stamped approved are NOT provided:**
    a. "Contractor is responsible to verify existing roof structure complies with conventional framing requirements as per 2019 CBC 2308.7, 2019 CRC Chapter 8 and California Solar Permitting Guidebook PV Toolkit 5. Contractor understands that a structural design is required by a California-licensed civil or structural engineer when framing does not meet conventional requirements, and/or unusual conditions are observed such as sagging, deterioration, carpenter trusses, roof overlays, etc. Contractor's name and signature below confirms that a thorough framing audit has been completed, and existing roof structure is in full compliance with the above code criteria, and no unusual conditions exist which would require engineering." **Contractor to print name, sign and date below note.**
11. Design and approval, from a California licensed civil or structural engineer, is required for any multi-family or commercial building.
12. A comprehensive structural analysis is required for modules proposed to be installed on a patio cover, carport, or other similar structure with open sides. Reinforcement of structure will likely be required to accommodate additional loading on the roof.

ELECTRICAL

1. Provide a comprehensive single line diagram showing PV module string/array layout(s), wiring methods and conduit, junction boxes, DC to DC converter(s), inverter(s), rapid shutdown devices, load centers, combiners, disconnects, meters, over-current devices, main service, equipment grounding and grounding electrode system. Specify all equipment ratings on the plans.
2. Provide circuit, conductor and overcurrent protection sizing calculations, including conductor ampacity adjustment and correction factors. Provide electrical system calculations to show maximum system current.
3. Depict all equipment on the **site plan** and **roof plan**. The main service, PV/ESS meter(s) and AC disconnect(s) shall be installed per the Glendale Water & Power Spot or DERS sheet. Identify locations of all AC & DC disconnecting means. A PV system DC disconnect is required between the modules and inverter or integral with the inverter.
4. Provide a disconnecting means at each detached structure. (690.13).
5. Specify required GWP wiring diagram on the single line (top of meter to top of AC disconnect).
6. Inverters shall be listed to UL 1741. Provide all inverter data on the plans (input and output values, model number(s), listing, etc.).
7. Provide module data including STC Max Power, VOC, ISC, Max fuse rating, etc.
8. Demonstrate module compatibility with DC-to-DC converter(s) and/or inverter(s) (string length, ISC, VOC, Max Power, etc.).
9. Provide calculation to demonstrate maximum system voltage is 600V or less for one and two-family dwellings, including ambient temperature correction factor per Table 690.7(A).
10. Specify all junction box transitions on roof plan and single line diagram. PV-wire/USE-2 is only approved to interconnect modules within a PV array per CEC 690.31(C)(1). An approved conductor in conduit is required between the rooftop junction box and inverter.
11. Residential service load calculations are required for downsizing of the main service disconnect. Calculations shall include information and signature of the contractor or electrical engineer who provides the calculations. Provide a label stating, **"MAX ALLOWABLE MAIN DISCONNECT IS XXX AMPS."**
12. DC circuits located inside a building shall be contained in a metal raceway, type MC cable or metal enclosure per CEC 690.31(G).
13. Conductors 8 AWG and larger installed in raceways are to be stranded. (2019 CEC 310.106(C))
14. Listed combiners shall be provided for DC source circuits combined prior to the inverter as per CEC 690.4(B).

15. Identify rapid shut down and initiation devices. Demonstrate compliance with 2019 CEC 690.12. Show location of the rapid shutdown initiation device(s) on **single line, site/roof plan**.
16. Provide calculations and/or engineering for protection of panel bussing to demonstrate compliance with CEC 705.12(B)(2)(3). This applies to all bi-directional panelboards in the system.
17. The aggregate of main disconnects in a meter bank panel shall not exceed the panelboard rating. (CEC 408.36, 240.4, 230.90)
18. Point of connection is at a dedicated circuit breaker or fused disconnect. (CEC 705.12(B)(1))
19. Specify all required labels and site directory with corresponding code sections. (CEC 690, 705.10, 705.12, CFC 1204)
20. Provide circuit, conductor and overcurrent protection sizing calculations, including conductor ampacity adjustment and correction factors. Provide electrical system calculations to show maximum system current. (CEC 240.4, 310.15, 690.8, 690.9)
21. Specify full sized neutral conductor or provide manufacturer specifications, listing and current CEC code article(s) to demonstrate the neutral is not required, or can be downsized. Manufacturer documentation must cite specific 2017 NEC/2019 CEC code article(s).
22. Depict required working spaces per GWP requirements and 2019 CEC 110.26. Working space depth shall be 42" when condition 2 applies of Table 110.26(A)(1).
23. Identification shall be included in a circuit directory. Provide circuit identification on meters, panels and disconnects. Every circuit shall be legibly identified as to its unique, clear, evident and specific purpose or use. The identification shall include sufficient detail to allow each disconnect to be distinguished from all others. Each piece of equipment shall be described in a manner that is uniquely identified for that piece of equipment. (CEC 408.4)
24. Uniquely identify each circuit on the **roof plan** and **single line**. Show which modules correspond to each string.
25. **Notes Required on the site/roof plan or equipment elevation:**
    a. "Equipment working spaces shall be provided per GWP requirements and 2019 CEC 110.26. Working space depth shall be 42" when condition 2 applies of Table 110.26(A)(1)."
    b. "Service panel, meters and PV disconnects shall be installed per GWP requirements."
    c. "The center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, shall not exceed 6'- 7" above the floor or working platform (CEC 240.24(A)."

ADDITIONAL INFORMATION REQUIRED

1. Provide all manufacturer's equipment specification sheets, installation instructions and listings on the plans. Include all approved NRTL listings that are compliant with current UL requirements.
2. Module UL 1703 fire type (1-15) and fire classification (racking and module assembly) must be shown on module and racking specifications and listings. Class A assembly required for projects located in a high fire zone, and minimum Class B for non-high fire zone (R902.1+City of Glendale Amendments).
3. Provide racking manufacturer NRTL listing to demonstrate proposed module has been testing with racking system for grounding, bonding, mounting in accordance with UL 2703.
4. Certificates of compliance must be from a nationally accredited testing laboratory.
5. Mounting hardware and racking must be compatible. Non compatible components will not be accepted or approved.
6. Provide manufacturer documentation and engineering report for XXXX mounting hardware supporting XXXX rails to demonstrate product compatibility and code compliance for structural elements. Engineering report must be stamped and signed by a California-licensed civil or structural engineer.
7. Designer's or Contractor's (B, C-10, C-36, or C-45) contact information is required on title sheet and wet signature required on all sheets.
8. When required, structural and/or electrical plans and calculations shall be stamped, signed and dated by an engineer registered in the State of California.