



108 E. Proctor Street
Carson City, NV 89701
(775) 887-2310
Hearing Impaired: 711

bldgdiv@carsoncity.gov
www.carsoncity.gov/building

SOLAR PHOTO VOLTAIC SYSTEMS RESIDENTIAL PLAN SUBMITTAL REQUIREMENTS

How to Apply for a Building Permit:

- Visit our online portal at www.carsoncity.gov/building
- Click on the link called "Online Portal – Submit Your Building Permit Application Onsite"
- Click on the box called "Login or Register" to either create an online account or log into your account to start the permit process.

General Information:

- The following is an outline for the requirements for a Solar Photo Voltaic System Plan submittal. This list is for reference purposes only and includes the most common items needed to assist in the plan review process. Additional project specific items may be requested to complete the plan review process.

Plan Submittal:

- Upload one complete set of digital plans with supporting documents in PDF format, ensure pages are accurately named/labeled, and that the pages face the same way for legibility.
- Documents submitted for review are required to be stamped or sealed, pursuant to the legal requirements for that specific design professional.
- Staff recommends that any time a project exceeds your skill level, to seek the advice of a Nevada Licensed Design Professional (Architect, Residential Designer, Contractor, or Engineer).

General

- Cover Sheet to include the following information:
 - Codes used in design
 - Address of proposed system
 - Contractor information
 - Index of Plan Sheets
 - Type of System Ground or Roof Mount
 - Contractor must be on site at Final Inspection to remove all Dead Fronts for Conductor verification.
 - Attic must be accessible to the Inspector to verify any PV Conduit.
 - Clearly show the location of all buildings, septic system components, wells, water lines, other existing utilities, a North arrow, and a vicinity map.
- Provide a Sheet with illustrations of all Warning Labels required by NEC 690.
 - Each Warning Label must have an alphabetical Key.
 - The Keys must be placed on the Line Diagram in the appropriate locations.
 - An equipment diagram on the Warning Label sheet with Labeled Keys is also acceptable.
 - Line Diagram and Equipment Diagram must match exactly.

- All PV Submittals must include:
 - Conductor Ampacity calculations
 - Exterior Conductors must be rated for Wet Locations
 - Listing information of all equipment
 - Rapid Shutdown Type (per NEC 690.56)
- Contract price of the installation.
- Electrical generation capacity: Watts, Volts, Amps.
- Total square footage of system panels.
- Number of DC to AC inverters.
- Number of electrical junction or panel boxes installed 'After' the inverter(s).
- Number of electrical combiner boxes installed between the solar panels and the inverter.
- Engineered diagrams used for construction require the engineer's wet signed/stamp.

Main Service Panel (existing or new)

- Provide load rating for panel, busbar rating, and main service breaker rating.
- Provide back-fed circuit breaker amperage rating Amps
- Provide AIC (arc interrupt capacity) rating for service panel Amps. (commercial installation requirement)
- Provide available arc fault current supplied by the power company amps (commercial installation requirement)
- Provide calculations showing the sum of ampere ratings of over-current devices in circuits supplying power to the main busbar does not exceed (120% for residential) rating of service panel busbar (2011 NEC 690.64 (B) (2)).

Solar Panels

- Provide specification sheets for the solar photo voltaic panels.
- Provide details and clearly show on your plans the grounding wire connection which connects all the panels and the rack assembly.

Rack Assembly

- Provide specifications and details for the support rack frame. Indicate on your plans how rack is grounded.

DC Combiner Boxes

- Provide the quantities, listings, and ratings for all combiner boxes.
- Number of Series strings and the output operating voltage.
- Maximum system voltage.
- Number of parallel source circuits and the output operating current Amps.

Provide an Electrical One-line Diagram

- Show all major field-installed electrical components.
- Provide wire insulation identification for each circuit segment (insulation type & conductor size).
- Show each circuit segments maximum ampacity value.
- Provide conductor size for each circuit segment.
- Provide conduit type and sizing per 2011 NEC 690.31 (metallic raceways).
- Provide conduit lengths. (metallic conduits in attics with lengths greater than 30 feet require expansion design) {2011 NEC 300.7, 352.44}.
- Provide equipment grounding conductor size. (Continuous ground mount solar minimum # 6 copper).
- Provide system grounding conductor sizing.
- Exposed wires must be sunlight resistant rated.
- Show PV source current 125% amperage design value increase (for irradiance).
- Show your conductor de-rating calculations (for temperature).
- Provide wire sizing calculations for temperature de-rating.
- Provide wire sizing calculations for temperature de-rating, for roof top run electrical conduits and attic conduits.
- Show your conductor sizing calculations for voltage drop. (wire length-resistance).
- Show solar PV source current conductor sizing calculated at 125% amperage design value increase (for continuous duty). These are the conductors traveling from the combiner box to the first inverter.

Grid Tied Systems:

You must contact NV Energy to inform them of the power generation system, to comply with their safety notification requirements. Please indicate your contact person and contact date on the cover page.

Special Considerations for Ground Mount and Roof Mounted Systems

Ground Mounted Applications	Roof Mounted Applications
<p>The following information needs to be present on the site plan:</p> <ul style="list-style-type: none"> • Ground Mount Systems <ul style="list-style-type: none"> ○ Site plan. ○ Panel locations. ○ Equipment locations. ○ Line diagram w/all conductors & conduits noted ○ Warning labels. ○ Manufacturer's specs for all equipment. ○ Guarding of PV Outputs (per NEC 690.31). ○ Fence or guarded to eliminate inadvertent contact • Clearly show placement of solar array with dimensions to structures, property lines, propane tanks, electrical pedestals, etc. • If a septic system is on the property include all Health Department required information on the site plan sheet. • Combiner box(s). • DC disconnect location. • Transfer switch location. {2011 NEC 705-40}. • AC disconnect location. • REC meter location. • Main service meter location. • Provide details for barrier/fencing or conduit/raceway enclosures that make solar panel wires inaccessible to unqualified individuals. Wires are considered accessible when less than eight feet from grade. <p>Solar Panel Array Footing Plan</p> <ul style="list-style-type: none"> • Is the footing a grid assembly of embedded posts design? • Is the footing a slab? • Is the footing grade beam strips? • Is the footing a single caisson/pier design? <p>Elevation View</p> <ul style="list-style-type: none"> • Combiner boxes. • Inverters. • AC disconnect. • REC meter panel <ul style="list-style-type: none"> ○ Main service disconnect locations. This may require more than one elevation view. • Provide dimensions to grade for panels and working space clearances in front of panels. • Indicate conduit size, type and location. • Provide a dimensioned roof elevation view showing solar panel height above grade. 	<p>The following information needs to be present on the site plan:</p> <p>Roof loading (weight of panels):</p> <ul style="list-style-type: none"> • A Licensed Nevada Engineer must evaluate the existing Roof Framing and provide a letter indicating any required roof Buildup or the existing Roof is adequate to support the PV Panels. • Provide structural calculations if existing roof material & sheathing exceeds eight (8) pounds per sq. foot. • Asphalt shingled roofs that have only one layer of shingles in place may utilize a manufactures rack stand-off spacing design provided the vertical placement of standoff spacing does not exceed 48 inches on center (parallel to eve). • Metal structures and tile roofs need their structural frames reviewed for the added loading from panel installation. <p>Provide Snow load calculations when applicable.</p> <p>Provide Roof plan views (as viewed from above) showing:</p> <ul style="list-style-type: none"> • Roof Mount Plan Sheets <ul style="list-style-type: none"> ○ Site plan. ○ Panel locations. ○ Equipment locations. ○ Sq. footage of panels & total Roof sq. footage. ○ Racking sections. ○ Line diagram with all conductor types and sizes. ○ Conduit type and sizes. ○ Warning labels (per 2017 NEC Article 690 and 705.10). ○ Manufactures specifications for all equipment including Racking System. ○ Spacing of rack support standoffs with horizontal and vertical spacing dimensions. • Details showing lag bolt sizes and placement. Clearly show standoff connection details. If using a manufactures racking system, provide on the roof plan, the page numbers for the details that correspond to the connection. • Provide details for solar panel to support rack rails connection. <p>Wind Uplift Connection</p> <ul style="list-style-type: none"> • Documentation for roof rack standoff bracket connections. • Lag screw size, spacing, and depth of lag screw penetration. • Your design must be based on a minimum 130 mph (V-ult) exposure 'C' meeting component and cladding design wind uplift requirements. {ASCE 7-10}.