PHOTOVOLTAIC (SOLAR) PANELS AND MODULES

The purpose of this checklist is to assist you in the submittal and permit process for your project. This checklist is intended as a basic plan submittal guideline under the 2021 International Building Code. It is not intended to cover all circumstances. Depending on the scope and complexity of your project, additional and/or more detailed plans may be required.

In the case of residential installations, this permitting process is not intended to take the place of any Homeowner Association (HOA) or Civic Association requirements; therefore, it is important for you to check with your HOA or CA for any additional requirements they may have.

SEPARATE FIRE DEPARTMENT SUBMITTAL AND PERMIT IS REQUIRED FOR COMMERCIAL SOLAR INSTALLATIONS

HOW TO USE THIS GUIDE

ALL WORK SHALL COMPLY WITH THE 2020 NATIONAL ELECTRIC CODE, 2021 INTERNATIONAL RESIDENTIAL CODE, AND 2018 INTERNATIONAL ENERGY CODE.

ONLINE BUILDING PERMIT APPLICATION MUST BE COMPLETED TO INCLUDE THE FOLLOWING:

- ☐ Contractor's name, phone number and address. **A LICENSED ELECTRICAL CONTRACTOR MUST BE PROVIDED AT TIME OF APPLICATION.**
- ☐ Owner's name, address and phone number.
- ☐ Specify a contact person: name, phone number, e-mail and fax number.
- ☐ Project address.
- ☐ The estimated value of the project (include all materials and labor).

To begin the online submittal process, click HERE.

REQUIRED SUBMITTAL INFORMATION

GENERAL

Must upload CORE/IREA application.

STRUCTURAL ENGINEERING LETTER

An engineering letter, stamped and sealed by a licensed structural engineer, shall be provided to support the installation of solar panels on both commercial and residential structures.

1. Required design criteria is a wind speed of 115 mph (Exposure Category C) and a roof snow load of 30 psf.
2. Engineering letter must demonstrate adequacy of the existing structure to support lateral loads as well as gravity loads when solar panels and modules are installed.

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Engineered drawings (no electrical engineering stamp is required – only structural) shall be submitted which clearly depict the following criteria:

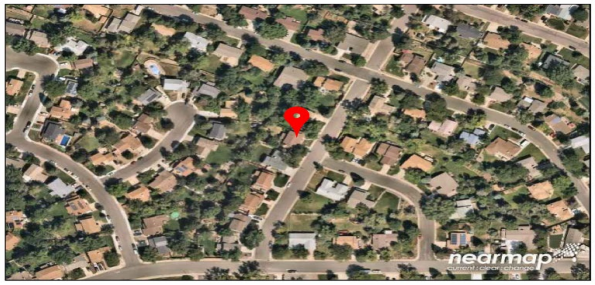
1. An overview, similar to what is shown below, shall be provided for each project as well as a scope of work narrative. Details shall include size, type and spacing of roof framing members, type and thickness of roof sheathing, type and number of layers of roofing materials, indicate whether array is flush or tilt mounted, and specify the method of locating framing members.

MODULE(S)			
MODULE TYPE	NUMBER OF MODS	MODULE SIZE: WATTS	SYSTEM SIZE: WATTS
	23	350	8050 WATTS
INVERTER(S)			
MANUFACTURER	MODEL	NUMBER OF INVERTERS	SYSTEM OUTPUT
		1	31.67 AMPS
JOB DETAILS			
ROOF MATERIAL	STANDARD ASPHALT SHINGLE ROOF		SQ FT OF ARRAY
ARRAY AZIMUTH(S)	295°,115°		417.2
RACKING TYPE	UL LISTED SNAP-N-RACK RACKING SYSTEM	ANCHOR SPACING	MAXIMUM 48" ANCHORED CENTERS
INSTALLATION SURFACE ANGLE		22.62°	

2. An aerial and vicinity map which depicts the commercial or residential structure involved in the project (an example is shown below):

AERIAL

VICINITY



3. The contractor's license number and type and show all applicable codes for the City of Centennial. For reference, the City of Centennial has adopted the 2015 International Codes and the 2020 NEC.

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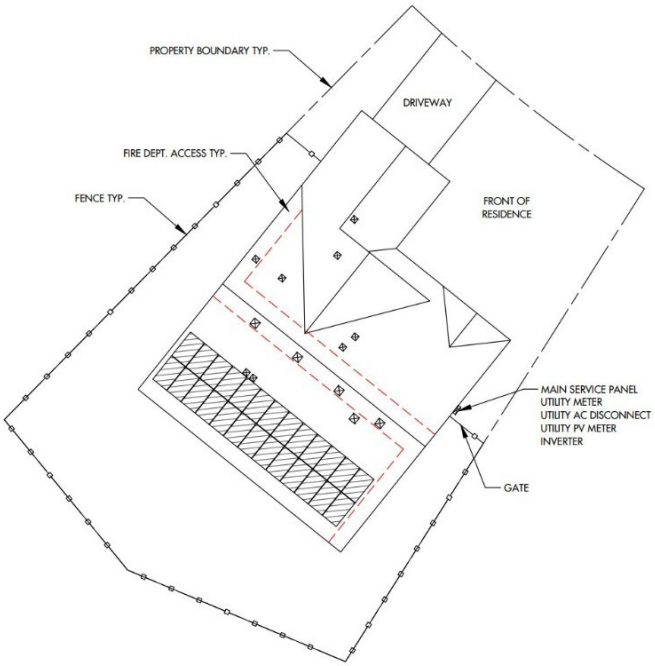
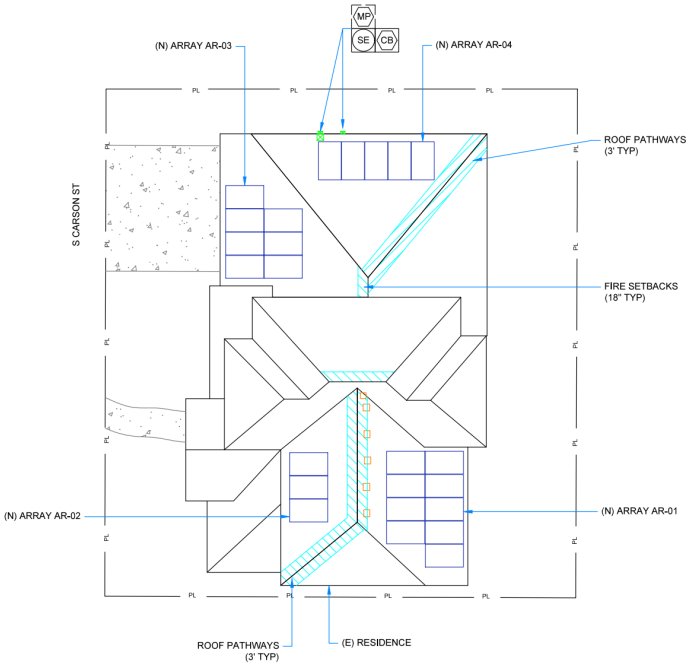
4. A site plan which clearly shows the structure as well as the layout of the photovoltaic array (some examples are shown below). In addition to the array layout, show the following:
    a. Locations of combiner/junction boxes, disconnects, inverters, meter and service panel/tie-in locations.
    b. general footprint of structure and proximity to property lines.
    c. Roof plan with location and physical size of all photovoltaic panels, b-vents, attic vents, and plumbing vents.
    d. 2' setback from eaves and 3' setback from the ridgeline.



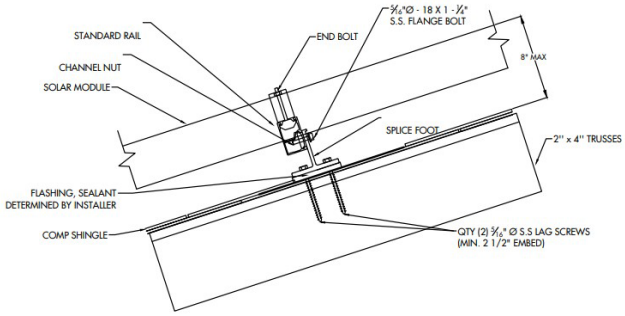


5. Mounting detail from manufacturer (an example is shown below). System details shall include manufacturer's specification sheets with uplift capacity for wind loads (115 mph), snow loads (30 psf), and attachment details (type, size, and spacing of fasteners). **<u>FOR CUSTOM RACKING, A SITE-SPECIFIC ENGINEERED DESIGN IS REQUIRED</u>**.

<u>MODULE & RACKING INFORMATION</u>
MODULE:
MODULE WEIGHT: 43.00 LBS
MODULE DIMENSIONS: 69.4"x 40.8" x 1.5"
RACKING/RAIL:

<u>ROOF & FRAMING INFORMATION</u>
MATERIAL: COMP SHINGLE
RAFTER/TRUSS SIZE: 2" x 4"
RAFTER/TRUSS SPACING: 2'

<u>ARRAY 01: 26 MODULES</u>
<u>UPLIFT</u> = <u>15337.40 LBS.</u>
<u>POINT LOAD</u> = <u>24.18 LBS. PER MOUNTING POINT</u>
<u>PULLOUT STRENGTH</u> = <u>26250.00 LBS.</u>
<u>DISTRIBUTED LOAD</u> = 2.36 PSF
<u>MODULE & RACKING WEIGHT</u> = 1209.00 LBS



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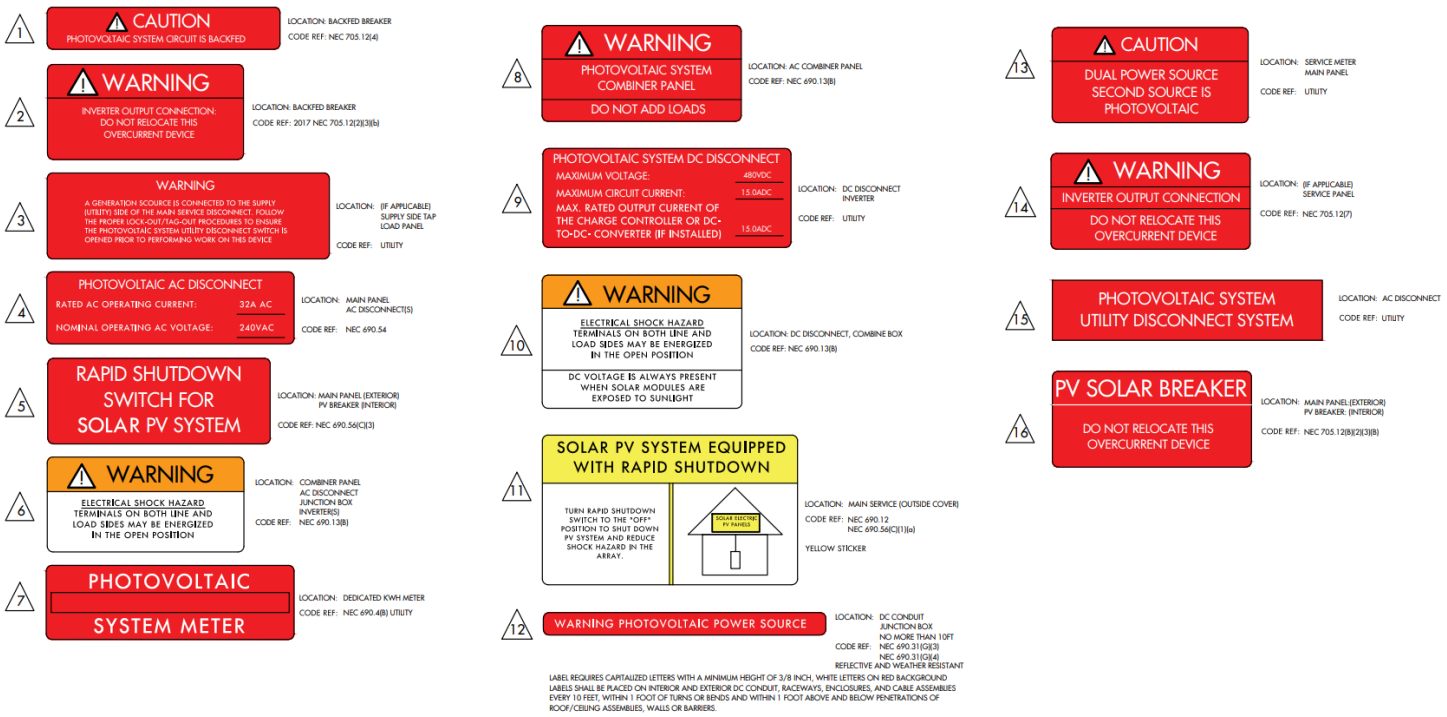
6. Manufacturer specification sheets for PV panels and PV inverter.

7. Complete electrical 3-line diagram. Electrical specifications shall indicate:
   a. System size (DC - STC "nameplate" rating).
   b. Module manufacturer and model number.
   c. Module specs (@ STC) including VOC, VMP, ISC, and IMP.
   d. Array specs (@ STC) show max VOE (w/ temp corrections), VMP, ISC, and IMP.
   e. Number of strings.
   f. String fuse rating (if applicable).
   g. Current carrying conductors - show size and type (i.e. USE-2).
   h. Grounding (equipment grounding conductor) - indicate size and type.
   i. Overcurrent protection/disconnects with voltage rating, current rating, and indicate if "integrated" in inverter.
   j. Inverter - note manufacturer, model number, rated AC output (wattage), AC voltage, and max AC current.
   k. Grid interconnection location shall show AC load panel with back feed breaker rating (voltage and amperage), panel rating (bus bar rating and main breaker rating), and line/ load side tap. Line-side taps must be a minimum of 6 AWG CU or 4 AWG AL. Only three conductors for single phase. (L1, L2, N (grounded conductor)).
   l. Effective January 1, 2023, pressure connectors and devices for splices and taps installed on service conductors shall be marked **"suitable for use on the line side of the service equipment"** or equivalent.

8. Required signage/labels (examples are shown below – not all-inclusive):



Additional information or engineering may be required for unique situations.

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INSTALLATION REQUIREMENTS

1. **All AC Electrical work must be completed by a current Colorado licensed electrician.**
2. All DC electrical work must be completed by a current NABCEP Certified Contractor (unless holding a Colorado Electrical License).
3. Approved, stamped plans including roof structural engineering report must be on site at all times that work is being done.
4. Neutral to Grounding Electrode System connection shall not be made again at the AC Disconnect. Existing Grounding Electrode System to Neutral Bond shall be verified and terminations checked.
5. All Photovoltaic Circuits must be identified regardless of type of source.
   AC (PHOTOVOLTAIC POWER SOURCE)
   DC (PHOTOVOLTAIC POWER SOURCE or SOLAR PV DC CIRCUIT)
6. Ferrules/Ferrule Sleeves are to be used when necessary for all stranded conductors where proper terminations are not possible.

7. Meter load side tap connectors are not allowed for use as reducers for conductors smaller than #6AWG for meter sockets.

INSPECTION REQUIREMENTS

1. **CORE/IREA Electric Cooperative Projects**
   a. **Final Inspection Prerequisite** - approved CORE Electric Cooperative Interconnection Application must be uploaded prior to Final Inspection requests.

2. One final electrical and final building inspection is required once all work is completed. **No rough inspections**.
   a. A Colorado licensed electrician must be on site for the inspection.
   b. Ladders must be installed and properly secured for the inspection if necessary.
   c. Attic access is required for electrical system and structural modification inspections if applicable.