Development Services Department
Building Division
311 Vernon Street
Roseville, California 95678-2649
(916) 774-5332 • Fax (916) 774-5394

Non-Residential Photovoltaic (PV) Packet

Contents of Packet:

- Roseville Electric Utility Business Solar (PV) Projects
- Non-Residential Photovoltaic Requirements
- Sample One-Line Diagram for PV System
- Sample Site Diagram
- CEC Table 310.15(B)(16) (included for reference)

See https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8888782 for Solar Energy Program Application and Requirements. Permits for PV projects will not be approved until the Solar Energy Program requirements are met.

See RE Construction Standards sections 7.1 and 7.4 for safety disconnect, tie in, metering, phone line and signage requirements.
https://roseville.ca.us/UserFiles/Servers/Server_7964838/File/Government/Departments/Roseville%20Electric%20Utility/Business/Environmental/Solar/Specifforcommercialconstruction.pdf

If you have questions regarding the PV system building permit please call the Building Division at (916) 774-5332.

If you have questions regarding the Roseville Electric Solar Energy Program please contact Roseville Electric Utility at (916) 774-5600.

Roseville Electric Utility
Business Solar (PV) Projects

All PV Project Applicants:

The Roseville Municipal Code and Roseville Electric Utility require all PV system installations to comply with the requirements of:

- **REQUIRED APPLICATIONS**
  - City of Roseville Permit – **SUBMITTAL REQUIRED**
  - Roseville Electric Solar Energy Program – **APPLICATION REQUIRED**
    - Visit https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8888782 for complete details
- Meter upgrade charges will apply
- Systems may offset no more than 100% of the customer's historical annual load
- Submittal of both applications at same time is recommended, otherwise project approvals will be delayed
- PV approvals are not available for expedited plan check process

New Buildings with PV

In addition, any new construction project that includes a PV system must provide a deferred permit submittal for the PV portion of the project.

Systems may offset no more than the T24 reports show for energy use; and must be at least 15% more efficient than the baseline energy allowance.

Contact Roseville Electric Utility to discuss customer electric load and additional compliance requirements.

For complete details on the Business Solar Energy Program please visit: https://roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8888782 or call 916-79-POWER

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Non-Residential Photovoltaic Requirements

Based on the 2016 California Electrical Code (CEC) Article 690, Roseville Electric Utility, and Roseville Fire Departments

Non-residential PV system shall be installed in accordance with the current adopted edition of the CEC Article 690 and any other applicable articles or codes adopted by this jurisdiction.

☐ **Simple plot plan showing:**

_____Lot lines
_____Structure locations
_____Main service panel location
_____PV module array configuration shown on a roof layout (or lot if ground mounted system)
_____% of coverage of roof area (If more than 50% a review by the fire department is required)
_____Distance from ridge to array(s) - (minimum of 3' required by Fire)
_____Distance from valley/ hip to array(s) - (minimum of 1.5' by Fire)
_____PV equipment locations
_____Plan & Elevation View Diagrams

☐ **Roof Information (for roof mounted systems):**

_____Type of roof structure and slope. If rafters, provide size and spacing of existing roof framing members
_____Existing roofing material

☐ **PV Equipment Manufacturer's Specifications:** Provide cut sheets on all components including but not limited to those shown below; including make, model, listing, size, weight, etc. Highlight project specific information on the cut sheets

_____PV modules
_____Inverter
_____Mounting System (if using substitution parts to any listed/certified system, additional engineering shall be required addressing the withdrawal and lateral capacities)
_____Disconnects
_____Combiner Box (if used)

☐ **Inverter:**

_____Model number
_____Integrated disconnect - Per *CEC 690.17
_____Roseville Electric requires a visible/lockable A/C disconnect at main service

☐ **Mounting System for Panel Installation:** *Highlight project specific information on the cut sheets*

_____Indicate the style, diameter, length of embedment of bolts into framing members and location of attachments
_____Indicate number of bolts per panel
_____Provide mounting details and certified engineering for listed mounting installation
_____Complete "**Solar Panel Dead Weight Loading Calculation**" form
_____If ground mounted, provide details for the foundation

☐ **Photovoltaic Modules:**

_____Open-circuit voltage (Voc) from listed cut sheet
_____Maximum system voltage from listed cut sheet
_____Short-circuit current (Isc) from listed cut sheet
_____Maximum fuse rating from listed cut sheet
_____Maximum power- panel wattage from listed cut sheet

☐ **Electrical Schematic:**

_____System inter-tie with utility company or stand alone
_____Indicate the system KW rating
_____Indicate if the system has battery backup
_____PBI Meter & Phone Line on systems >10kw
_____Single line drawing of electrical installation which includes:
- _____Array - detailed
- _____PV power source short circuit rating
- _____Conductor size and type
- _____Conductor locations and runs
- _____Equipment bonding points and sizes – Per *CEC 250.122
- _____Inverter location, display provided if micro-inverters are installed
- _____AC & DC disconnect locations – Per *CEC 690.14 (5) & Roseville Electric
- _____Batteries; number, size and locations (if applicable)
- _____Point of connect to existing electrical service panel
- _____Size and number of electrical service meters – Per *CEC 690.64(B)(2) exception
- _____Location of required signage (Per Roseville Electric specifications, Section 7.4)

☐ **Proper Signage and Labeling:** Signage required per Roseville Electric Utility (see Section 7.4)

☐ Indicate system type below and show location of each required sign on one line diagram (see electrical):

- ☐ **SINGLE PV ARRAY SYSTEM**
- ☐ **PV ARRAY SYSTEM W/ BATTERY BACKUP**
- ☐ **MULTIPLE PV ARRAY SYSTEMS**

☐ **Fees and Plan Review Information:** Verify current Roseville Electric Utility fees

_____Permit & Plan Check Fees to be based on project valuation
_____Roseville Electric meter upgrade charge

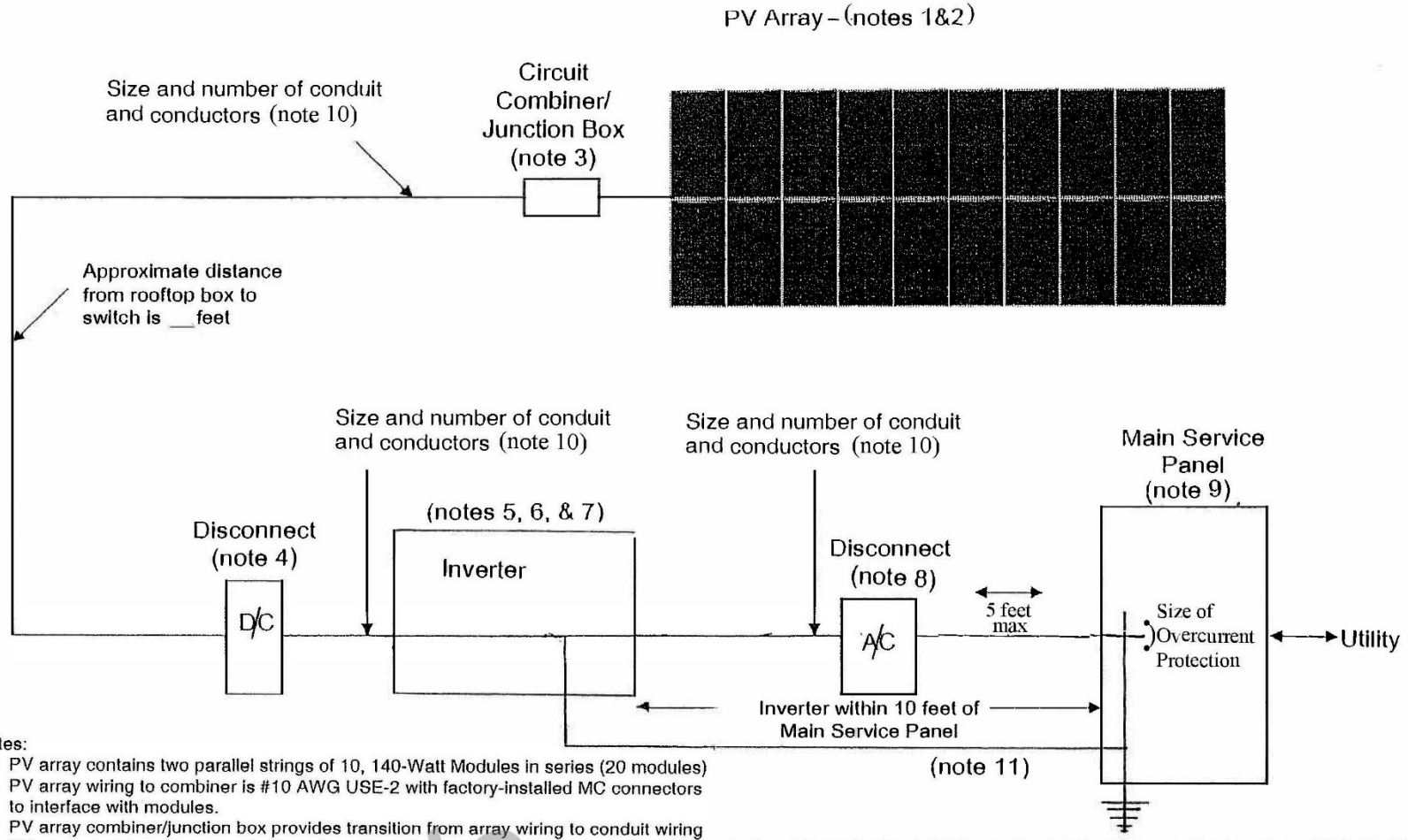
***CEC 690.17 - Switch or Circuit Breaker.** The disconnecting means for ungrounded conductors shall consist of a manually operable switch (es) or circuit breaker(s) complying with all of the following requirements:

(1) Located where readily accessible
(2) Externally operable without exposing the operator to contact with live parts
(3) Plainly indicating whether in the open or closed position
(4) Having an interrupting rating sufficient for the nominal circuit voltage and the current that is available at the line terminals of the equipment.

***CEC 250.122 – Size of Equipment Grounding Conductors**. Copper, aluminum, or copper-clad aluminum equipment grounding conductors of the wire type shall not be smaller than shown in Table 250.122 but shall not be required to be larger than the circuit conductors supplying the equipment.

***CEC 690.46(C) – Grounding for AC/DC Systems.**

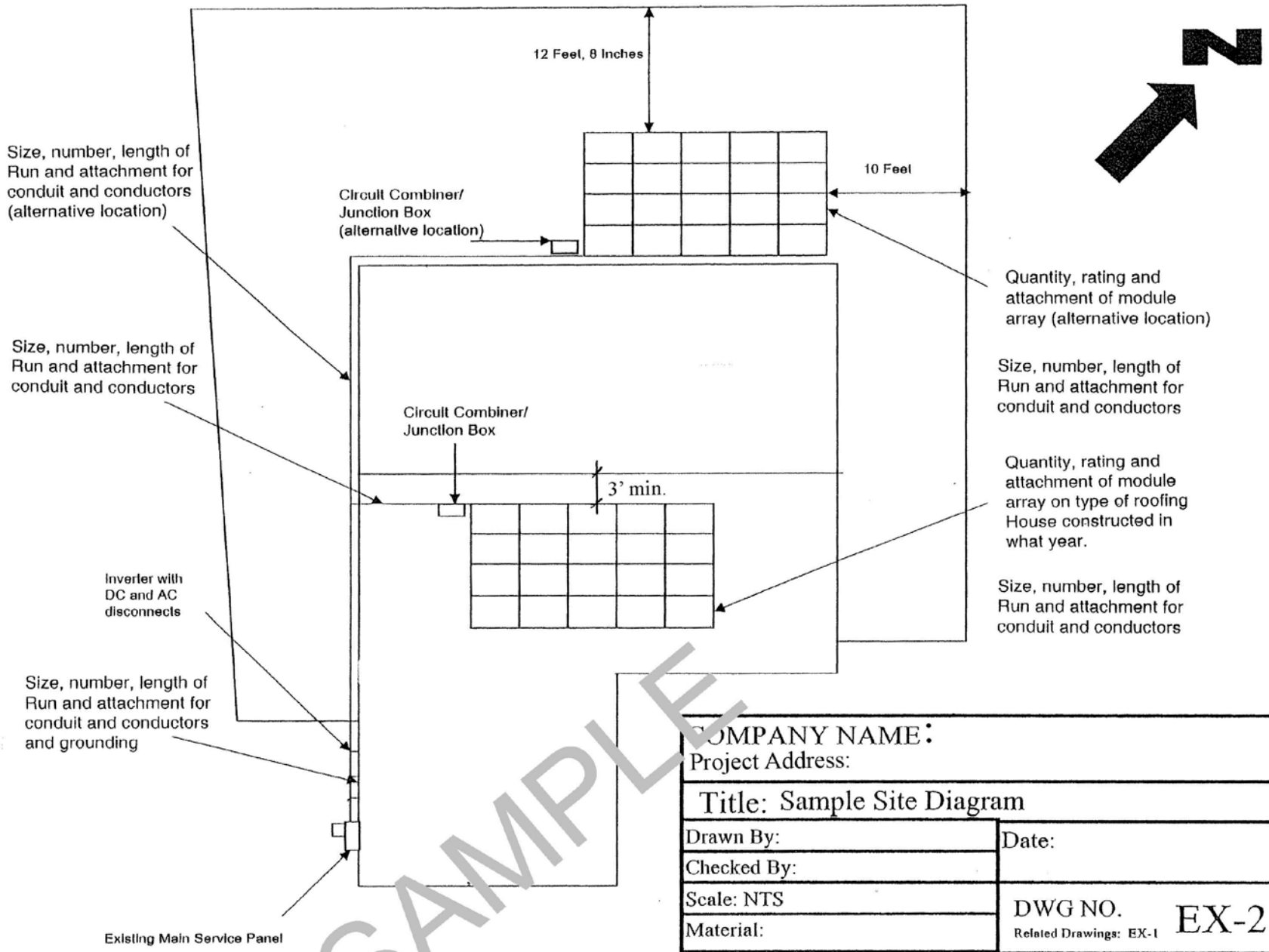
***CEC 690.14 (5) – Grouping.** The photovoltaic system disconnecting means shall be grouped with other disconnecting means for the system to comply with 690.14(C)(4). A Photovoltaic disconnecting means shall not be required at the photovoltaic module or array location.**CEC 690.64(B)(2) exception – Load Side**. A photovoltaic power source shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the premises, provided that (exception) the sum of the ampere ratings of the overcurrent devices shall not exceed 120% of the rating of the busbar or conductor.



Notes:

1. PV array contains two parallel strings of 10, 140-Watt Modules in series (20 modules)
2. PV array wiring to combiner is #10 AWG USE-2 with factory-installed MC connectors to interface with modules.
3. PV array combiner/junction box provides transition from array wiring to conduit wiring
4. PV power source disconnect (unfused) rated at 30-amps, 600 Vdc, NEMA 3R rainproof.
5. Ground Fault Protection provided in Inverter.
6. Inverter is SB2500UL model rated at 2.5 kW AC output and is rated to provide 10.4 amps at 240-Volts at 40 C.
7. Inverter is Listed to UL-1741 "Utility-Interactive"
8. Inverter output disconnect rated at 30-amps, 240Vac, NEMA 3R (Req. by Roseville Electric)
9. 100-Amp Main Service Panel with 15-Amp Two-Pole circuit breaker for point of connection (not to exceed 120% of busbar rating – CEC 690.64 (B) (2) exp)
10. Equipment grounding conductors on AC and DC side sized according to CEC 250.122.
11. Negative pole of PV array referenced to ground at the Inverter.

COMPANY NAME: Project Address:	
Title: Sample One-Line Diagram for PV System	
Drawn By:	Date:
Checked By:	
Scale: NTS	DWG NO. EX-1
Material:	Related Dwgs: EX-2



COMPANY NAME: Project Address:	
Title: Sample Site Diagram	
Drawn By:	Date:
Checked By:	
Scale: NTS	DWG NO. EX-2
Material:	Related Drawings: EX-1

Table 310.15(B)(16) (formerly Table 310.16) Allowable Ampacities of Insulated Conductors Rated Up to and Including 2000 Volts, 60°C Through 90°C (140°F Through 194°F), Not More Than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)*

Size AWG or kcmil	Temperature Rating of Conductor [See Table 310.104(A).]						Size AWG or kcmil
	60°C (140°F)	75°C (167°F)	90°C (194°F)	60°C (140°F)	75°C (167°F)	90°C (194°F)	
	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, USE, ZW	Types TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, USE	Types TBS, SA, SIS, THHN, THHW, THW-2, THWN-2, RHH, RHW-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	
	COPPER			ALUMINUM OR COPPER-CLAD ALUMINUM			
18**	—	—	14	—	—	—	—
16**	—	—	18	—	—	—	—
14**	15	20	25	—	—	—	—
12**	20	25	30	15	20	25	12**
10**	30	35	40	25	30	35	10**
8	40	50	55	35	40	45	8
6	55	65	75	40	50	55	6
4	70	85	95	55	65	75	4
3	85	100	115	65	75	85	3
2	95	115	130	75	90	100	2
1	110	130	145	85	100	115	1
1/0	125	150	170	100	120	135	1/0
2/0	145	175	195	115	135	150	2/0
3/0	165	200	225	130	155	175	3/0
4/0	195	230	260	150	180	205	4/0
250	215	255	290	170	205	230	250
300	240	285	320	195	230	260	300
350	260	310	350	210	250	280	350
400	280	335	380	225	270	305	400
500	320	380	430	260	310	350	500
600	350	420	475	285	340	385	600
700	385	460	520	315	375	425	700
750	400	475	535	320	385	435	750
800	410	490	555	330	395	445	800
900	435	520	585	355	425	480	900
1000	455	545	615	375	445	500	1000
1250	495	590	665	405	485	545	1250
1500	525	625	705	435	520	585	1500
1750	545	650	735	455	545	615	1750
2000	555	665	750	470	560	630	2000

*Refer to 310.15(B)(2) for the ampacity correction factors where the ambient temperature is other than 30°C (86°F).

**Refer to 240.4(D) for conductor overcurrent protection limitations