



**CITY OF CAMPBELL**  
**Community Development Department**

February 2, 2018

**NOTICE OF PUBLIC HEARING**

Notice is hereby given that the Planning Commission of the City of Campbell has set the time of 7:30 p.m., or shortly thereafter, on Tuesday, **February 13, 2018**, in the City Hall Council Chambers, 70 North First Street, Campbell, California, for a Public Hearing to consider the application of Solar Technologies for a Site and Architectural Review Permit (PLN2017-273) to allow the construction of an approximately 3,700 sq. ft. solar carport structure and associated equipment on property located at **1675 S. Winchester Boulevard**. Three Carolina Laurel Cherry trees are proposed for removal in association with the proposed solar carport structure (PLN2017-274). Staff is recommending that this item be deemed Categorical Exempt under CEQA.

Interested persons may appear and be heard at this hearing. Please be advised that if you challenge the nature of the above project in court, you may be limited to raising only those issues you or someone else raised at the Public Hearing described in this Notice, or in written correspondence delivered to the City of Campbell Planning Commission at, or prior to, the Public Hearing. Questions may be addressed to the Community Development Department at (408) 866-2140.

Plans and architectural drawings may be viewed at the Planning Division office during normal business hours (8:00 a.m. – 5:00 p.m.) and on the City's 'Public Notices' web page (<http://www.cityofcampbell.com/501/Public-Notices>) under 'Planning Commission'.

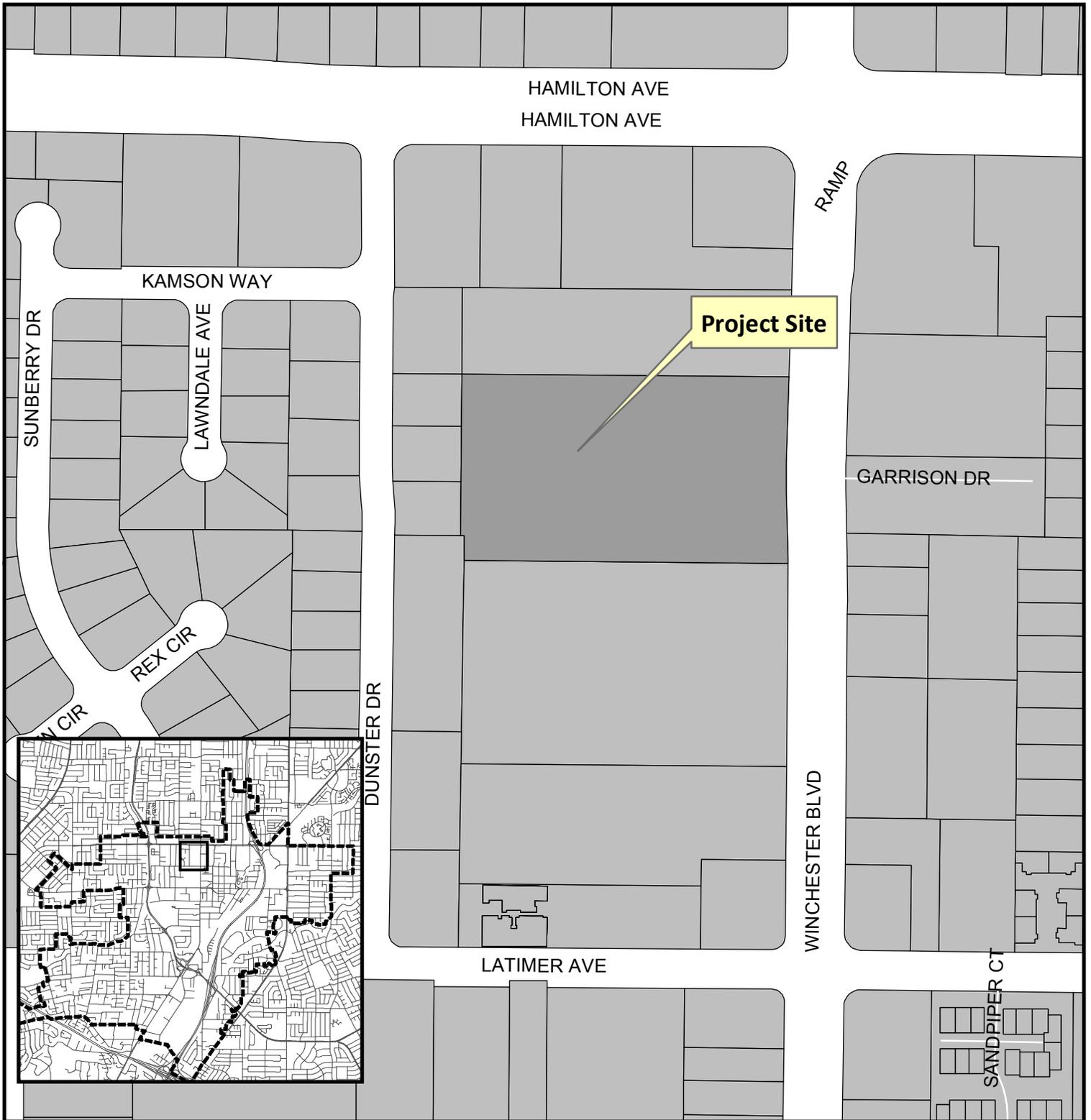
Decisions of the Planning Commission may be appealed to the City Council. Appeals must be submitted to the City Clerk in writing within 10 calendar days of an action by the Commission.

In compliance with the Americans with Disabilities Act, listening assistive devices are available for all meetings held in the Council Chambers. If you require accommodation, please contact the Community Development Department at (408) 866-2140, at least one week in advance of the meeting.

PLANNING COMMISSION  
CITY OF CAMPBELL  
PAUL KERMOYAN  
SECRETARY

PLEASE NOTE: When calling about this Notice,  
please refer to: **1675 S. Winchester Boulevard**

# Project Location Map

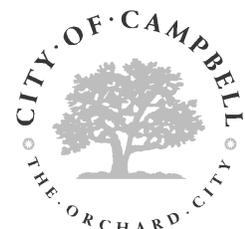


**Project Location:** 1675 S. Winchester Blvd.

**Application Type:** Site and Architectural Review Permit  
and Tree Removal Permit

**Planning File No.:** PLN2017-273, PLN2017-274

**Description:** New solar carport structure and removal  
of three (3) trees



Community Development Department  
Planning Division

# PHOTOVOLTAIC SYSTEM - CAMPBELL UNITED METHODIST CHURCH

## 1675 S. WINCHESTER BLVD., CAMPBELL, CA 95008

### Vicinity Map:



### Contact Info:

**OWNER:**  
 CAMPBELL UNITED METHODIST CHURCH  
 1675 S. WINCHESTER BLVD.,  
 CAMPBELL, CA 95008

**GENERAL CONTRACTOR:**  
 SOLAR TECHNOLOGIES  
 705 N BRANCIFORTE AVE  
 SANTA CRUZ, CA 95062

**ELECTRICAL ENGINEER:**  
 NATRON RESOURCES  
 1480 MORAGA ROAD, SUITE C #229  
 MORAGA, CA 94556

**CODE REFERENCES:**

- 2016 CALIFORNIA ELECTRICAL CODE (CEC)
- 2016 CALIFORNIA FIRE CODE (CFC)
- 2016 CALIFORNIA BUILDING CODE (CBC)
- 2016 CALIFORNIA GREEN BUILDING CODE (GBC)

### Table of Contents:

- T - TITLE PAGE
- A.1.1 - SITE PLAN-1
- A.1.2 - SITE PLAN-2**
- A.1.3 - REPLANTING PLAN
- A.2.1 - ARRAY PLAN**
- A.3.1 - CANOPY ELEVATION
- E.0.1 - ELECTRICAL NOTES
- E.1.1 - ELECTRICAL SITE PLAN
- E.1.2 - DETAILED ELECTRICAL SITE PLAN
- E.2.1 - SINGLE LINE DIAGRAM
- E.3.1 - THREE LINE DIAGRAM**
- E.4.1 - WIRING SCHEDULE**
- E.5.1 - EQUIPMENT LAYOUT PLAN**
- E.6.1 - ELECTRICAL DETAILS
- E.7.1 - LABELS AND MARKING
- E.8.1 - SPEC SHEETS-1
- E.8.2 - SPEC SHEETS-2
- S0.1 - GENERAL STRUCTURAL NOTES
- S2.1 - FOUNDATION AND FRAMING PLANS
- S3.1 - DETAILS

### SCOPE OF WORK:

ALL ELECTRICITY GENERATED IS FOR CONSUMPTION ON SITE.

SYSTEM ELECTRICAL CONNECTION TO MAIN ELECTRICAL SERVICE IS AT 208Y/120V SWITCHGEAR.

PERMIT SHALL INCLUDE LABOR OF INSTALLING PANELS, RUNNING OF ELECTRICAL CONDUITS, INSTALLATION OF NEW ELECTRICAL EQUIPMENT AND ELECTRICAL CONNECTION TO EXISTING BUILDING SERVICE.

NO BATTERIES REQUIRED AS PART OF THIS PROJECT SCOPE.

### System Specifications:

PANEL MODEL	SUNPOWER E20-327-COM
NUMBER OF PANELS	210
SYSTEM POWER, KWSTC	68.67
SYSTEM POWER, KWAC	60
ARRAY SQUARE FOOTAGE	3,683
ARRAY WEIGHT (LBS)	8,610
CONSTRUCTION TYPE	COMMERCIAL
ASHRAE STATION	SAN JOSE INTL AP
ASHRAE 2% HIGH DESIGN TEMP. DB	32
ASHRAE MIN MEAN EXTREME ANNUAL DB	0

PROJECT TITLE:  
**CAMPBELL UMC**  
 1675 S. WINCHESTER BLVD.,  
 CAMPBELL, CA 95008

ENGINEER'S STAMP

**SOLAR TECHNOLOGIES**  
 CLEAR ENERGY SOLUTIONS  
 705 N BRANCIFORTE AVE  
 SANTA CRUZ, CA 95062  
 (408) 298-1071

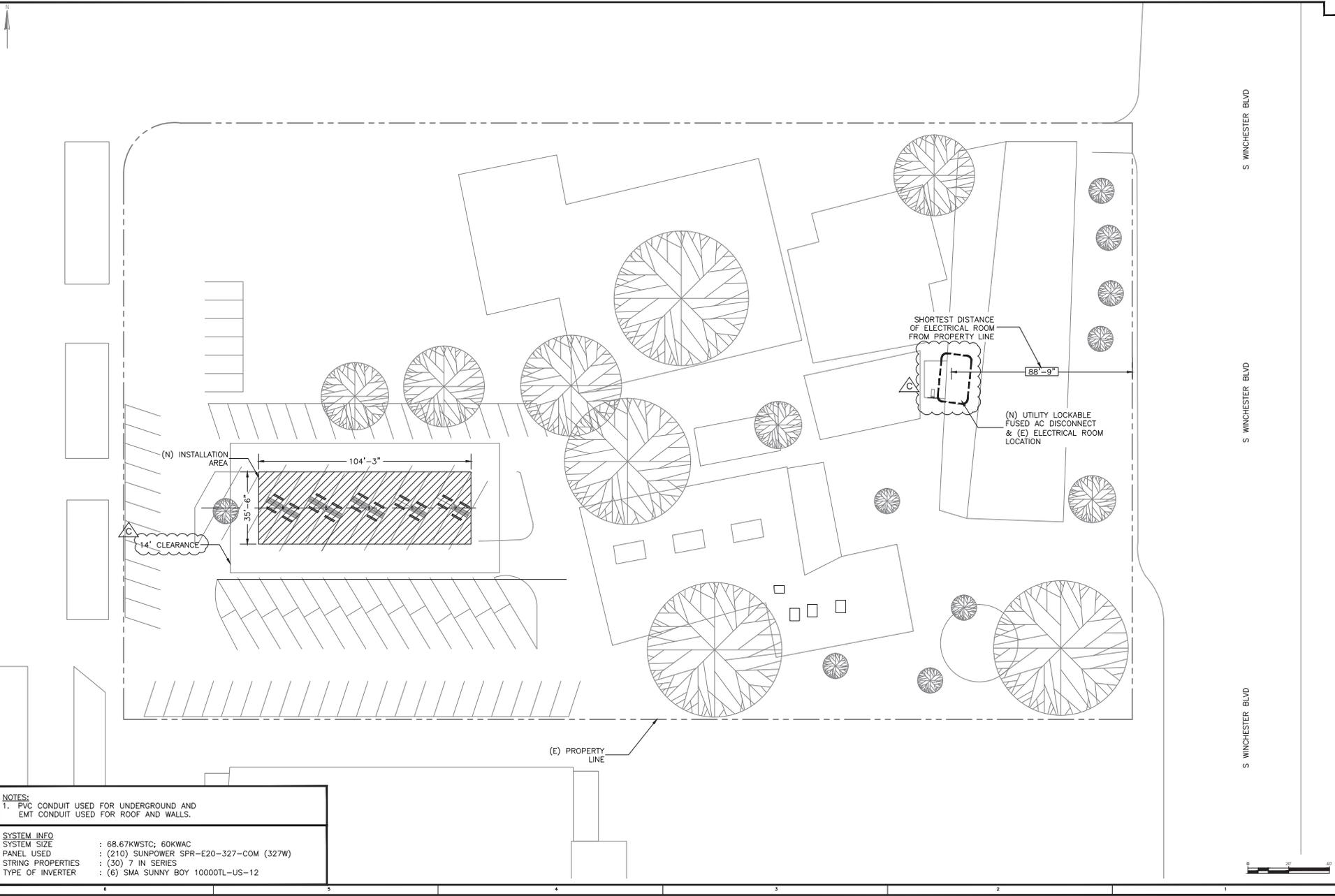
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12-20-17	FOR RESUBMITTAL

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 APPROVED BY: JHA

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 TITLE PAGE

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**NOTES:**  
 1. PVC CONDUIT USED FOR UNDERGROUND AND EMT CONDUIT USED FOR ROOF AND WALLS.

**SYSTEM INFO**  
 SYSTEM SIZE : 68.67KWSTC; 60KWAC  
 PANEL USED : (210) SUNPOWER SPR-E20-327-COM (327W)  
 STRING PROPERTIES : (30) 7 IN SERIES  
 TYPE OF INVERTER : (6) SMA SUNNY BOY 10000TL-US-12



PROJECT TITLE:  
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12-14-17	FOR RESUBMITTAL
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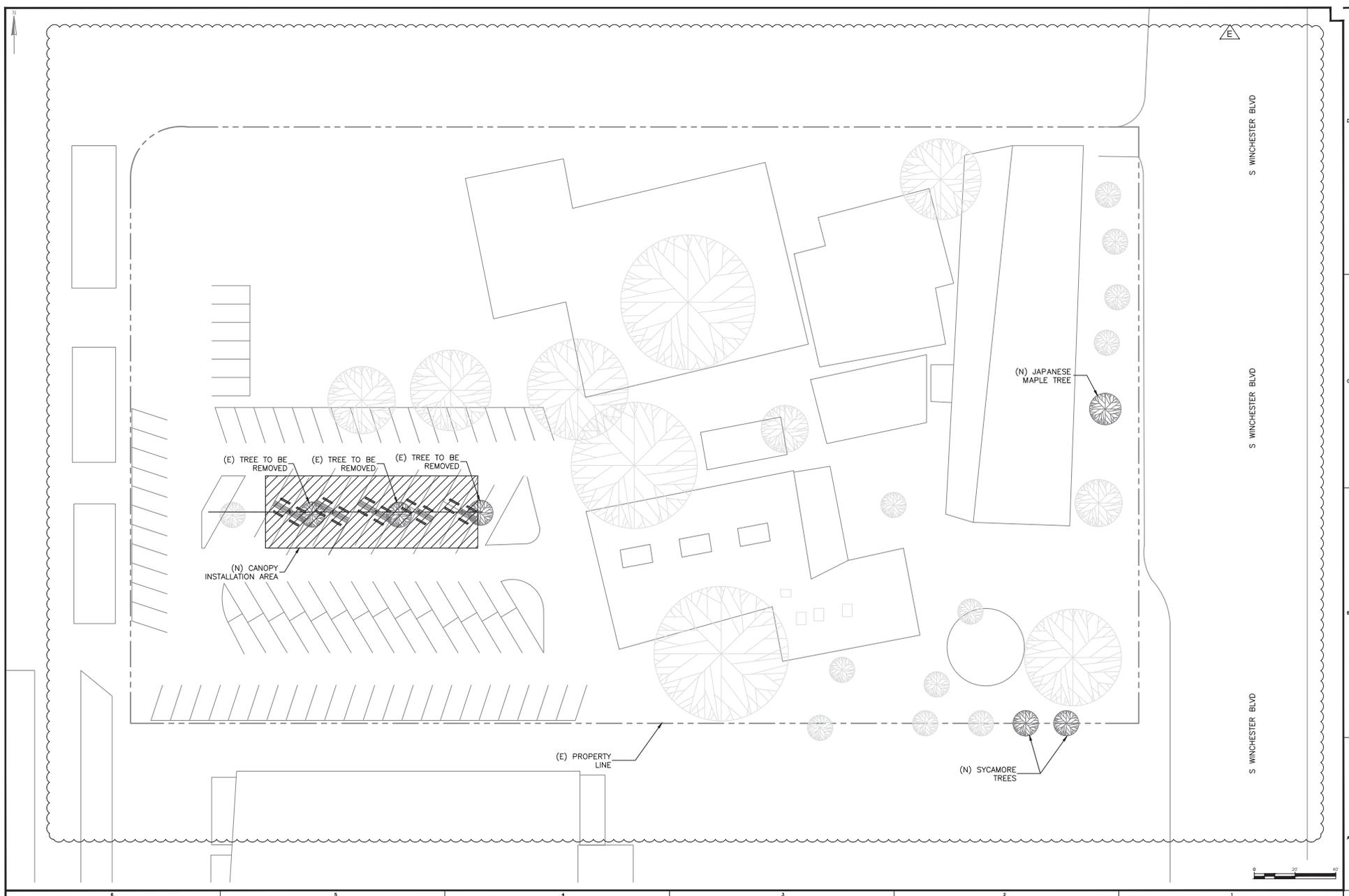
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 1" = 20'-0"

SHEET TITLE:  
**SITE PLAN-1**

SHEET #:  
 A.1.1





PROJECT TITLE  
**CAMPBELL UMC**  
 1675 S. WINCHESTER BLVD.,  
 CAMPBELL, CA 95008



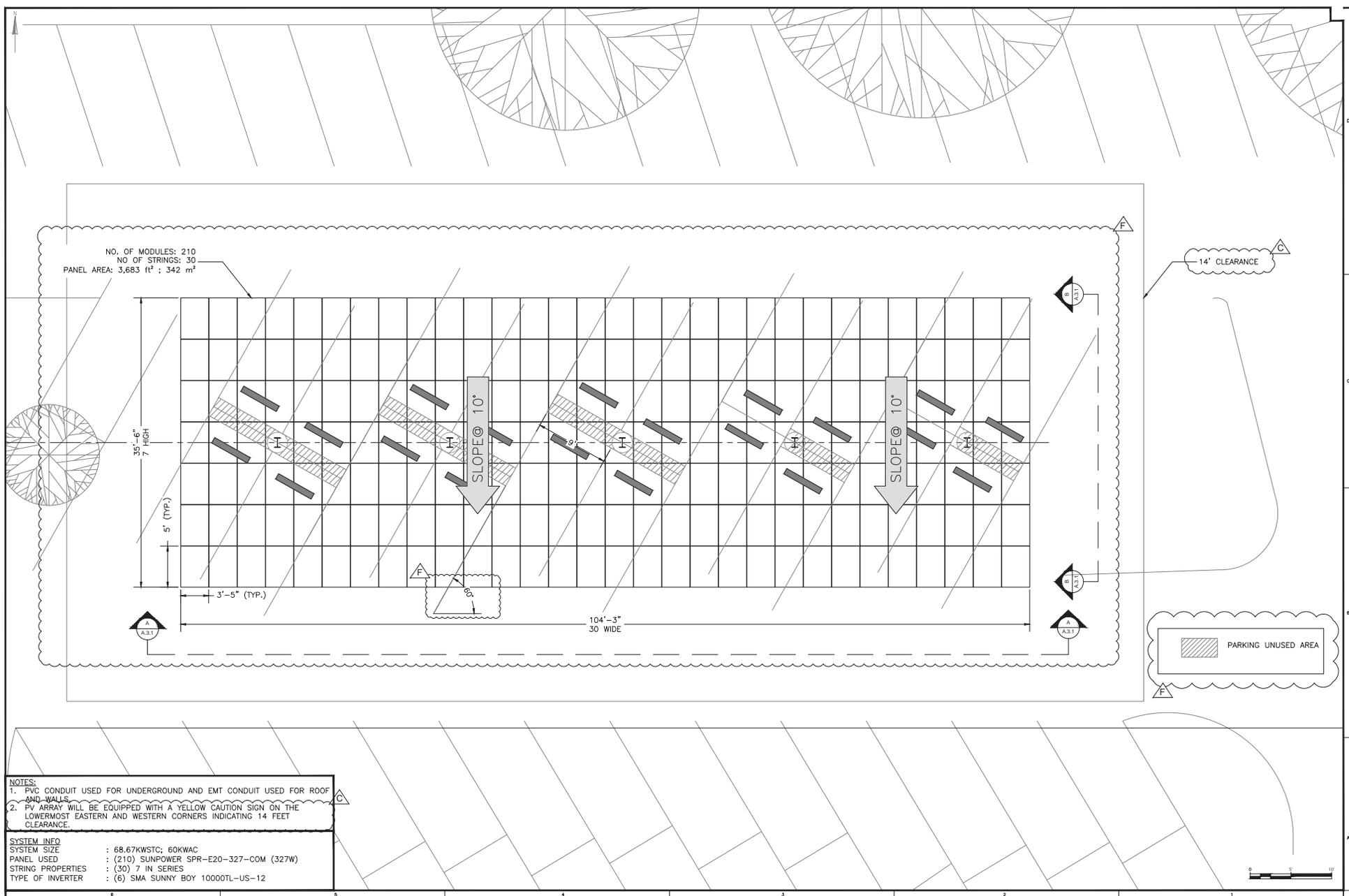
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 APPROVED BY: JHA

SCALE:  
 1" = 20'-0"

SHEET TITLE:  
**REPLANTING PLAN**

SHEET #:  
**A.1.3**



NO. OF MODULES: 210  
 NO. OF STRINGS: 30  
 PANEL AREA: 3,683 ft<sup>2</sup> ; 342 m<sup>2</sup>

35'-6"  
 7 HIGH

5' (TYP.)

3'-5" (TYP.)

104'-3"  
 30 WIDE

14' CLEARANCE

PARKING UNUSED AREA

**NOTES:**  
 1. PVC CONDUIT USED FOR UNDERGROUND AND EMT CONDUIT USED FOR ROOF AND WALLS.  
 2. PV ARRAY WILL BE EQUIPPED WITH A YELLOW CAUTION SIGN ON THE LOWERMOST EASTERN AND WESTERN CORNERS INDICATING 14 FEET CLEARANCE.

**SYSTEM INFO**  
 SYSTEM SIZE : 68.67KWSTC; 60KWAC  
 PANEL USED : (210) SUNPOWER SPR-E20-327-COM (327W)  
 STRING PROPERTIES : (30) 7 IN SERIES  
 TYPE OF INVERTER : (6) SMA SUNNY BOY 10000TL-US-12



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SCALE:  
 1" = 5'-0"

SHEET TITLE:  
**ARRAY PLAN**

SHEET #:  
 A.2.1



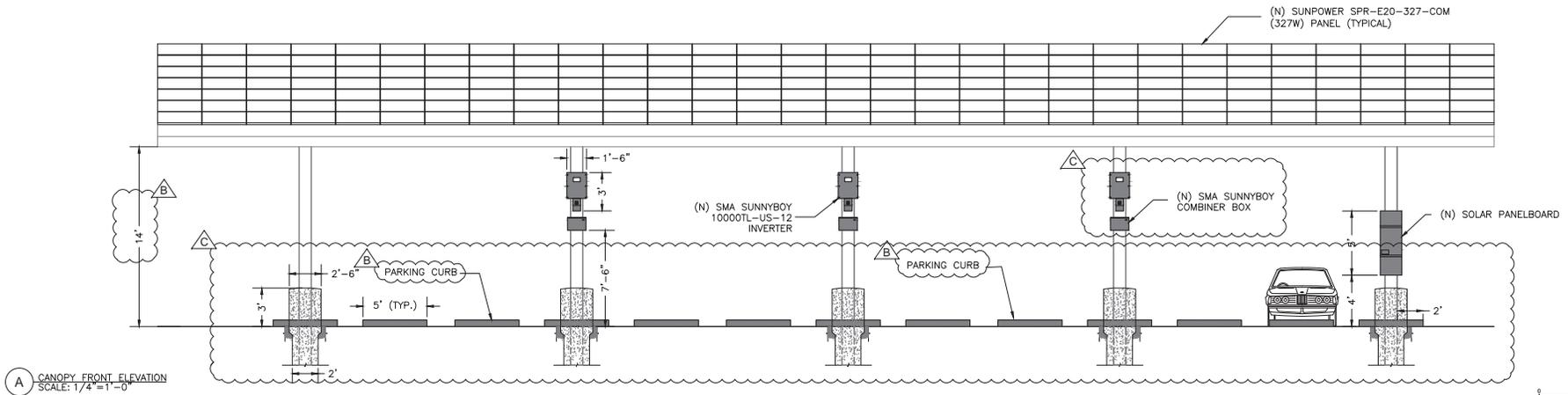
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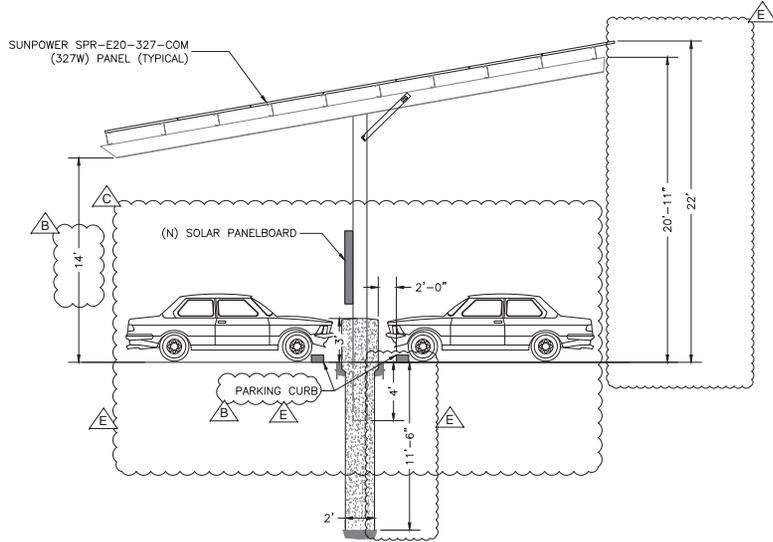
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**CANOPY ELEVATION**

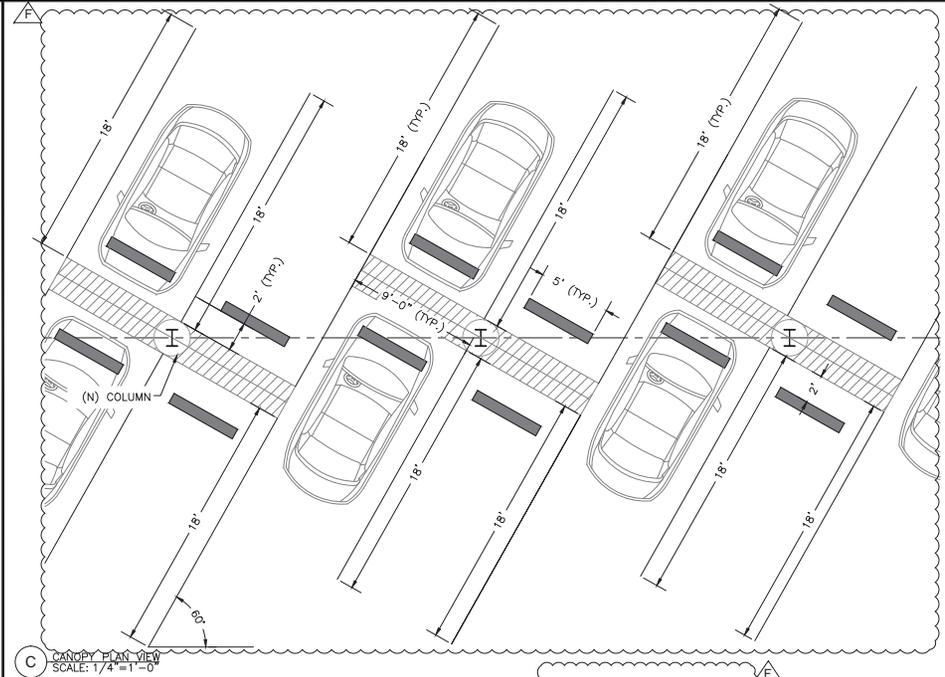
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 A.3.1



**A** CANOPY FRONT ELEVATION  
 SCALE: 1/4"=1'-0"



**B** CANOPY SIDE ELEVATION  
 SCALE: 1/4"=1'-0"



**C** CANOPY PLAN VIEW  
 SCALE: 1/4"=1'-0"

NOTES:  
 1. STALL STRIPING TO BE EXTENDED TO ACCOMMODATE STANDARD PARKING STALL REQUIREMENTS.

NOTE:  
 DIMENSIONS ON STRUCTURAL SHEETS SHALL GOVERN.



**GENERAL ELECTRICAL NOTES FOR PHOTOVOLTAIC SYSTEM**

1. THIS PROPOSED SOLAR ELECTRIC SYSTEM IS INTENDED TO OPERATE IN PARALLEL WITH POWER RECEIVED FROM THE UTILITY SERVICE PROVIDER.
2. THE INVERTER FOR THE PROPOSED SOLAR ELECTRIC SYSTEM SHALL BE IDENTIFIED FOR USE IN SOLAR PHOTOVOLTAIC SYSTEMS. ALL EQUIPMENT SHALL BE UL 1741 APPROVED.
3. THIS SYSTEM IS INTENDED TO CONNECT TO THE EXISTING FACILITY'S POWER SYSTEM AT ONE POINT, POINT OF COMMON COUPLING (POCC). THIS CONNECTION SHALL BE IN COMPLIANCE WITH THE NEC ARTICLE 690.64 "POINT OF CONNECTION".
4. ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION FOR TESTING AND ISOLATION. ALL COMBINER BOXES SHALL HAVE DISCONNECTION MEANS NEAR THE COMBINER FOR ISOLATION AND TESTING.
5. ALL DISCONNECTS AND COMBINERS SHALL BE SECURED FROM UNAUTHORIZED/UNQUALIFIED PERSONNEL BY LOCK OR LOCATION.
6. ALL DISCONNECTS, COMBINERS, PULL/SPICE BOXES AND ENCLOSURES SHALL BE LISTED FOR ITS PURPOSE.
7. EQUIPMENT SHALL BE INSTALLED IN A SECURE AREA. INVERTER PERFORMANCE MAY BE AFFECTED IF INSTALLED IN DIRECT SUNLIGHT.
8. ALL PARTS SPECIFIED IN THESE DRAWINGS MAY BE REPLACED BY EQUIVALENT PARTS FROM ANOTHER MANUFACTURER.

**WIRING AND WIRING METHODS**

ALL WIRING METHODS AND INSTALLATION PRACTICES SHALL CONFORM TO THE NATIONAL ELECTRIC CODE, LOCAL STATE CODES, AND OTHER APPLICABLE LOCAL CODES.

1. EXPOSED PV SOLAR PANEL WIRING WILL BE PV WIRE, 90 DEGREE C, WET RATED. ALL EXPOSED CABLES, SUCH AS MODULE LEADS SHALL BE SECURED WITH MECHANICAL OR OTHER SUNLIGHT RESISTANT MEANS.
2. ALL GROUNDED CONDUCTORS SHALL BE WHITE AND EQUIPMENT GROUNDING CONDUCTORS SHALL BE GREEN OR BARE. (NEC 200.6)
3. FOR UNGROUNDED DC SYSTEMS PER 690.35, CONDUCTOR OR CONDUCTOR LABEL COLORS SHALL BE RED FOR POSITIVE CONDUCTORS, AND BLACK FOR NEGATIVE CONDUCTORS. DO NOT USE WHITE OR GREY CONDUCTORS OR LABELS WITH UNGROUNDED OR TRANSFORMERLESS DC SYSTEMS.
4. ALL FIELD WIRING LARGER THAN 6 AWG THAT IS NOT COLOR CODED SHALL BE TAGGED AT BOTH ENDS WITH PERMANENT WIRE MAKERS, IDENTIFYING POLARITY AND GROUND.
5. FITTINGS FOR EXTERIOR RUNS OF EMT SHALL BE RAIN-TIGHT COMPRESSION TYPE
6. LIQUID TIGHT FLEXIBLE METAL CONDUIT IS GENERALLY SUITABLE FOR INSTALLATION IN WET AND DRY LOCATIONS. SHOULD IT BE EMPLOYED, SUPPORTS WILL BE NO GREATER THAN 12 INCHES FROM BOXES (JUNCTION BOX, CABINETS OR CONDUIT FITTINGS) AND NO GREATER THAN 36 INCHES APART (NEC 351).
7. LIQUID TIGHT FLEXIBLE NON-METALLIC CONDUIT IS GENERALLY SUITABLE FOR INSTALLATION IN WET AND DRY LOCATIONS. SHOULD IT BE EMPLOYED, SUPPORTS WILL BE NO GREATER THAN 12 INCHES FROM BOXES (JUNCTION BOX, CABINETS OR CONDUIT FITTINGS) AND NO MORE THAN 36 INCHES APART (NEC 351).
8. UNLESS MARKED AS UV RESISTANT, PVC IS NOT APPROVED FOR INSTALLATION IN LOCATIONS SUBJECT TO DIRECT SUNLIGHT AND SHALL NOT BE EMPLOYED IN ANY SUCH LOCATION.
9. IF USED, ALL EXPOSED WIRENUTS ARE TO BE SILICONE FILLED, EQUIVALENT TO IDEAL BLUE, AND MUST BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS BY A QUALIFIED/CERTIFIED PERSON.

10. FUSES AND WIRES SUBJECT TO TRANSFORMER INRUSH CURRENT SHALL BE SIZED ACCORDINGLY.

11. ALL DC MATERIALS SHALL BE UL LISTED FOR 600 OR 1000VDC DEPENDING ON THE INVERTER OPERATING VOLTAGE.

12. THE PHOTOVOLTAIC SOURCE CIRCUITS AND PHOTOVOLTAIC OUTPUT CIRCUITS OF THIS PROPOSED SOLAR SYSTEM SHALL NOT BE CONTAINED IN THE SAME RACEWAY CABLE TRAY, CABLE, OUTLET BOX, JUNCTION BOX, OR SIMILAR FITTINGS AS FEEDERS OR BRANCH CIRCUITS OF OTHER SYSTEMS UNLESS THE CONDUCTORS OF THE DIFFERENT SYSTEMS ARE SEPARATED BY A PARTITION OR ARE CONNECTED TOGETHER.

13. PULL BOXES SHALL BE PROVIDED IN ACCORDANCE WITH NEC 314.28. CONDUIT BODY TYPES T AND L SHALL NOT BE USED FOR 600V LISTED WIRING. CONDUIT BODY TYPES T AND L USED FOR 300V LISTED WIRING SHALL BE METALLIC.

14. CONNECTORS SHALL BE TORQUED PER DEVICE LISTING OR MANUFACTURER'S RECOMMENDATIONS.

15. LONG STRAIGHT CONDUIT RUNS, 100 FEET OR MORE, SHALL HAVE EXPANSION FITTINGS.

16. SPLIT BOLTS/SPICES/CONNECTORS SHALL BE INSULATED WITH APPROVED MEANS. UL LISTED ELECTRICAL TAPE ALONE IS NOT SUITABLE AS THE ONLY INSULATING MEANS. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR APPLICATION OF INSULATING PRODUCT.

17. ALL CONDUITS ON ROOF MUST BE AT MIN. 3 1/2" ABOVE ROOF.

**GROUNDING**

SEE ELECTRICAL DIAGRAM AND ELECTRICAL DETAILS FOR MORE GROUNDING INFORMATION.

1. ONLY ONE CONNECTION TO DC CIRCUITS AND ONE CONNECTION TO AC CIRCUITS WILL BE USED FOR SYSTEM GROUNDING (NEC250-21) (REFERENCED TO THE SAME POINT).
2. EQUIPMENT GROUNDING AND SYSTEM GROUNDING CONDUCTORS WILL HAVE AS SHORT A DISTANCE TO GROUND AS POSSIBLE WITH A MINIMUM NUMBER OF TURNS.
3. NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER GROUNDING; NOTING THAT TERMINAL LUGS BOLTED ON AN ENCLOSURE'S FINISHED SURFACE MAY BE INSULATED BECAUSE OF PAINT/FINISH. PAINT/FINISH AT POINT OF CONTACT SHALL BE PROPERLY REMOVED.
4. MODULES SHALL BE GROUNDED WITH EQUIPMENT GROUNDING CONDUCTORS BONDED TO A LOCATION APPROVED BY THE MANUFACTURER WITH A MEANS OF BONDING LISTED FOR THIS PURPOSE.
5. THE CONNECTION TO THE MODULE OR PANEL OF THIS PROPOSED SOLAR ELECTRIC SYSTEM SHALL BE ARRANGED SO THAT REMOVAL OF A MODULE OR A PANEL FROM THE PHOTOVOLTAIC SOURCE CIRCUIT DOES NOT INTERRUPT A GROUNDED CONDUCTOR TO ANOTHER PHOTOVOLTAIC SOURCE CIRCUIT. SETS OF MODULES INTERCONNECTED AS SYSTEMS RATED AT 50 VOLTS OR LESS WITH OR WITHOUT BLOCKING DIODES, AND HAVING A SINGLE OVER CURRENT DEVICE SHALL BE CONSIDERED A SINGLE SOURCE CIRCUIT.

6. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE INCLUDING BUT NOT LIMITED TO GROUND RODS, GROUNDING LUGS, GROUNDING CLAMPS, ETC. GROUNDING DEVICES EXPOSED TO THE ENVIRONMENT SHALL BE RATED FOR DIRECT BURIAL.

**GROUND FAULT PROTECTION**

1. PHOTOVOLTAIC INVERTERS SHALL BE EQUIPPED WITH DC GROUND FAULT PROTECTION TO REDUCE FIRE HAZARDS. INVERTERS SHALL BE EQUIPPED WITH ANTI-ISLANDING CIRCUITRY.

**DISCONNECTING MEANS**

1. MEANS SHALL BE PROVIDED TO DISCONNECT ALL CURRENT CARRYING CONDUCTORS OF THE PHOTOVOLTAIC POWER SOURCE FROM ALL OTHER CONDUCTORS IN THE BUILDING.
2. WHERE A CIRCUIT GROUNDING CONNECTION IS NOT DESIGNED TO BE AUTOMATICALLY INTERRUPTED AS PART OF THE GROUND-FAULT PROTECTION SYSTEM REQUIRED BY SECTION 690-5, A SWITCH OR CIRCUIT BREAKER USED AS A DISCONNECTING MEANS SHALL NOT HAVE A POLE IN THE GROUNDED CONDUCTOR.
3. THE GROUNDED CONDUCTOR MAY HAVE A BOLTED OR TERMINAL DISCONNECTING MEANS TO ALLOW MAINTENANCE OR TROUBLESHOOTING BY QUALIFIED PERSONNEL.
4. THE DISCONNECTING MEANS SHALL NOT BE REQUIRED TO BE SUITABLE AS SERVICE EQUIPMENT AND SHALL BE RATED IN ACCORDANCE WITH SECTION 690-17.
5. EQUIPMENT SUCH AS PHOTOVOLTAIC SOURCE CIRCUITS, OVER CURRENT DEVICES, AND BLOCKING DIODES SHALL BE PERMITTED ON THE PHOTOVOLTAIC SIDE OF THE PHOTOVOLTAIC DISCONNECTING MEANS.
6. MEANS SHALL BE PROVIDED TO DISCONNECT EQUIPMENT SUCH AS INVERTERS, BATTERIES, CHARGE CONTROLLERS, AND THE LIKE FROM ALL UNGROUNDED CONDUCTORS OF ALL SOURCES. IF THE EQUIPMENT IS ENERGIZED FROM MORE THAN ONE SOURCE, THE DISCONNECTING MEANS SHALL BE GROUPED AND IDENTIFIED.

7. A SINGLE DISCONNECTING MEANS SHALL BE PERMITTED FOR THE COMBINED AC OUTPUT OF ONE OR MORE INVERTERS IN AN INTERACTIVE SYSTEM.

8. 600-16 FUSES, DISCONNECTING MEANS SHALL BE PROVIDED TO DISCONNECT A FUSE FROM ALL SOURCES OF SUPPLY IF THE FUSE IS ENERGIZED FROM BOTH DIRECTIONS AND ACCESSIBLE TO OTHER THAN QUALIFIED PERSONS. SUCH A FUSE IN PHOTOVOLTAIC SOURCE CIRCUIT SHALL BE CAPABLE OF BEING DISCONNECTED INDEPENDENTLY OF FUSES IN OTHER PHOTOVOLTAIC SOURCE CIRCUITS.

9. ALL DISCONNECTS AND COMBINERS SHALL BE SECURED FROM UNAUTHORIZED AND UNQUALIFIED PERSONNEL BY EITHER LOCK OR LOCATION.

**REQUIRED SAFETY SIGNS AND LABELS**

REQUIRED SAFETY SIGNS AND LABELS SHALL BE PERMANENTLY ATTACHED BY ADHESIVE OR OTHER MECHANICAL MEANS. LABELS SHALL COMPLY WITH ARTICLE 690 OF THE NEC OR OTHER APPLICABLE STATE AND LOCAL CODES. SEE LABELS AND MARKING PAGE E-8 FOR MORE INFORMATION

1. ANY SWITCH, FUSE, OR CIRCUIT BREAKERS THAT CAN BE ENERGIZED IN EITHER DIRECTION SHALL BE LABELED AS FOLLOWS:

WARNING:  
ELECTRICAL SHOCK HAZARD. DO NOT TOUCH TERMINALS.  
TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.

2. THIS PHOTOVOLTAIC SYSTEM WILL BE EQUIPPED WITH AN AC DISCONNECT WHICH WILL BE LABELED AS FOLLOWS:

PHOTOVOLTAIC  
DISCONNECTING MEANS  
AC DISCONNECT

3. A MARKING SPECIFYING THE PHOTOVOLTAIC POWER SOURCE RATED AS FOLLOWS SHALL BE PROVIDED AT AN ACCESSIBLE LOCATION AT THE DISCONNECTION MEANS FOR THE POWER SOURCE:

OPERATING CURRENT  
OPERATING VOLTAGE  
MAXIMUM SYSTEM VOLTAGE  
SHORT CIRCUIT CURRENT  
FUSE RATING

**MARKINGS**

1. ALL INTERACTIVE SYSTEM POINTS OF INTERCONNECTION WITH OTHER SOURCES SHALL BE MARKED AT AN ACCESSIBLE LOCATION AT THE DISCONNECTION MEANS.
2. A PERMANENT PLAQUE OR DIRECTORY SHALL BE PROVIDED IDENTIFYING THE LOCATION OF THE SERVICE DISCONNECTION MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTION MEANS, IF NOT LOCATED AT THE SAME LOCATION.
3. PHOTOVOLTAIC MODULES SHALL BE MARKED TO IDENTIFY LEAD POLARITY, DEVICE RATINGS, AND SPECIFICATIONS FOR VOLTAGE, CURRENT, AND POWER.

**GENERAL NOTES FOR PHOTOVOLTAIC INVERTERS**

1. CONDUIT AND CONDUCTORS: ALL INTERCONNECT WIRING AND POWER CONDUCTORS INTERFACING THE UNIT MUST BE IN ACCORDANCE WITH THE NEC ANS/NFPA 70 AND ANY APPLICABLE LOCAL CODES. LARGE GAUGE WIRE MUST CONFORM TO THE MINIMUM BEND RADIUS SPECIFIED IN THE NEC, ARTICLE 373-6B, NINTH EDITION. KEEP ALL WIRE BUNDLES AWAY FROM ANY SHARP EDGES TO AVOID DAMAGE TO WIRE INSULATION. ALL CONDUCTORS SHOULD BE MADE OF COPPER AND RATED FOR 90 DEGREE C MINIMUM. FOR OUTDOOR INSTALLATIONS, ALL INTERCONNECT CONDUITS AND FITTINGS MUST BE NEMA-4 RATED AS REQUIRED BY NEC. FOR WIRE GAUGE, BOLT SIZE, AND TORQUE VALUES FOR THE DC AND AC TERMINALS, SEE INSTALLATION MANUAL.

2. INVERTER ENCLOSURE: INVERTERS ARE INDOOR/OUTDOOR RATED. RUGGED HEAVY GAUGE METAL WITH ENAMEL COATED PAINT ON ALL SURFACES. ALL REMOVABLE INTERNAL PANELS ARE GALVANIZED. ALL SURFACES ARE PAINTED WITH (2) COATS OF RUST INHIBITING PRIMER AND PAINTED WITH UL LISTED RAL 7032.

3. ENVIRONMENTAL CONDITIONS: INVERTERS ARE DESIGNED TO BE INSTALLED IN EITHER AN INDOOR OR OUTDOOR LOCATION. THE UNIT MUST BE ANCHORED TO A LEVEL CONCRETE FLOOR OR PAD. ALLOWABLE OPERATING TEMPERATURE RANGE FOR THE UNIT IS -15 TO 50 DEGREES C. EXPOSURE LIMITS OF THE UNIT ARE 40 TO 50 DEGREE C. THE INVERTER UNIT USES FILTERED FORCED AIR COOLING FOR ALL MAJOR SYSTEM COMPONENTS. THE 3 PHASE INVERTER ASSEMBLIES ARE MOUNTED ON AIR-COOLED HEAT SINK.

4. OPERATOR INTERFACE CONTROLS: OPERATOR INTERFACE CONTROLS ARE LOCATED ON THE FRONT OF THE MAIN INVERTER ENCLOSURE. CONSULT THE OPERATIONS AND MAINTENANCE MANUAL FOR INSTRUCTIONS AND CODE REFERENCES.

5. ELECTRICAL SAFETY FEATURES:

E-STOP BUTTON IS LOCATED ON THE OPERATOR INTERFACE PANEL ON THE MAIN DOOR OF THE INVERTER. TRIGGERING OF THE E-STOP WILL RESULT IN IMMEDIATE SHUTDOWN OF THE UNIT. (NOTE: OPENING THE DOOR WILL CAUSE THE UNIT TO TRIP AND THERE WILL BE LIVE PARTS IN THE INPUT AND OUTPUT SECTION.)

DISCONNECTING DEVICES BETWEEN THE SOLAR ARRAY PANELS, THE UTILITY, AND THE UNIT ARE PROVIDED FOR THE INVERTER ENCLOSURE. THESE DISCONNECT SWITCHES ARE TO BE USED FOR ISOLATING THE SOLAR ARRAY PANELS FROM THE UNIT FOR MAINTENANCE PURPOSES AND ARE TO BE USED AS NO-LOAD DISCONNECTING DEVICES ONLY.

THE UNIT HAS ONLY ONE MODE OF OPERATION, LINE LINKAGE MODE (GRID EXPORT MODE). THE THREE PHASE OUTPUT VOLTAGES AND CURRENTS ARE SINUSOIDAL WITH LOW TOTAL HARMONIC DISTORTION MEETING IEEE 519-1992 HARMONIC STANDARDS.

THE ANTI-ISLANDING TRIP TIME IS LESS THAN (2) SECONDS AS PER UL 1741 STANDARDS. THE INVERTER UNIT WILL AUTOMATICALLY SHUT DOWN WHEN THE LOSS OF GRID POWER IS DETECTED.

6. PV PROTECTION DEVICE

THE UNIT COMES EQUIPPED WITH A UL1741 APPROVED GROUND FAULT CIRCUIT INTERRUPTER ("GFCI"). EQUIPMENT GROUNDING CONDUCTORS SIZED PER TABLE 250.122 IN ACCORDANCE WITH NEC 250.122(F)(2).

PROJECT TITLE

CAMPBELL UMC  
1675 S. WINCHESTER BLVD.,  
CAMPBELL, CA 95008

ENGINEER'S STAMP



DATE	ISSUE
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11-APR-17	FOR RESUBMITAL

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APPROVED BY:	JHA

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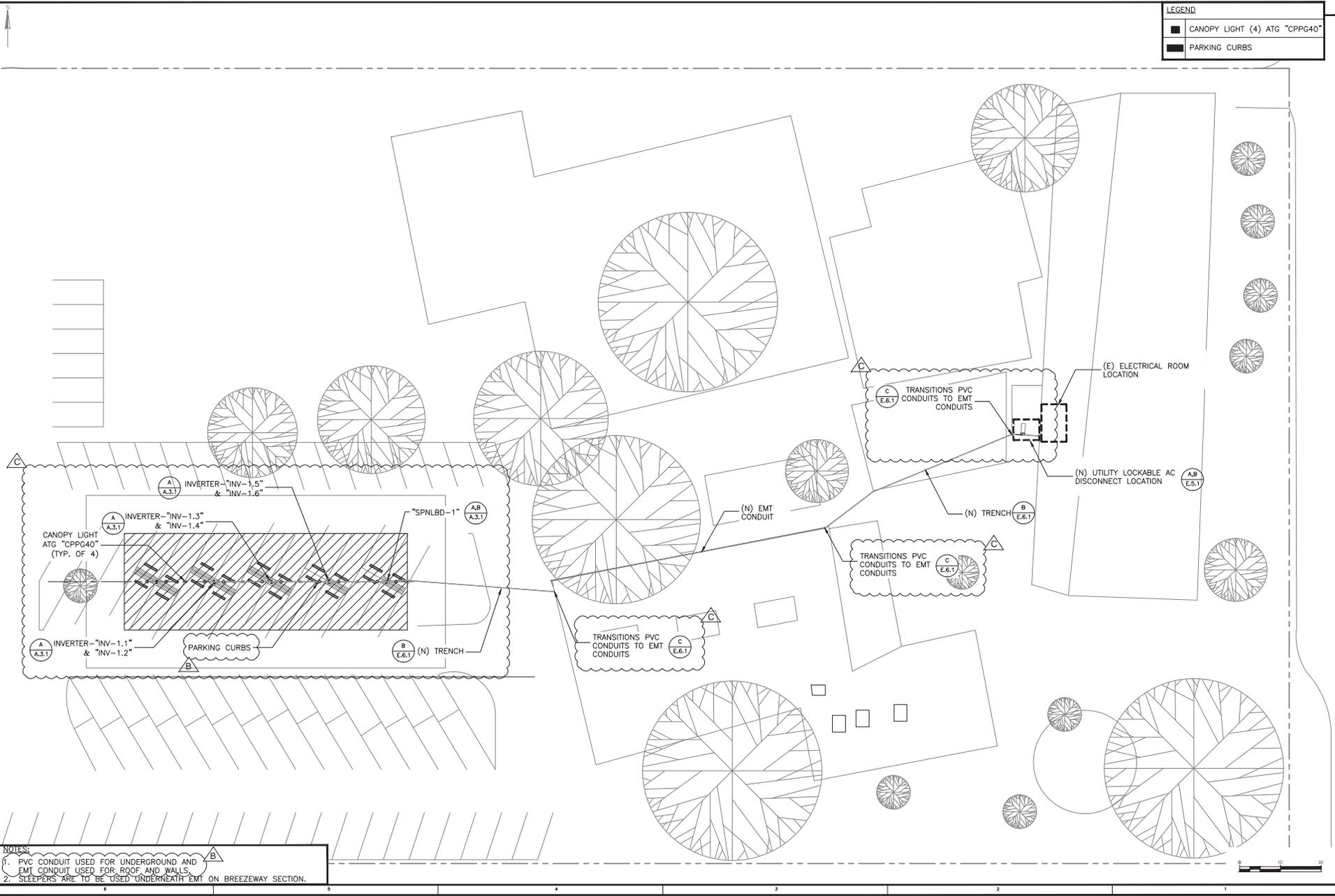
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SHEET TITLE:

ELECTRICAL  
NOTES

SHEET #:

E.O.1



PROJECT TITLE:  
**CAMPBELL UMC**  
 1675 S. WINCHESTER BLVD.,  
 CAMPBELL, CA 95008



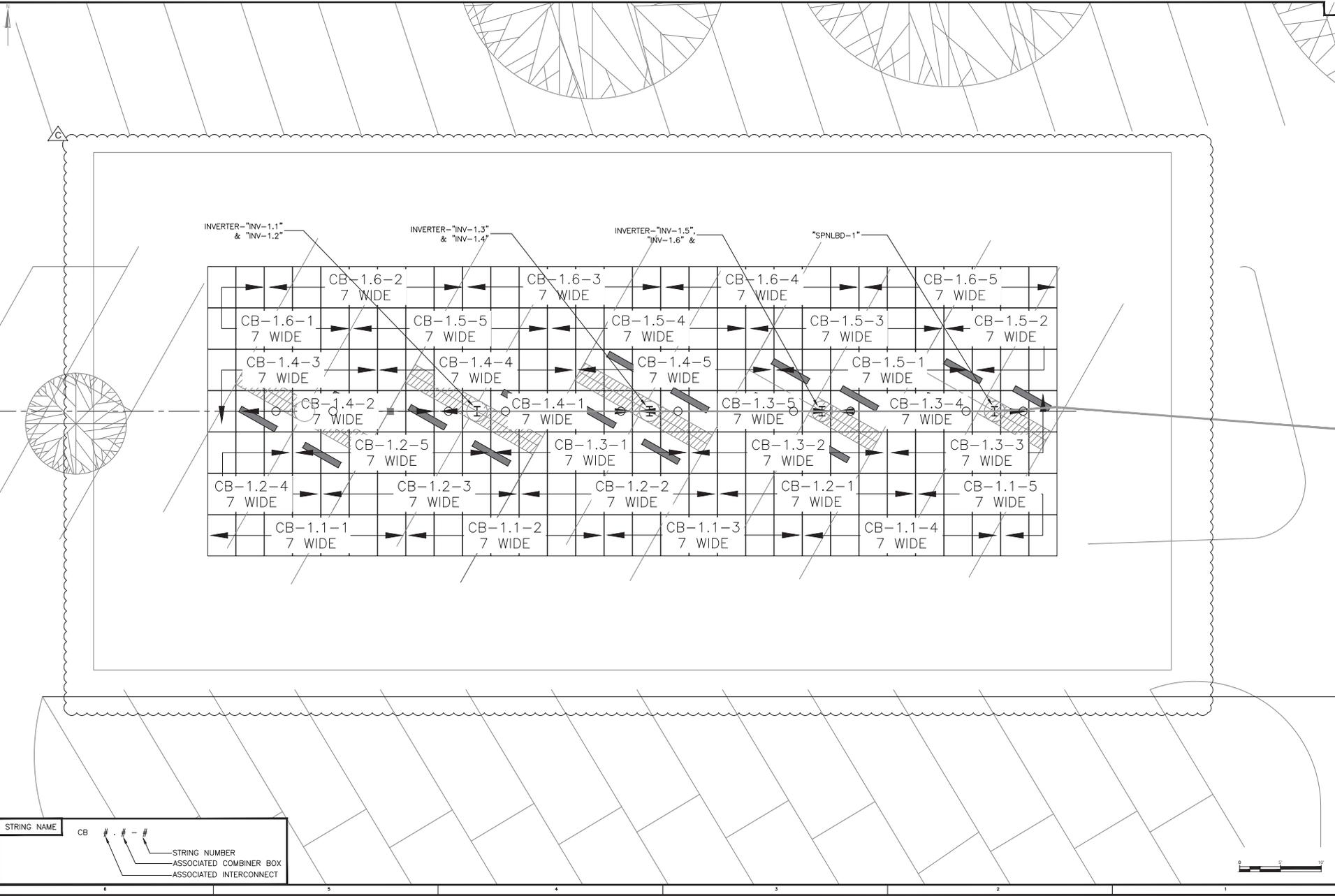
DATE	ISSUE	REVISION
10-15-11	FOR SUBMITTAL	
11-15-11	FOR RESUBMITTAL	
12-15-11	FOR RESUBMITTAL	
01-15-12	FOR RESUBMITTAL	
02-15-12	FOR RESUBMITTAL	

PAPER SIZE: ARCH D  
 DRAWN BY: NATRON  
 CHECKED BY: JHA  
 APPROVED BY: JHA

SCALE:  
 1" = 15'-0"

SHEET TITLE:  
**ELECTRICAL SITE PLAN**

SHEET #:  
 E.1.1



STRING NAME    CB    # . # - #

PROJECT TITLE:  
**CAMPBELL UMC**  
 1675 S. WINCHESTER BLVD.,  
 CAMPBELL, CA 95008



DATE	ISSUE
10-MAR-17	FOR SUBMITTAL
12-MAR-17	FOR RESUBMITTAL
13-APR-17	FOR RESUBMITTAL
24-DEC-17	FOR RESUBMITTAL

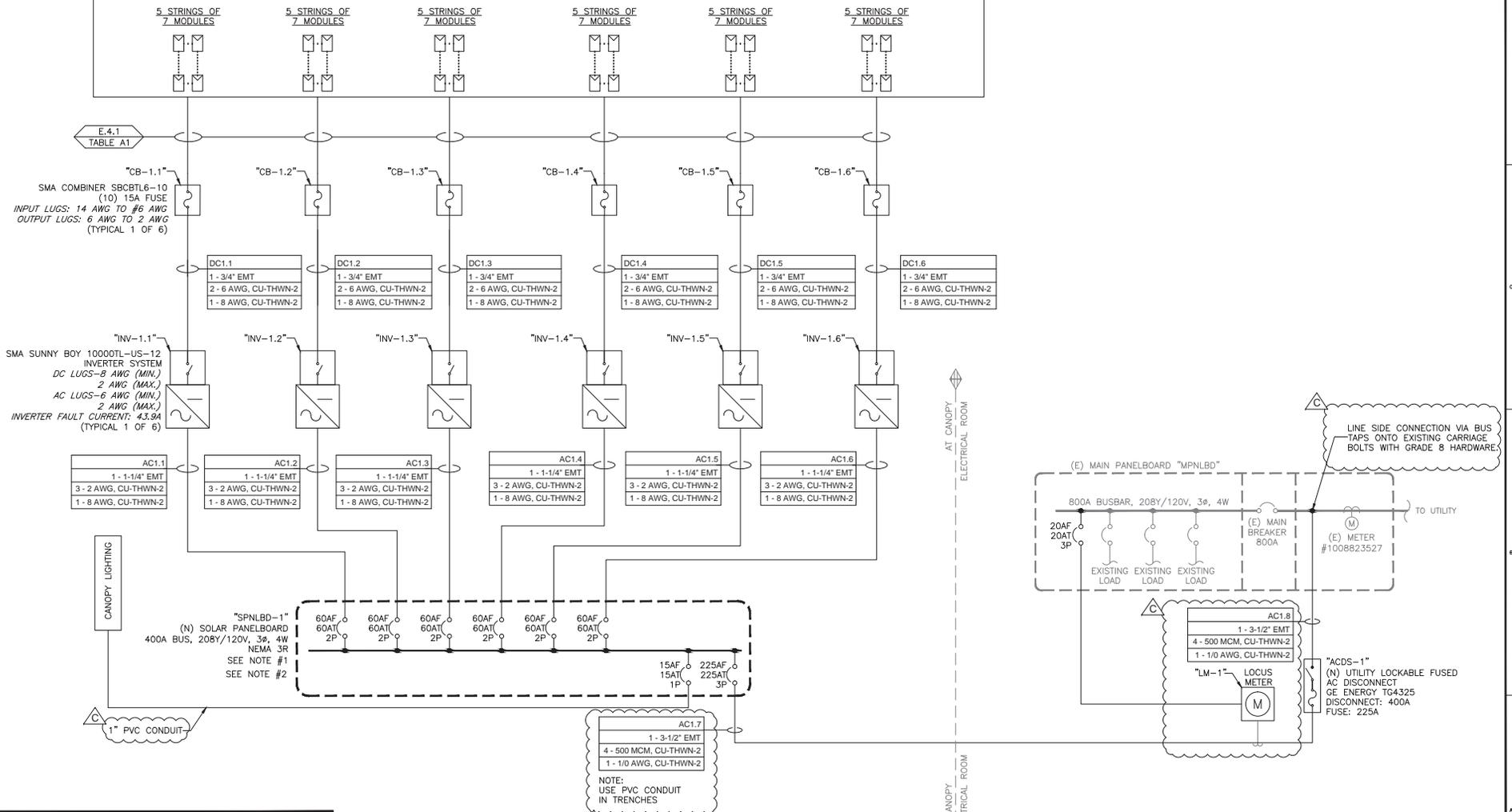
PAPER SIZE: ARCH D  
 DRAWN BY: NATRON  
 CHECKED BY: JHA  
 APPROVED BY: JHA

SCALE:  
 1" = 5'-0"

SHEET TITLE:  
**DETAILED ELECTRICAL SITE PLAN**

SHEET #:  
 E.1.2

(06) SMA SB1000TL-US-12 (208V) INVERTER  
 68.67KWSTC, 60KWAC  
 210 MODULES, SUNPOWER SPR-E20-327-COM (327W)  
 07 MODULES PER STRING, 30 STRINGS,  
 STRING VOLTAGE: 349.1V VMP HIGH TEMP, 485.2V VOC MAX.  
 STRING AMPERAGE: 5.98A IMP, 6.46A ISC



NOTES:  
 1. ADD NOTE ON PERMANENTLY AFFIXED LABEL FOR PANEL:  
 "ENERGY SYSTEM SUPPLY CIRCUITS ONLY. NO LOAD CIRCUITS ALLOWED".  
 2. MADE TO ORDER GE PANELBOARD AND CIRCUIT BREAKERS.

PROJECT TITLE:  
**CAMPBELL UMC**  
 1675 S. WINCHESTER BLVD.,  
 CAMPBELL, CA 95008



NO.	DATE	ISSUE	REVISION
1		FOR SUBMITTAL	
2		FOR RESUBMITTAL	
3		FOR RESUBMITTAL	
4		FOR RESUBMITTAL	

PAPER SIZE: ARCH D  
 DRAWN BY: NATRON  
 CHECKED BY: JHA  
 APPROVED BY: JHA

SCALE:  
 NTS

SHEET TITLE:  
 SINGLE LINE DIAGRAM

SHEET #:  
 E. 2.1

REFERENCE NOTES:

(A1) SEE TABLE "A1" ON SHEET E.4.1 FOR CONDUCTOR SIZES.

(B1) SEE TABLE "B1" ON SHEET E.4.1 FOR CONDUCTOR SIZES.

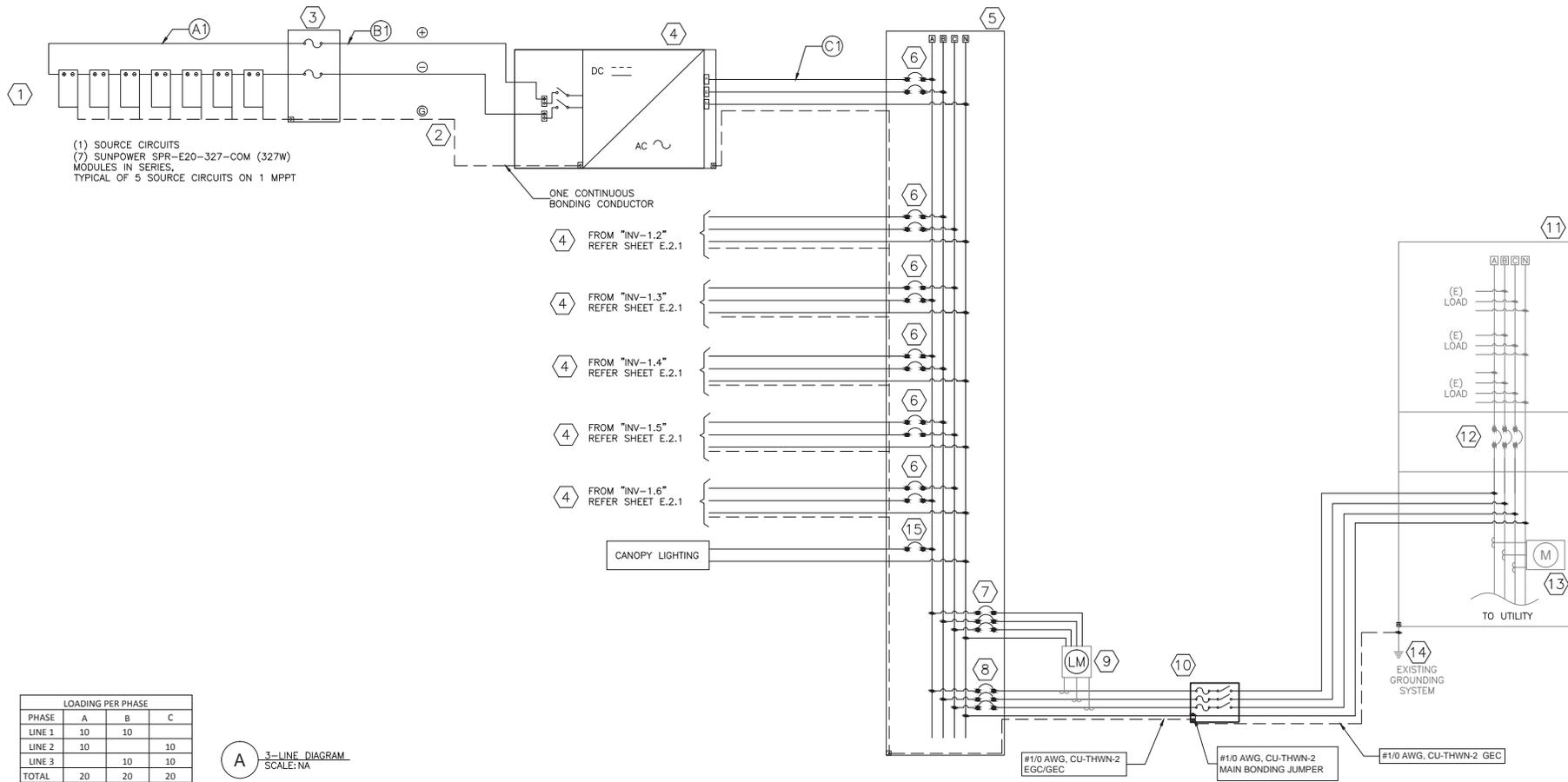
(C1) SEE TABLE "C1" ON SHEET E.4.1 FOR CONDUCTOR SIZES.

KEYED NOTES:

- (1) (N) SUNPOWER SPR-E20-327-COM (327W) MODULES (TYPICAL OF 210)
- (2) EGC IS SIZED PER 250.122. IN CASES WHERE EGC IS EXPOSED TO MECHANICAL DAMAGE AFTER INSTALLATION, IT SHALL BE #6 AWG MINIMUM. USE THE "LAY-IN" LUGS OR EQUIVALENT WEEB GROUNDING CLIP REQUIRED PER NEC 690 FOR MODULE EQUIPMENT GROUNDING. USE THE MODULE RECOMMENDED METHODS FOR GROUNDING. THE MODULE EQUIPMENT GROUND SHALL GROUND ALL OTHER EQUIPMENT AND SHALL TERMINATE IN THE INVERTER CABINET.
- (3) (N) COMBINER BOX (TYPICAL OF 6)
- (4) (N) SMA SUNNY BOY 10000TL-US-12 (TYPICAL OF 6)

- (5) (N) SOLAR PANELBOARD "SPNLBD-1".
- (6) (N) CIRCUIT BREAKER. (TYPICAL OF 6)
- (7) (N) CIRCUIT BREAKER.
- (8) (N) CIRCUIT BREAKER.
- (9) (N) LOCUS METER "LM-1"
- (10) (N) UTILITY LOCKABLE FUSED AC DISCONNECT "ACDS-1"
- (11) (E) MAIN SWITCHBOARD.

- (12) (E) MAIN BREAKER,
- INSTALLER SHALL BE RESPONSIBLE FOR VERIFYING THAT ALL BACKFED BREAKERS ARE SUITABLE FOR THE APPLICATION AND THAT IF A LOAD SIDE CONNECTION IS PERFORMED, THE EXISTING GROUND FAULT PROTECTION IS NOT COMPROMISED.
- (13) (E) METER.
- (14) GEC IS SIZED PER TABLE 250.66. CONDUCTOR MAY BE DOWNSIZED IF EXCEPTION A,B, OR C APPLIES
- (15) (N) CIRCUIT BREAKER.



PROJECT TITLE:  
**CAMPBELL UMC**  
1675 S. WINCHESTER BLVD.,  
CAMPBELL, CA 95008



DATE	ISSUE	REVISION

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CHECKED BY: JHA  
APPROVED BY: JHA

SCALE:  
NTS

SHEET TITLE:  
THREE LINE  
DIAGRAM

SHEET #:  
E.3.1



DATE	ISSUE	REVISION
11-MAR-17	FOR SUBMITTAL	
20-MAR-17	FOR RESUBMITTAL	
21-MAR-17	FOR RESUBMITTAL	
24-DEC-17	FOR RESUBMITTAL	

PAPER SIZE: ARCH D  
 DRAWN BY: NATRON  
 CHECKED BY: JHA  
 APPROVED BY: JHA

SCALE:  
 NTS

SHEET TITLE:  
**WIRING SCHEDULE**

SHEET #:  
 E. 4.1

CONDUCTOR LOCATION	NUMBER OF MODULES IN SERIES	Isc (A)	Imp (A)	Voc (VDC)	Vmp (VDC)	ONE WAY LENGTH (FT)	VOLTAGE DROP %	CURRENT CARRYING CONDUCTOR	BONDING CONDUCTOR SIZE (AWG)	CONDUIT	NOTES
MODULE TO CB-1.1 THROUGH CB-1.6	7	6.46	5.98	454.3	349.1	50	0.21%	10 AWG, PV WIRE	10	FREE-AIR OR 1/2" EMT MIN	

INITIAL CONDUCTOR LOCATION	FINAL CONDUCTOR LOCATION	# STRINGS IN COMBINER BOX IN PARALLEL	RACEWAY NAME	CIRCUIT ID	RACEWAY SIZE OR DIRECT BURIAL	# OF PARALLEL CIRCUITS	# OF CONDUCTORS IN RACEWAY OR BURIAL BUNDLE	% OF MAX CONDUIT FILL	310.15 and 310.16 Temp Correction Factor	310.15 Fill Adjustment Factor	690.8 (A)(1) and (B)(1) Adjustment Factors	Isc	DESIGN LINE CURRENT	TERMINAL TEMP LIMIT	TEMP LIMIT AMPACITY 30C AMB	OCPD	MINIMUM CORRECTED AMPACITY	CONDUCTOR CORRECTED AMPACITY	ONE WAY LENGTH (FT)	VOLTAGE DROP %	CURRENT CARRYING CONDUCTOR TYPE AND SIZE (AWG)	EQUIPMENT GROUNDING CONDUCTOR SIZE (AWG)	NOTES
CB-1.1	INV-1.1	5	DC1.1	DC1.1-1	3/4" EMT	1	3	65%	0.96	1.00	1.56	32	50	Cu-60C	55	N/A	40	72	5	0.04%	2 - 6 AWG, CU-THWN-2	1 - 8 AWG, CU-THWN-2	
CB-1.2	INV-1.2	5	DC1.2	DC1.2-1	3/4" EMT	1	3	65%	0.96	1.00	1.56	32	50	Cu-60C	55	N/A	40	72	5	0.04%	2 - 6 AWG, CU-THWN-2	1 - 8 AWG, CU-THWN-2	
CB-1.3	INV-1.3	5	DC1.3	DC1.3-1	3/4" EMT	1	3	65%	0.96	1.00	1.56	32	50	Cu-60C	55	N/A	40	72	5	0.04%	2 - 6 AWG, CU-THWN-2	1 - 8 AWG, CU-THWN-2	
CB-1.4	INV-1.4	5	DC1.4	DC1.4-1	3/4" EMT	1	3	65%	0.96	1.00	1.56	32	50	Cu-60C	55	N/A	40	72	5	0.04%	2 - 6 AWG, CU-THWN-2	1 - 8 AWG, CU-THWN-2	
CB-1.5	INV-1.5	5	DC1.5	DC1.5-1	3/4" EMT	1	3	65%	0.96	1.00	1.56	32	50	Cu-60C	55	N/A	40	72	5	0.04%	2 - 6 AWG, CU-THWN-2	1 - 8 AWG, CU-THWN-2	
CB-1.6	INV-1.6	5	DC1.6	DC1.6-1	3/4" EMT	1	3	65%	0.96	1.00	1.56	32	50	Cu-60C	55	N/A	40	72	5	0.04%	2 - 6 AWG, CU-THWN-2	1 - 8 AWG, CU-THWN-2	

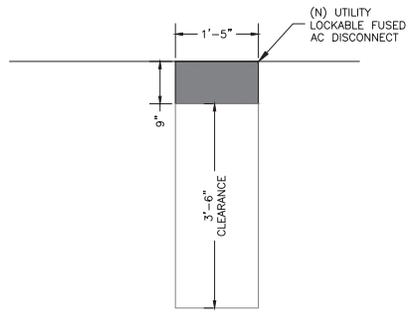
INITIAL CONDUCTOR LOCATION	FINAL CONDUCTOR LOCATION	RACEWAY NAME	CIRCUIT ID	RACEWAY SIZE OR DIRECT BURIAL	# OF PARALLEL CIRCUITS	# OF CONDUCTORS IN RACEWAY OR BURIAL BUNDLE	% OF MAX CONDUIT FILL	310.15 and 310.16 Temp Correction Factor	310.15 Fill Adjustment Factor	690.8 (A)(3) Adjustment Factor	OPERATING LINE CURRENT	DESIGN LINE CURRENT	TERMINAL TEMP LIMIT	TEMP LIMIT AMPACITY 30C AMB	OCPD	MINIMUM CORRECTED AMPACITY	CONDUCTOR CORRECTED AMPACITY	ONE WAY LENGTH (FT)	VOLTAGE DROP %	CURRENT CARRYING CONDUCTOR TYPE AND SIZE (AWG)	GROUNDING CONDUCTOR SIZE (AWG)	NOTES
INV-1.1	SPNLBD-1	AC1.1	AC1.1-1	1-1/4" EMT	1	4	64%	0.96	1.00	1.25	48	60	Cu-60C	95	60	60	125	95	0.74%	3 - 2 AWG, CU-THWN-2	1 - 8 AWG, CU-THWN-2	EGC/GEC
INV-1.2	SPNLBD-1	AC1.2	AC1.2-1	1-1/4" EMT	1	4	64%	0.96	1.00	1.25	48	60	Cu-60C	95	60	60	125	95	0.74%	3 - 2 AWG, CU-THWN-2	1 - 8 AWG, CU-THWN-2	EGC/GEC
INV-1.3	SPNLBD-1	AC1.3	AC1.3-1	1-1/4" EMT	1	4	64%	0.96	1.00	1.25	48	60	Cu-60C	95	60	60	125	55	0.43%	3 - 2 AWG, CU-THWN-2	1 - 8 AWG, CU-THWN-2	EGC/GEC
INV-1.4	SPNLBD-1	AC1.4	AC1.4-1	1-1/4" EMT	1	4	64%	0.96	1.00	1.25	48	60	Cu-60C	95	60	60	125	55	0.43%	3 - 2 AWG, CU-THWN-2	1 - 8 AWG, CU-THWN-2	EGC/GEC
INV-1.5	SPNLBD-1	AC1.5	AC1.5-1	1-1/4" EMT	1	4	64%	0.96	1.00	1.25	48	60	Cu-60C	95	60	60	125	30	0.23%	3 - 2 AWG, CU-THWN-2	1 - 8 AWG, CU-THWN-2	EGC/GEC
INV-1.6	SPNLBD-1	AC1.6	AC1.6-1	1-1/4" EMT	1	4	64%	0.96	1.00	1.25	48	60	Cu-60C	95	60	60	125	30	0.23%	3 - 2 AWG, CU-THWN-2	1 - 8 AWG, CU-THWN-2	EGC/GEC
SPNLBD-1	ACDS-1	AC1.7	AC1.7-1	3-1/2" EMT	1	5	65%	0.96	1.00	1.25	167	208	Cu-75C	380	225	208	413	280	1.00%	4 - 500 MCM, CU-THWN-2	1 - 1/0 AWG, CU-THWN-2	EGC/GEC
ACDS-1	MPNLBD	AC1.8	AC1.8-1	3-1/2" EMT	1	5	65%	0.96	1.00	1.25	167	208	Cu-75C	380	225	208	413	10	0.04%	4 - 500 MCM, CU-THWN-2	1 - 1/0 AWG, CU-THWN-2	GEC

DC CONDUITS	DC VOLTAGE DROP	DESIGN LINE CURRENT	MINIMUM CORRECTED AMPACITY	CONDUIT FILL	CONDUCTOR CORRECTED AMPACITY
CONDUIT NAME	(2*ONE WAY LENGTH*RESISTANCE PER 1000FT*PHASE CURRENT/1000 FT/STRING VOLTAGE/# WIRES PER PHASE)- VOLTAGE DROP IN CONDUIT	ISC*1.56	ISC*1.25	100*(TOTAL CONDUCTOR AREA)/(CONDUIT AREA)*(PERCENT ALLOWED FILL) = PERCENT MAXIMUM FILL	CONDUCTOR AMPACITY AT 30C * CONDUCTOR PER PHASE * TEMP. CORRECTION FACTOR * FILL ADJUSTMENT FACTOR = CONDUCTOR CORRECTED AMPACITY
DC1.1	(2 * 5 * 0.491 * 32.3 / 1000FT / 349.14 / 1) = 0.04%	(32.3 * 1.56) = 50.47	(32.3 * 1.25) = 40.38	100 * 0.14 / (0.53 * 0.4) = 65%	(75 * 1 * 0.96 * 1) = 72

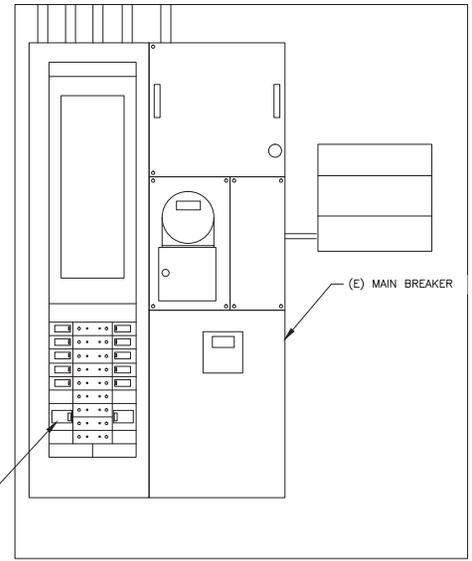
AC CONDUITS ( For 3-Phase system)	3 PHASE AC VOLTAGE DROP	DESIGN LINE CURRENT	MINIMUM CORRECTED AMPACITY	CONDUIT FILL	CONDUCTOR CORRECTED AMPACITY
CONDUIT NAME	1.732*ONE WAY LENGTH*RESISTANCE PER 1000FT*PHASE CURRENT/1000 FT/OPERATING VOLTAGE/# WIRES PER PHASE) = VOLTAGE DROP IN CONDUIT	OPERATING CURRENT*1.25	OPERATING CURRENT*1.25	100*(TOTAL CONDUCTOR AREA)/(CONDUIT AREA)*(PERCENT ALLOWED FILL) = PERCENT MAXIMUM FILL	CONDUCTOR AMPACITY AT 30C * CONDUCTOR PER PHASE * TEMP. CORRECTION FACTOR * FILL ADJUSTMENT FACTOR = CONDUCTOR CORRECTED AMPACITY
AC1.1	(1.732*95 * 0.194 * 48 / 1000FT / 208 / 1)=0.74%	(48.1 * 1.25) = 60.13	(48.1 * 1.25) = 60.13	100 * 0.38 / (1.5 * 0.4) = 64%	(130*1*0.96*1) = 124.8

PANEL VOC, 25C	64.9
NUMBER IN SERIES	7
STRING VOC STC	454.3
DESIGN LOW, (ASHRAE) C	0
TEMP COEFFICIENT, %/C	-0.27%
PANEL VOC * NUMBER IN SERIES * (1 - (25 - DESIGN LOW TEMP) * VOC TEMP COEFFICIENT) = MAX VOC AT DESIGN LOW	
(64.9 * 7 * (1 - (25 - 0) * (-0.00272))) = 485.19	

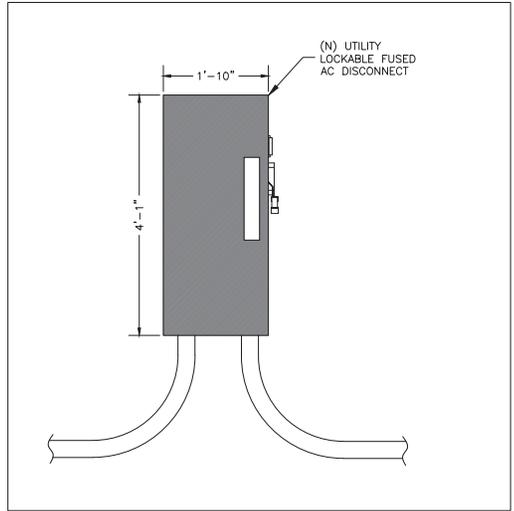
Circuit Voltage Drop	INV-1.1	INV-1.2	INV-1.3	INV-1.4	INV-1.5	INV-1.6
Total DC drop	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
Total AC drop	1.77%	1.77%	1.46%	1.46%	1.27%	1.27%
Total voltage drop	2.03%	2.03%	1.72%	1.72%	1.52%	1.52%



**A** EQUIPMENT LAYOUT PLAN  
SCALE: 1"=1'-0"



**C** EXISTING EQUIPMENT ELEVATION  
SCALE: NTS



**B** EQUIPMENT ELEVATION  
SCALE: 1"=1'-0"



PROJECT TITLE:  
**CAMPBELL UMC**  
1675 S. WINCHESTER BLVD.,  
CAMPBELL, CA 95008



DATE	ISSUE
11-14-13	FOR SUBMITTAL
12-10-13	FOR RESUBMITTAL
01-28-14	FOR RESUBMITTAL
02-11-14	FOR RESUBMITTAL
04-25-14	FOR RESUBMITTAL

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APPROVED BY: JHA

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1"=1'-0"

SHEET TITLE:  
**EQUIPMENT LAYOUT PLAN**

SHEET #:  
E.5.1



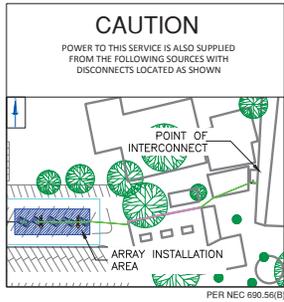
1 COMBINER BOX / CIRCUITS / ENCLOSURES

**WARNING**  
ELECTRICAL SHOCK HAZARD  
DO NOT TOUCH TERMINALS  
TERMINALS ON BOTH LINE AND  
LOAD SIDES MAY BE ENERGIZED IN  
THE OPEN POSITION  
PER NEC 690.17(4)

**WARNING**  
ELECTRICAL SHOCK HAZARD  
THE DC CONDUCTORS OF THIS  
PHOTOVOLTAIC SYSTEM ARE  
UNGROUNDING AND MAY BE ENERGIZED  
PER NEC 690.35(F)

**WARNING:**  
TURN OFF PHOTOVOLTAIC  
AC DISCONNECT PRIOR TO  
WORKING INSIDE PANEL  
PER NEC 110.27(C) & OSHA 1910.145(F)(7)

2 BUILDING / STRUCTURE



3 EMT / CONDUIT RACEWAYS  
(REFLECTIVE MATERIAL REQUIRED)

**PHOTOVOLTAIC POWER SOURCE**  
PER NEC 690.31 (E) (3) & IFC 605.11.1.2

**PHOTOVOLTAIC POWER SOURCE**  
DO NOT REMOVE UNLESS REPEATED REARCT LOCATION. INVERTER CIRCUIT DIRECTLY BELOW  
PER NEC 690.4(F)

**CAUTION: SOLAR ELECTRIC**  
PER NEC 690.31 (E) (3) &  
IFC 605.11.1.2, 605.11.1.4

4 DC DISCONNECT / BREAKER / RECOMBINER BOX

**WARNING**  
ELECTRICAL SHOCK HAZARD  
THE DC CONDUCTORS OF THIS  
PHOTOVOLTAIC SYSTEM ARE  
UNGROUNDING AND MAY BE ENERGIZED  
PER NEC 690.35(F)

**WARNING**  
ELECTRICAL SHOCK HAZARD  
DO NOT TOUCH TERMINALS  
TERMINALS ON BOTH LINE AND  
LOAD SIDES MAY BE ENERGIZED IN  
THE OPEN POSITION  
DC VOLTAGE IS ALWAYS PRESENT  
WHEN SOLAR MODULES  
ARE EXPOSED TO SUNLIGHT  
PER NEC 690.17(4)

**PHOTOVOLTAIC COMBINER BOX**  
"CB1-1"  
RATED MAX POWER-POINT CURRENT: 15A/30P  
RATED MAX POWER-POINT VOLTAGE: 600V  
MAXIMUM SYSTEM VOLTAGE: 685-2V  
OPERATING CURRENT: 15A/30P  
DISCONNECT MAX CURRENT RATING: 15A  
DISCONNECT OPERATING CURRENT: 30A  
PER NEC 690.53

**PHOTOVOLTAIC COMBINER BOX**  
"CB1-2"  
RATED MAX POWER-POINT CURRENT: 15A/30P  
RATED MAX POWER-POINT VOLTAGE: 600V  
MAXIMUM SYSTEM VOLTAGE: 685-2V  
OPERATING CURRENT: 15A/30P  
DISCONNECT MAX CURRENT RATING: 15A  
DISCONNECT OPERATING CURRENT: 30A  
PER NEC 690.53

**PHOTOVOLTAIC COMBINER BOX**  
"CB1-3"  
RATED MAX POWER-POINT CURRENT: 15A/30P  
RATED MAX POWER-POINT VOLTAGE: 600V  
MAXIMUM SYSTEM VOLTAGE: 685-2V  
OPERATING CURRENT: 15A/30P  
DISCONNECT MAX CURRENT RATING: 15A  
DISCONNECT OPERATING CURRENT: 30A  
PER NEC 690.53

**PHOTOVOLTAIC COMBINER BOX**  
"CB1-4"  
RATED MAX POWER-POINT CURRENT: 15A/30P  
RATED MAX POWER-POINT VOLTAGE: 600V  
MAXIMUM SYSTEM VOLTAGE: 685-2V  
OPERATING CURRENT: 15A/30P  
DISCONNECT MAX CURRENT RATING: 15A  
DISCONNECT OPERATING CURRENT: 30A  
PER NEC 690.53

**PHOTOVOLTAIC COMBINER BOX**  
"CB1-5"  
RATED MAX POWER-POINT CURRENT: 15A/30P  
RATED MAX POWER-POINT VOLTAGE: 600V  
MAXIMUM SYSTEM VOLTAGE: 685-2V  
OPERATING CURRENT: 15A/30P  
DISCONNECT MAX CURRENT RATING: 15A  
DISCONNECT OPERATING CURRENT: 30A  
PER NEC 690.53

**PHOTOVOLTAIC COMBINER BOX**  
"CB1-6"  
RATED MAX POWER-POINT CURRENT: 15A/30P  
RATED MAX POWER-POINT VOLTAGE: 600V  
MAXIMUM SYSTEM VOLTAGE: 685-2V  
OPERATING CURRENT: 15A/30P  
DISCONNECT MAX CURRENT RATING: 15A  
DISCONNECT OPERATING CURRENT: 30A  
PER NEC 690.53

5 INVERTER

**WARNING**  
ELECTRICAL SHOCK HAZARD  
IF A GROUND FAULT IS INDICATED  
NORMALLY GROUNDING CONDUCTORS  
MAY BE UNGROUNDING AND ENERGIZED  
PER NEC 690.5(C)

6 PRODUCTION / NET METER

**WARNING**  
ELECTRICAL SHOCK HAZARD  
IF A GROUND FAULT IS INDICATED  
NORMALLY GROUNDING CONDUCTORS  
MAY BE UNGROUNDING AND ENERGIZED  
PER NEC 690.5(C)

7 PRODUCTION / NET METER (BI-DIRECTIONAL)

**CAUTION:**  
SOLAR ELECTRIC SYSTEM CONNECTED  
PER NEC 690.14(C)(2), IFC 605.11.1,  
IFC 605.11.1.4, NEC 690.15 & NEC 690.53

**WARNING DUAL POWER SOURCE**  
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM  
PER NEC 705.12(D)(4) & NEC 690.64

8 AC DISCONNECT / BREAKER / POINTS OF CONNECTION

**PHOTOVOLTAIC AC DISCONNECT**  
PER IFC 605.11.1, IFC 605.11.1.4,  
NEC 690.15, NEC 690.14(C)(2)

**WARNING**  
ELECTRICAL SHOCK HAZARD  
DO NOT TOUCH TERMINALS  
TERMINALS ON BOTH LINE AND  
LOAD SIDES MAY BE ENERGIZED IN  
THE OPEN POSITION  
PER NEC 690.17(4)

**PHOTOVOLTAIC AC DISCONNECT**  
MAXIMUM AC OPERATING CURRENT: 15A/30P  
NOMINAL OPERATING AC VOLTAGE: 208/240V  
PER NEC 690.14(C)(2)

9 BREAKER PANEL / PULL BOXES

**WARNING**  
ELECTRICAL SHOCK HAZARD  
IF A GROUND FAULT IS INDICATED  
NORMALLY GROUNDING CONDUCTORS  
MAY BE UNGROUNDING AND ENERGIZED  
PER NEC 690.5(C)

**WARNING**  
ELECTRICAL SHOCK HAZARD  
DO NOT TOUCH TERMINALS  
TERMINALS ON BOTH LINE AND  
LOAD SIDES MAY BE ENERGIZED IN  
THE OPEN POSITION  
PER NEC 690.17(4)

**WARNING:**  
TURN OFF PHOTOVOLTAIC  
AC DISCONNECT PRIOR TO  
WORKING INSIDE PANEL  
PER NEC 110.27(C) & OSHA 1910.145(F)(7)

**WARNING DUAL POWER SOURCE**  
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM  
PER NEC 705.12(D)(4) & NEC 690.64

**CAUTION:**  
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED  
PER NEC 705.12(D)(4) & NEC 690.64

**DO NOT DISCONNECT UNDER LOAD**  
PER NEC 690.33(E)(2)

**WARNING**  
ELECTRICAL SHOCK HAZARD  
THE DC CONDUCTORS OF THIS  
PHOTOVOLTAIC SYSTEM ARE  
UNGROUNDING AND MAY BE ENERGIZED  
PER NEC 690.35(F)

10 MAIN SERVICE DISCONNECT

**MAIN PV SYSTEM AC DISCONNECT**  
PER NEC 690.14(C)(2), IFC 605.11.1,  
IFC 605.11.1.4, NEC 690.15 & NEC 690.53

**CAUTION:**  
SOLAR ELECTRIC SYSTEM CONNECTED  
PER NEC 690.14(C)(2), IFC 605.11.1,  
IFC 605.11.1.4, NEC 690.15 & NEC 690.53

**SOLAR DISCONNECT**  
PER IFC 605.11.1

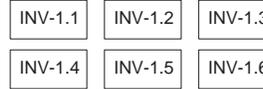
**MAIN PV SYSTEM DISCONNECT**  
PER NEC 690.14(C)(2), IFC 605.11.1,  
IFC 605.11.1.4, NEC 690.15 & NEC 690.53

**WARNING**  
ELECTRICAL SHOCK HAZARD  
DO NOT TOUCH TERMINALS  
TERMINALS ON BOTH LINE AND  
LOAD SIDES MAY BE ENERGIZED IN  
THE OPEN POSITION  
PER NEC 690.17(4)

**WARNING:**  
TURN OFF PHOTOVOLTAIC  
AC DISCONNECT PRIOR TO  
WORKING INSIDE PANEL  
PER NEC 110.27(C) & OSHA 1910.145(F)(7)

12 FIELD MARKING  
NOTE:  
ELECTRICAL SERVICE EQUIPMENT MUST BE FIELD MARKED PER THE NEC CODE  
WHEN IT IS PRESENT IN A BUILDING OR STRUCTURE (OTHER THAN DWELLING  
UNITS) SUPPORTED BY MORE THAN ONE SERVICE PROVIDER (I.E., PUBLIC  
UTILITIES SUCH AS ELECTRICITY AND A PV SYSTEM).  
THIS INCLUDES ARC FLASH AND INFORMATION LABELING.

a. INVERTER



PER NEC 408.4(B)

b. BREAKER PANEL / PULL BOXES / MAIN SERVICE DISCONNECT

**WARNING**  
ARC-FLASH AND SHOCK HAZARD  
APPROPRIATE PPE REQUIRED  
PER NEC ARTICLE 110.16 AND NFPA 2012 ARTICLE 130.5(C)(1),(2),(3)

c. BREAKER PANEL

**THIS PANEL FED FROM INV-1.1 THROUGH INV-1.6**  
PER NEC 408.4(B)

GENERAL NOTES FOR LABELS AND MARKINGS:

- Labels and markings shall be applied to the appropriate components in accordance with the NEC.
- Solar modules are supplied from the manufacturer with markings pre-applied to meet the requirements of the NEC.
- The inverter is supplied from the manufacturer with the appropriate labels and markings to meet the requirements of NEC.
- IFC requires that these labels must have reflective properties so that they are clearly visible in the beam of a flashlight. The IFC is specifying that the markings must be detectable from a distance, which denotes that the minimum text height is 3/8" using white lettering on a red background.

ADHESIVE FASTENED SIGNS

- IFC 605.11.1.3  
Adhesive fastened signs may be acceptable if properly adhered. Vinyl signs shall be weather resistant.
- NEC 110.21  
The markings shall be sufficient durability to withstand the environment involved.
- IFC 605.11.1.1  
The materials used for marking shall be reflective, weather resistant and suitable for the environment.

LABELING REQUIREMENTS FOR ARTICLE 690

NEC 690.14(C)(2)  
Each photovoltaic system disconnect means shall be permanently marked to identify it as a photovoltaic system disconnect.  
NEC 690.15, IFC 605.11.1 & IFC 605.11.1.4  
If the equipment is energized from more than one source, the disconnecting means must be grouped and identified.

NEC 690.16(B)  
Non-load break rated disconnect means shall be marked.  
NEC 690.17(4)  
Where all terminals of the disconnecting means may be energized in the open position, a warning label shall be mounted on or adjacent to the disconnecting means.

NEC 690.31(E)(3), IFC 605.11.1.2  
Labels shall appear at every section of the wiring system that is separated by enclosures, walls, partitions, ceilings or floors. Spacing between labels not to exceed 10 feet (3M).

NEC 690.33(E)(2)  
Interruption current - be a type that requires the use of a tool to open will be marked "Do Not Disconnect Under Load".

NEC 690.35(F)  
A PV power source shall be labeled at each junction box, combiner box or disconnect, and device where energized, ungrounded circuits may be exposed during service.

NEC 690.4(F)  
Where circuits are embedded in build up, laminate or membrane roofing materials not covered by PV modules and associated equipment, the location of the circuits shall be clearly marked.

NEC 690.5(C)  
A label shall appear on the utility interactive inverter or be applied by the installer near the ground fault indicator at a visible location.

NEC 690.52  
AC modules shall be marked with identification terminals or leads with the ratings as shown on the label.

NEC 690.53  
A permanent label for the direct-current PV power source shall be provided by the installer at the DC disconnecting means.

NEC 690.54  
All interactive system points of interconnection with other sources shall be marked at an accessible location at the disconnecting means as the power source and with the rated AC output current and the nominal operating AC voltage.

NEC 690.55  
PV power systems employing energy storage shall also be marked with the maximum operating voltage, including any equalization voltage and polarity of the grounded circuit conductor.

NEC 690.64  
Points of connection shall be in accordance with NEC 705.12.

NEC 705.12(D)(4)  
Equipment containing overcurrent devices in circuits supplying power to a busbar or conductor supplied from multiple sources shall be marked to indicate the presence of all sources.

REQUIREMENTS FOR ELECTRICAL INSTALLATIONS (FIELD MARKING)

NFPA 2012 130.5(C)  
Same as NEC 110.16 but includes additional label information that is required after 9/30/2011. Check latest 2012 NFPA Arc Flash requirements.

OSHA 1910.145(F)(7)  
Warning tags are used to represent a hazard level between "Caution" and "Danger".

NEC 110.16  
Electrical equipment that are in other than dwelling units shall be field marked to warn qualified persons of a potential Arc Flash hazard.

NEC 110.24(A)  
Service equipment in other than dwelling units shall be legibly field marked with the available fault current.

NEC 110.27(C)  
Entrances to rooms or other guarded locations that contain exposed live parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter.

NEC 230.2(E)  
Where a building or structure is supported by more than one service, add a plaque to denote all other services.

NEC 408.4(B)  
All switchboards and panelboards supplied by a feeder in other than one or two family dwellings shall be marked to indicate the device or equipment where the power supply originates.

IFC 605.11.3  
Adhesive fastened signs may be acceptable if properly adhered. Vinyl signs shall be weather resistant.

NEC 110.21  
The markings shall be of sufficient durability to withstand the environment involved.

IFC 605.11.1  
The materials used for marking shall be reflective, weather resistant and suitable for the environment.

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