

SAMPLE DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY AND IS NOT TO BE USED FOR DESIGN OR CONSTRUCTION. THIS DRAWING AND ITS SUITABILITY FOR END-USE IS NOT IMPLIED. THE INTENT IS TO ONLY ILLUSTRATE TYPICAL MINIMUM INFORMATION REQUIRED AT TIME OF APPLICATION TO APS. ADDITIONAL INFORMATION MAY BE REQUIRED,

WHOLE HOME SYSTEM

NOTE: All equipment must be utilized in accordance with the manufacturer's intended use and design specifications.

REFERENCE SHEET 3 FOR KEYED NOTES.

(N)(64) ENPHASE IQ8-60-2-US, 240V MICRO-INVERTERS, 240V, 1.00A MAX CEC WEIGHTED EFFICIENCY 97.0% NEMA 6, UL LISTED, INTERNAL GFDI (5)(8)(10)

(N) COMBINER PANEL ENPHASE IQ COMBINER 3 MAXIMUM 64A/240V CONTINUOUS, PROTECTION MAX 80A BREAKER ON SOLAR OUPUT; WITH MINIMUM 10 KAIC CIRCUIT BREAKERS

(N) ENPHASE ENPOWER SMART SWITCH MICROGRID INTERCONNECT DEVICE, EP200G101-M240US00, NEMA 3R, 160A RATED, 240V (1)(13)

(N) SERVICE ENTRANCE SECTION BI-DIRECTIONAL METER

200A FUSIBLE PULLOUT W/200A CLASS T FUSES
GROUNDING ELECTRODE

UTILITY GRID 120/240V 1 PHASE, 3 WIRE

(N) UTILITY DISCONNECT (VISIBLE OPEN, NON FUSED) [SPECIFY MAKE & MODEL #] 2-POLE, 200A, 240 VAC

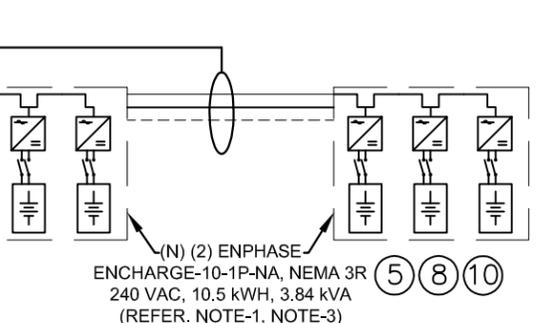
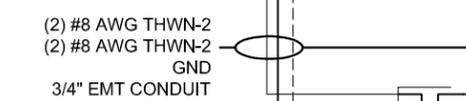
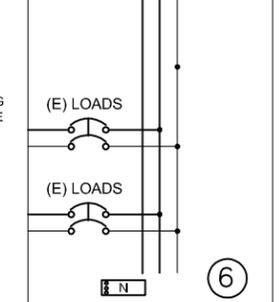
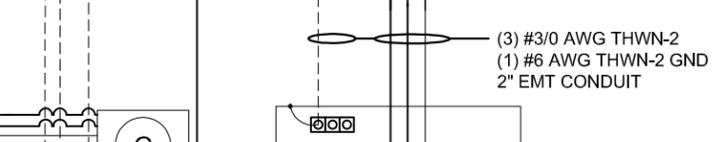
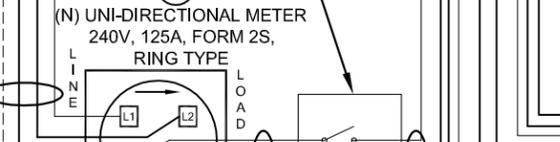
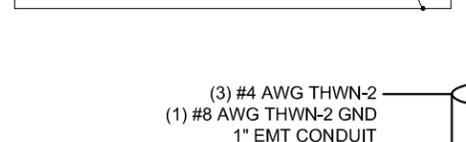
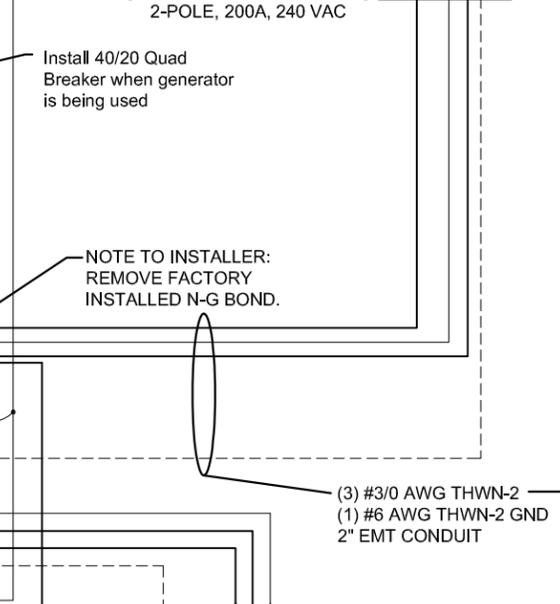
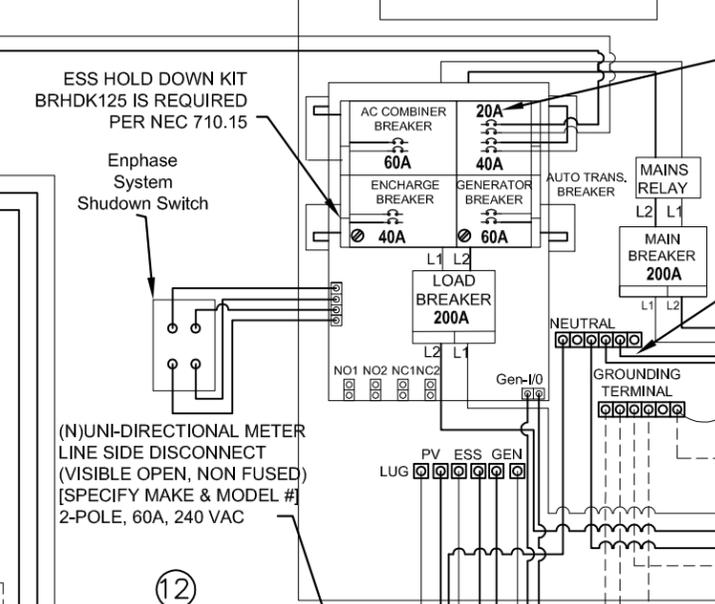
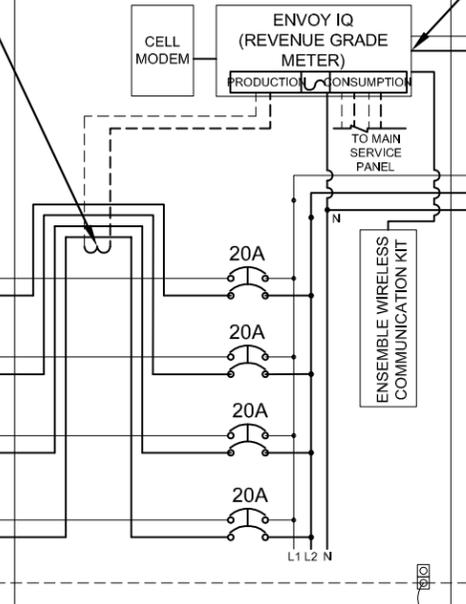
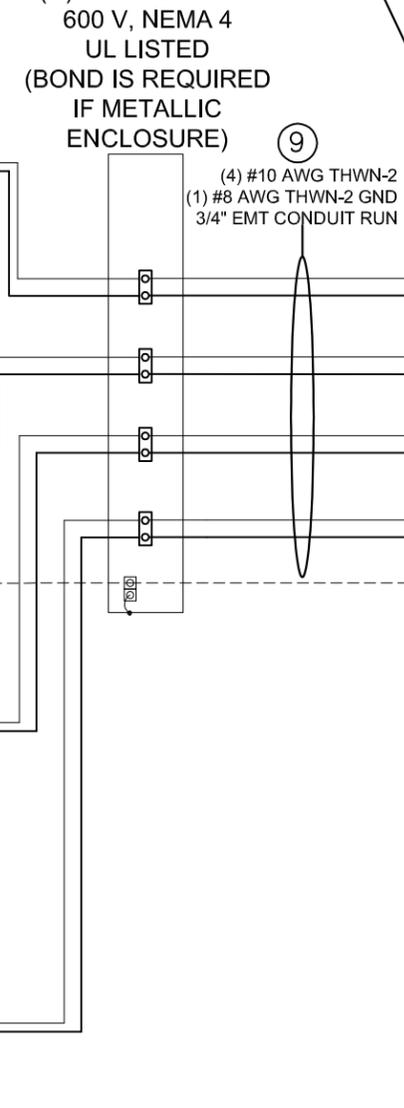
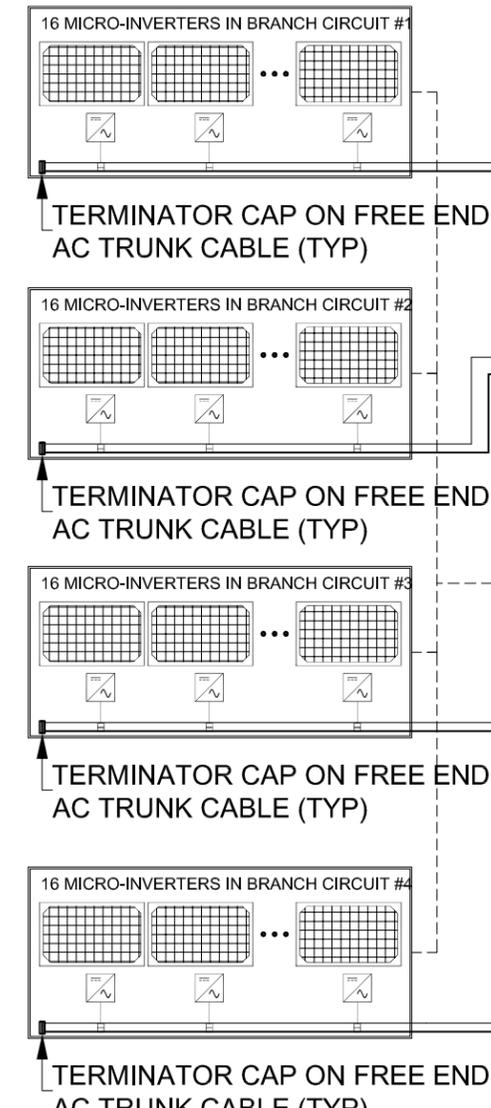
(N) JUNCTION BOX 600 V, NEMA 4 UL LISTED (BOND IS REQUIRED IF METALLIC ENCLOSURE)

WIFI OR ETHERNET MUST BE CONNECTED

ESS HOLD DOWN KIT BRHDK125 IS REQUIRED PER NEC 710.15

Install 40/20 Quad Breaker when generator is being used

NOTE TO INSTALLER: REMOVE FACTORY INSTALLED N-G BOND.



- NOTE:-
- (1) ENCHARGE BATTERY SYSTEM ENERGY CAPACITY SHALL BE SIZED TO SUPPLY ALL DESIRED LOADS DURING AN OUTAGE. POWER CAPACITY OF THE ENCHARGE BATTERY SYSTEM SHALL BE CAPABLE OF SUPPLYING THE LARGEST LOAD ON SITE, PER 2020 NEC 710.15(A) & NEC 710.15(E).
 - (2) ENCHARGE BATTERY STORAGE DISCONNECT SHALL BE SECURED USING AN EATON TYPE-BR CIRCUIT BREAKER HOLD DOWN KIT #BRHDK125 (2020 NEC 710.15(E))
 - (3) DISTANCE BETWEEN ENPOWER AND ENCHARGE SHOULD BE LESS THAN 5' ELSE AN AC DISCONNECT WILL BE REQUIRED
 - (4) INSTALLER TO VERIFY HOW ENCLOSURES ARE COUPLED TOGETHER VIA CHASE NIPPLE/ CONDUIT
 - (5) DRAWING COMPLIES WITH NEC 2020.

REVISIONS	DATE	DESCRIPTION	DESIGNED BY	DESIGNED	TEAM	SRB	ML
Initial	12/02/2021	Design		00			
ESS	05/26/2023	REV		01			

Project Name & Address

48AC/48DC kW DER SYSTEM
L C SMITH
12 SHOTGUN WAY, ANY CITY,
AZ 85123

Sheet Name
3-LINE
DIAGRAM

Sheet Size
ANSI B
11" X 17"

Sheet Number
SHEET 1

DRAWN BY
DESIGN TEAM

NEC 110.31(D) ENCLOSED EQUIPMENT ACCESSIBLE TO UNQUALIFIED PERSONS. VENTILATING OR SIMILAR OPENINGS IN EQUIPMENT SHALL BE DESIGNED SUCH THAT FOREIGN OBJECTS INSERTED THROUGH THESE OPENINGS ARE DEFLECTED FROM ENERGIZED PARTS. WHERE EXPOSED TO PHYSICAL DAMAGE FROM VEHICULAR TRAFFIC, SUITABLE GUARDS SHALL BE PROVIDED. EQUIPMENT LOCATED OUTDOORS AND ACCESSIBLE TO UNQUALIFIED PERSONS SHALL BE DESIGNED SUCH THAT EXPOSED NUTS OR BOLTS CANNOT BE READILY REMOVED, PERMITTING ACCESS TO LIVE PARTS. WHERE EQUIPMENT IS ACCESSIBLE TO UNQUALIFIED PERSONS AND THE BOTTOM OF THE ENCLOSURE IS LESS THAN 2.5 M (8FT.) ABOVE THE FLOOR OR GRADE LEVEL, THE ENCLOSURE DOOR OR HINGED COVER SHALL BE KEPT LOCKED. DOORS AND COVERS OF ENCLOSURES USED SOLELY AS PULL BOXES, SPLICE BOXES, OR JUNCTION BOXES SHALL BE LOCKED, BOLTED, OR SCREWED ON. UNDERGROUND BOX COVERS THAT WEIGH OVER 45.4 KG (100LB) SHALL BE CONSIDERED AS MEETING THIS REQUIREMENT.

NEC 240.4(B) DEVICES RATED 800 AMPERES OR LESS. THE NEXT HIGHER STANDARD OVERCURRENT DEVICE RATING (ABOVE THE AMPACITY OF THE CONDUCTORS BEING PROTECTED) SHALL BE PERMITTED TO BE USED IF: 1) THE CONDUCTORS BEING PROTECTED ARE NOT PART OF A MULTIOUTLET BRANCH CIRCUIT SUPPLYING RECEPTACLES FOR CORD-AND-PLUG-CONNECTED PORTABLE LOADS. 2) THE AMPACITY OF THE CONDUCTORS DOES NOT CORRESPOND WITH THE STANDARD AMPERE RATING OF A FUSE OR A CIRCUIT BREAKER WITHOUT OVERLOAD TRIP ADJUSTMENTS ABOVE ITS RATING. 3) THE NEXT HIGHER STANDARD RATING SELECTED DOES NOT EXCEED 800 AMPERES.

NEC 240.6(A) FUSES AND FIXED-TRIP CIRCUIT BREAKERS. THE STANDARD AMPERE RATINGS FOR FUSES AND INVERSE TIME CIRCUIT BREAKERS SHALL BE CONSIDERED: 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 110, 125, 150, 175, 200, 225, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000, 1200, 1600, 2000, 2500, 3000, 4000, 5000, 6000 AMPERES.

NEC 250.64(C) GROUNDING ELECTRODE CONDUCTOR BE CONTINUOUS, GROUND CRIMPS
NEC 250.160 TO BE IRREVERSIBLE.
AND PART VIII

NEC 250.97 FOR CIRCUITS OVER 250 VOLTS TO GROUND, THE ELECTRICAL CONTINUITY OF METAL RACEWAYS AND CABLES WITH METAL SHEATHS THAT CONTAIN ANY CONDUCTOR OTHER THAN SERVICE CONDUCTORS SHALL BE ENSURED BY ONE OR MORE OF THE METHODS SPECIFIED FOR SERVICES IN 250.90(B), EXCEPT OR (B)(1).

----- MODULE CONNECTION ARRANGEMENT SHALL BE ARRANGED SO THAT REMOVAL OF A MODULE OR PANEL FROM A PHOTOVOLTAIC SOURCE CIRCUIT DOES NOT INTERRUPT A GROUNDED CONDUCTOR TO ANOTHER PHOTOVOLTAIC SOURCE CURRENT.

NEC 690.41 GROUND-FAULT PROTECTION.

NEC 110.27 OUTPUT CIRCUITS OVER 150 VOLTS TO GROUND SHALL NOT BE ACCESSIBLE TO OTHER THAN QUALIFIED PERSONS WHILE ENERGIZED.

NEC 690.8(A)(1) PHOTOVOLTAIC SOURCE CIRCUIT CURRENTS. THE MAXIMUM CURRENT SHALL BE THE SUM OF THE PARALLEL MODULE RATED SHORT-CIRCUIT CURRENTS MULTIPLIED BY 125 PERCENT.

NEC 690.8(A)(3) INVERTER OUTPUT CIRCUIT CURRENT. THE MAXIMUM CURRENT SHALL BE THE INVERTER CONTINUOUS OUTPUT CURRENT RATING.

NEC 690.8(B)(1) SIZING OF CONDUCTORS AND OVERCURRENT DEVICES. THE CIRCUIT CONDUCTORS AND
NEC 690.8(B)(2) OVERCURRENT DEVICES SHALL BE SIZED TO CARRY NOT LESS THAN 125 PERCENT OF
NEC 690.8(B)(3) THE MAXIMUM CURRENTS AS CALCULATED IN 690.8(A). THE RATING OR SETTING OF OVERCURRENT DEVICES SHALL BE PERMITTED IN ACCORDANCE WITH 240.4(B) AND (C).

NEC 690.13(B) PV SYSTEM DISCONNECT SHALL BE SIGNED LABELED:
 WARNING - ELECTRIC SHOCK HAZARD
 TERMINALS ON THE LINE AND LOAD SIDES
 MAY BE ENERGIZED IN THE OPEN POSITION
 PV SYSTEM DISCONNECT SHALL BE PERMANENTLY MARKED AS A "PHOTOVOLTAIC SYSTEM DISCONNECT."

NEC 690.33 (A) CONFIGURATION
 (B) GUARDING
 (C) TYPE
 (D) GROUNDING MEMBER
 (E) INTERRUPTION OF CIRCUIT
 LABELED "DO NOT DISCONNECT UNDER LOAD"

NEC 690.53 PERMANENT LABEL FOR DIRECT-CURRENT PHOTOVOLTAIC POWER SOURCE AT DISCONNECTING MEANS:
 (1) MAXIMUM VOLTAGE [REF: 690.7]
 (2) MAXIMUM CIRCUIT CURRENT [REF: 690.8(A)]
 (3) MAXIMUM RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER (IF INSTALLED)

NEC 690.56(B) PERMANENT LABEL/PLAQUE: [SOURCE/LABEL]
 PV SYSTEM DISCONNECT / REF: NEC690.13 (B)
 UTILITY SERVICE PANEL / "UTILITY SERVICE DISCONNECT."

NEC 690.56(C) BUILDINGS WITH RAPID SHUTDOWN
 (1) RAPID SHUTDOWN TYPE
 (a) FOR PV SYSTEMS THAT SHUT DOWN THE ARRAY AND CONDUCTORS LEAVING THE ARRAY SHALL BE LABELED:
 "SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN. TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN ARRAY".
 (b) FOR PV SYSTEMS THAT ONLY SHUT DOWN CONDUCTORS LEAVING THE ARRAY:
 "SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUTDOWN CONDUCTORS OUTSIDE THE ARRAY. CONDUCTORS IN ARRAY REMAIN ENERGIZED IN SUNLIGHT".

THE TITLE "SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN" SHALL UTILIZE CAPITALIZED CHARACTERS WITH A MINIMUM HEIGHT OF $\frac{3}{8}$ INCH IN WHITE ON RED BACKGROUND AND THE REMAINING CHARACTERS SHALL BE CAPITALIZED WITH A MINIMUM HEIGHT OF $\frac{3}{16}$ INCH IN BLACK ON WHITE BACKGROUND.

NEC 705.12(B)(4) CIRCUIT BREAKERS, IF BACKFED, SHALL BE SUITABLE FOR SUCH OPERATION.

NEC 705.10 A PERMANENT PLAQUE OR DIRECTORY, DENOTING ALL ELECTRIC POWER SOURCES ON OR IN THE PREMISES, SHALL BE INSTALLED AT EACH SERVICE EQUIPMENT LOCATION AND AT LOCATIONS OF ALL ELECTRIC POWER PRODUCTION SOURCES CAPABLE OF BEING INTERCONNECTED. EXCEPTION: INSTALLATIONS WITH LARGE NUMBERS OF POWER PRODUCTION SOURCES SHALL BE PERMITTED TO BE DESIGNATED BY GROUPS.

NEC TABLE 250.66 SIZE OF ALTERNATING-CURRENT GROUNDING ELECTRODE CONDUCTOR. THE SIZE OF THE GROUNDING ELECTRODE CONDUCTOR AT THE SERVICE, AT EACH BUILDING OR STRUCTURE WHERE SUPPLIED BY A FEEDER(S) OR BRANCH CIRCUIT(S), OR AT A SEPARATELY DERIVED SYSTEM OF A GROUNDED OR UNGROUNDED AC SYSTEM SHALL NOT BE LESS THAN GIVEN IN TABLE 250.66, EXCEPT AS PERMITTED IN 250.66(A) THROUGH (C).

NEC TABLE 310.15(B)(16) ALLOWABLE AMPACITIES OF INSULATED CONDUCTORS RATED 0 THROUGH 2000 VOLTS, 60°C THROUGH 90°C, NOT MORE THAN THREE CURRENT-CARRYING CONDUCTORS IN RACEWAY, CABLE, OR EARTH, BASED ON AMBIENT TEMPERATURE OF 30°C. NOTE CORRECTION FACTORS FOR AMBIENT TEMPERATURE AT END OF TABLE.

NFPA70E - 120.5 PROCESS FOR ESTABLISHING AND VERIFYING AN ELECTRICALLY SAFE WORK CONDITION. (1) DETERMINE ALL POSSIBLE SOURCES OF ELECTRICAL SUPPLY TO THE SPECIFIC EQUIPMENT. (2) AFTER PROPERLY INTERRUPTING THE LOAD CURRENT, OPEN THE DISCONNECTING DEVICE(S) FOR EACH SOURCE.
 (3) WHEREVER POSSIBLE, VISUALLY VERIFY THAT ALL BLADES OF THE DISCONNECTING DEVICES ARE FULLY OPEN.

REVISIONS	DESCRIPTION	DATE	REV	BY	DESIGN TEAM	SRB
	Initial Design	12/02/2021	00			

Project Name & Address

48AC/48DC kW DER SYSTEM
 L C SMITH
 12 SHOTGUN WAY, ANY CITY,
 AZ 85123

Sheet Name
 NEC
 NOTES

Sheet Size
 ANSI B
 11" X 17"

Sheet Number
 SHEET 2

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 DESIGN TEAM

KEYED NOTES:

- ① LABEL: "CAUTION – MULTI SOURCES OF POWER" ON PLACARD/DIRECTORY PER NEC 705.10.
- ② BI-DIRECTIONAL UTILITY METER TO BE INSTALLED BY UTILITY COMPANY.
- ③ LABEL BREAKER "PHOTOVOLTAIC ELECTRIC POWER SOURCE" "BREAKERS ARE BACKFED". LABEL WITH THE RATED AC OUTPUT CURRENT AND THE NOMINAL OPERATING VOLTAGE PER NEC 690.54.
- ④ LABEL "UTILITY DISCONNECT". SWITCH COVER TO BE LOCKED PER NEC 690.13(B) AT ALL TIMES BY UTILITY. SWITCH TO BE VISIBLE OPEN AND ACCESSIBLE PER UTILITY REQUIREMENTS AND CONFORM TO NEC 705.20.
- ⑤ LABEL "PHOTOVOLTAIC ARRAY DC DISCONNECT" PER NEC 690.13(B). LABEL WITH MAXIMUM DC VOLTAGE, CURRENT PER NEC 690.53. SWITCH COVER TO BE LOCKED PER NEC 690.13(A).
- ⑥ LABEL "WARNING: THIS SUB-PANEL FED FROM MULTI-POWER PRODUCTION SOURCES".
- ⑦ PROVIDE WARNING SIGN PER NEC 690.13(B) AND 706.15(C) READING "WARNING-ELECTRIC SHOCK HAZARD-TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.
- ⑧ INVERTER TO BE LISTED TO UL 1741SA AND SB.
- ⑨ METALLIC CONDUIT SHALL BE USED WITHIN BUILDING AND LABELED PER NEC 690.31 (D).
- ⑩ GROUND FAULT PROTECTION PER NEC 690.41(B) PROVIDED IN DC/AC INVERTER.

- ⑪ GEC TO BE INSTALLED AS REQUIRED PER MANUFACTURER INSTRUCTIONS AND NEC 690.47.
- ⑫ CUSTOMER WILL INSTALL RING-TYPE METER SOCKET WITH NON-DETENTED FORM 2S. APS WILL INSTALL THE PRODUCTION METERS. LABEL METER SOCKET UNII-DIRECTIONAL METER".
- ⑬ SYSTEM COMPLIES WITH RAPID SHUTDOWN PER NEC 690.56.
- ⑭ LABEL: "UNI-DIRECTIONAL METER LINE SIDE DISCONNECT". SWITCH COVER TO BE LOCKED PER NEC 690.13(B) AT ALL TIMES BY UTILITY. SWITCH TO BE VISIBLE OPEN & ACCESSIBLE PER UTILITY REQUIREMENTS AND CONFORM TO NEC 705.20.

GENERAL NOTES:

- A. EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE 2020 NEC AND ALL APPLICABLE REQUIREMENTS OF THE LOCAL AUTHORITY HAVING JURISDICTION.
- B. DC ARRAY PANEL GROUND WIRES MUST BE CONTINUOUS AND INSTALLED TO ALLOW FOR PANEL REMOVAL WITHOUT DISRUPTING CONTINUITY. ALL MODULE GROUND CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH NEC 690.43 & 690.47.
- C. FOLLOW MANUFACTURERS' SUGGESTED INSTALLATION PRACTICES AND WIRING SPECIFICATIONS FOR ALL EQUIPMENT.
- D. ARRAY DC WIRES SHALL BE RATED AND LABELED "SUNLIGHT RESISTANT" WHERE EXPOSED TO AMBIENT CONDITIONS. NEC 300.6(B)(1).
- E. DC EQUIPMENT SHOWN FOR ILLUSTRATION PURPOSES ONLY. ACTUAL DESIGN SHALL BE IN ACCORDANCE WITH THE NEC AND MANUFACTURER'S SPECIFICATIONS AND INSTALLATION SHALL BE IN ACCORDANCE WITH AHJ REQUIREMENTS.
- F. A PERMANENT PLAQUE OR DIRECTORY DENOTING ALL ELECTRIC POWER SOURCE DISCONNECTING MEANS ON OR IN THE PREMISES, SHALL BE INSTALLED AT EACH SERVICE EQUIPMENT LOCATION AND AT LOCATIONS OF ALL ELECTRIC POWER PRODUCTION SOURCES CAPABLE OF BEING INTERCONNECTED PER NEC 705.10.
- G. EQUIPMENT SHALL BE LISTED, TESTED AND MARKED TO WITHSTAND THE AVAILABLE SHORT CIRCUIT CURRENT.
- H. DWELLING BATTERY STORAGE ENERGY TRESHOLDS PER NFPA 855 (2020) SECTION 15.7.1, THE 2021 VERSION OF THE "INTERNATIONAL FIRE CODE" AND THE 2021 VERSION OF THE "INTERNATIONAL RESIDENTIAL FIRE CODE FOR ONE AND TWO FAMILY DWELLINGS":
 INDIVIDUAL: 20KWH
 AGGREGATE: 40KWH WITHIN CLOSETS AND STORAGE OR UTILITY SPACES
 80KWH IN ATTACHED OR DETACHED GARAGES AND DETACHED ACCESSORY STRUCTURES
 80KWH ON EXTERIOR WALLS
 80KWH IN OUTDOOR INSTALLATIONS

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REVISIONS	DESCRIPTION	DATE	REV	DRAWN BY	CHECKED BY
	Initial Design	12/02/2021	00		
	ESS REV	05/26/2023	01		

Project Name & Address

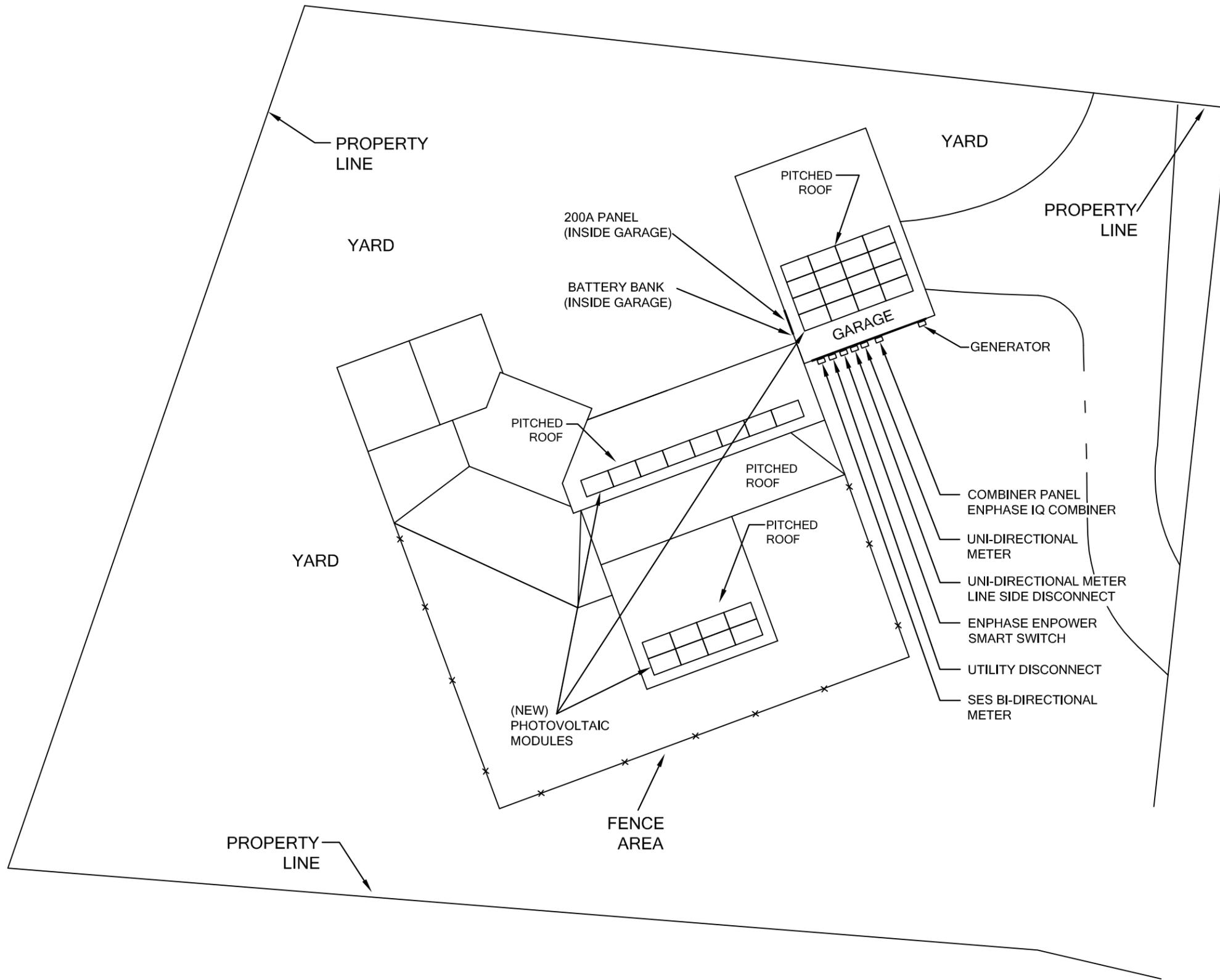
48AC/48DC kW DER SYSTEM
L C SMITH
12 SHOTGUN WAY, ANY CITY,
AZ 85123

Sheet Name
KEYED NOTES

Sheet Size
**ANSI B
 11" X 17"**

Sheet Number
SHEET 3

DRAWN BY
DESIGN TEAM



GENERAL NOTES:

NOTE: UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AND SERVICE ENTRANCE.

NOTE: WORKSPACE IN FRONT OF AC ELECTRICAL SYSTEM COMPONENTS SHALL BE IN ACCORDANCE WITH APS AND NEC REQUIREMENTS. FOR WORKSPACE AND ELEVATION OF PV SYSTEM UTILITY DISCONNECT, APS PRODUCTION METERS WITH ASSOCIATED DISCONNECTS, REFER TO SECTION 300 OF THE APS ESRM.

NOTE: REFERENCE SECTION 301.15 OF THE APS ESRM FOR ELECTRIC METER SEPARATION BETWEEN WATER, GAS METER AND FUEL SOURCES.

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48AC/48DC kW DER SYSTEM
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Sheet Name
SITE PLAN

Sheet Size
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Sheet Number
SHEET 4

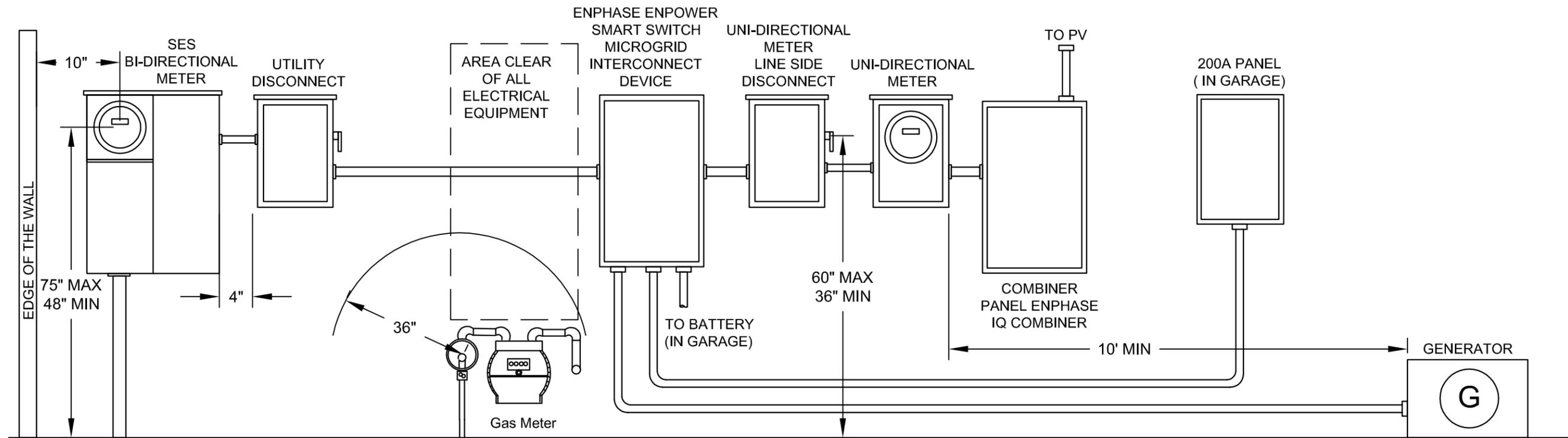
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Sheet Name
 EQUIPMENT
 ELEVATION

Sheet Size
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 11" X 17"

Sheet Number
SHEET 5

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