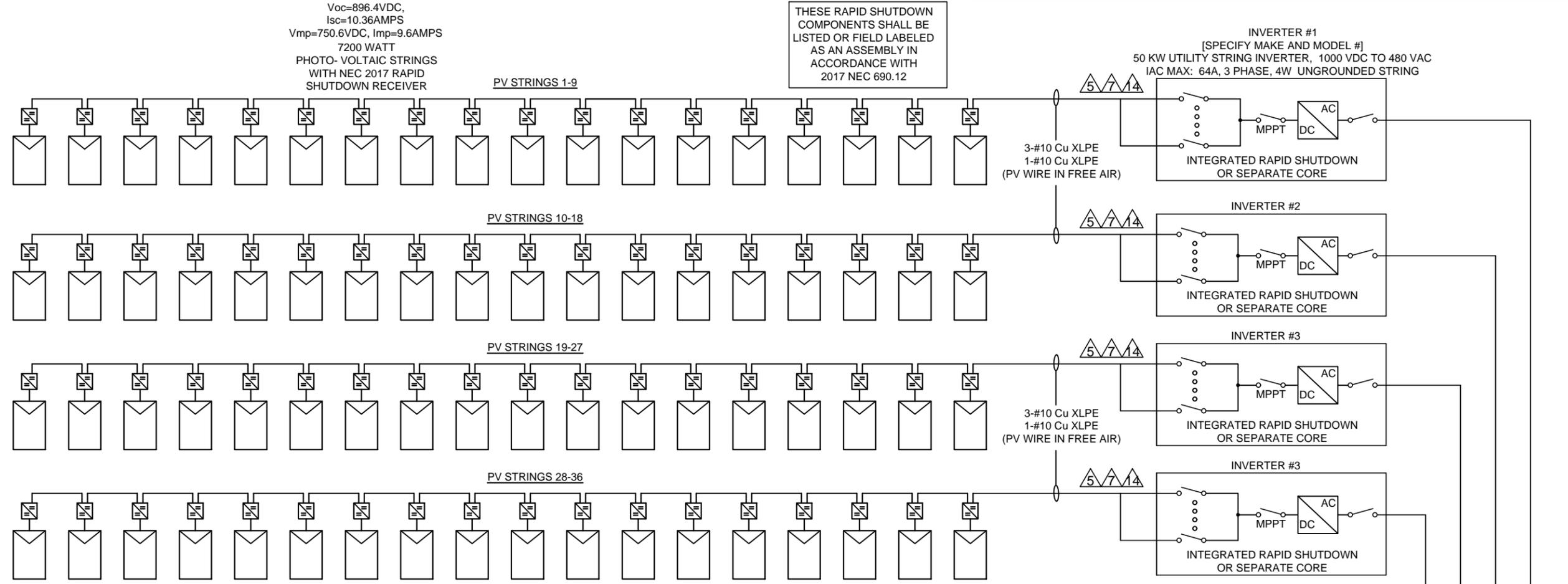
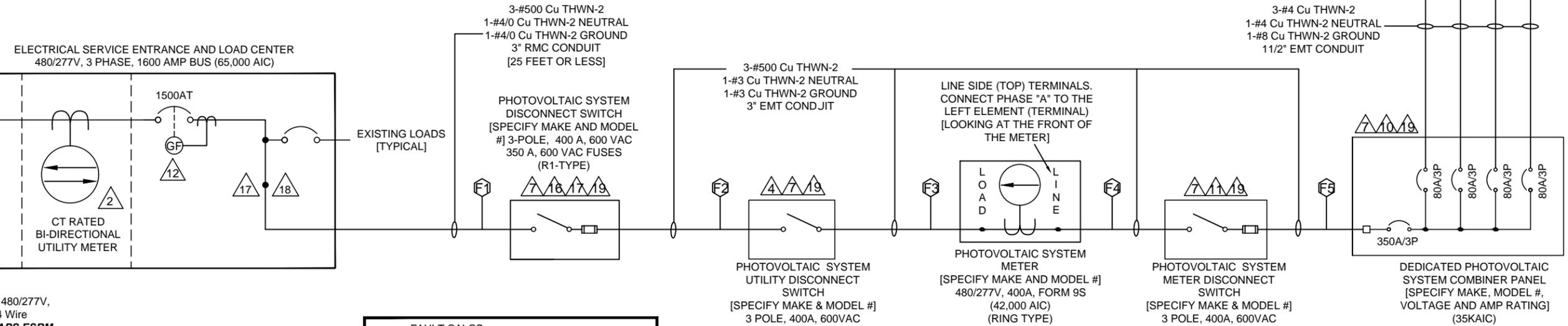


REV.	DESCRIPTION	DATE
A	NEW DRAWING - LST	12-19-14
B	REVISED PER 2017 NEC REQUIREMENTS	03-18-20



THESE RAPID SHUTDOWN COMPONENTS SHALL BE LISTED OR FIELD LABELED AS AN ASSEMBLY IN ACCORDANCE WITH 2017 NEC 690.12

Voc=896.4VDC, Isc=10.36AMPS
Vmp=750.6VDC, Imp=9.6AMPS
7200 WATT
PHOTO-VOLTAIC STRINGS WITH NEC 2017 RAPID SHUTDOWN RECEIVER



ELECTRICAL SERVICE ENTRANCE AND LOAD CENTER
480/277V, 3 PHASE, 1600 AMP BUS (65,000 AIC)

3-#500 Cu THWN-2
1-#4/0 Cu THWN-2 NEUTRAL
1-#4/0 Cu THWN-2 GROUND
3" RMC CONDUIT
[25 FEET OR LESS]

3-#4 Cu THWN-2
1-#4 Cu THWN-2 NEUTRAL
1-#8 Cu THWN-2 GROUND
1 1/2" EMT CONDUIT

FAULT CALCS:

F1: AVAIL = 32,990 AIC d = 10 feet f = 0.0537 m = 0.949 Isc = 31,309 AIC	F2: AVAIL = 31,309 AIC d = 10 feet f = 0.0509 m = 0.9515 Isc = 29,790 AIC
F3: AVAIL = 29,790 AIC d = 10 feet f = 0.0485 m = 0.954 Isc = 28,419 AIC	F4: AVAIL = 28,419 AIC d = 10 feet f = 0.0462 m = 0.9558 Isc = 27,163 AIC
F5: AVAIL = 27,163 AIC d = 200 feet f = 5.146 m = 0.163 Isc = 4,420 AIC	

NOTE: FOR COMBINER BOX TO BE RATED PROPERLY FOR THE AVAILABLE FAULT CURRENT, TAKE F4 ISC AND ADD TO THE FULL LOAD INVERTER FAULT AT 120%. IN THIS CASE SINCE WE HAVE FOUR INVERTERS, THE FAULT CONTRIBUTION FROM THE PV SYSTEM WILL BE THE TOTAL FAULT CONTRIBUTION FROM INVERTERS.

I.E. $4 \times (64A \times 120\%) = 307A + 27,163A = 27,470A$

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

* SOURCE: COOPER BUSSMAN SPD MANUAL, REV 2009. CALCULATIONS IN ACCORDANCE WITH NEC ART 110.9 & 110.10.

NOTE: SYSTEM DESIGNED IN ACCORDANCE WITH THE 2017 N.E.C.

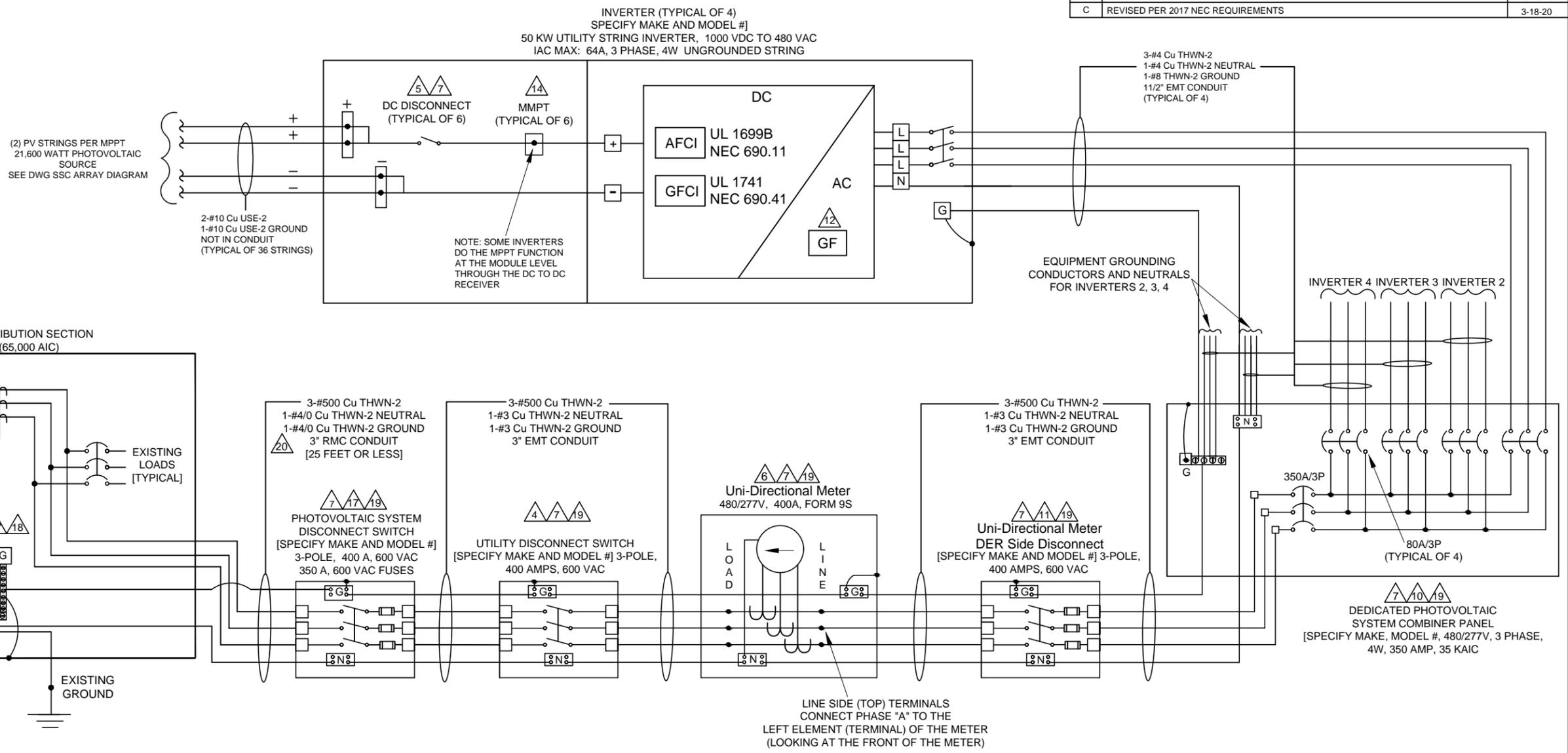
SAMPLE LOAD SIDE TAP ONE-LINE DIAGRAM

1234 South Main Street Any City, Arizona 85123 Tel: 602-555-5555		ABC SOLAR COMPANY INC.	
APPROVALS		DATE	
DRAWN ABC		09-10-10	
CHECKED			
ENGINEER			
REV. B		03-18-20	
ABC PROJECT #1111-9999		SIZE B	CODE INTENT NO.
		DRAWING NO. LST ONE-LINE	
SCALE NA	REV. B	SHEET 1 OF 5	

UTILITY GRID 480/277V,
3 Phase, 4 Wire
MAX ISC PER APS ESRM
800.2 IS 32,990A

This Sample Drawing is for illustration 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.

REV.	DESCRIPTION:	DATE
A	PRELIMINARY DRAWING SET	09-10-10
B	APS CORRECTIONS	10-10-10
C	REVISED PER 2017 NEC REQUIREMENTS	3-18-20



NOTES:

- 1 ALL EQUIPMENT SHALL BE INSTALLED AND LABELED IN ACCORDANCE WITH THE NEC AND ALL APPLICABLE REQUIREMENTS OF THE SERVING ELECTRIC UTILITY COMPANY AND OF THE LOCAL AUTHORITY HAVING JURISDICTION.
- 2 CT-RATED BI-DIRECTIONAL UTILITY METER INSTALLED BY UTILITY COMPANY.
- 3 -----
- 4 LABEL "UTILITY DISCONNECT SWITCH". SWITCH COVER TO BE LOCKED AT ALL TIMES. SWITCH TO BE VISUAL OPEN, ACCESSIBLE PER UTILITY REQUIREMENTS, CONFORM TO NEC 705.22, AND RATED FOR THE AVAILABLE FAULT CURRENT.
- 5 LABEL "PHOTOVOLTAIC SYSTEM DC DISCONNECT" PER NEC 690.13(B). LABEL WITH OPERATING CURRENT, OPERATING VOLTAGE, MAXIMUM SYSTEM VOLTAGE, AND SHORT CIRCUIT CURRENT PER NEC 690.53. SWITCH TO BE LOCKED. [SWITCH IS INTERNAL TO INVERTER]
- 6 LABEL "Uni-Directional Meter". METER ENCLOSURE AND SOCKET PROVIDED AND INSTALLED BY CUSTOMER PER APS ESRM. METER, CTs AND TEST SWITCHES PROVIDED BY UTILITY COMPANY WHEN REQUIRED. **NOTE: CUSTOMER TO SUBMIT SHOP DRAWINGS OF METERING CABINET TO APS METERSHOP FOR APPROVAL.**
- 7 PROVIDE WARNING SIGN PER NEC 690.13(B) READING "WARNING-ELECTRIC SHOCK HAZARD-DO NOT TOUCH TERMINALS-TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION".
- 8 -----
- 9 METALLIC CONDUIT SHALL BE USED WITHIN BUILDING PER NEC 690.31(G).
- 10 LABEL "DEDICATED PHOTOVOLTAIC SYSTEM COMBINER PANEL" AND "DO NOT ADD LOADS TO THIS PANEL".

- 11 LABEL "Uni-Directional Meter DER Side Disconnect". SWITCH COVER TO BE LOCKED AT ALL TIMES. SWITCH TO BE ACCESSIBLE PER UTILITY REQUIREMENTS, CONFORM TO NEC 705.22, AND RATED FOR THE AVAILABLE FAULT CURRENT.
- 12 GROUND-FAULT PROTECTION ACCESSORY INTEGRAL TO THE INVERTER IN ACCORDANCE WITH NEC 705.32 SINCE THE EXISTING MAIN IS EQUIPPED WITH GROUND FAULT PROTECTION. DOCUMENTATION IS INCLUDED WITH THE DRAWINGS AND INTERCONNECTION APPLICATION SHOWING THE CALCULATIONS ON HOW TO PROPERLY SET THE GROUND FAULT TRIPS ON BOTH THE MAIN AND PV SYSTEM. DOCUMENTATION FROM THE MAIN BREAKER SUPPLIER CERTIFYING THAT GROUND FAULT ACCESSORY IS SUITABLE FOR BACK FEEDING.
- 13 IF DC FUSES ARE ADDED, LABEL: "WARNING, DO NOT OPEN FUSES UNDER LOAD."
- 14 THE STRING INVERTERS DEPICTED HAVE A MAXIMUM OF TWO STRINGS PER MPPT; THEREFORE, THE STRINGS DO NOT REQUIRE OVERCURRENT DEVICES. FOR STRING INVERTERS WITH THREE STRINGS OR MORE IN PARALLEL EACH SERIES STRING REQUIRES OVERCURRENT DEVICES.
- 15 A PLACARD OR DIRECTORY IS INSTALLED AT THE SERVICE ENTRANCE WITH EXPLICIT DIRECTIONS TO THE LOCATION OF THE PHOTOVOLTAIC SYSTEM UTILITY DISCONNECT SWITCH AS REQUIRED BY APS.
- 16 -----
- 17 LOAD SIDE TAP IS INSTALLED PER NEC 240.21(B) AND LOCAL AHJ APPROVALS. LABEL "PHOTOVOLTAIC CUSTOMER DISCONNECT". SWITCH TO BE LOCKED AT ALL TIMES.
- 18 LOAD SIDE TAP IS INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. DOCUMENTATION IS INCLUDED WITH THE APS INTERCONNECTION APPLICATION.
- 19 EQUIPMENT SHALL BE TESTED, LISTED AND MARKED TO WITHSTAND THE AVAILABLE SHORT CIRCUIT CURRENT.
- 20 EGC IS INSTALLED IN ACCORDANCE WITH NEC ARTICLE 250.122(G).

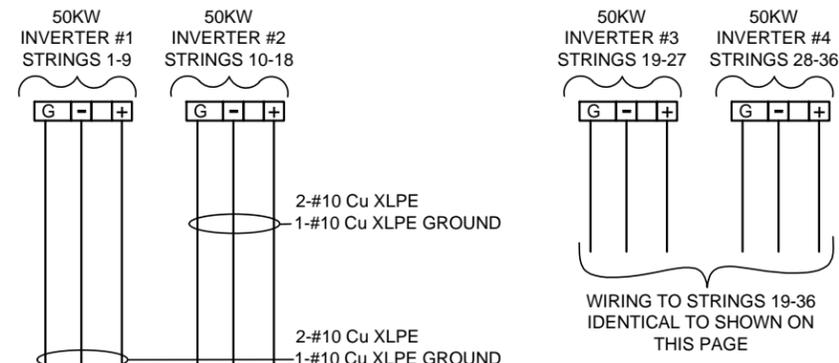
NOTE: All equipment must be utilized in accordance with the manufacturer's intended use and design specifications.

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SAMPLE LOAD SIDE TAP 3-LINE DIAGRAM

1234 South Main Street Any City, Arizona 85123 Tel: 602-555-5555		ABC SOLAR COMPANY INC.	
APPROVALS		DATE	
DRAWN ABC		09-10-10	
CHECKED			
ENGINEER			
REV. C		03-18-20	
ABC PROJECT #1111-9999		SIZE B	CODE INTENT NO. NA
		DRAWING NO. LST THREE-LINE	
		SCALE NA	REV. C
		SHEET 2 OF 5	

REV.	DESCRIPTION	DATE
A	PRELIMINARY DRAWING SET	09/10/10
B	REVISED PER 2011 NEC REQUIREMENTS	04/30/13
C	REVISED PER 2017 NEC REQUIREMENTS	09/13/19



PHOTOVOLTAIC MODULE SPECIFICATIONS

[SPECIFY MAKE & MODEL]
 400 WATTS
 $V_{oc}=49.8$ VDC, $I_{sc}=10.36$ AMPS
 $V_{mp}=41.7$ VDC, $I_{mp}=9.6$ AMPS
 T_{coeff} of $V_{oc}=-0.28$ %/°C
 T_{coeff} of $P_{max}=-0.36$ %/°C

ONE PHOTOVOLTAIC STRING

7,200 WATTS
 18 MODULES IN SERIES PER STRING
 $V_{oc}=896.4$ VDC, $I_{sc}=10.36$ AMPS
 $V_{mp}=750.6$ VDC, $I_{mp}=9.6$ AMPS
 TYPICAL OF 36 STRINGS
 (9 STRINGS PER INVERTER)

COMPLETE PHOTOVOLTAIC ARRAY

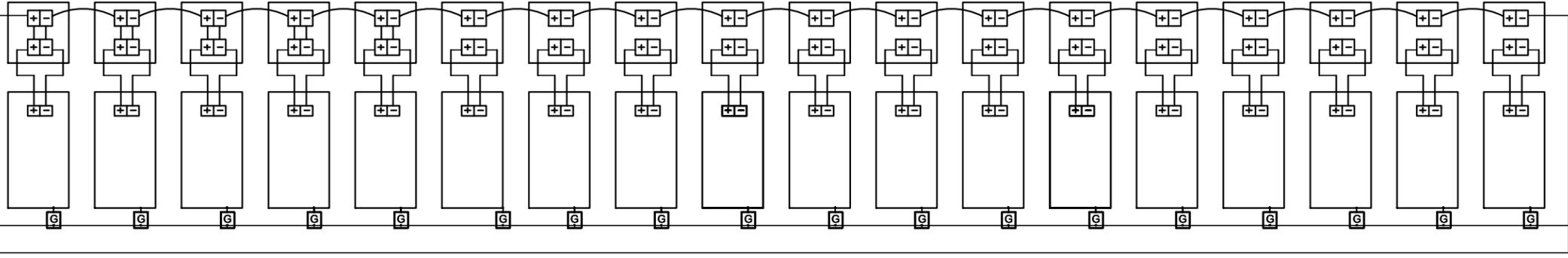
259,200 WATTS
 $V_{oc} = 896.4$ VDC, $I_{sc} = 372.96$ AMPS
 $V_{mp} = 750.6$ VDC, $I_{mp} = 345.6$ AMPS

WIRING TO STRINGS 19-36
 IDENTICAL TO SHOWN ON
 THIS PAGE

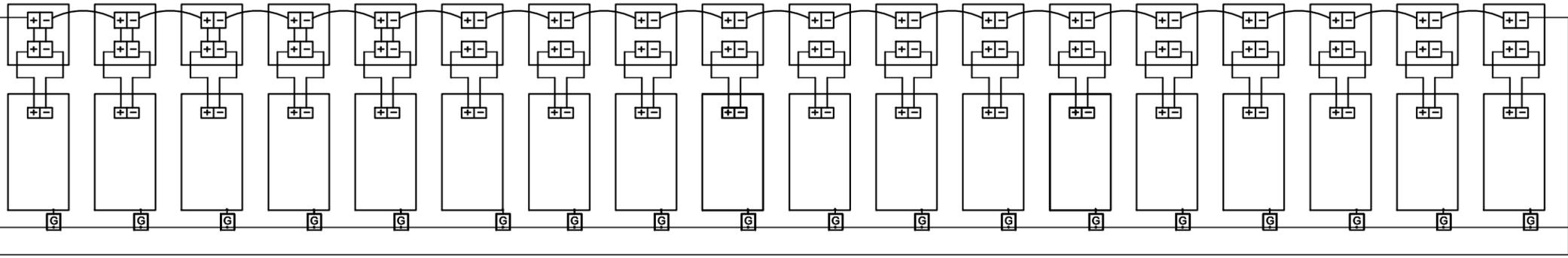
RAPID SHUTDOWN
 TRANSMITTER AND
 RECEIVER COMPONENTS
 SHALL BE LISTED OR FIELD
 LABELED
 AS AN ASSEMBLY IN
 ACCORDANCE WITH
 2017 NEC 690.12

TS4-F FIRE SAFETY RAPID
 SHUTDOWN RECEIVERS

PV STRING OF 18 MODULES (TYPICAL OF 9)



PV STRING OF 18 MODULES (TYPICAL OF 9)



NOTES:

- EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE NEC AND ALL APPLICABLE REQUIREMENTS OF THE LOCAL AUTHORITY HAVING JURISDICTION.
- FOLLOW MANUFACTURERS SUGGESTED INSTALLATION PRACTICES AND WIRING SPECIFICATIONS.
- WIRES SHALL BE RATED AND LABELED "SUNLIGHT RESISTANT" WHERE EXPOSED TO AMBIENT CONDITIONS.

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SAMPLE LOAD SIDE TAP ARRAY DRAWING

1234 South Main Street Any City, Arizona 85123 Tel: 602-555-5555		ABC SOLAR COMPANY INC.	
APPROVALS		DATE	
DRAWN ABC		09-10-10	
CHECKED			
ENGINEER			
REV. C		09-13-19	
ABC PROJECT #1111-9999		SIZE B	CODE INTENT NO.
		DRAWING NO. LST ARRAY DIAGRAM	
SCALE NA		REV. C	SHEET 3 OF 5

REV.	DESCRIPTION:	DATE
A	PRELIMINARY DRAWING SET	09/10/10

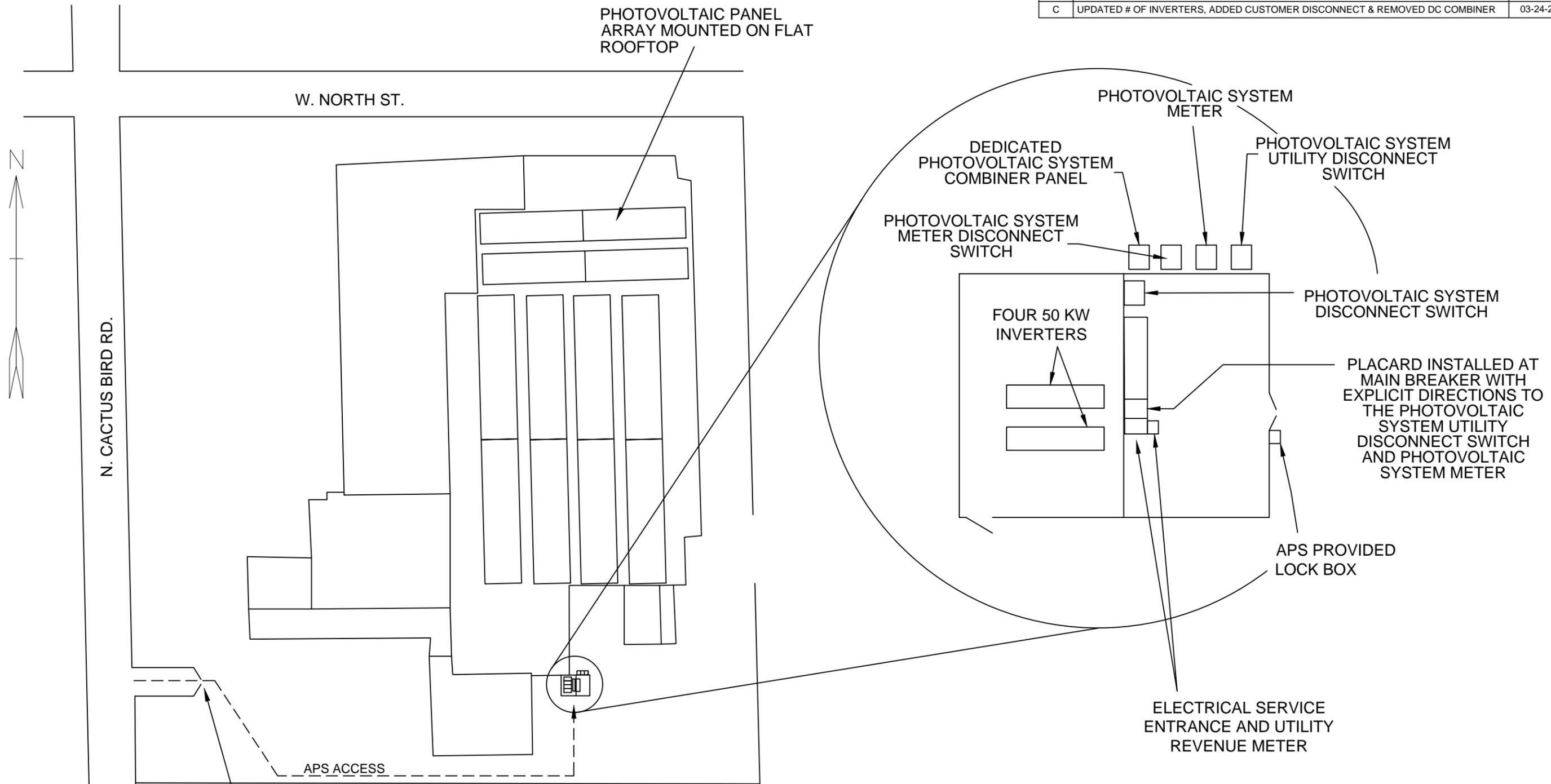


SAMPLE LOAD SIDE TAP PLANT LOCATION

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1234 South Main Street Any City, Arizona 85123 Tel: 602-555-5555		ABC SOLAR COMPANY INC.	
APPROVALS		DATE	
DRAWN	ABC	09-10-10	
CHECKED			
ENGINEER			
REV. A	09-10-10		
ABC PROJECT #1111-9999		SIZE A	CODE INTENT NO. DRAWING NO. LST PLANT LOCATION
SCALE NA		REV. A	SHEET 4 OF 5

REV.	DESCRIPTION:	DATE
A	PRELIMINARY DRAWING SET	09-10-10
B	ADDED METER DISCONNECT SWITCH	02-24-20
C	UPDATED # OF INVERTERS, ADDED CUSTOMER DISCONNECT & REMOVED DC COMBINER	03-24-20



DRIVEWAY WITH GATE & KEY CODE SECURITY IN APS PROVIDED LOCKBOX
ACCESS CODE: 12345#

NOTE: UTILITY HAS 24-HR UNRESTRICTED ACCESS TO THE PHOTOVOLTAIC SYSTEM METER AND PHOTOVOLTAIC SYSTEM UTILITY DISCONNECT SWITCH THROUGH THE SECURITY GATE

SAMPLE LOAD SIDE TAP SITE PLAN

1234 South Main Street Any City, Arizona 85123 Tel: 602-555-5555		ABC SOLAR COMPANY INC.	
APPROVALS		DATE	
DRAWN	ABC	09-10-10	
CHECKED			
ENGINEER			
REV.C		03-24-20	
ABC PROJECT #1111-9999		SIZE B	CODE INTENT NO.
		DRAWING NO.	
		LST SITE PLAN	
SCALE NA		REV. C	SHEET 5 OF 5

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