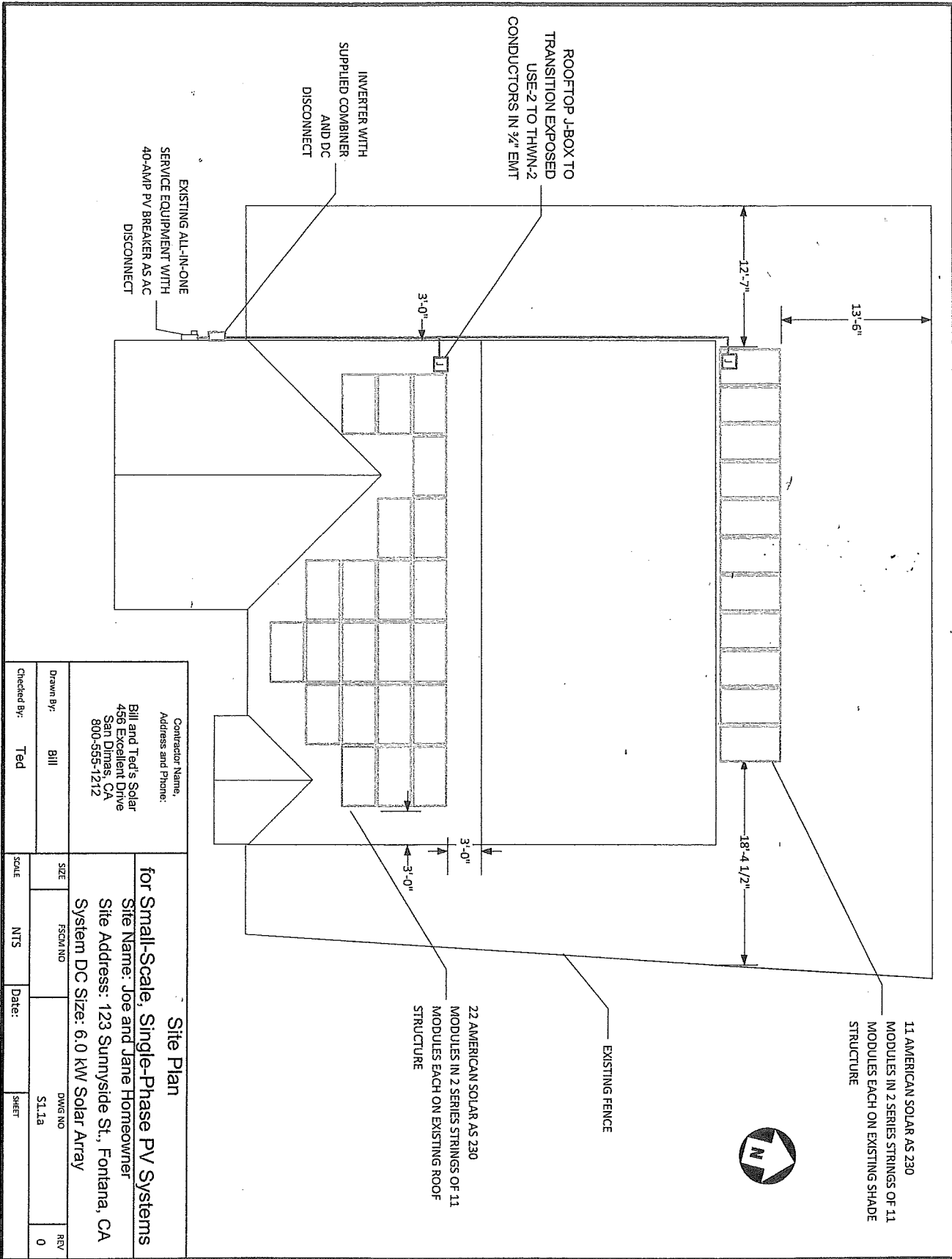




EXAMPLES OF REQUIRED MATERIALS

SUBMITTAL DIAGRAM TEMPLATES

EXAMPLE SITE PLAN



Contractor Name,
Address and Phone:

 Bill and Ted's Solar
 456 Excellent Drive
 San Dimas, CA
 800-555-1212

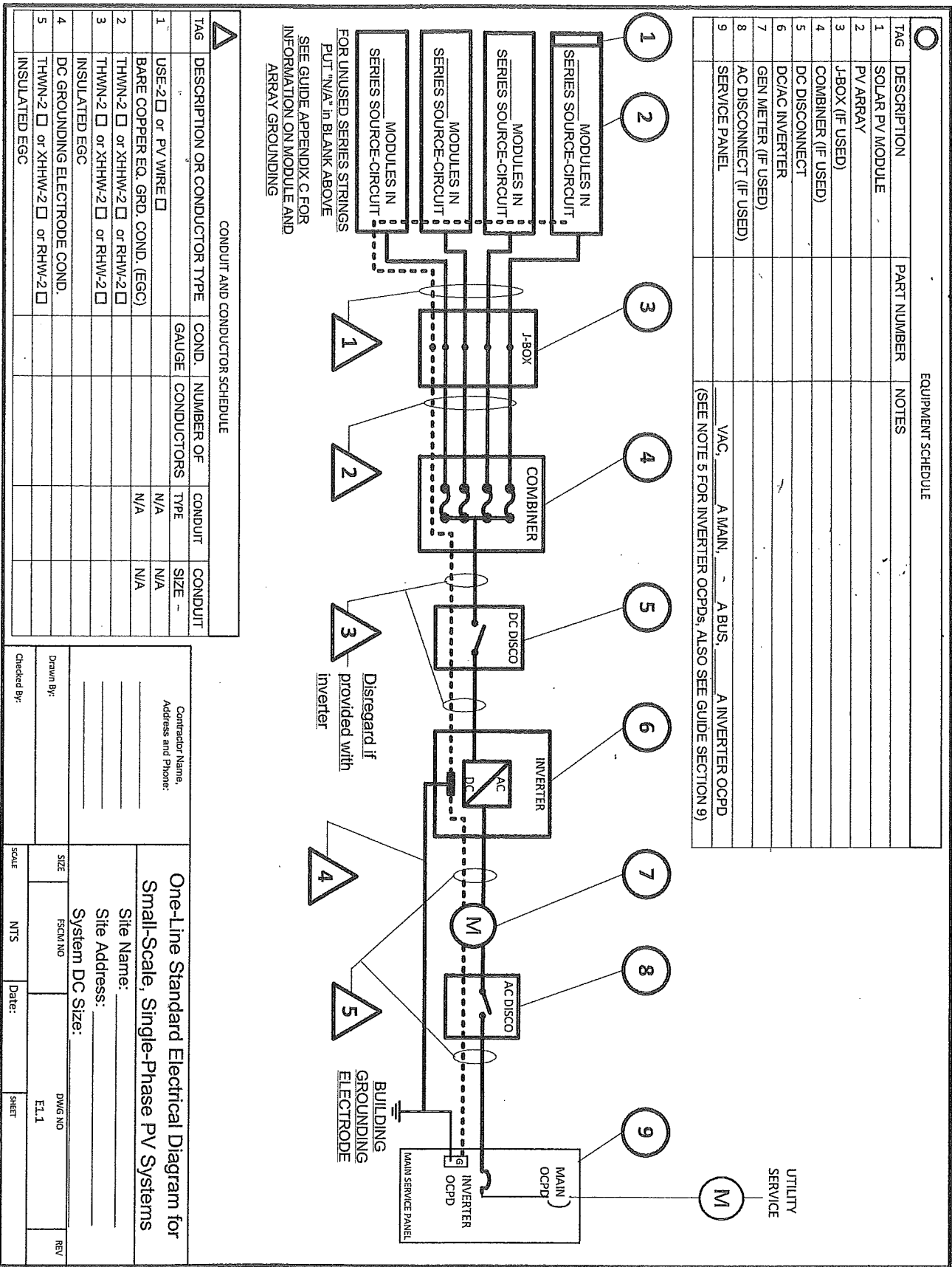
Drawn By: Bill
 Checked By: Ted

Site Plan
 for Small-Scale, Single-Phase PV Systems
 Site Name: Joe and Jane Homeowner
 Site Address: 123 Sunnyside St., Fontana, CA
 System DC Size: 6.0 kW Solar Array

SIZE	FSCM NO.	DWG NO.	REV
SCALE	NTS	Date:	0
SHEET		S1.1a	

SUBMITTAL DIAGRAM TEMPLATES

STANDARD ELECTRICAL DIAGRAM



NOTES FOR STANDARD ELECTRICAL DIAGRAM

SIGNS-SEE GUIDE SECTION 7

PV MODULE RATINGS @ STC (Guide Section 5)

MODULE MAKE	
MODULE MODEL	
MAX POWER-POINT CURRENT (I _{mp})	A
MAX POWER-POINT VOLTAGE (V _{mp})	V
OPEN-CIRCUIT VOLTAGE (V _{oc})	V
SHORT-CIRCUIT CURRENT (I _{sc})	A
MAX SERIES FUSE (OCPD)	A
MAXIMUM POWER (P _{max})	W
MAX VOLTAGE (TYP 600V _{DC})	V
VOC TEMP COEFF (mV/°C or %/°C)	
IF COEFF SUPPLIED, CIRCLE UNITS	

NOTES FOR ALL DRAWINGS:

OCPD = OVERCURRENT PROTECTION DEVICE
 NATIONAL ELECTRICAL CODE® REFERENCES
 SHOWN AS (NEC XXX.XX)

INVERTER RATINGS (Guide Section 4)

INVERTER MAKE	
INVERTER MODEL	
MAX DC VOLT RATING	V
MAX POWER @ 40°C	W
NOMINAL AC VOLTAGE	V
MAX AC CURRENT	A
MAX OCPD RATING	A

SIGN FOR DC DISCONNECT

PHOTOVOLTAIC POWER SOURCE	
RATED MPP CURRENT	A
RATED MPP VOLTAGE	V
MAX SYSTEM VOLTAGE	V
MAX CIRCUIT CURRENT	A

WARNING: ELECTRICAL SHOCK
 HAZARD-LINE AND LOAD MAY BE
 ENERGIZED IN OPEN POSITION

SIGN FOR INVERTER OCPD AND AC DISCONNECT (IF USED)

SOLAR PV SYSTEM	
AC POINT OF CONNECTION	A
AC OUTPUT CURRENT	A
NOMINAL AC VOLTAGE	V

THIS PANEL FED BY MULTIPLE
 SOURCES (UTILITY AND SOLAR)

NOTES FOR ARRAY CIRCUIT WIRING (Guide Section 6 and 8 and Appendix D):

- 1) LOWEST EXPECT AMBIENT TEMPERATURE BASED ON ASHRAE MINIMUM MEAN EXTREME DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. LOWEST EXPECTED AMBIENT TEMP _____ °C
- 2) HIGHEST CONTINUOUS AMBIENT TEMPERATURE BASED ON ASHRAE HIGHEST MONTH 2% DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. HIGHEST CONTINUOUS TEMPERATURE _____ °C
- 3) 2005 ASHRAE FUNDAMENTALS 2% DESIGN TEMPERATURES DO NOT EXCEED 47°C IN THE UNITED STATES (PALM SPRINGS, CA IS 44.7°C), FOR LESS THAN 9 CURRENT-CARRYING CONDUCTORS IN ROOF-MOUNTED SUNLIT CONDUIT AT LEAST 0.5" ABOVE ROOF AND USING THE OUTDOOR DESIGN TEMPERATURE OF 47°C OR LESS (ALL OF UNITED STATES).
- 4) 12 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH I_{sc} OF 7.68 AMPS OR LESS WHEN PROTECTED BY A 12-AMP OR SMALLER FUSE.
- 5) 10 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH I_{sc} OF 9.6 AMPS OR LESS WHEN PROTECTED BY A 15-AMP OR SMALLER FUSE.

NOTES FOR INVERTER CIRCUITS (Guide Section 8 and 9):

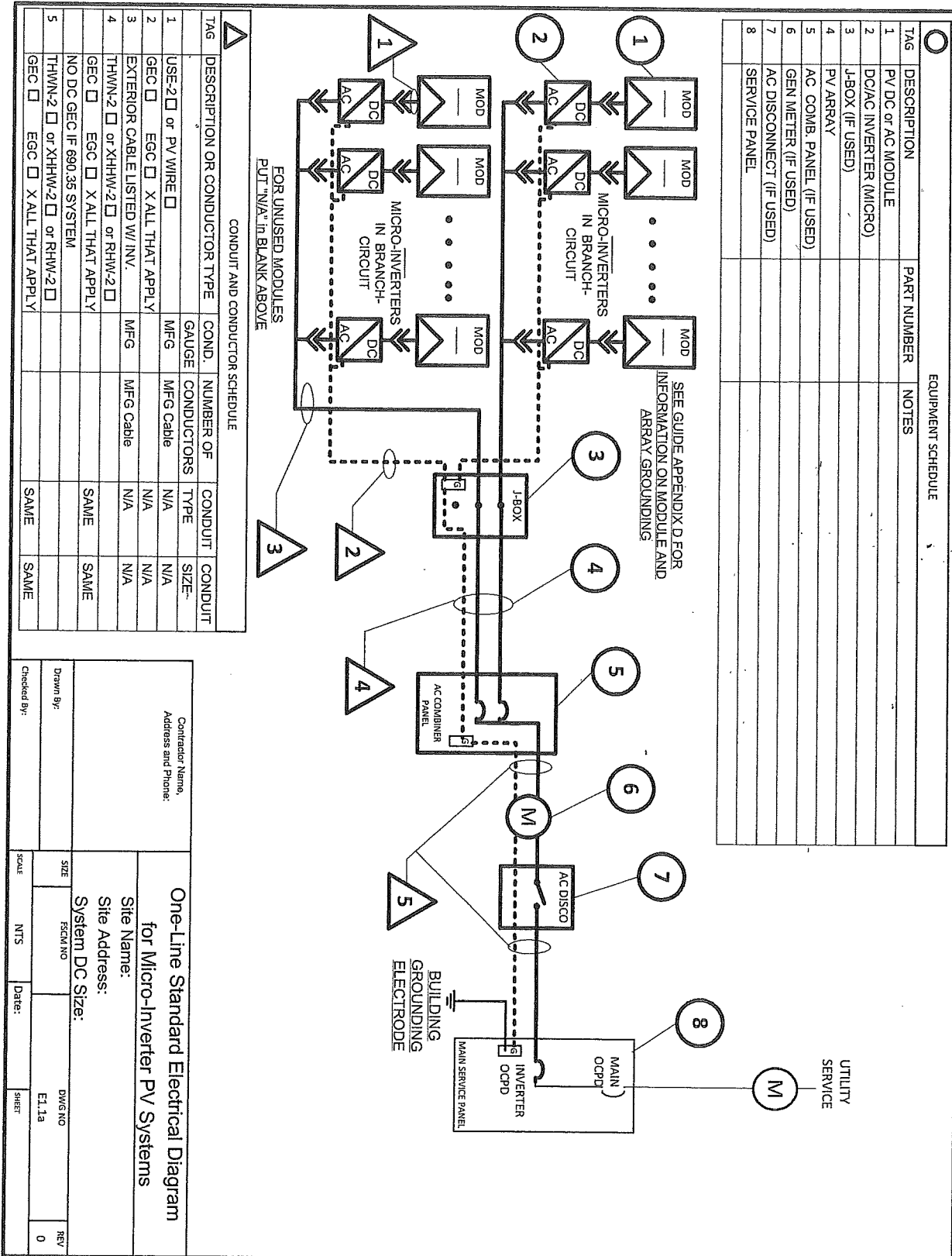
- 1) IF UTILITY REQUIRES A VISIBLE-BREAK SWITCH, DOES THIS SWITCH MEET THE REQUIREMENT? YES NO N/A
- 2) IF GENERATION METER REQUIRED, DOES THIS METER SOCKET MEET THE REQUIREMENT? YES NO N/A
- 3) SIZE PHOTOVOLTAIC POWER SOURCE (DC) CONDUCTORS BASED ON MAX CURRENT ON NEC 690.53 SIGN OR OCPD RATING AT DISCONNECT
- 4) SIZE INVERTER OUTPUT CIRCUIT (AC) CONDUCTORS ACCORDING TO INVERTER OCPD AMPERE RATING. (See Guide Section 9)
- 5) TOTAL OF _____ INVERTER OCPD(S). ONE FOR EACH INVERTER. DOES TOTAL SUPPLY BREAKERS COMPLY WITH 120% BUSBAR EXCEPTION IN 690.64(B)(2)(a)? YES NO

Notes for One-Line Standard Electrical Diagram for Single-Phase PV Systems

Contractor Name: Address and Phone:		Site Name:	
_____		_____	
_____		Site Address:	
_____		_____	
_____		System DC Size:	
Drawn By:	SIZE	FSCM NO	DWG NO
_____	_____	_____	E1.2
Checked By:	SCALE	NTS	Date:
_____	_____	_____	_____
			SHEET
			REV

SUBMITTAL DIAGRAM TEMPLATES

MICRO-INVERTER ELECTRICAL DIAGRAM



SUBMITTAL DIAGRAM TEMPLATES

NOTES FOR MICRO-INVERTER ELECTRICAL DIAGRAM

PV MODULE RATINGS @ STC (Guide Section 5)

MODULE MAKE	
MODULE MODEL	
MAX POWER-POINT CURRENT (I _{mp})	
MAX POWER-POINT VOLTAGE (V _{mp})	
OPEN-CIRCUIT VOLTAGE (V _{oc})	
SHORT-CIRCUIT CURRENT (I _{sc})	
MAX SERIES FUSE (OCPD)	
MAXIMUM POWER (P _{max})	
MAX VOLTAGE (TYP 600V _{ac})	
VOC TEMP COEFF (mV/°C <input type="checkbox"/> or %/°C <input type="checkbox"/>)	
IF COEFF SUPPLIED, CIRCLE UNITS	

NOTES FOR ALL DRAWINGS:
 OCPD = OVERCURRENT PROTECTION DEVICE
 NATIONAL ELECTRICAL CODE® REFERENCES
 SHOWN AS (NEC XXX.XX)

INVERTER RATINGS (Guide Section 4)

INVERTER MAKE	
INVERTER MODEL	
MAX DC VOLT RATING	
MAX POWER @ 40°C	
NOMINAL AC VOLTAGE	
MAX AC CURRENT	
MAX OCPD RATING	

SIGNS—SEE GUIDE SECTION 7
 SIGN FOR DC DISCONNECT
 No sign necessary since 690.51 marking on PV module covers needed information

SIGN FOR INVERTER OCPD AND AC DISCONNECT (IF USED)
 SOLAR PV SYSTEM
 AC POINT OF CONNECTION
 AC OUTPUT CURRENT
 NOMINAL AC VOLTAGE
 THIS PANEL FED BY MULTIPLE SOURCES (UTILITY AND SOLAR)

NOTES FOR ARRAY CIRCUIT WIRING (Guide Section 6 and 8 and Appendix E):

- 1.) LOWEST EXPECT AMBIENT TEMPERATURE BASED ON ASHRAE MINIMUM MEAN EXTREME DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. LOWEST EXPECTED AMBIENT TEMP ____ °C
- 2.) HIGHEST CONTINUOUS AMBIENT TEMPERATURE BASED ON ASHRAE HIGHEST MONTH 2% DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. HIGHEST CONTINUOUS TEMPERATURE ____ °C
- 2.) 2009 ASHRAE FUNDAMENTALS 2% DESIGN TEMPERATURES DO NOT EXCEED 47°C IN THE UNITED STATES (PALM SPRINGS, CA IS 44.1°C). FOR LESS THAN 9 CURRENT-CARRYING CONDUCTORS IN ROOF-MOUNTED SUNLIT CONDUIT AT LEAST 0.5" ABOVE ROOF AND USING THE OUTDOOR DESIGN TEMPERATURE OF 47°C OR LESS (ALL OF UNITED STATES),
 - a) 12 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH I_{sc} OF 7.68 AMPS OR LESS WHEN PROTECTED BY A 12-AMP OR SMALLER FUSE.
 - b) 10 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH I_{sc} OF 9.6 AMPS OR LESS WHEN PROTECTED BY A 15-AMP OR SMALLER FUSE.

NOTES FOR INVERTER CIRCUITS (Guide Section 8 and 9):

- 1) IF UTILITY REQUIRES A VISIBLE-BREAK SWITCH, DOES THIS SWITCH MEET THE REQUIREMENT? YES NO N/A
- 2) IF GENERATION METER REQUIRED, DOES THIS METER SOCKET MEET THE REQUIREMENT? YES NO N/A
- 3) SIZE PHOTOVOLTAIC POWER SOURCE (DC) CONDUCTORS BASED ON MAX CURRENT ON NEC 690.53 SIGN OR OCPD RATING AT DISCONNECT
- 4) SIZE INVERTER OUTPUT CIRCUIT (AC) CONDUCTORS ACCORDING TO INVERTER OCPD AMPERE RATING. (See Guide Section 9)
- 5) TOTAL OF INVERTER OUTPUT CIRCUIT OCPD(S) ONE FOR EACH MICRO-INVERTER CIRCUIT DOES TOTAL SUPPLY BREAKERS COMPLY WITH 120% BUSBAR EXCEPTION IN 690.64(B)(2)(a)? YES NO

Contractor Name: _____
 Address and Phone: _____

Notes for One-Line Standard Electrical Diagram for Single-Phase PV Systems

Site Name: _____
 Site Address: _____
 System DC Size: _____

Drawn By: _____	SIZE	ESCM NO	DWG NO	REV
Checked By: _____	SCALE	NTS	Date: _____	skt
			E1.2a	

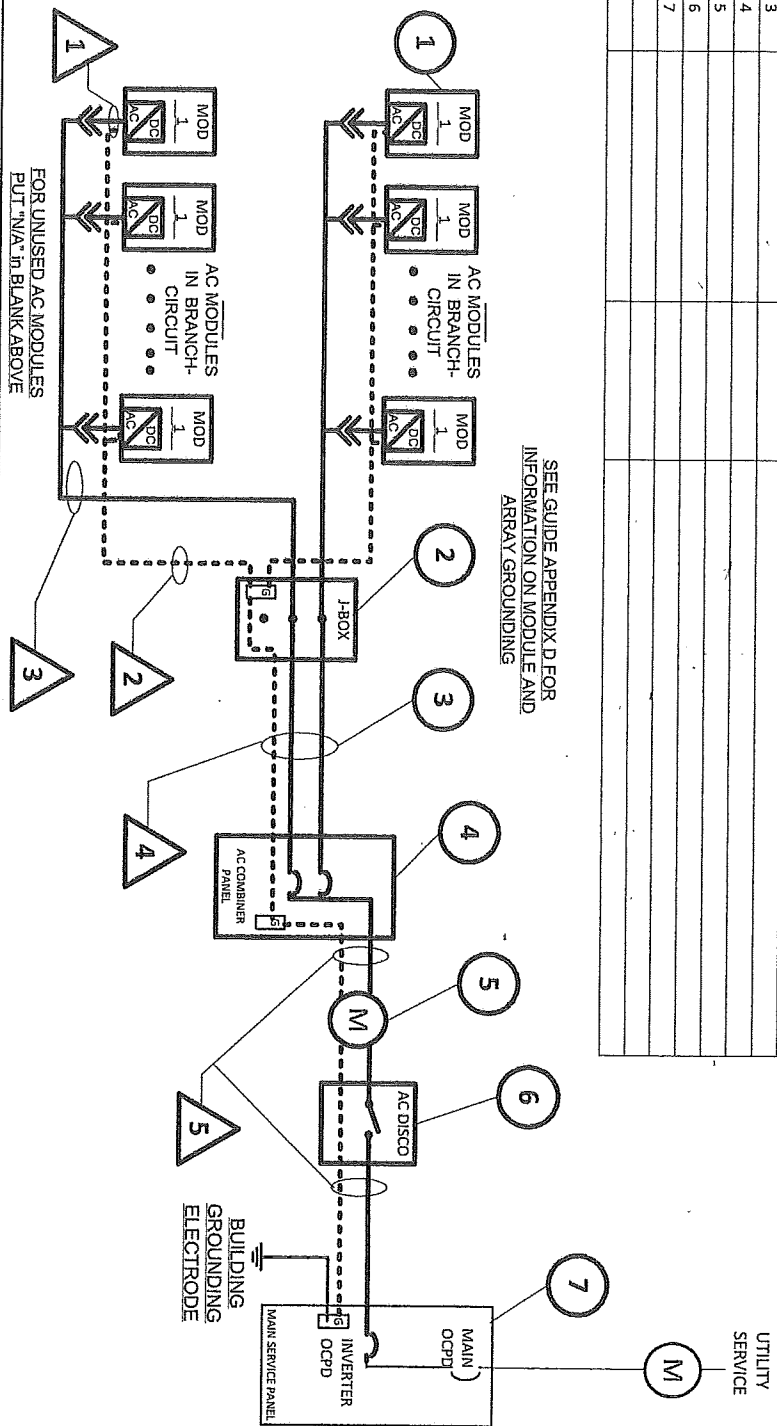
SUBMITTAL DIAGRAM TEMPLATES

AC MODULE ELECTRICAL DIAGRAM

EQUIPMENT SCHEDULE

TAG	DESCRIPTION	PART NUMBER	NOTES
1			
2			
3			
4			
5			
6			
7			

SEE GUIDE APPENDIX D FOR INFORMATION ON MODULE AND ARRAY GROUNDING



CONDUIT AND CONDUCTOR SCHEDULE

TAG	DESCRIPTION OR CONDUCTOR TYPE	COND. GAUGE	NUMBER OF CONDUCTORS	CONDUIT TYPE	CONDUIT SIZE
1	USE-2 <input type="checkbox"/> or PV WIRE <input type="checkbox"/>	MFG	MFG Cable	N/A	N/A
2	GEC <input type="checkbox"/> EGC <input type="checkbox"/> X ALL THAT APPLY	MFG	MFG Cable	N/A	N/A
3	EXTERIOR CABLE LISTED W/ INV.	MFG	MFG Cable	N/A	N/A
4	THWN-2 <input type="checkbox"/> or XHHW-2 <input type="checkbox"/> or RHW-2 <input type="checkbox"/>	MFG	MFG Cable	N/A	N/A
5	GEC <input type="checkbox"/> EGC <input type="checkbox"/> X ALL THAT APPLY				
	NG DC GEC IF 690.35 SYSTEM				
	THWN-2 <input type="checkbox"/> or XHHW-2 <input type="checkbox"/> or RHW-2 <input type="checkbox"/>				
	GEC <input type="checkbox"/> EGC <input type="checkbox"/> X ALL THAT APPLY				

Contractor Name, Address and Phone:

One-Line Standard Electrical Diagram for AC Module PV Systems

Site Name:
Site Address:
System DC Size:

Drawn By: _____
Checked By: _____
Scale: _____
Date: _____
Sheet: _____

SUBMITTAL DIAGRAM TEMPLATES

NOTES FOR AC MODULE ELECTRICAL DIAGRAM

NOTES FOR ALL DRAWINGS:
 OCPD = OVERCURRENT PROTECTION DEVICE
 NATIONAL ELECTRICAL CODE® REFERENCES
 SHOWN AS (NEC XXXXX)

AC MODULE RATINGS (Guide Appendix C)

AC MODULE MAKE	
AC MODULE MODEL	
NOMINAL OPERATING AC VOLTAGE	
NOMINAL OPERATING AC FREQUENCY	
MAXIMUM AC POWER	
MAXIMUM AC CURRENT	
MAXIMUM OCPD RATING	

SIGNS-SEE GUIDE SECTION 7
 SIGN FOR DC DISCONNECT
 N/A since no dc wiring

SIGN FOR INVERTER OCPD AND AC DISCONNECT (IF USED)
 SOLAR PV SYSTEM
 AC POINT OF CONNECTION
 AC OUTPUT CURRENT
 NOMINAL AC VOLTAGE
 THIS PANEL FED BY MULTIPLE SOURCES (UTILITY AND SOLAR)

NOTES FOR ARRAY CIRCUIT WIRING (Guide Section 6 and 8 and Appendix E):

1.) LOWEST EXPECT AMBIENT TEMPERATURE BASED ON ASHRAE MINIMUM MEAN EXTREME DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. LOWEST EXPECTED AMBIENT TEMP ____ °C

2.) HIGHEST CONTINUOUS AMBIENT TEMPERATURE BASED ON ASHRAE HIGHEST MONTH 2% DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. HIGHEST CONTINUOUS TEMPERATURE ____ °C

2) 2009 ASHRAE FUNDAMENTALS 2% DESIGN TEMPERATURES DO NOT EXCEED 47°C IN THE UNITED STATES (PALM SPRINGS, CA IS 44.1°C). FOR 6 OR LESS CURRENT-CARRYING CONDUCTORS IN ROOF-MOUNTED SUNLIT CONDUIT AT LEAST 0.5" ABOVE ROOF AND USING THE OUTDOOR DESIGN TEMPERATURE OF 47°C OR LESS (ALL OF UNITED STATES).

a) 12 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR AC MODULES INVERTER OUTPUT CIRCUITS WITH 12 AMPS OR LESS WHEN PROTECTED BY A 15-AMP OR SMALLER OCPD.

b) 10 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR AC MODULES INVERTER OUTPUT CIRCUITS WITH 16 AMPS OR LESS WHEN PROTECTED BY A 20-AMP OR SMALLER OCPD.

NOTES FOR INVERTER CIRCUITS (Guide Section 8 and 9):

1) IF UTILITY REQUIRES A VISIBLE-BREAK SWITCH, DOES THIS SWITCH MEET THE REQUIREMENT? YES NO N/A

2) IF GENERATION METER REQUIRED, DOES THIS METER SOCKET MEET THE REQUIREMENT? YES NO N/A

3) SIZE PHOTOVOLTAIC POWER SOURCE (DC) CONDUCTORS BASED ON MAX CURRENT ON NEC 690.53 SIGN OR OCPD RATING AT DISCONNECT (N/A)

4) SIZE INVERTER OUTPUT CIRCUIT (AC) CONDUCTORS ACCORDING TO INVERTER OCPD AMPERE RATING. (See Guide Section 9)

5) TOTAL OF ____ INVERTER OUTPUT CIRCUIT OCPD(S), ONE FOR EACH AC MODULE CIRCUIT DOES TOTAL SUPPLY BREAKERS COMPLY WITH 120% BUSBAR EXCEPTION IN 690.64(B)(2)(a)? YES NO

Contractor Name,
Address and Phone:

Notes for One-Line Standard Electrical
Diagram for Single-Phase PV Systems

Site Name:
Site Address:
System DC Size:

Drawn By: Bill
Checked By: Ted

SCALE: NTS

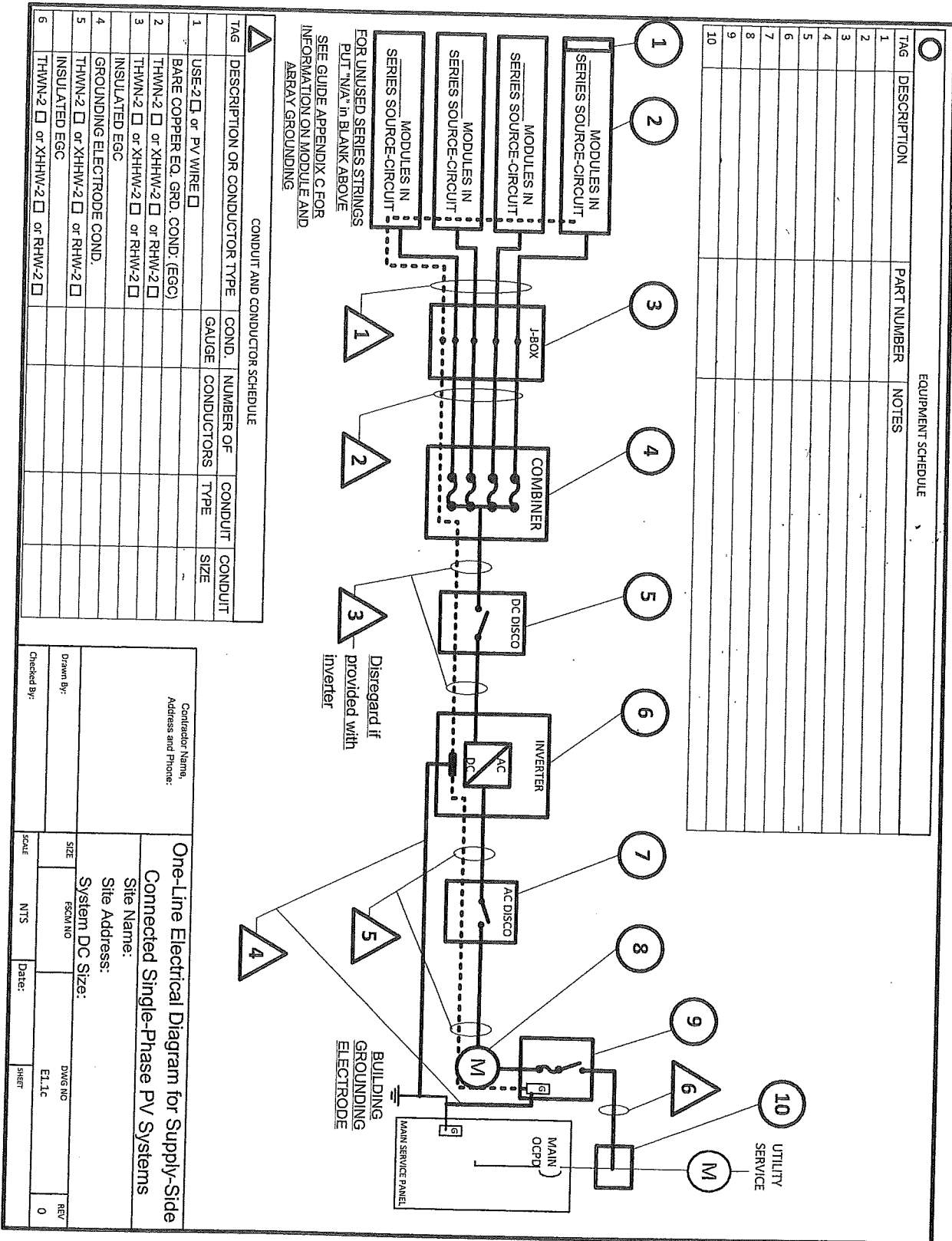
Date:

DWG NO: EL.2b
REV: 0

SHEET

SUBMITTAL DIAGRAM TEMPLATES

SUPPLY-SIDE CONNECTED ELECTRICAL DIAGRAM



NOTES FOR SUPPLY-SIDE CONNECTED ELECTRICAL DIAGRAM

SIGNS-SEE GUIDE SECTION 7.

PV MODULE RATINGS @ STC (Guide Section 5)

MODULE MAKE	
MODULE MODEL	
MAX POWER-POINT CURRENT (I_{mp})	A
MAX POWER-POINT VOLTAGE (V_{mp})	V
OPEN-CIRCUIT VOLTAGE (V_{oc})	V
SHORT-CIRCUIT CURRENT (I_{sc})	A
MAX SERIES FUSE (OCPD)	A
MAXIMUM POWER (P_{max})	W
MAX VOLTAGE (TYP 600V _{dc})	V
VOC TEMP COEFF (mV/°C <input type="checkbox"/> or %/°C <input type="checkbox"/>)	
IF COEFF SUPPLIED, CIRCLE UNITS	

NOTES FOR ALL DRAWINGS:

OCPD = OVERCURRENT PROTECTION DEVICE
 NATIONAL ELECTRICAL CODE® REFERENCES
 SHOWN AS (NEC XXXX.XX)

INVERTER RATINGS (Guide Section 4)

INVERTER MAKE	
INVERTER MODEL	
MAX DC VOLT RATING	V
MAX POWER @ 40°C	W
NOMINAL AC VOLTAGE	V
MAX AC CURRENT	A
MAX OCPD RATING	A

SIGN FOR DC DISCONNECT

PHOTOVOLTAIC POWER SOURCE	
RATED MPP CURRENT	A
RATED MPP VOLTAGE	V
MAX SYSTEM VOLTAGE	V
MAX CIRCUIT CURRENT	A

WARNING: ELECTRICAL SHOCK
 HAZARD-LINE AND LOAD MAY BE
 ENERGIZED IN OPEN POSITION

SIGN FOR INVERTER OCPD AND AC DISCONNECT (IF USED)

SOLAR PV SYSTEM AC POINT OF CONNECTION	
AC OUTPUT CURRENT	A
NOMINAL AC VOLTAGE	V

THIS PANEL FED BY MULTIPLE SOURCES (UTILITY AND SOLAR)

NOTES FOR ARRAY CIRCUIT WIRING (Guide Section 6 and 8 and Appendix D):

- 1.) LOWEST EXPECT AMBIENT TEMPERATURE BASED ON ASHRAE MINIMUM MEAN EXTREME DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. LOWEST EXPECTED AMBIENT TEMP _____ °C
- 2.) HIGHEST CONTINUOUS AMBIENT TEMPERATURE BASED ON ASHRAE HIGHEST MONTH 2% DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. HIGHEST CONTINUOUS TEMPERATURE _____ °C
- 2.) 2005 ASHRAE FUNDAMENTALS 2% DESIGN TEMPERATURES DO NOT EXCEED 47°C IN THE UNITED STATES (PALM SPRINGS, CA IS 44.1°C). FOR LESS THAN 9 CURRENT-CARRYING CONDUCTORS IN ROOF-MOUNTED SUNLIT CONDUIT AT LEAST 0.3' ABOVE ROOF AND USING THE OUTDOOR DESIGN TEMPERATURE OF 47°C OR LESS (ALL OF UNITED STATES).
 - a) 12 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH 1isc OF 7.88 AMPS OR LESS WHEN PROTECTED BY A 12-AMP OR SMALLER FUSE.
 - b) 10 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH 1isc OF 9.16 AMPS OR LESS WHEN PROTECTED BY A 15-AMP OR SMALLER FUSE.

NOTES FOR INVERTER CIRCUITS (Guide Section 8 and 9):

- 1) IF UTILITY REQUIRES A VISIBLE-BREAK SWITCH, DOES THIS SWITCH MEET THE REQUIREMENT? YES NO N/A
- 2) IF GENERATION METER REQUIRED, DOES THIS METER SOCKET MEET THE REQUIREMENT? YES NO N/A
- 3) SIZE PHOTOVOLTAIC POWER SOURCE (DC) CONDUCTORS BASED ON MAX CURRENT ON NEC 690.53 SIGN OR OCPD RATING AT DISCONNECT
- 4) SIZE INVERTER OUTPUT CIRCUIT (AC) CONDUCTORS ACCORDING TO INVERTER OCPD AMPERE RATING. (See Guide Section 9)
- 5) TOTAL OF INVERTER OCPD(S), ONE FOR EACH INVERTER, DOES TOTAL SUPPLY BREAKERS COMPLY WITH 120% BUSBAR EXCEPTION IN 690.64(B)(2)(a)? YES NO

Notes for One-Line Standard Electrical Diagram for Single-Phase PV Systems

Contractor Name, Address and Phone:		Site Name:	
_____		_____	
_____		Site Address: _____	
_____		System DC Size: _____	
Drawn By: _____	SIZE	FSCM NO	DWG NO
Checked By: _____	SCALE	NTS	E1.2
		Date: _____	REV
			SHEET

SUBMITTAL DIAGRAM TEMPLATES