

GENERAL NOTES

- 1.1.1

PROJECT NOTES:
- 1.1.2

THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURERS'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES.
- 1.1.3

GROUND FAULT DETECTION AND INTERRUPTION (GFDI) DEVICE IS INTEGRATED WITH THE INVERTER IN ACCORDANCE WITH [NEC 690.5(A)]
- 1.1.4

THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION
- 1.1.5

LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 690.64 (B)]
- 1.1.6

ALL PV SYSTEM COMPONENTS: MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINER BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY [NEC 690.4] & [NEC 690.60]
PV MODULES:UL 1703 CERTIFIED, NFPA 70 CLASS C FIRE
INVERTER(S):UL 1741 CERTIFIED, IEEE 1547, 929, 519
COMBINER BOX(S):UL 1703 OR UL 1741 ACCESSORY
- 1.2.1

SCOPE OF WORK:
- 1.2.2

PRIME CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND SPECIFICATIONS OF THE GRID-TIED PHOTOVOLTAIC SYSTEM RETROFIT. PRIME CONTRACTOR WILL BE RESPONSIBLE FOR COLLECTING EXISTING ONSITE REQUIREMENTS TO DESIGN, SPECIFY, AND INSTALL THE EXTERIOR ROOF-MOUNTED PORTION OF THE PHOTOVOLTAIC SYSTEMS DETAILED IN THIS DOCUMENT.
- 1.3.1

WORK INCLUDES:
- 1.3.2

PV ROOF ATTACHMENTS - L-FOOT
- 1.3.3

PV RACKING SYSTEM INSTALLATION - MAGERACK ALUMINUM
- 1.3.4

PV MODULE AND INVERTER INSTALLATION - AXITEC SOLAR AC-280M/156-60S / ENPHASE M250-60-2LL-S22 (-ZC)(-NA)(240V)
- 1.3.5

PV EQUIPMENT GROUNDING
- 1.3.6

PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX
- 1.3.7

PV INSTALLING SYSTEM MONITORING EQUIPMENT
- 1.3.8

PV LOAD CENTERS (IF NEC.)
- 1.3.9

PV METERING (IF NEC.)
- 1.3.10

PV DISCONNECTS
- 1.3.11

PV GROUNDING ELECTRODE & BONDING TO (E) GEC
- 1.3.12

PV FINAL COMMISSIONING
- 1.3.13

(E) ELECTRICAL EQUIPMENT RETROFIT FOR PV

SCOPE OF WORK
SYSTEM SIZE: STC: 19 x 280 = 5.320kW
PTC: 19 x 257.3 = 4.889kW DC
(19) AXITEC SOLAR AC- 280M/156-60S
(19) ENPHASE M250-60-2LL-S22
(-ZC)(-NA)(240V)

ATTACHMENT TYPE: L-FOOT
MSP UPGRADE: NO

NEW PV SYSTEM: 5.320 kWp

ADJEI RESIDENCE

21546 OAK PARK TRAILS DR

KATY, TX 77450

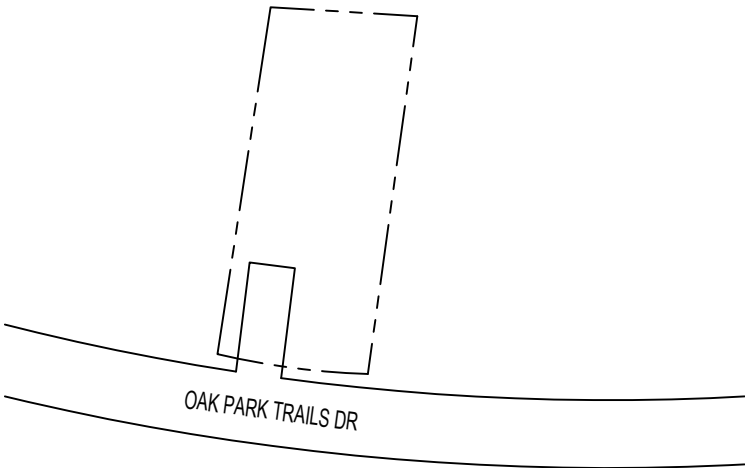
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AERIAL PHOTO

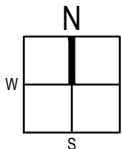
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02

PLAT MAP

NOT TO SCALE



SHEET LIST TABLE

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G-001	NOTES
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S-501	ASSEMBLY DETAILS
R-001	RESOURCE DOCUMENT
R-002	RESOURCE DOCUMENT
R-003	RESOURCE DOCUMENT
R-004	RESOURCE DOCUMENT
R-005	RESOURCE DOCUMENT
R-006	RESOURCE DOCUMENT

PROJECT INFORMATION

OWNER
NAME: KWABENA ADJEI

PROJECT MANAGER
NAME: JEFF BRYAN
PHONE: 2109930437

CONTRACTOR
NAME: TE SERVICES - PRO SOLAR LLC
PHONE: 2109930437

AUTHORITIES HAVING JURISDICTION
BUILDING: KATY
ZONING: KATY
UTILITY: CENTER POINT

DESIGN SPECIFICATIONS
OCCUPANCY: II
CONSTRUCTION: SINGLE-FAMILY
ZONING: RESIDENTIAL
GROUND SNOW LOAD: 0 PSF
WIND EXPOSURE: B
WIND SPEED: 130 MPH

APPLICABLE CODES & STANDARDS
BUILDING: IBC 2012 IRC 2012
ELECTRICAL: NEC 2011
FIRE: IFC 2012



CONTRACTOR

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NEW PV SYSTEM: 5.320 kWp

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APN: 1234360030014

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

COVER PAGE

DATE: 4.27.2017

DESIGN BY: V.K.

CHECKED BY: M.M.

REVISIONS

T-001.00

(SHEET 1)

	A	B	C	D	E	F	G	H
1	2.1.1	SITE NOTES						
	2.1.2	A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.		2.4.3	ALL PV CABLES AND HOMERUN WIRES BE #10AWG *USE-2, PV WIRE, OR PROPRIETARY SOLAR CABLING SPECIFIED BY MFR, OR EQUIVALENT; ROUTED TO SOURCE CIRCUIT COMBINER BOXES AS REQUIRED		2.6.8	ENCLOSURES SHALL BE PROPERLY PREPARED WITH REMOVAL OF PAINT/FINISH AS APPROPRIATE WHEN GROUNDING EQUIPMENT WITH TERMINATION GROUNDING LUGS.
	2.1.3	THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS AN UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.		2.4.4	ALL CONDUCTORS AND OCPD SIZES AND TYPES SPECIFIED ACCORDING TO [NEC 690.8 (A)(1) & (B)(1)], [NEC 240] [NEC 690.7] FOR MULTIPLE CONDUCTORS		2.6.9	GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR DIRECT BURIAL.
	2.1.4	THE SOLAR PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.		2.4.5	ALL PV DC CONDUCTORS IN CONDUIT EXPOSED TO SUNLIGHT SHALL BE DERATED ACCORDING TO [NEC TABLE 310.15 (B)(2)(C)] BLACK ONLY**		2.6.10	GROUNDING AND BONDING CONDUCTORS SHALL BE COPPER, SOLID OR STRANDED, AND BARE WHEN EXPOSED.
	2.1.5	PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION [NEC 110.26]		2.4.6	EXPOSED ROOF PV DC CONDUCTORS SHALL BE USE-2, 90°C RATED, WET AND UV RESISTANT, AND UL LISTED RATED FOR 600V, UV RATED SPIRAL WRAP SHALL BE USED TO PROTECT WIRE FROM SHARP EDGES		2.6.11	EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZE ACCORDING TO [NEC 690.45] AND BE A MINIMUM OF #10AWG WHEN NOT EXPOSED TO DAMAGE (#6AWG SHALL BE USED WHEN EXPOSED TO DAMAGE).
	2.1.6	ALTERNATE POWER SOURCE PLACARD SHALL BE PLASTIC, ENGRAVED IN A CONTRASTING COLOR TO THE PLAQUE. THIS PLAQUE WILL BE ATTACHED USING AN APPROVED METHOD. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC.		2.4.7	PHASE AND NEUTRAL CONDUCTORS SHALL BE DUAL RATED THHN/THWN-2 INSULATED, 90°C RATED, WET AND UV RESISTANT, RATED FOR 600V PER NEC 2008 OR 1000V PER NEC 2011		2.6.12	GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLOR CODED GREEN (OR MARKED GREEN IF #4 AWG OR LARGER)
	2.1.7	THE GROUNDING ELECTRODE CONDUCTOR SHALL BE PROTECTED FROM PHYSICAL DAMAGE BETWEEN THE GROUNDING ELECTRODE AND THE PANEL (OR INVERTER) IF SMALLER THAN #6 AWG COPPER WIRE PER NEC 250-64B. THE GROUNDING ELECTRODE CONDUCTOR WILL BE CONTINUOUS, EXCEPT FOR SPLICES OR JOINTS AT BUSBARS WITHIN LISTED EQUIPMENT PER [NEC 250.64C.]		2.4.8	4-WIRE DELTA CONNECTED SYSTEMS HAVE THE PHASE WITH THE HIGHER VOLTAGE TO GROUND MARKED ORANGE OR IDENTIFIED BY OTHER EFFECTIVE MEANS		2.6.13	ALL CONDUIT BETWEEN THE UTILITY AC DISCONNECT AND THE POINT OF CONNECTION SHALL HAVE GROUNDED BUSHINGS AT BOTH ENDS.
	2.1.8	ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SHALL SERVE TO PROTECT THE BUILDING OR STRUCTURE.		2.4.9	ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION		2.6.14	AC SYSTEM GEC SIZED ACCORDING TO [NEC 690.47], [NEC TABLE 250.66], DC SYSTEM GEC SIZED ACCORDING TO [NEC 250.166], MINIMUM #8AWG WHEN INSULATED, #6AWG WHEN EXPOSED TO DAMAGE.
	2.1.9	RIGID CONDUIT (AND/OR NIPPLES) MUST HAVE A PULL BUSHING TO PROTECT WIRES.		2.4.10	VOLTAGE DROP LIMITED TO 2% FOR DC CIRCUITS AND 1% FOR AC CIRCUITS		2.6.15	EXPOSED NON-CURRENT CARRYING METAL PARTS OF MODULE FRAMES, EQUIPMENTS, AND CONDUCTOR ENCLOSURES SHALL BE GROUNDED IN ACCORDANCE WITH 250.134 OR 250.136(A) REGARDLESS OF VOLTAGE.
	2.1.10	BOLTED CONNECTION REQUIRED IN DC DISCONNECTS ON THE WHITE GROUNDED CONDUCTOR (USE POLARIS BLOCK OR NEUTRAL BAR)		2.4.11	NEGATIVE GROUNDED SYSTEMS DC CONDUCTORS SHALL BE COLOR CODED AS FOLLOWS: DC POSITIVE - RED (OR MARKED RED), DC NEGATIVE - GREY (OR MARKED GREY)		2.7.1	INTERCONNECTION NOTES
2	2.1.11	ANY CONNECTION ABOVE LIVE PARTS MUST BE WATERTIGHT. REDUCING WASHERS DISALLOWED ABOVE LIVE PARTS, MEYERS HUBS RECOMMENDED		2.4.12	POSITIVE GROUNDED SYSTEMS DC CONDUCTORS COLOR CODED: DC POSITIVE - GREY (OR MARKED GREY), DC NEGATIVE - BLACK (OR MARKED BLACK)		2.7.2	PV DEDICATED BACKFEED BREAKERS MUST BE LOCATED AT THE OPPOSITE END OF THE BUS FROM THE MAIN SERVICE BREAKER OR TRANSFORMER INPUT FEEDER IN ACCORDANCE WITH [NEC 690.64(B)(7)]
				2.4.13	AC CONDUCTORS >4AWG COLOR CODED OR MARKED: PHASE A OR L1- BLACK, PHASE B OR L2- RED, PHASE C OR L3- BLUE, NEUTRAL- WHITE/GRAY *USE-2 IS NOT INDOOR RATED BUT PV CABLE IS RATED THWN/THWN-2 AND MAY BE USED INSIDE **USE-2 IS AVAILABLE AS UV WHITE		2.7.3	SUM OF BREAKER RATINGS SUPPLYING THE BUS MAY NOT EXCEED 120% OF THE THE BUSBAR RATING PER [NEC 690.64(B)(2)] AND/OR [NEC 705.12(D)(1).
							2.7.4	GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9] & [NEC 230.95] ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
							2.7.5	SUPPLY SIDE INTERCONNECTION ACCORDING TO [NEC 690.64(A)] AND/OR [NEC 705.12(A)] WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH [NEC 230.42(B)]
							2.7.6	MICROINVERTER BRANCHES SHALL BE CONNECTED TO A SINGLE BREAKER OCPD IN ACCORDANCE WITH [NEC 110.3(B)].
							2.8.1	DISCONNECT NOTES
							2.8.2	DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS)
							2.8.3	AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
							2.8.4	DC CURRENT CONDUCTORS ARE TO REMAIN OUTSIDE OF BUILDING PRIOR TO EITHER A FUSEABLE SOURCE CIRCUIT COMBINER BOX OR A LOAD-BREAK DISCONNECTING DEVICE
3	2.2.1	SOLAR CONTRACTOR						
	2.2.2	MODULE CERTIFICATIONS WILL INCLUDE UL1703, IEC61646, IEC61730.						
	2.2.3	IF APPLICABLE, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE MARKED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.		2.5.1	STRUCTURAL NOTES:			
	2.2.4	AS INDICATED BY DESIGN, OTHER NRTL LISTED MODULE GROUNDING DEVICES MAY BE USED IN PLACE OF STANDARD GROUNDING LUGS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ.		2.5.2	RACKING SYSTEM & PV ARRAY SHALL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL.			
	2.2.5	CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS.		2.5.3	ROOF MOUNTED STANDARD RAIL REQUIRES ONE THERMAL EXPANSION GAP FOR EVERY RUN OF RAIL GREATER THAN 40'.			
	2.2.6	CONDUIT POINT OF PENETRATION FROM EXTERIOR TO INTERIOR TO BE INSTALLED AND SEALED WITH A SUITABLE SEALING COMPOUND.		2.5.4	ARRAY SHALL BE A MIN. HEIGHT OF 3" ABOVE THE COMPOSITION ROOF.			
	2.2.7	DC WIRING LIMITED TO MODULE FOOTPRINT W/ ENPHASE AC SYSTEM.		2.5.5	JUNCTION BOX SHALL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.			
	2.2.8	WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.		2.5.6	ROOFTOP PENETRATIONS PERTAINING TO SOLAR RACKING WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.			
	2.2.9	MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC UNLESS NOT AVAILABLE.		2.5.7	ALL PV RELATED RACKING ATTACHMENTS WILL BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER. O.C. FINAL ATTACHMENT LOCATIONS MAY BE ADJUSTED IN THE FIELD AS NECESSARY.			
	2.2.10	ALL INVERTERS, MOTOR GENERATORS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AC PHOTOVOLTAIC MODULES, SOURCE CIRCUIT COMBINERS, AND CHARGE CONTROLLERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4 (D).		2.5.8	ALL PV RELATED RACKING ATTACHMENTS SHALL BE STAGGERED BY ROW AMONGST THE ROOF FRAMING MEMBERS.			
	2.2.11	ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE.		2.6.1	GROUNDING NOTES			
4				2.6.2	A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH [NEC 690-47] AND [NEC 250-50] THROUGH [NEC 60 250-166] SHALL BE PROVIDED. PER NEC, GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO AT THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, OR IS ONLY METALLIC WATER PIPING, A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT GROUND ROD WITH ACORN CLAMP.			
				2.6.3	GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #8 AWG AND NO GREATER THAN #6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.			
				2.6.4	PV SYSTEM SHALL BE GROUNDED IN ACCORDANCE TO [NEC 250.21], [NEC TABLE 250.122], AND ALL METAL PARTS OR MODULE FRAMES ACCORDING TO [NEC 690.43].			
				2.6.5	MODULE SOURCE CIRCUITS SHALL BE GROUNDED IN ACCORDANCE TO [NEC 690.42].			
				2.6.6	THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDED CONDUCTOR TO ANOTHER MODULE.			
				2.6.7	EACH MODULE WILL BE GROUNDED USING THE SUPPLIED CONNECTIONS POINTS IDENTIFIED IN THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.			
5	2.3.1	EQUIPMENT LOCATIONS						
	2.3.2	ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY [NEC 110.26].						
	2.3.3	EQUIPMENT INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY [NEC 690.31 (A)-(B)] AND [NEC TABLE 310.15 (B)(2)(C)].						
	2.3.4	ADDITIONAL AC DISCONNECTS SHALL BE PROVIDED WHERE THE INVERTER IS NOT ADJACENT TO THE UTILITY AC DISCONNECT, OR NOT WITHIN SIGHT OF THE UTILITY AC DISCONNECT.						
	2.3.5	ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.						
	2.3.6	ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.						
6	2.4.1	WIRING & CONDUIT NOTES						
	2.4.2	ALL CONDUIT SIZES AND TYPES, SHALL BE LISTED FOR ITS PURPOSE AND APPROVED						



CONTRACTOR

TE SERVICES - PRO SOLAR LLC

PHONE: 2109930437

ADDRESS: 15301 C STORM DRIVE
AUSTIN, TX 78734

LIC. NO.: 18081

HIC. NO.:

ELE. NO.:

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NEW PV SYSTEM: 5.320 kWp

ADJEL
RESIDENCE

21546 OAK PARK TRAILS DR
KATY, TX 77450
APN: 1234360030014

ENGINEER OF RECORD

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NOTES

DATE: 4.27.2017

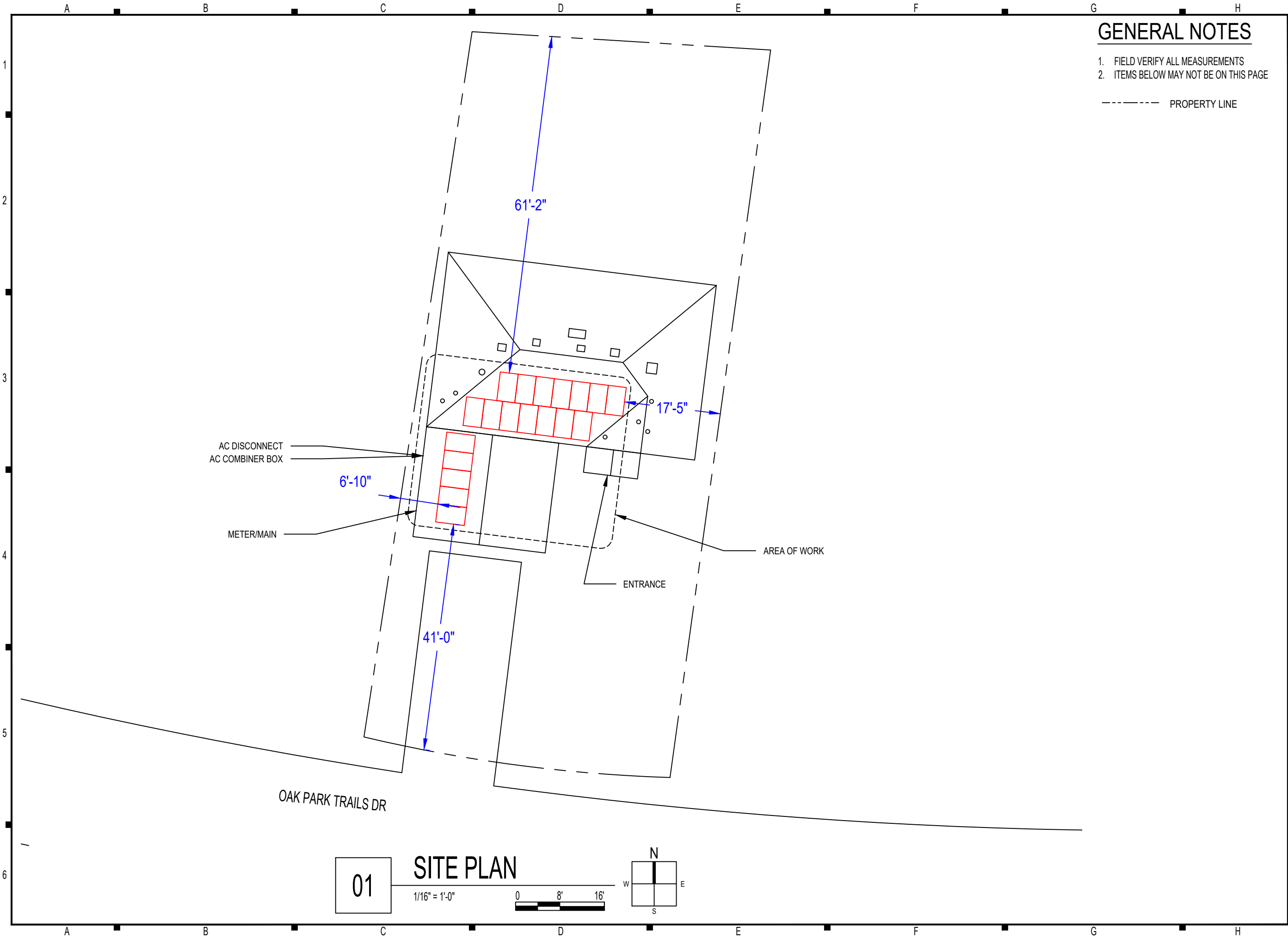
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SITE PLAN

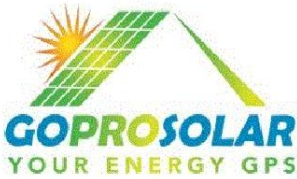
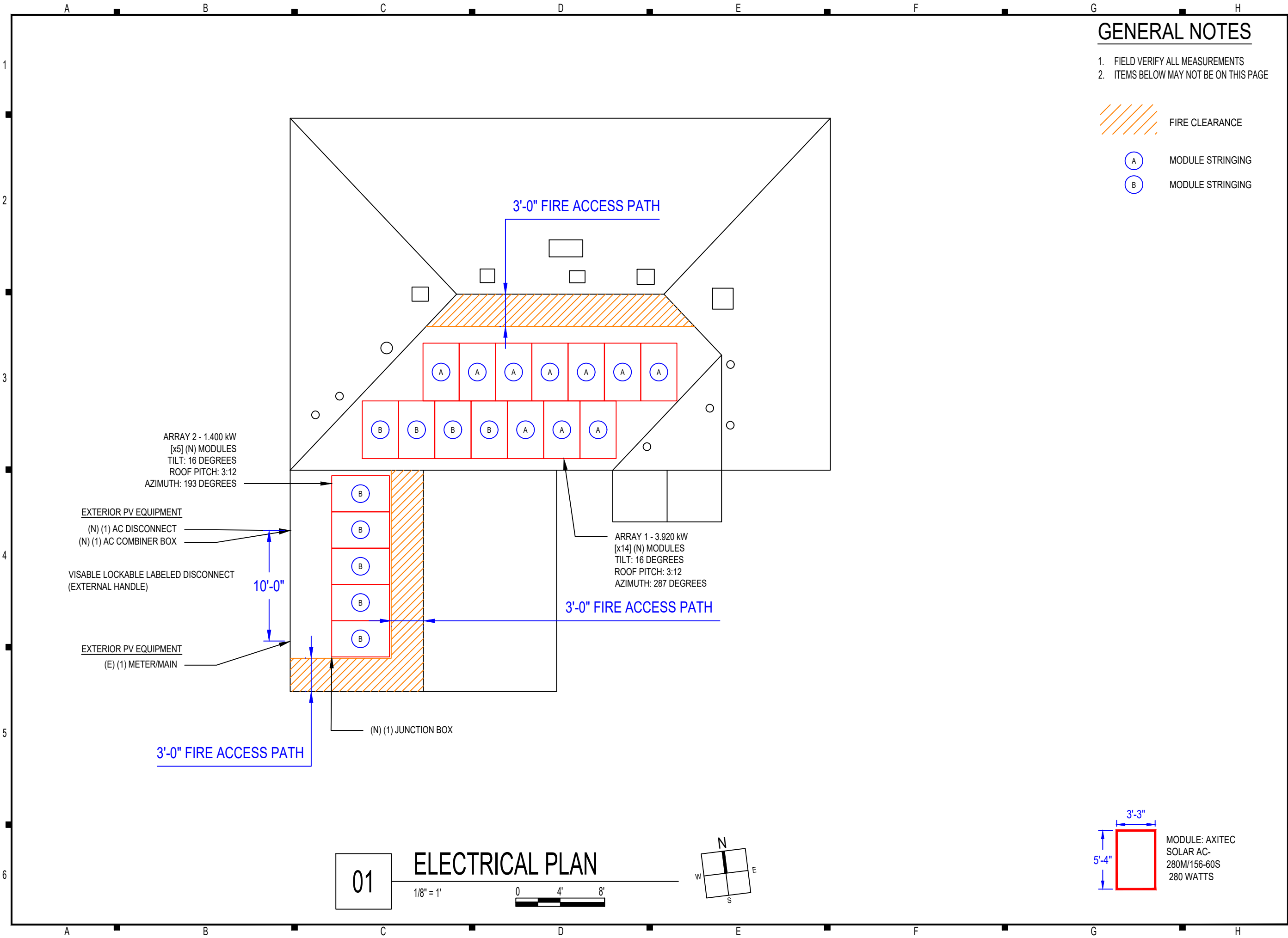
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ELECTRICAL PLAN

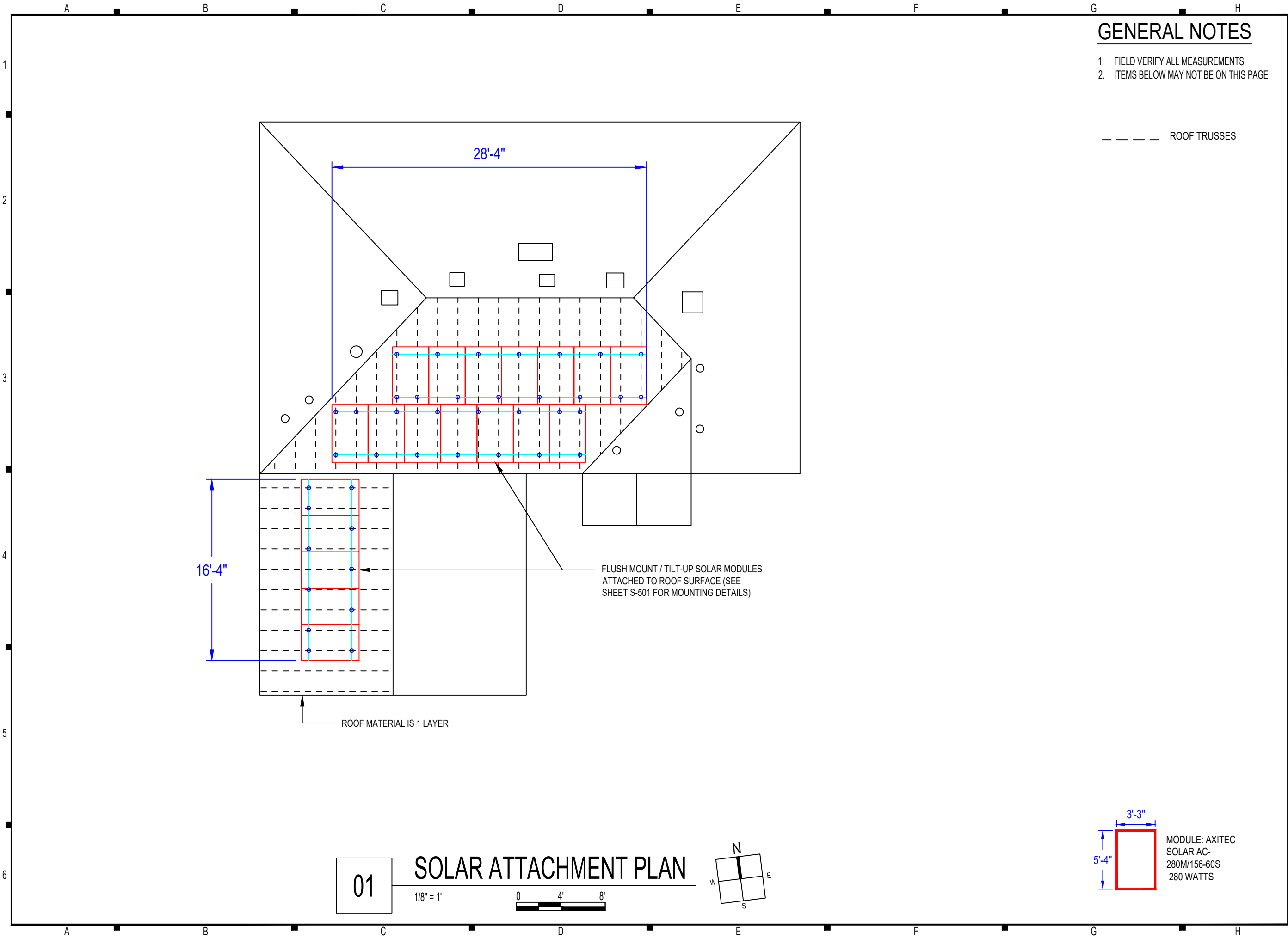
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(SHEET 4)



GENERAL NOTES

- 1. FIELD VERIFY ALL MEASUREMENTS
- 2. ITEMS BELOW MAY NOT BE ON THIS PAGE

--- ROOF TRUSSES



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SOLAR ATTACHMENT PLAN

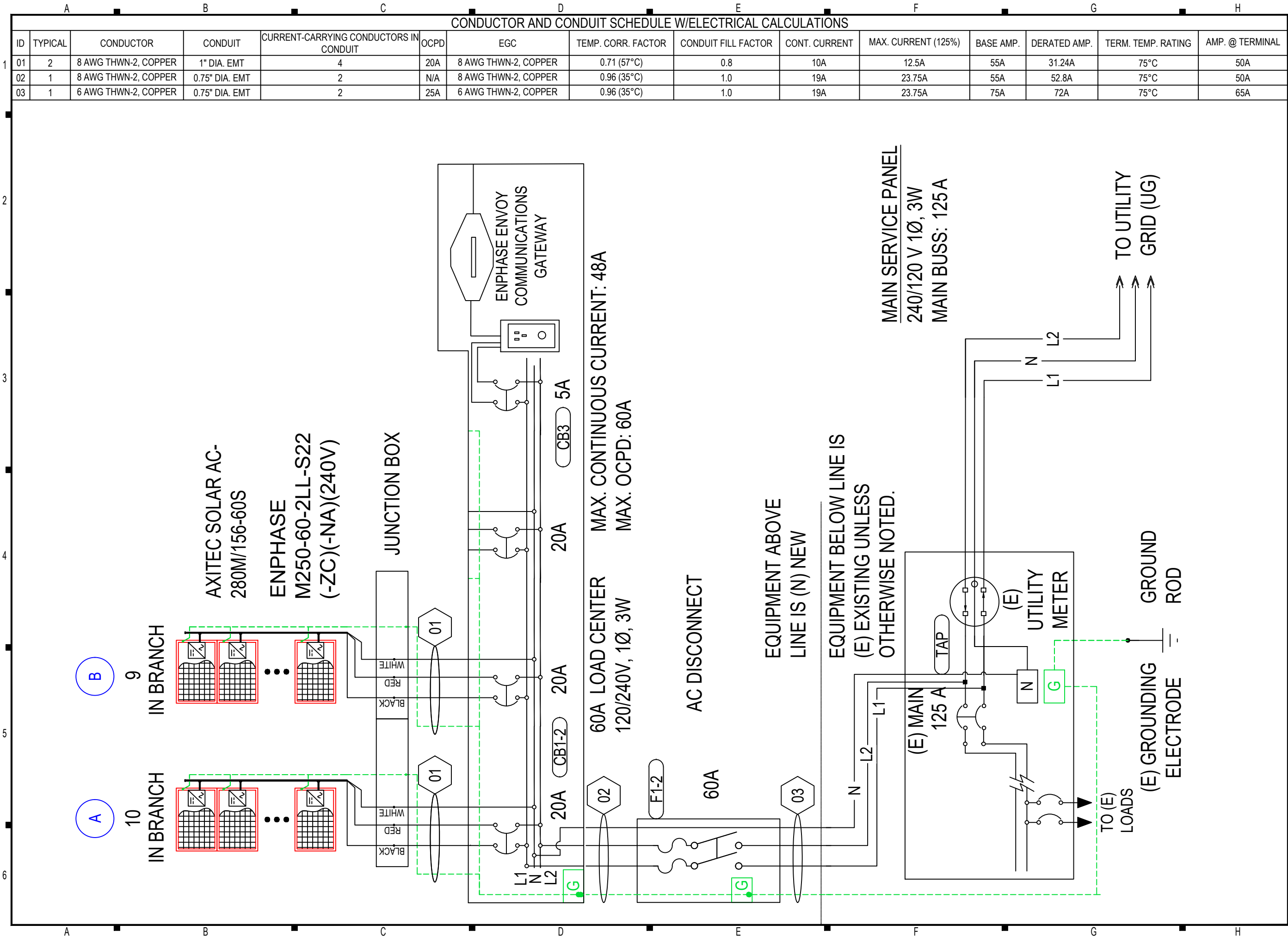
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LINE DIAGRAM

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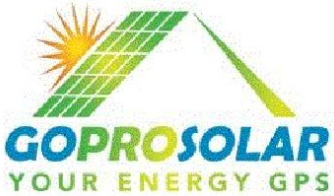
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E-601.00
(SHEET 6)

SYSTEM SUMMARY			MODULES													
			REF.	QTY.	MAKE AND MODEL			PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC		FUSE RATING
NVERTERS PER BRANCH			PM1-19	19	AXITEC AC-280M/156-60S (BLK)			280W	257W	9.55A	8.95A	39.4V	31.5V	-0.118V/°C (-0.3%/°C)		15A
MAX AC CURRENT			INVERTERS													
MAX AC OUTPUT POWER			REF.	QTY.	MAKE AND MODEL		AC VOLTAGE	GROUND	MAX OCPD RATING	RATED POWER	MAX OUTPUT CURRENT		MAX INPUT CURRENT	MAX INPUT VOLTAGE		CEC WEIGHTED EFFICIENCY
ARRAY STC POWER			I1-19	19	ENPHASE M250-60-2LL-S22 (-ZC) (-NA) (240V)		240V	FLOATING	20A	250W	1.0A		9.8A	48V		96.5%
ARRAY PTC POWER			DISCONNECTS													
MAX AC CURRENT			REF.	QTY.	MAKE AND MODEL			RATED CURRENT		MAX RATED VOLTAGE		OCPDS				
MAX AC POWER			SW1	1	EATON DG222NRB OR EQUIV.			60A		240VAC		REF.	QTY.	RATED CURRENT		MAX VOLTAGE
DERATED (CEC) AC POWER			DESIGN TEMPERATURES													
ASHRAE EXTREME LOW			-4°C (25°F), SOURCE: HOUSTON BUSH INTERCONTINENTAL (KIAH) 29.99°, -95.36°													
ASHRAE 2% HIGH			35°C (95°F), SOURCE: HOUSTON BUSH INTERCONTINENTAL (KIAH) 29.99°, -95.36°													
BILL OF MATERIALS																
CATEGORY	MAKE	MODEL NUMBER	REF	QTY	UNIT	QTY/UNIT	DESCRIPTION									
MODULE	AXITEC	AC-280M/156-60S (BLK)	PM1-19	19	PIECES	1	AXITEC AC-280M/156-60S (BLK) 280W, 60 CELLS, MONOCRYSTALLINE SILICON									
INVERTER	ENPHASE	M250-60-2LL-S22-IG	I1-19	19	PIECES	1	ENPHASE M250-60-2LL-S22-IG 250W MICROINVERTER									
DISCONNECT	EATON	DG222NRB	SW1	1	PIECE	1	EATON DG222NRB DISCONNECT SWITCH, 2-POLE, 60A, 240VAC, OR EQUIVALENT									
MISC ELECTRICAL EQUIPMENT	ENPHASE	XAM1-120	EP1	1	PIECE	1	ENPHASE, XAM1-120, AC COMBINER BOX									
MISC ELECTRICAL EQUIPMENT	ENPHASE	ENVOY COMMUNICATION SYSTEM		1	PIECES	1	ENPHASE, ENVOY COMMUNICATION SYSTEM									
MISC ELECTRICAL EQUIPMENT		GEN-CABLE-CLIP	HDWR6-100	95	PIECES	1	GENERIC CABLE CLIP									
WIRING	ENPHASE	ET17-240-40	EN1-2	2	PIECES	1	ENPHASE ENGAGE (TM) TRUNK CABLE FOR LANDSCAPE LAYOUT									
WIRING	ENPHASE	ET-TERM-10	EN3	1	BUNDLE	10	ENPHASE ENGAGE (TM) BRANCH TERMINATOR									
WIRING	ENPHASE	ET-SEAL-10	EN4	1	BUNDLE	10	ENPHASE ENGAGE (TM) WATERTIGHT SEALING CAP									
WIRING		GEN-8-AWG-THWN-2-CU-BLK	WR1-2	110	FEET	1	8 AWG THWN-2, COPPER, BLACK (LINE 1)									
WIRING		GEN-8-AWG-THWN-2-CU-RD	WR1-2	110	FEET	1	8 AWG THWN-2, COPPER, RED (LINE 2)									
WIRING		GEN-8-AWG-THWN-2-CU-GR	WR1-2	110	FEET	1	8 AWG THWN-2, COPPER, GREEN (GROUND)									
WIRING		GEN-8-AWG-THWN-2-CU-WH	WR1-2	110	FEET	1	8 AWG THWN-2, COPPER, WHITE (NEUTRAL)									
WIRING		GEN-6-AWG-THWN-2-CU-RD	WR3	10	FEET	1	6 AWG THWN-2, COPPER, RED (LINE 2)									
WIRING		GEN-6-AWG-THWN-2-CU-BLK	WR3	10	FEET	1	6 AWG THWN-2, COPPER, BLACK (LINE 1)									
WIRING		GEN-6-AWG-THWN-2-CU-WH	WR3	10	FEET	1	6 AWG THWN-2, COPPER, WHITE (NEUTRAL)									
WIRING		GEN-6-AWG-THWN-2-CU-GR	WR3	10	FEET	1	6 AWG THWN-2, COPPER, GREEN (GROUND)									
WIREWAY	ENPHASE	ET-SPLK-05	EN5	1	BUNDLE	5	ENPHASE ENGAGE (TM) ENGAGE COUPLER									
WIREWAY	EATON	GEN-COMBINER BOX	CB1	1	PIECE	1	EATON COMBINER BOX									
WIREWAY		GEN-EMT-1DIA	WW1	45	FEET	1	EMT CONDUIT, 1 DIA.									
WIREWAY		GEN-EMT-0.75DIA	WW2-3	30	FEET	1	EMT CONDUIT, 0.75 DIA.									
OCPD	GENERIC MANUFACTURER	GEN-CB-20A-240VAC	CB1-2	2	PIECES	1	CIRCUIT BREAKER, 20A, 240VAC									
OCPD	GENERIC MANUFACTURER	GEN-CB-5A-240VAC	CB3	1	PIECES	1	CIRCUIT BREAKER, 5A, 240VAC									
OCPD	GENERIC MANUFACTURER	GEN-FU-25A-240VAC	F1-2	2	PIECES	1	FUSE, 25A, 240VAC									



CONTRACTOR

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NEW PV SYSTEM: 5.320 kWp

ADJEI
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21546 OAK PARK TRAILS DR
KATY, TX 77450
APN: 1234360030014

ENGINEER OF RECORD

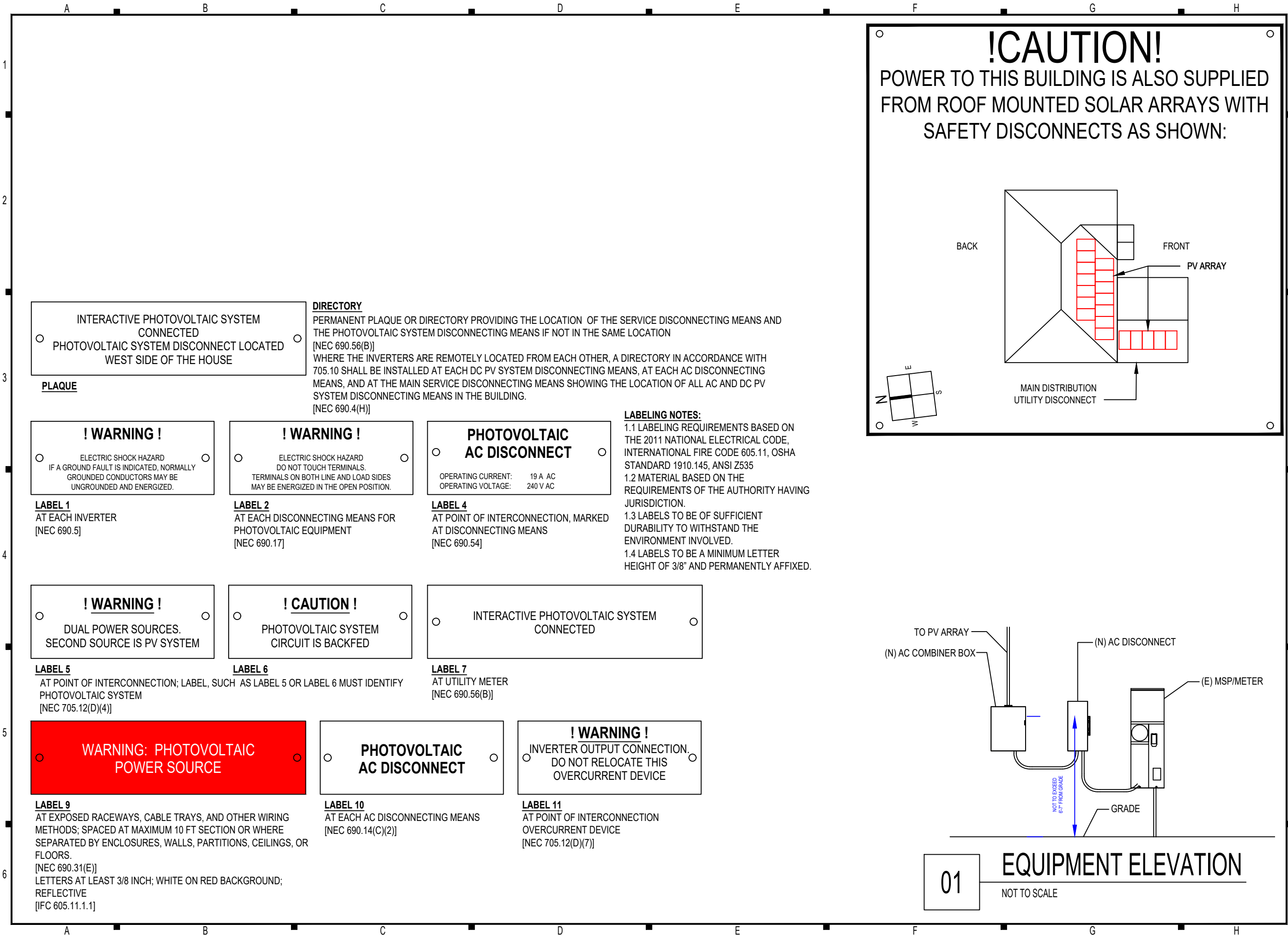
PAPER SIZE: 11" x 17" (ANSI B)

DESIGN TABLES

DATE: 4.27.2017
DESIGN BY: V.K.
CHECKED BY: M.M.

REVISIONS

E-602.00
(SHEET 7)



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PAPER SIZE: 11" x 17" (ANSI B)

PLACARDS

DATE: 4.27.2017

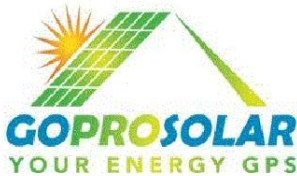
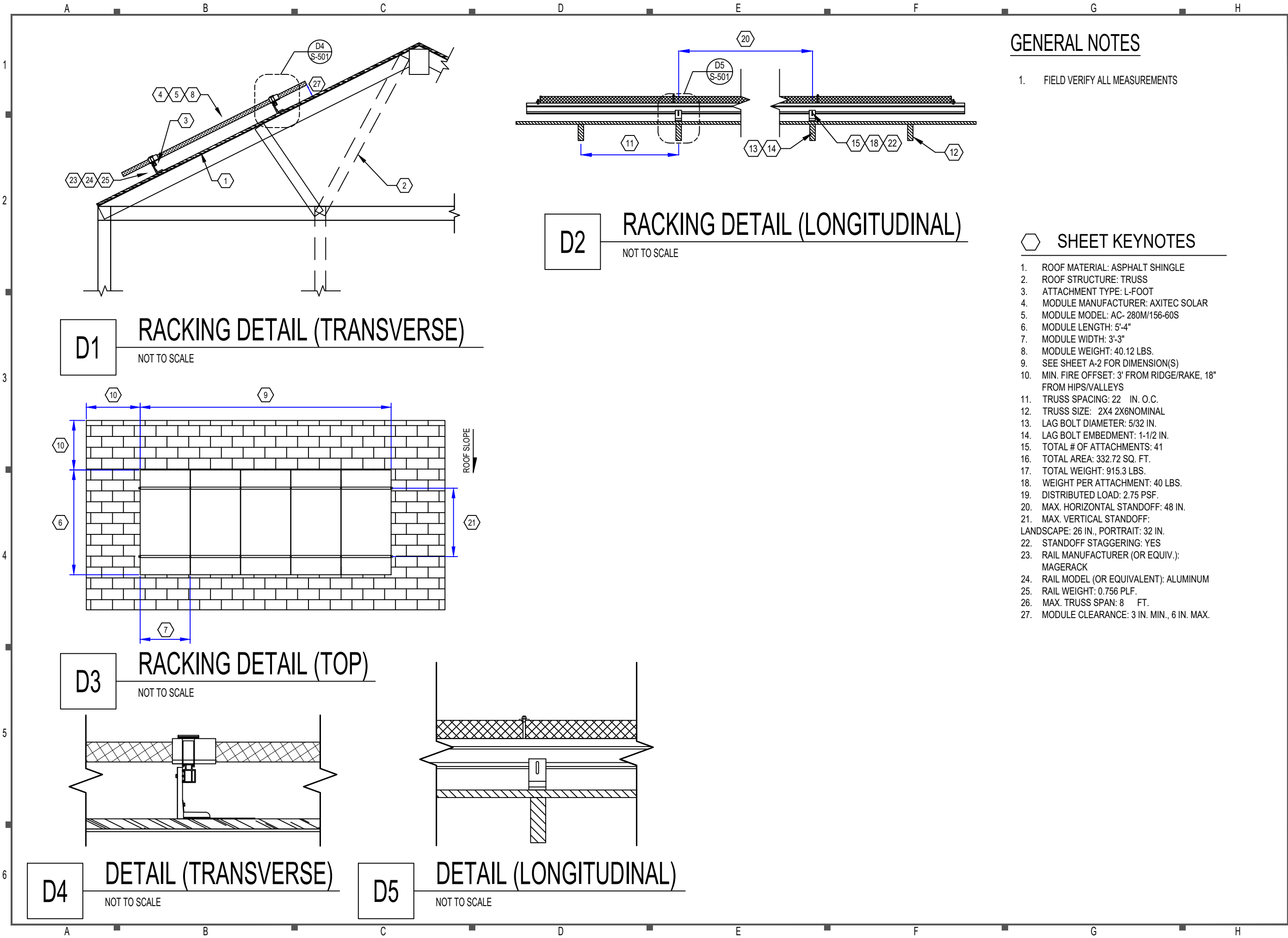
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ASSEMBLY DETAILS

DATE: 4.27.2017

DESIGN BY: V.K.

CHECKED BY: M.M.

REVISIONS

S-501.00

(SHEET 9)

A B C D E F G H



AC-275M/156-60S
AC-280M/156-60S
AC-285M/156-60S
AC-290M/156-60S
AC-295M/156-60S

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AXITEC
high quality german solar brand

AXIworld-
premium

Distributed by:

AC-275M/156-60S
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AXIworldpremium

60 cell/monocrystalline photovoltaic modules
High performance photovoltaic modules

The advantages:

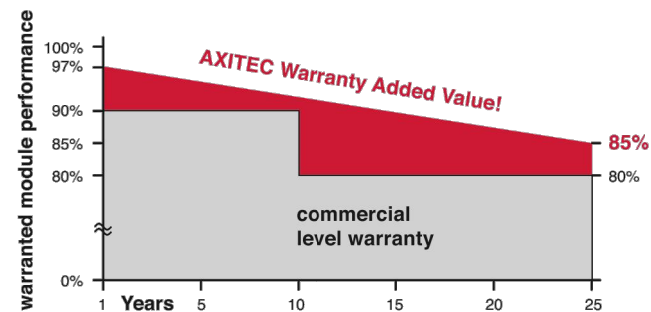
- 12** Years
12 years manufacturer's warranty
- A-Max**
Highest performance due to specifically selected technologies and materials
- +** Wp
Guaranteed positive power tolerance from 0-5 Wp by individual measurement
- ↓** 5,400 Pa
Maximum 5400 Pa snow load
- 100%**
100 % electroluminescence inspection
- IP 67**
High quality junction box and connector systems



Fig. similar 60M156EN16012BA-56/1

Exclusive linear AXITEC high performance guarantee!

- 15 years manufacturer's guarantee on 90 % of the nominal performance
- 25 years manufacturer's guarantee on 85 % of the nominal performance



Electrical data (at standard conditions (STC) irradiance 1000 watt/m², spectrum AM 1.5 at a cell temperature of 25°C)						
Type	Nominal output Pmpp	Nominal voltage Umpp	Nominal current Impp	Short circuit current Isc	Open circuit voltage Uoc	Module conversion efficiency
AC-275M/156-60S	275 Wp	31,20 V	8,86 A	9,50 A	39,32 V	16,90 %
AC-280M/156-60S	280 Wp	31,50 V	8,95 A	9,55 A	39,45 V	17,21 %
AC-285M/156-60S	285 Wp	31,59 V	9,09 A	9,68 A	39,56 V	17,52 %
AC-290M/156-60S	290 Wp	31,71 V	9,16 A	9,70 A	39,70 V	17,83 %
AC-295M/156-60S	295 Wp	31,80 V	9,29 A	9,75 A	39,95 V	18,13 %

Design

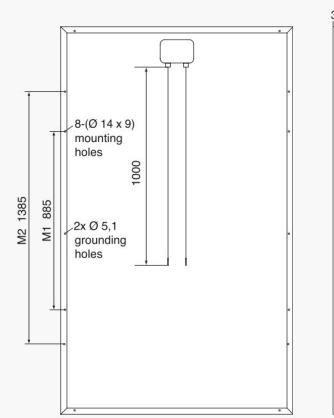
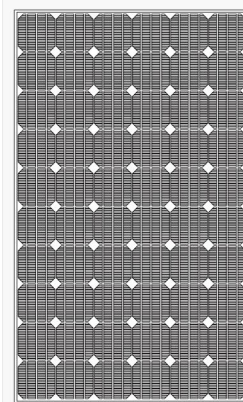
Frontside	3,2 mm hardened, low-reflection white glass
Cells	60 monocrystalline high efficiency cells 156 mm x 156 mm (6")
Backside	Composite film
Frame	35 mm silver anodized aluminium frame

Mechanical data

L x W x H	1640 x 992 x 35 mm
Weight	18,2 kg with frame

Power connection

Socket	Protection Class IP68 (3 bypass diodes)
Wire	approx. 1,0 m, 4 mm²
Plug-in system	Plug/socket IP67



All dimensions in mm

Limit values

System voltage	1000 VDC
NOCT (nominal operating cell temperature)*	45°C +/-2K
Max. load-carrying capacity	5400 N/m²
Reverse current feed IR	20,0 A
Permissible operating temperature	-40°C to 85°C / -40F to 185F

(No external voltages greater than Uoc may be applied to the module)

* NOCT, irradiance 800 W/m²; AM 1,5; wind speed 1 m/s; Temperature 20°C

Temperature coefficients

Voltage Uoc	-0,30 %/K
Current Isc	0,04 %/K
Output Pmpp	-0,40 %/K

Low-light performance (Example for AC-260M/156-60S)

I-U characteristic curve	Current Ipp	Voltage Upp
200 W/m²	1,71 A	30,00 V
400 W/m²	3,41 A	30,10 V
600 W/m²	5,18 A	30,18 V
800 W/m²	6,89 A	30,36 V
1000 W/m²	8,60 A	30,42 V

Packaging

Module pieces per pallet	30
Module pieces per HC-container	840

Technical data are subject to change without prior notice, errors excepted.

The measurement tolerances are +/-3%



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RESOURCE DOCUMENT

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REVISIONS

R-001.00

SHEET 10

A B C D E F G H

Enphase M250

The versatile **Enphase M250 Microinverter™** performs in both residential and commercial solar PV installations and is compatible with both 60-cell and 72-cell modules. With its all-AC approach and integrated grounding, the M250 delivers increased energy harvest and reduces design and installation complexity.

The Enphase M250 Microinverter integrates seamlessly with the Enphase Engage™ Cable, the Enphase Envoy™ communications gateway, and Enphase Enlighten™ monitoring and analysis software.

Productive

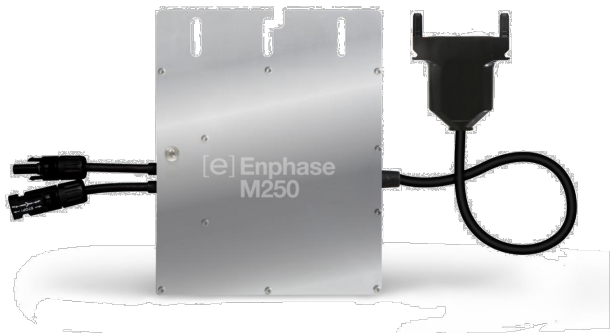
- Designed for a wide range of modules
- Maximizes energy production
- Minimizes impact of shading, dust, and debris

Simple

- No DC design or string calculation required
- No GEC needed for microinverter
- Easy installation with Engage cable

Reliable

- 4th-generation product
- More than 1 million hours of testing and millions of units shipped
- Industry-leading warranty, up to 25 years



To learn more about Enphase offerings, visit enphase.com



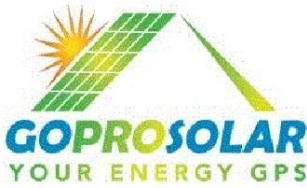
Enphase M250 Microinverter

INPUT DATA (DC)	MODELS: M250-60-2LL-S22, M250-60-2LL-S25	MODELS: M250-72-2LL-S22, M250-72-2LL-S25
Commonly used module pairings ¹	210 - 350+ W	210 - 350+ W
Compatibility	60-cell PV modules	60-cell and 72-cell PV modules
Maximum input DC voltage	48 V	62 V
Peak power tracking voltage	27 V - 39 V	27 V - 48 V
Operating range	16 V - 48 V	16 V - 60V
Min/Max start voltage	22 V / 48 V	22 V / 48 V
Max DC short circuit current	15 A	15 A
OUTPUT DATA (AC)		
Peak output power	250 W	
Maximum continuous output power	240 W	
Nominal output current	1.15 A @ 208 VAC 1.0 A @ 240 VAC	
Nominal voltage/range	208 V / 183-229 V @ 208 VAC 240 V / 211-264 V @ 240 VAC	
Nominal frequency/range	60.0 / 57-61 Hz	
Extended frequency range ²	57-62.5 Hz	
Power factor	>0.95	
Maximum units per 20 A branch circuit	24 (three-phase 208 VAC) 16 (single phase 240 VAC)	
Maximum output fault current	850 mA rms for 6 cycles	
EFFICIENCY		
CEC weighted efficiency	96.5%	
Peak inverter efficiency	96.5%	
Static MPPT efficiency (weighted, reference EN50530)	99.4%	
Night time power consumption	65 mW max	
MECHANICAL DATA		
Ambient temperature range	-40°C to +65°C	
Dimensions (WxHxD)	171 mm x 173 mm x 30 mm (without mounting bracket)	
Weight	1.6 kg (3.4 lbs)	
Cooling	Natural convection - No fans	
Enclosure environmental rating	Outdoor - NEMA 6	
Connector type	MC4: M250-60-2LL-S22 and M250-72-2LL-S22 Amphenol H4: M250-60-2LL-S25 and M250-72-2LL-S25	
FEATURES		
Communication	Power line	
Integrated ground	The DC circuit meets the requirements for ungrounded PV arrays in NEC 690.35. Equipment ground is provided in the Engage Cable. No additional GEC or ground is required. Ground fault protection (GFP) is integrated into the microinverter.	
Monitoring	Enlighten Manager and MyEnlighten monitoring options	
Transformer design	High frequency transformers, galvanically isolated	
Compliance	UL 2703 recognized, UL1741/IEEE1547, FCC Part 15 Class B, CAN/CSA-C22.2 NO. 0-M91, 0.4-04, and 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.	

1. No enforced DC/AC ratio. See the compatibility calculator at enphase.com/en-us/support/module-compatibility.
2. Frequency ranges can be extended beyond nominal if required by the utility.

To learn more about Enphase offerings, visit enphase.com

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NEW PV SYSTEM: 5.320 kWp

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KATY, TX 77450
APN: 1234360030014

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

RESOURCE DOCUMENT

DATE: 4.27.2017

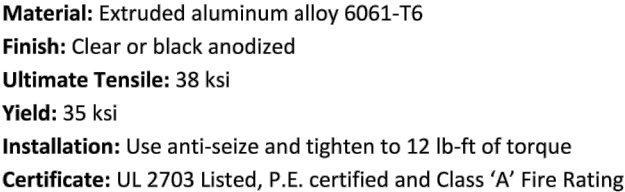
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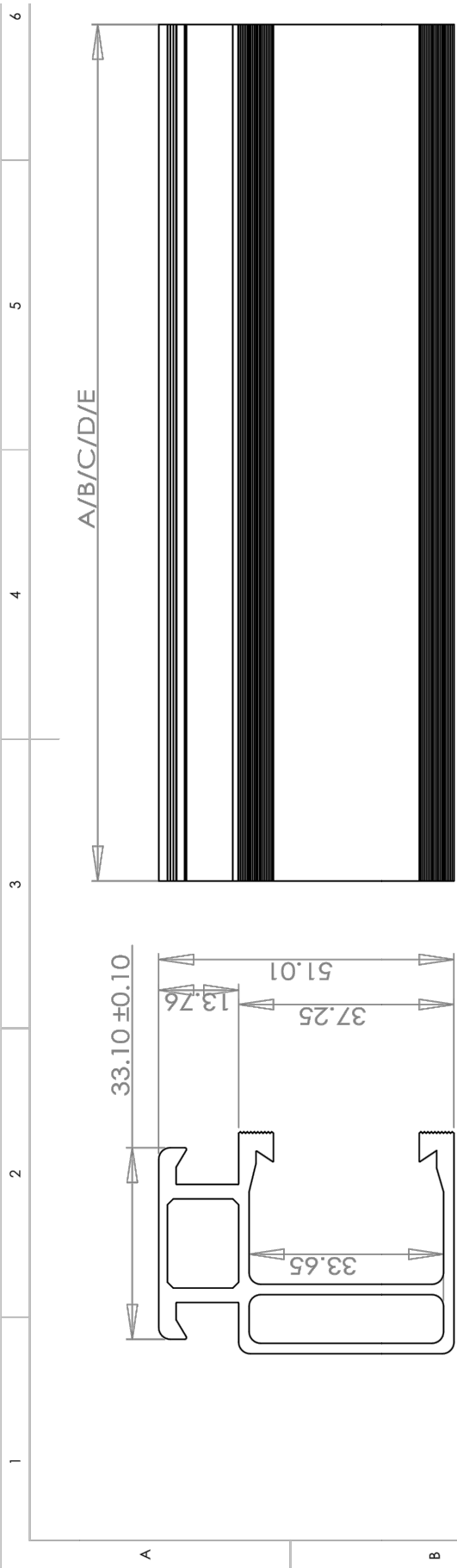
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Magerack Technical Datasheet

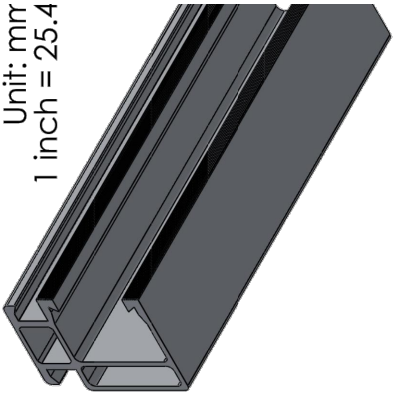


Part #	Length	Finish	Weight (LB)
101-001-110	10.5' (126")	Clear	7.89
101-001-112	12' (144")		9.07
101-001-114	14' (168")		10.58
101-001-117	17' (204")		12.85
101-001-120	20' (240")		15.08
101-001-210	10.5' (126")	Black	7.89
101-001-212	12' (144")		9.07
101-001-214	14' (168")		10.58
101-001-217	17' (204")		12.85
101-001-220	20' (240")		15.08

www.magerack.com
sales@magerack.com
510-656-6661



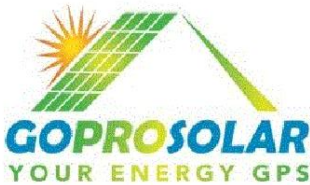
Unit: mm
1 inch = 25.4



Note	Part No.	Dimension	Weight
A/10.5	101-001-110	3200	3.827kg
	101-001-210		
B/12	101-001-112	3658	4.37474kg
	101-001-212		
C/14	101-001-114	4267	5.10307kg
	101-001-214		
D/17	101-001-117	5182	6.19735kg
	101-001-217		
E/20	101-001-120	6096	7.29044kg
	101-001-220		

DRAWN	NAME	SIGNATURE	DATE	DEBUR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING	REVISION
FINISH: _____ UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: _____ TOLERANCES: LINEAR: _____ ANGULAR: _____				TITLE: _____		

Maaderack



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DESIGN BY: V.K.

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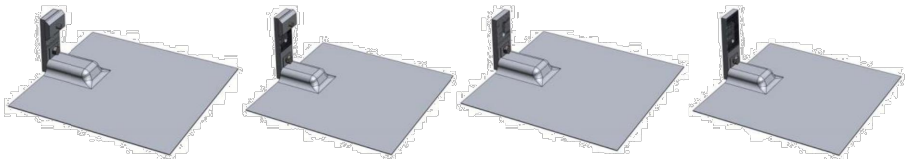
R-003.00

SHEET 12



Magerack Technical Datasheet

L-foot with Flashing



- Parts:**

 - One (1) L-foot or Tall L-foot
 - One (1) rail nut
 - One (1) 5/16 1-1/4" stainless steel bolt/washer
 - One (1) 5/16 X 3/4" stainless steel bolt/washer
 - One (1) L-foot flashing (9"x12" or 18"x18")
- Material:** Extruded aluminum alloy 6061-T6, aluminum 3003-H14

Finish: Mill finish, clear anodized

Ultimate Tensile: 38 ksi

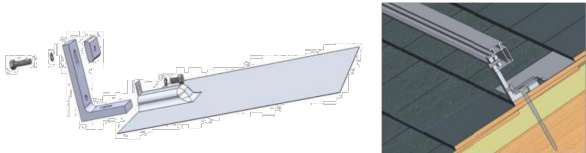
Yield: 35 ksi

Installation: Use anti-seize and tighten to 12 lb-ft of torque

Roof attachment: Use one stainless steel 5/16" lag bolt or 5/16" through bolt

Load: Loads are given for the L-Foot to beam connection only; be sure to check load limits for L-foot, lag screw, or other attachment method.

Certificate: P.E. certified and Class 'A' Fire Rating

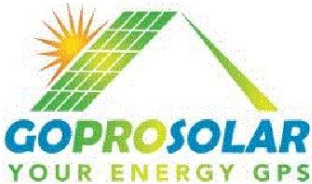
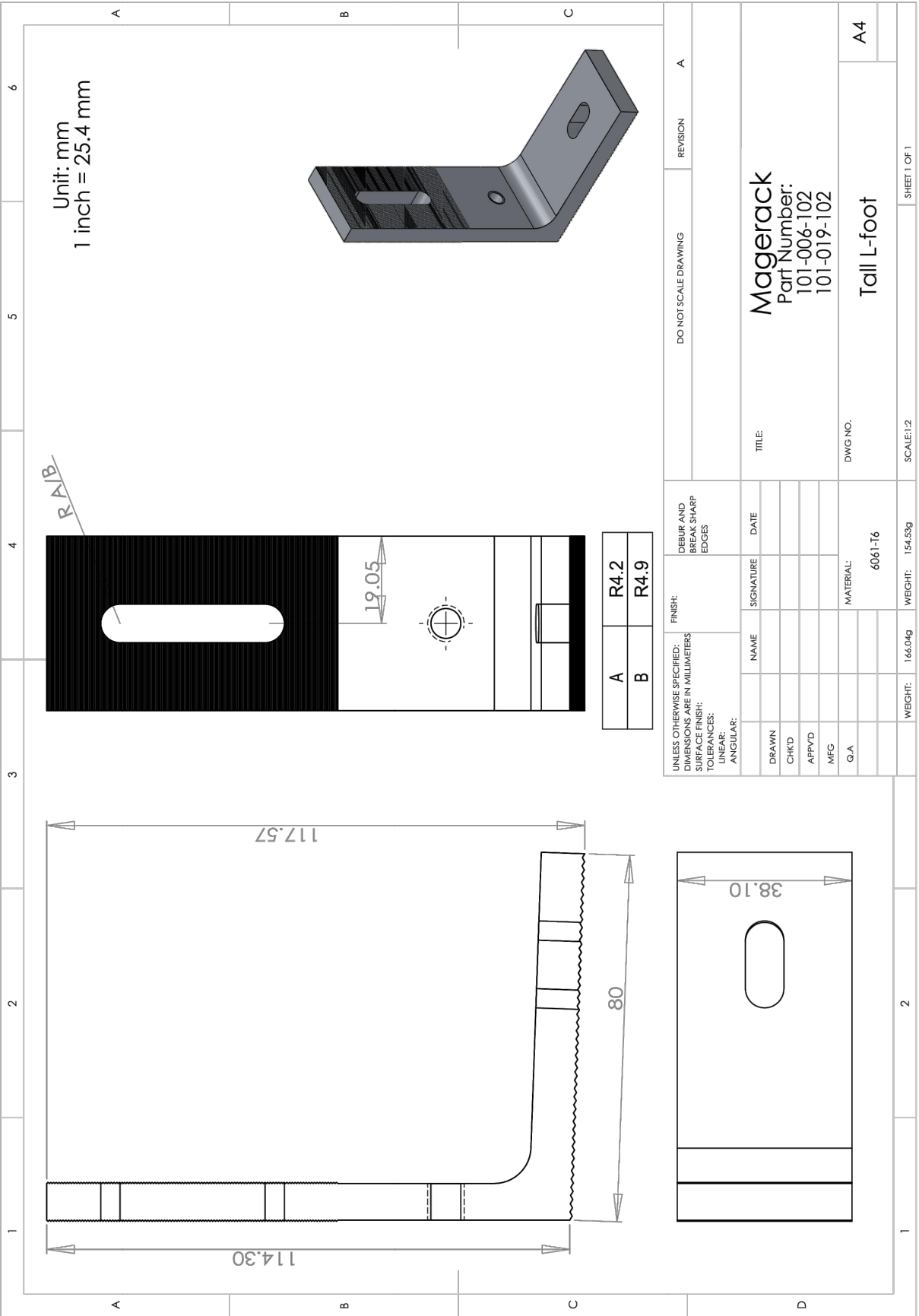


Part #	Description	Finish	Height	Unit Weight (LB)
101-006-101	L-foot with flashing (L-foot, rail nut, 1-1/4" bolt/washer, flashing, 3/4" bolt/washer)	Clear	3.5" - 4.2" (89 - 107 mm) *	0.77
101-006-102	Tall L-foot with flashing (Tall L-foot, rail nut, 1-1/4" bolt/washer, flashing, 3/4" bolt/washer)		4.5" - 5.2" (114 - 132 mm) *	0.81
101-019-101	L-foot with flashing only (L-foot, flashing, 3/4" bolt/washer)		2.24" - 2.87" (56.9 - 72.9 mm)**	0.68
101-019-102	Tall L-foot with flashing only (Tall L-foot, flashing, 3/4" bolt/washer)		3.24" - 3.87" (82.3 - 98.3 mm)**	0.71

* Height is the spacing between rail top and attachment bottom (the space clearance between bottom of PV module frame and attachment bottom).

** The height is the spacing between bolt slot and attachment bottom.

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510-656-6661



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REVISIONS

R-004.00

Envoy Communications Gateway

Envoy Communications Gateway™



The Enphase **Envoy® Communications Gateway** provides network access to the solar array enabling comprehensive monitoring and management of an Enphase system.

Solar professionals and system owners can easily check the status of their Enphase System using the Envoy's LCD display or get more detailed performance data via Enlighten® Software, included with purchase of Envoy.

- SMART**

 - Includes web-based monitoring and control
 - Integrates with smart energy devices
 - Automatically upgrades and sends performance data
- SIMPLE**

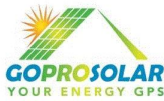
 - Plug and play installation
 - Flexible network configuration
 - No additional AC wiring required
- SCALABLE**

 - Residential or commercial ready out of the box
 - Supports up to 600 microinverters



Envoy Communications Gateway // DATA

INTERFACE	
Power Line Communications	Enphase proprietary
Local Area Network (LAN)	10/100 auto-sensing, auto-negotiating, 802.3
LAN CONNECTION OPTIONS	
Cable Assembly, Ethernet, RJ45, Orange, 10ft	Included with model ENV-120
Power line communication bridge pair	Optional, order EPLC-01
Wireless N USB adapter (802.11b/g/n)	Optional, order WF-01
POWER REQUIREMENTS	
AC supply	120 VAC, 60 Hz
Power consumption	2.5 watts typical, 7 watts maximum
CAPACITY	
Number of microinverters polled	Recommended up to 600
MECHANICAL DATA	
Dimensions (WxHxD)	222.5 mm x 112 mm x 43.2 mm (8.8" x 4.4" x 1.7")
Weight	340 g (12 oz.)
Ambient temperature range	-40°C to +65°C (-40° to 149°F)
Cooling	Natural convection—no fans
Enclosure environmental rating	Indoor NEMA 1
FEATURES	
Standard warranty term	Two years
Compliance	UL 60950-1, EN 60950-1, CSA22.2 No. 60950-1 and IEC 60950-1, FCC Part 15 Class B
API available	System-level production data



CONTRACTOR

TE SERVICES - PRO SOLAR LLC

PHONE: 2109930437

ADDRESS: 15301 C STORM DRIVE
AUSTIN, TX 78734

LIC. NO.: 18081

HIC. NO.:

ELE. NO.:

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS.

NEW PV SYSTEM: 5.320 kWp

ADJEI RESIDENCE

21546 OAK PARK TRAILS DR
KATY, TX 77450
APN: 1234360030014

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

RESOURCE DOCUMENT

DATE: 4.27.2017

DESIGN BY: V.K.

CHECKED BY: M.M.

REVISIONS

R-006.00

SHEET 15