

HISTORIC AND DESIGN REVIEW COMMISSION

September 19, 2018

HDRC CASE NO: 2018-447
ADDRESS: 505 BURNET ST
LEGAL DESCRIPTION: NCB 537 (CHERRY MODERN SUBD (IDZ)), BLOCK 22 LOT 16
ZONING: IDZ H
CITY COUNCIL DIST.: 2
DISTRICT: Dignowity Hill Historic District
APPLICANT: Chuck Gonzales
OWNER: Alexander Lo
TYPE OF WORK: Installation of solar panels
APPLICATION RECEIVED: August 31, 2018
60-DAY REVIEW: October 30, 2018
REQUEST:

The applicant is requesting a Certificate of Appropriateness for approval to install a solar photovoltaic system on the roof at 505 Burnet to feature thirteen (13) panels.

APPLICABLE CITATIONS:

Historic Design Guidelines, Chapter 3, Guidelines for Additions

Chapter 6

C. SOLAR COLLECTORS

- i. Location*—Locate solar collectors on side or rear roof pitch of the primary historic structure to the maximum extent feasible to minimize visibility from the public right-of-way while maximizing solar access. Alternatively, locate solar collectors on a garage or outbuilding or consider a ground-mount system where solar access to the primary structure is limited.
- ii. Mounting (sloped roof surfaces)*—Mount solar collectors flush with the surface of a sloped roof. Select collectors that are similar in color to the roof surface to reduce visibility.
- iii. Mounting (flat roof surfaces)*—Mount solar collectors flush with the surface of a flat roof to the maximum extent feasible. Where solar access limitations preclude a flush mount, locate panels towards the rear of the roof where visibility from the public right-of-way will be minimized.

FINDINGS:

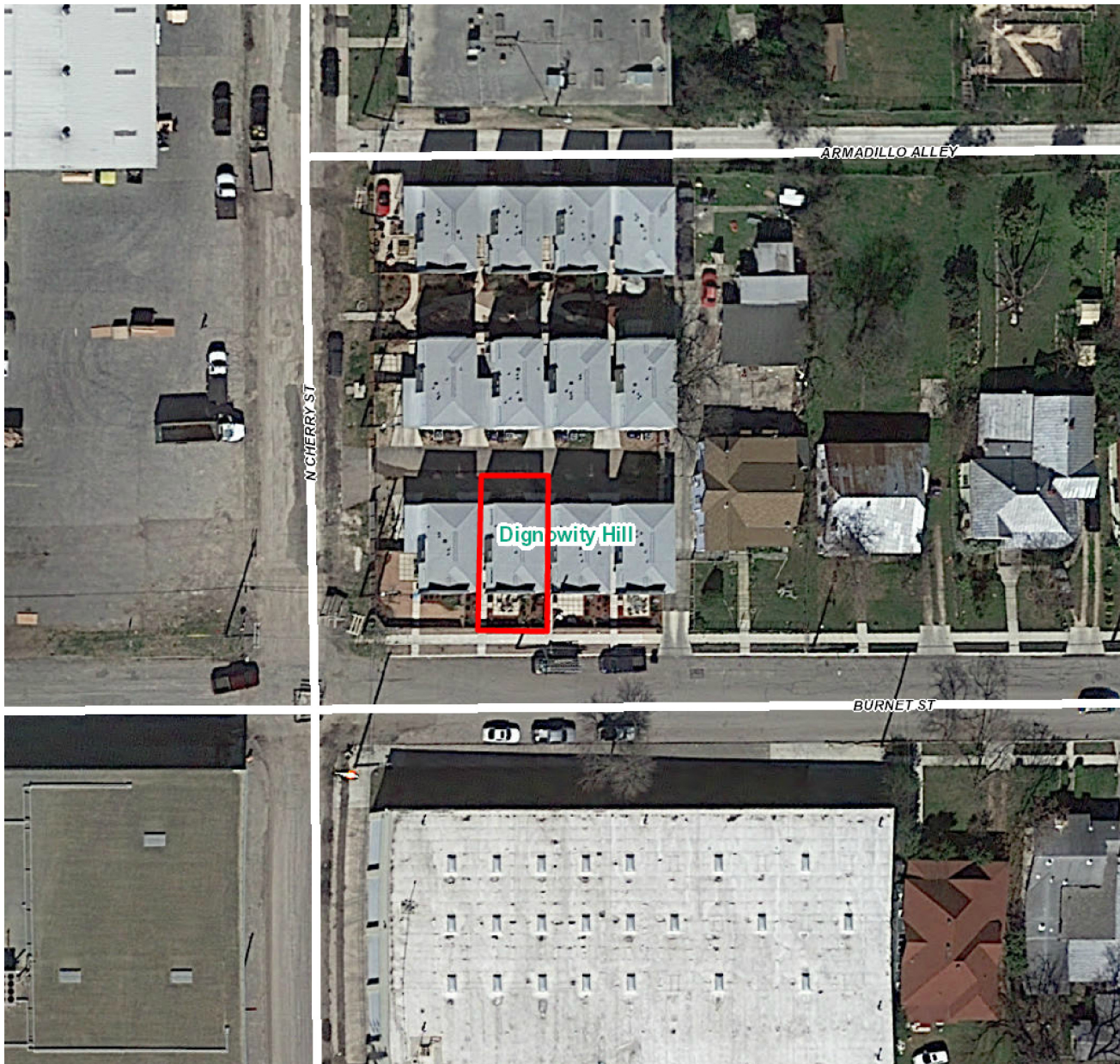
- a. The applicant is requesting a Certificate of Appropriateness for approval to install a solar photovoltaic system on the roof at 505 Burnet to feature thirteen (13) panels. The structure located at 505 Burnet Street was constructed in 2014. The structure features a parapet wall on the front (south) façade and a low sloped hipped roof.
- b. The Guidelines for Additions 6.C. notes that solar collectors should be located on the side or rear roof pitch to minimize visibility from the public right of way, should be mounted flush with the roof surface of a sloped roof and should be similar in color to the roof surface. The applicant has noted that panels will be located on the side roof slopes and will be mounted flush with the roof. The proposed location and mounting pitch are consistent with the Guidelines.
- c. Staff finds that due to the proximity of neighboring structures, the parapet wall on the front façade and the low roof pitch, that the proposed solar panels will not be immediately seen from the public right of way.

RECOMMENDATION:

Staff recommends approval as submitted based on findings a through c.

CASE MANAGER:

Edward Hall



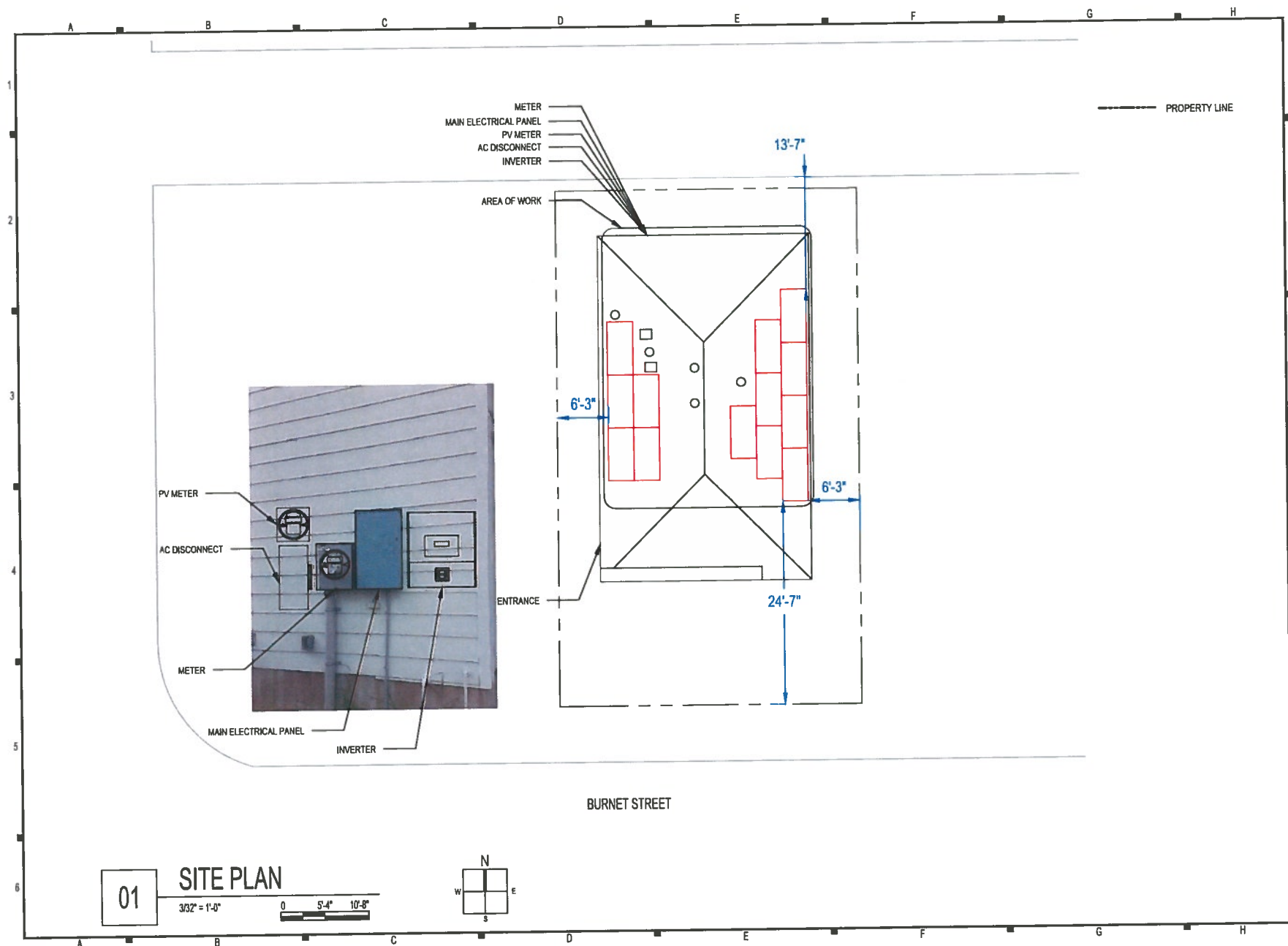
Flex Viewer

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Printed: Sep 11, 2018

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CONTRACTOR

SOLAR ELECTRIC TEXAS LLC

PHONE: 2102699842

ADDRESS: 1874 GRANDSTAND
SAN ANTONIO, TEXAS 78238

LIC. NO.: TECL 18011

HIC. NO.:

ELE. NO.:

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PERMISSION FROM CONTRACTOR IS IN
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AND WILL BE SUBJECT TO CIVIL
DAMAGES AND PROSECUTIONS.

NEW PV SYSTEM: 4.680 kWp

LO RESIDENCE

505 BURNET STREET
SAN ANTONIO, TX 78202
APN: 005370220161

ENGINEER OF RECORD

SITE PLAN

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

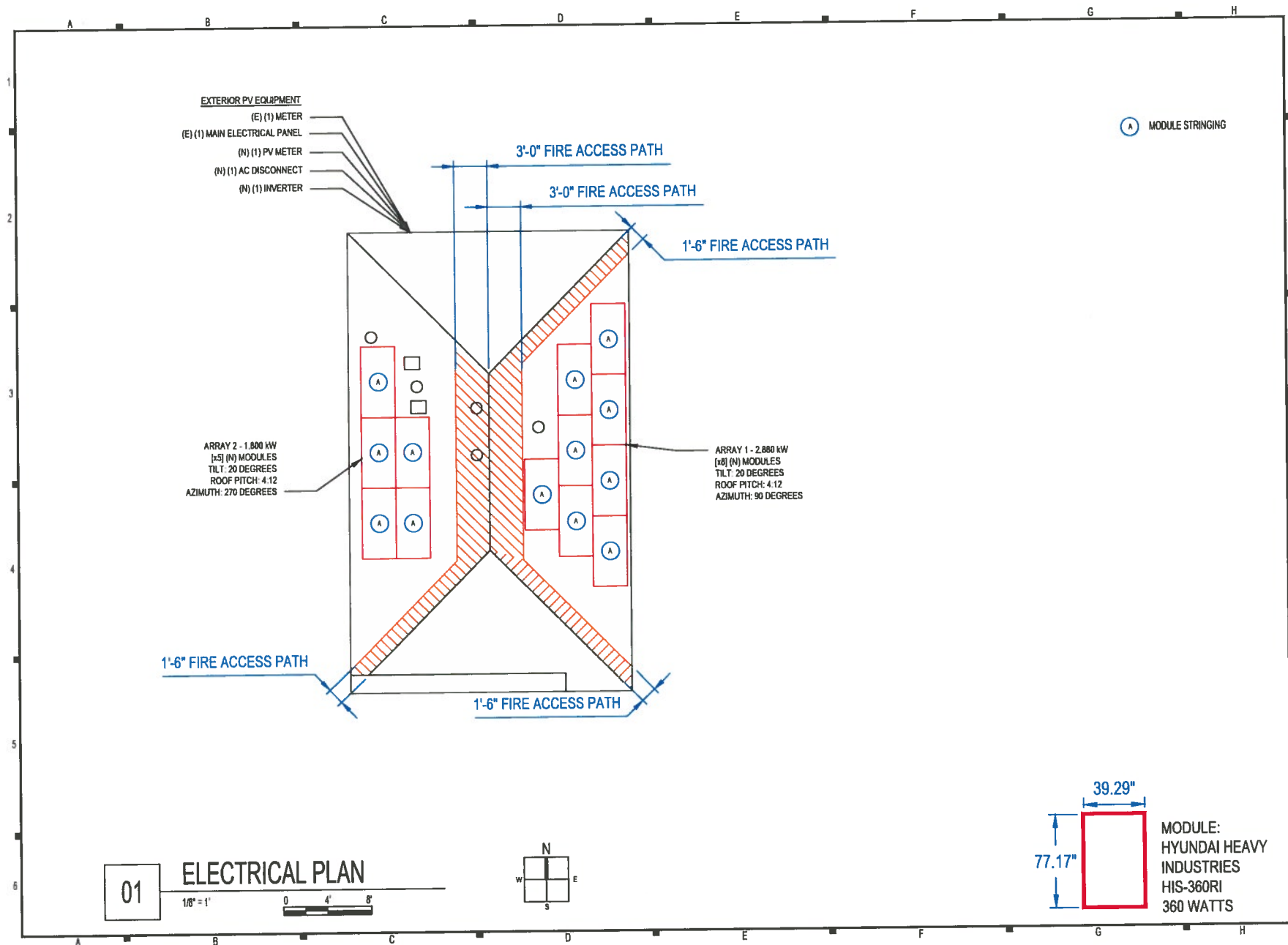
DATE: 8.17.2018

DESIGN BY: V.P.

REVISIONS

A 201.00

(SHEET 3)



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ELECTRICAL PLAN

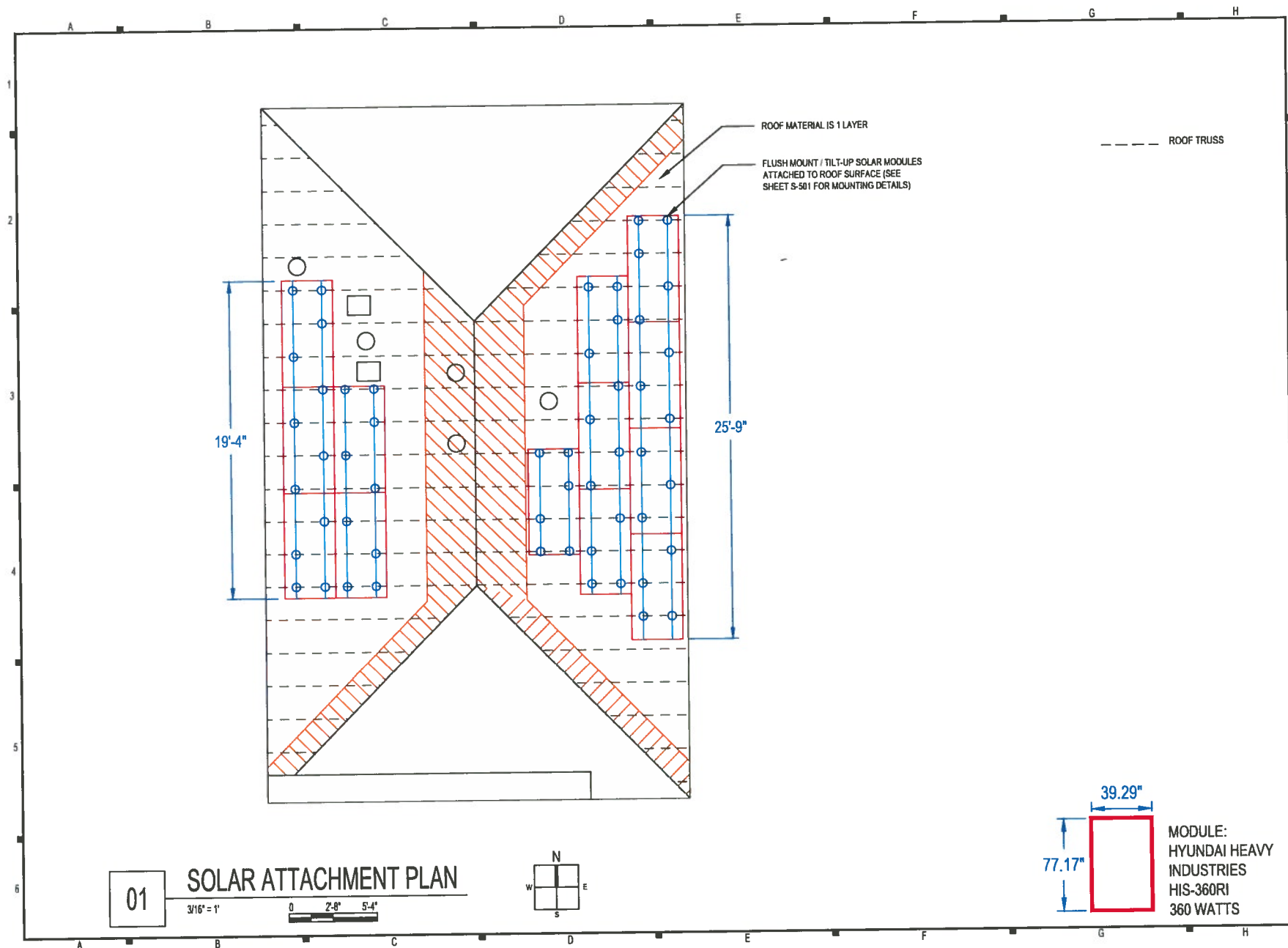
PAPER SIZE: 11" x 17" (ANSI B)

DATE: 8.17.2018

DESIGN BY: V.P.

REVISIONS

A 202.00
 (SHEET 4)



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SOLAR ATTACHMENT PLAN

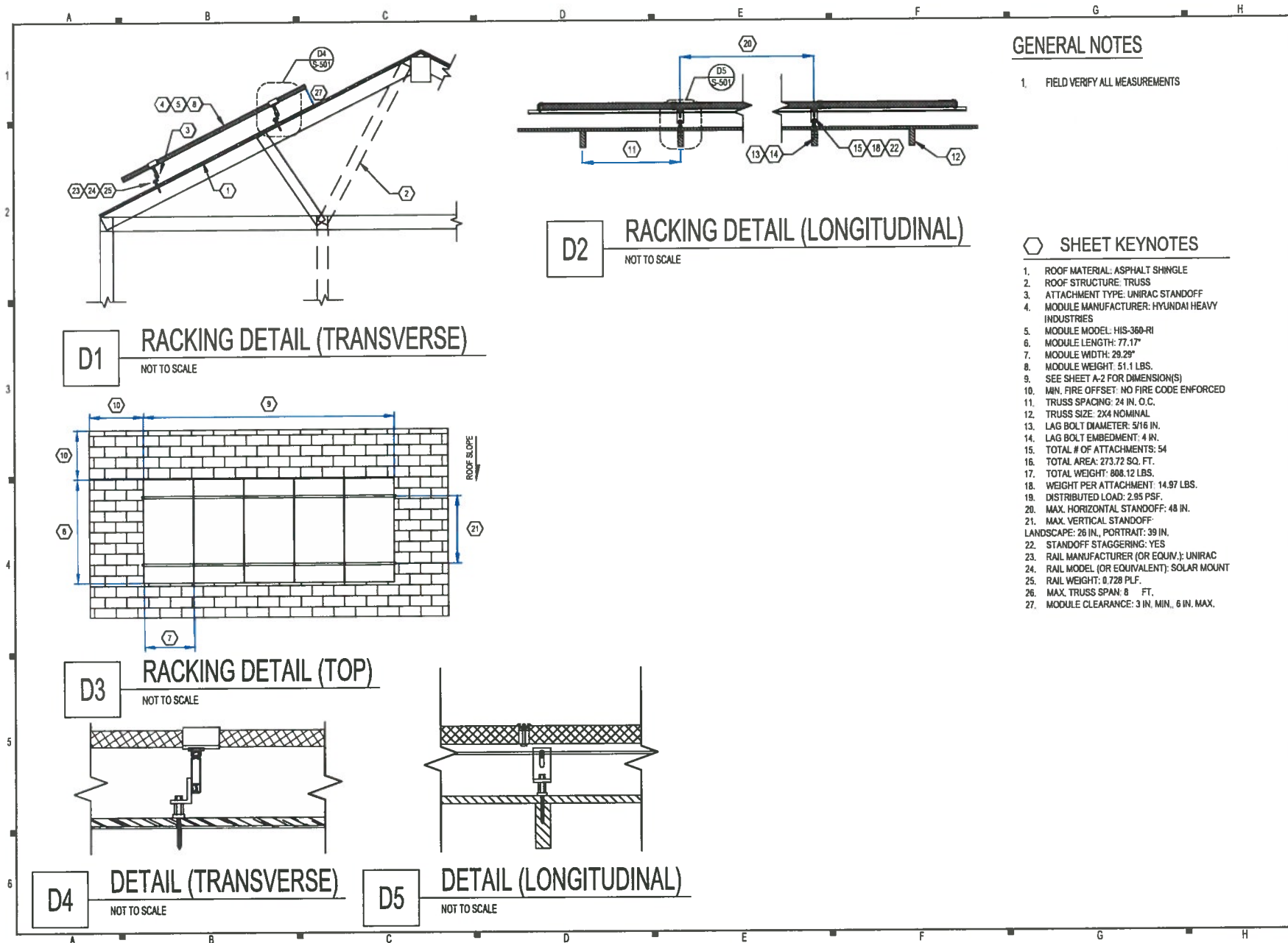
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DATE: 8.17.2018

DESIGN BY: V.P.

REVISIONS

A 203.00
(SHEET 5)



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NEW PV SYSTEM: 4.680 kWp

**LO
RESIDENCE**
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APN: 005370220161

ENGINEER OF RECORD

ASSEMBLY DETAILS

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

DATE: 8.15.2018

DESIGN BY: V.P.

REVISIONS

S 501.00
(SHEET 8)

CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS

ID	TYPICAL	CONDUCTOR	CONDUIT	CURRENT-CARRYING CONDUCTORS IN CONDUIT	OCPD	EGC	TEMP. CORR. FACTOR	CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERMINAL
01	1	10 AWG PV WIRE, COPPER	FREE AIR	2	N/A	8 AWG BARE, COPPER	0.71 (59.1°C)	1	15A	18.75A	80A	56.8A	75°C	70A
02	1	10 AWG THWN-2, COPPER	0.5" DIA EMT	2	N/A	10 AWG THWN-2, COPPER	0.71 (59.1°C)	1	15A	18.75A	55A	39.05A	75°C	50A
03	1	10 AWG THWN-2, COPPER	0.75" DIA EMT	2	N/A	10 AWG THWN-2, COPPER	0.91 (37.1°C)	1	16A	20A	55A	50.05A	75°C	50A
04	1	8 AWG THWN-2, COPPER	0.5" DIA EMT	3	N/A	8 AWG THWN-2, COPPER	0.91 (37.1°C)	1	16A	20A	40A	36.4A	75°C	35A
05	1	8 AWG THWN-2, COPPER	0.5" DIA EMT	3	20A	8 AWG THWN-2, COPPER	0.91 (37.1°C)	1	16A	20A	40A	36.4A	75°C	35A

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NEW PV SYSTEM: 4.680 kWp

LO

RESIDENCE

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ENGINEER OF RECORD

LINE DIAGRAM

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

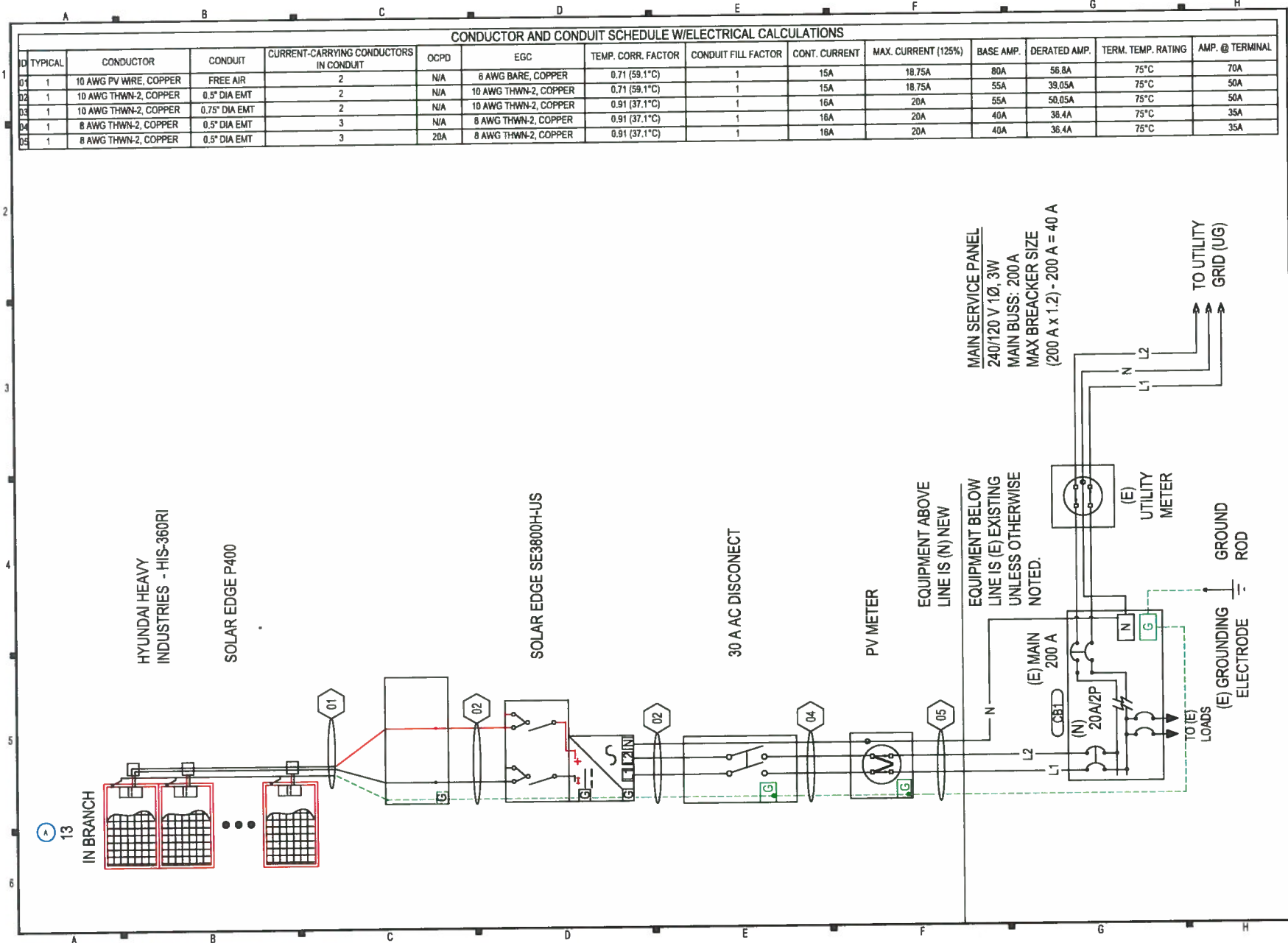
DATE: 8.30.2018

DESIGN BY: V.P.

REVISIONS

E 601.00

(SHEET 7)



	A	B	C	D	E	F	G	H
2.1.1	SITE NOTES:			2.4.9	THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH NEC 690.47 AND NEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED ACCORDING TO NEC 250, NEC 690.47 AND AHJ.			
2.1.2	A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.			2.4.10	ACCORDING TO NEC 690.47 (C)(3), UNGROUNDED SYSTEMS INVERTER MAY SIZE DC GEC ACCORDING TO EGC REQUIREMENTS OF NEC 250.122. HOWEVER, DC GEC TO BE UNSPLICED OR IRREVERSIBLY SPLICED.			
2.1.3	THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.			2.4.11	IN UNGROUNDED INVERTERS, GROUND FAULT PROTECTION IS PROVIDED BY "ISOLATION MONITOR INTERRUPTOR," AND GROUND FAULT DETECTION PERFORMED BY "RESIDUAL-CURRENT DETECTOR."			
2.1.4	THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.			2.5.1	INTERCONNECTION NOTES:			
2.1.5	PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.			2.5.2	LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 690.64 (B)]			
2.1.6	ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SERVES TO PROTECT THE BUILDING OR STRUCTURE.			2.5.3	THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS INPUT MAY NOT EXCEED 120% OF BUSBAR RATING [NEC 705.12(D)(2)(3)].			
2.2.1	EQUIPMENT LOCATIONS			2.5.4	WHEN SUM OF THE PV SOURCES EQUALS >100% OF BUSBAR RATING, PV DEDICATED BACKFED BREAKERS MUST BE LOCATED OPPOSITE END OF THE BUS FROM THE UTILITY SOURCE OCPD [NEC 705.12(D)(2)(3)].			
2.2.2	ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.			2.5.5	AT MULTIPLE INVERTERS OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE COMBINED OVERCURRENT DEVICE MAY BE EXCLUDED ACCORDING TO NEC 705.12 (D)(2)(3)(C).			
2.2.3	WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31 (A),(C) AND NEC TABLES 310.15 (B)(2)(A) AND 310.15 (B)(3)(C).			2.5.6	FEEDER TAP INTERCONNECTION (LOAD SIDE) ACCORDING TO NEC 705.12 (D)(2)(1)			
2.2.4	JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.			2.5.7	SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42			
2.2.5	ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.			2.5.8	BACKFEEDING BREAKER FOR UTILITY-INTERACTIVE INVERTER OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (D)(5)].			
2.2.6	ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.			2.6.1	DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:			
2.2.8	ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.			2.6.2	DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).			
2.3.1	STRUCTURAL NOTES:			2.6.3	DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH.			
2.3.2	RACKING SYSTEM & PV ARRAY WILL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL. TOP CLAMPS REQUIRE A DESIGNATED SPACE BETWEEN MODULES, AND RAILS MUST ALSO EXTEND A MINIMUM DISTANCE BEYOND EITHER EDGE OF THE ARRAY/SUBARRAY, ACCORDING TO RAIL MANUFACTURER'S INSTRUCTIONS.			2.6.4	BOTH POSITIVE AND NEGATIVE PV CONDUCTORS ARE UNGROUNDED. THEREFORE BOTH MUST OPEN WHERE A DISCONNECT IS REQUIRED, ACCORDING TO NEC 690.13.			
2.3.3	JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.			2.6.5	DC DISCONNECT INTEGRATED INTO ROOFTOP DC COMBINER OR INSTALLED WITHIN 6 FT, ACCORDING TO NEC 690.15 (C).			
2.3.4	ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.			2.6.6	RAPID SHUTDOWN OF ENERGIZED CONDUCTORS BEYOND 10 FT OF PV ARRAY OR 5 FT INSIDE A BUILDING WITHIN 10 SECONDS. CONTROLLED CONDUCTORS ≤30V AND ≤240VA [NEC 690.12]. LOCATION OF LABEL ACCORDING TO AHJ.			
2.3.5	ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.			2.6.7	ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.			
2.3.6	WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.			2.6.8	BOTH POSITIVE AND NEGATIVE PV CONDUCTORS ARE UNGROUNDED, THEREFORE BOTH REQUIRE OVER-CURRENT PROTECTION, ACCORDING TO NEC 240.21. (SEE EXCEPTION IN NEC 690.9)			
2.4.1	GROUNDING NOTES:			2.6.9	IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL 1699B.			
2.4.2	GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.			2.7.1	WIRING & CONDUIT NOTES:			
2.4.3	AS IN CONVENTIONAL PV SYSTEMS, UNGROUNDED PV SYSTEMS REQUIRE AN EQUIPMENT GROUNDING CONDUCTOR, ALL METAL ELECTRICAL EQUIPMENT AND STRUCTURAL COMPONENTS BONDED TO GROUND, IN ACCORDANCE WITH 250.134 OR 250.136(A). ONLY THE DC CONDUCTORS ARE UNGROUNDED.			2.7.2	ALL CONDUIT AND WIRE WILL BE LISTED AND APPROVED FOR THEIR PURPOSE. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING.			
2.4.4	PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.			2.7.3	ALL CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.			
2.4.5	METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURE CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136(A).			2.7.4	EXPOSED UNGROUNDED PV SOURCE AND OUTPUT CIRCUITS SHALL USE WIRE LISTED AND IDENTIFIED AS PHOTOVOLTAIC (PV) WIRE [690.35 (D)]. PV MODULES WIRE LEADS SHALL BE LISTED FOR USE WITH UNGROUNDED SYSTEMS, ACCORDING TO NEC 690.35 (D)(3).			
2.4.6	EACH MODULE WILL BE GROUNDED USING WEBB GROUNDING CLIPS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ. IF WEBBS ARE NOT USED, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE SPECIFIED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.			2.7.5	PV WIRE BLACK WIRE MAY BE FIELD-MARKED WHITE [NEC 200.6 (A)(6)].			
2.4.7	THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.			2.7.6	MODULE WIRING SHALL BE LOCATED AND SECURED UNDER THE ARRAY.			
2.4.8	GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119]			2.7.7	ACCORDING TO NEC 200.7, UNGROUNDED SYSTEMS DC CONDUCTORS			
	A	B	C	D	E	F	G	H

COLORED OR MARKED AS FOLLOWS:
 DC POSITIVE- RED, OR OTHER COLOR EXCLUDING WHITE, GREY AND GREEN
 DC NEGATIVE- BLACK, OR OTHER COLOR EXCLUDING WHITE, GREY AND GREEN
 AC CONDUCTORS COLORED OR MARKED AS FOLLOWS:
 PHASE A OR L1- BLACK
 PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE
 PHASE C OR L3- BLUE, YELLOW, ORANGE*, OR OTHER CONVENTION
 NEUTRAL- WHITE OR GREY

* IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].

CONTRACTOR

SOLAR ELECTRIC TEXAS LLC

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 SAN ANTONIO, TEXAS 78238

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NEW PV SYSTEM: 4.680 kWp

LO RESIDENCE

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 APN: 005370220161

ENGINEER OF RECORD

NOTES

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

DATE: 8.15.2018

DESIGN BY: V.P.

REVISIONS

G 101.00

(SHEET 2)

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 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION
- 1.1.4 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: UL1703, IEC61730, AND IEC61215, AND TYPE 1 FIRE RATING INVERTERS: UL 1741 CERTIFIED, IEEE 1547, 929, 519 COMBINER BOX(ES): UL 1703 OR UL 1741 ACCESSORY, PV MOUNTING SYSTEM: UL2703, AND CLASS A FIRE RATED PER UL 2703.
- 1.1.5 NEC 690.35 REFERS SPECIFICALLY TO "UNGROUNDING" PV POWER SYSTEMS, ALSO DESIGNATED AS "TRANSFORMERLESS" BY INVERTER MANUFACTURERS AND "NON-ISOLATED" BY UNDERWRITERS LABORATORY.
- 1.1.6 INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE LISTED FOR THIS USE [NEC 690.35 (G)].
- 1.1.7 AS SPECIFIED BY THE AHJ, EQUIPMENT USED IN UNGROUNDED SYSTEMS LABELED ACCORDING TO NEC 690.35 (F).
- 1.1.8 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.
- 1.1.9 ALL INVERTERS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, PHOTOVOLTAIC MOUNTING SYSTEMS, AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4 (D), SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3].
- 1.1.10 ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.
- 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 PHOTOVOLTAIC MOUNTING SYSTEMS - UNIRAC STANDOFF
- 1.3.3 PV RACKING SYSTEM INSTALLATION - UNIRAC
- 1.3.4 PV MODULE AND INVERTER INSTALLATION - HYUNDAI HEAVY INDUSTRIES HIS-360R1 / SOLAR EDGE SE3800H-US (240V)
- 1.3.5 PV EQUIPMENT GROUNDING
- 1.3.6 PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX
- 1.3.7 PV LOAD CENTERS (IF INCLUDED)
- 1.3.8 PV METERING/MONITORING (IF INCLUDED)
- 1.3.9 PV DISCONNECTS
- 1.3.10 PV FINAL COMMISSIONING
- 1.3.11 (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV
- 1.3.12 SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

SYSTEM SIZE: STC: 13 x 360 = 4.680kW
PTC: 13 x 327 = 4.251kW DC
(13) HYUNDAI HEAVY INDUSTRIES HIS-360R1
(X1 DC OPTIMIZER INVERTER) SOLAR EDGE SE3800H-US (240V)

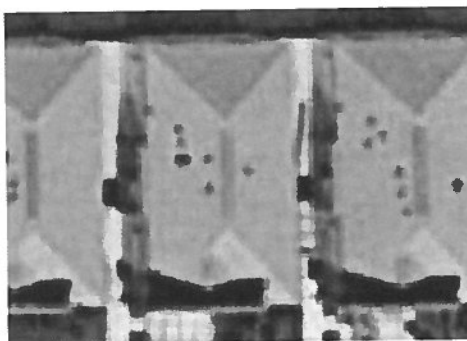
ATTACHMENT TYPE: UNIRAC STANDOFF

MSP UPGRADE: NO

NEW PV SYSTEM: 4.680 kWp

LO RESIDENCE

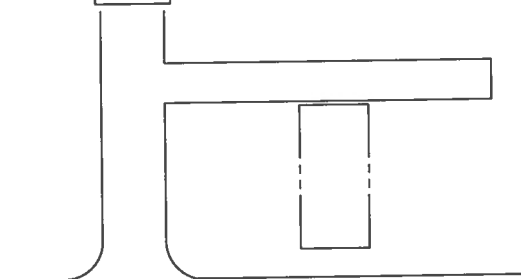
505 BURNET STREET
SAN ANTONIO, TX 78202
ASSESSOR'S #: 005370220161



01

AERIAL PHOTO

NOT TO SCALE



BURNET STREET

02

PLAT MAP

NOT TO SCALE



SHEET LIST

SHEET NUMBER	SHEET TITLE
CS 100	COVER SHEET
G 101	NOTES
A 201	SITE PLAN
A 202	ELECTRICAL PLAN
A 203	SOLAR ATTACHMENT PLAN
S 501	ASSEMBLY DETAILS
E 601	LINE DIAGRAM
E 602	DESIGN TBALSSS
E 603	PLACARDS
R 001	RESOURCE DOCUMENT
R 002	RESOURCE DOCUMENT
R 003	RESOURCE DOCUMENT
R 004	RESOURCE DOCUMENT
R 005	RESOURCE DOCUMENT

PROJECT INFORMATION

OWNER NAME: ALEXANDER LO

PROJECT MANAGER
NAME: LISA PASTRANO
PHONE: 2102699842

CONTRACTOR
NAME: SOLAR ELECTRIC TEXAS LLC
PHONE: 2102699842

AUTHORITIES HAVING JURISDICTION
BUILDING: BEXAR COUNTY
ZONING: BEXAR COUNTY
UTILITY: -

DESIGN SPECIFICATIONS
OCCUPANCY: II
CONSTRUCTION: SINGLE-FAMILY
ZONING: RESIDENTIAL
GROUND SNOW LOAD: 5 PSF
WIND EXPOSURE: B
WIND SPEED: 110 MPH

APPLICABLE CODES & STANDARDS
BUILDING: IRC 2015, IRC 2015
ELECTRICAL: NEC 2014
ZONING: IFC 2015

CONTRACTOR

SOLAR ELECTRIC TEXAS LLC

PHONE: 2102699842
ADDRESS: 1874 GRANDSTAND
SAN ANTONIO, TEXAS 78238

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DAMAGES AND PROSECUTIONS.

NEW PV SYSTEM: 4.680 kWp

LO RESIDENCE

505 BURNET STREET
SAN ANTONIO, TX 78202
APN: 005370220161

ENGINEER OF RECORD

COVER SHEET

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

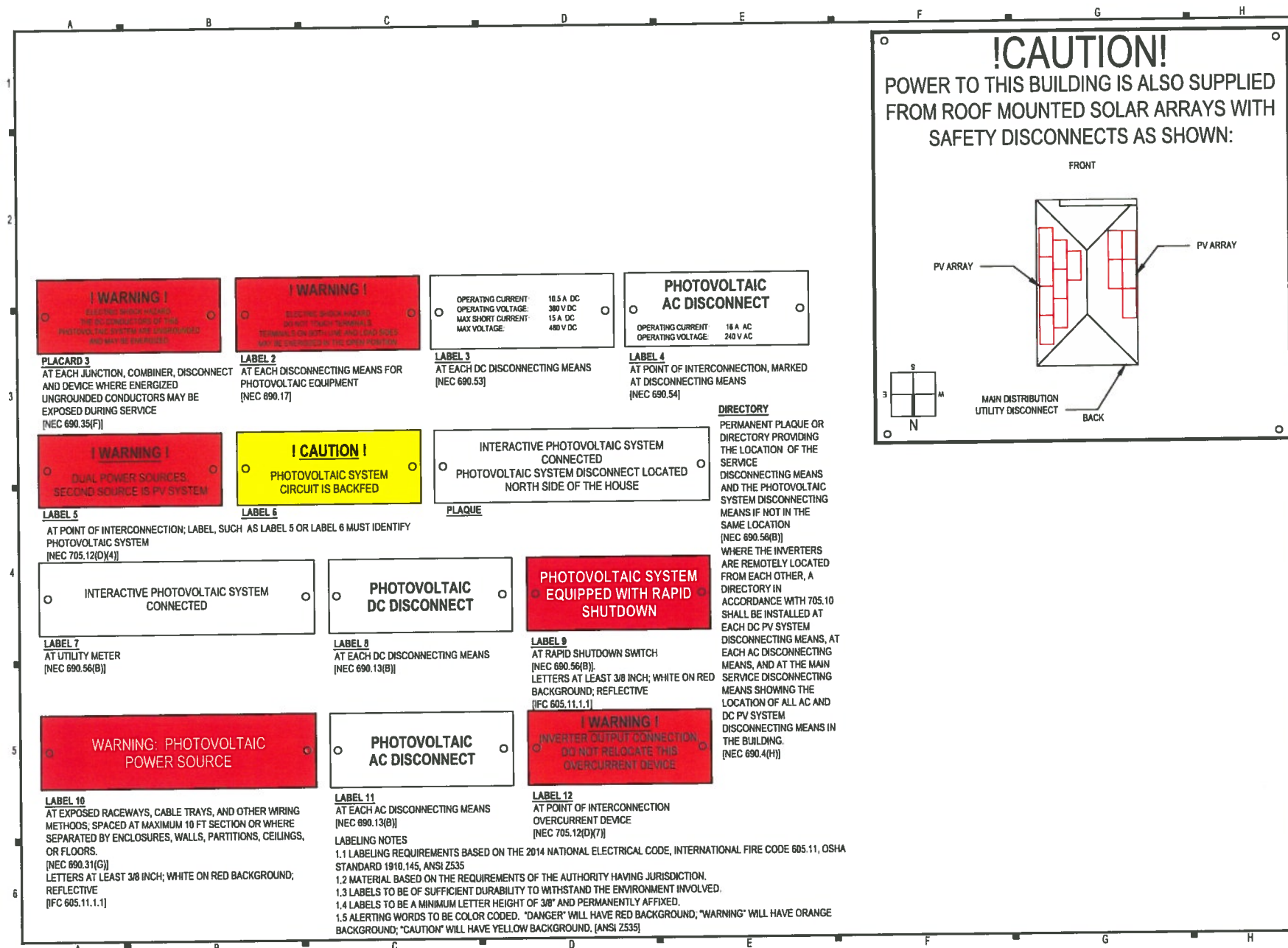
DATE: 8.15.2018

DESIGN BY: V.P.

REVISIONS

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(SHEET 1)



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(SHEET 8)	

HYUNDAI SOLAR MODULE

RI
SERIES

Multi-Crystalline Type

HIS-M310RI HIS-M315RI HIS-M320RI

Mono-Crystalline Type

HIS-S330RI HIS-S335RI HIS-S340RI HIS-S345RI
HIS-S350RI HIS-S355RI HIS-S360RI

72

Cells



For Commercial & Utility Applications



More Power Generation in Low Light



Hyundai Cell, Made in Korea



PERL Technology

PERL technology provides ultra-high efficiency with better performance in low irradiation. Maximizes installation capacity in limited space.



Anti-LID / PID

Both LID (Light Induced Degradation) and PID (Potential Induced Degradation) are strictly eliminated to ensure higher actual yield during lifetime.



Mechanical Strength

Tempered glass and reinforced frame design withstand rigorous weather conditions such as heavy snow and strong wind.



Reliable Warranty

Global brand with powerful financial strength provide reliable 25-year warranty.



Corrosion Resistant

Various tests under harsh environmental conditions such as ammonia and salt-mist passed.



UL / VDE Test Labs

Hyundai's R&D center is an accredited test laboratory of both UL and VDE.

Hyundai's Warranty Provisions

10 YEARS

• 10-Year Product Warranty
On materials and workmanship

25 YEARS

• 25-Year Performance Warranty
Initial year 97%
• Linear warranty after second year with 0.7% annual degradation.
80.2% is guaranteed up to 25 years

About Hyundai Solar

Established in 1972, Hyundai Heavy Industries (HHI) is one of the most trusted names in the heavy industries sector with 48,000 employees and more than 40 Billion USD in annual sales (2015). As a global leader and innovator, Hyundai Heavy Industries is committed to building a future growth engine by developing and investing heavily in the field of renewable energy.

Started as a core business division of HHI, Hyundai Solar (Hyundai Heavy Industries Green Energy) now stands as an independent company and an affiliate of HHI as from December 2016. It is the largest and the longest standing PV cell and module manufacturer in South Korea with 800 MW of module production capacity. We have strong pride in providing high-quality solar PV products to more than 3,000 customers worldwide.

Certification



HYUNDAI
GREEN ENERGY

www.hi.solar.com

Printed Date: 03/2017

Electrical Characteristics

		Multi-Crystalline Module (HIS-M)					Mono-Crystalline Module (HIS-S)				
		310	315	320	330	335	340	345	350	355	360
Nominal Output (Watt)	W	310	315	320	330	335	340	345	350	355	360
Open Circuit Voltage (Voc)	V	45.3	45.3	45.5	46.3	46.5	46.7	46.9	47.1	47.3	47.4
Short Circuit Current (Isc)	A	8.9	9.0	9.0	9.3	9.4	9.5	9.6	9.8	9.7	9.8
Voltage at Pmax (Vmp)	V	36.0	36.2	36.4	36.0	36.2	36.4	36.6	36.7	36.9	36.1
Current at Pmax (Imp)	A	8.6	8.7	8.8	8.7	8.8	8.9	9.0	9.0	9.1	9.2
Module Efficiency (%)	%	15.8	16.1	16.4	16.9	17.1	17.4	17.6	17.9	18.1	18.4
Cell Type	-	6", multi-crystalline silicon					6", mono-crystalline silicon				
Maximum System Voltage (V)	V	1,000					1,000				
Temperature coefficient of Pmax (%/K)	%/K	-0.41					-0.40				
Temperature coefficient of Voc (%/K)	%/K	-0.31					-0.29				
Temperature coefficient of Isc (%/K)	%/K	0.039					0.039				

*All data at STC (Standard Test Condition). Above data may be changed without prior notice.

Mechanical Characteristics

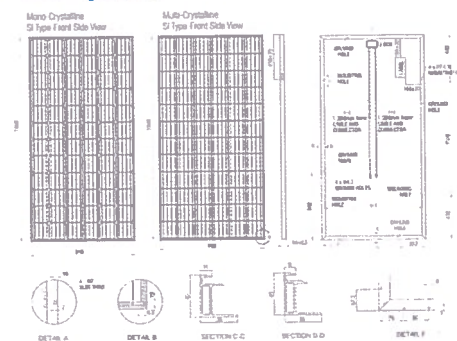
Dimensions	990 mm (39.29")W x 1,980 mm (77.17")L x 40 mm (1.57")H
Weight	Approx. 22.9 kg (50.5 lbs)
Solar Cells	72 cells in series (6 x 12 matrix) (Hyundai cell, Made in Korea)
Output Cables	4 mm ² (12AWG) cables with polarized weatherproof connectors, IEC certified (UL listed and UL 4703 certified), Length 1.2 m (47.2")
Junction Box	IP67, weatherproof, IEC certified (UL listed)
Bypass Diodes	3 bypass diodes to prevent power decrease by partial shade
Construction	Front: Anti-reflection coated glass, 3.2 mm (0.126") Encapsulant: EVA / Back Sheet: Weatherproof film
Frame	Clear anodized aluminum alloy type 6063

Installation Safety Guide

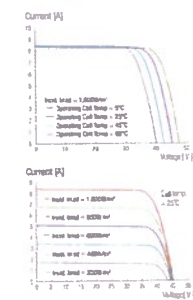
- Only qualified personnel should install or perform maintenance.
- Be aware of dangerous high DC voltage.
- Do not damage or scratch the rear surface of the module.
- Do not handle or install modules when they are wet.

Nominal Operating Cell Temperature	48°C ± 2
Operating Temperature	-40 ~ 85°C
Maximum System Voltage	DC 1,000 V (IEC) DC 1,000 V (UL)
Maximum Reverse Current	15A (up to 350W) 20A (above 350W)

Module Diagram



I-V Curves



HYUNDAI
GREEN ENERGY

Sales & Marketing

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Printed Date: 03/2017

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RESOURCE DOCUMENT

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DESIGN BY: V.P.

REVISIONS

R 001.00

(SHEET 10)

solaredge

Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US /
SE6000H-US / SE7600H-US / SE10000H-US



Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- High reliability without any electrolytic capacitors
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)



www.solaredge.us

INVERTERS

solaredge

Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US /
SE6000H-US / SE7600H-US / SE10000H-US

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	
OUTPUT							
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	VA
Max. AC Power Output	3000	3800 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	VA
AC Output Voltage Min.-Nom.-Max. (183-208-229)							Vac
AC Output Voltage Min.-Nom.-Max. (211-240-264)							Vac
AC Frequency (Nominal)			59.3-60	60.5 ¹⁾			Hz
Maximum Continuous Output Current @208V		16	21	25	32	42	A
Maximum Continuous Output Current @240V	12.5	16					A
GFDI Threshold			1				A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds			Yes				
INPUT							
Maximum DC Power @140V	4650	5900	7750	9300	11800	15500	W
Maximum DC Power @208V		5100		7750			W
Transformer less, Ungrounded			Yes				Vdc
Maximum Input Voltage			480		400		Vdc
Nominal DC Input Voltage		9	380				Vdc
Maximum Input Current @208V		10.5	13.5	16.5	20	27	Adc
Maximum Input Current @240V	8.5			45			Adc
Max. Input Short Circuit Current			Yes				
Reverse-Polarity Protection			600Hz Sensitivity				%
Ground Fault Isolation Detection			99.2				%
Maximum Inverter Efficiency	99						%
CEC Weighted Efficiency			99				%
Nighttime Power Consumption			< 2.5				W
ADDITIONAL FEATURES							
Supported Communication Interfaces			RS485, Ethernet, ZigBee (optional), Cellular (optional)				
Revenue Grade Data, ANSI C12.20			Optional ²⁾				
Rapid Shutdown - NEC 2014 and 2017 690.12			Automatic Rapid Shutdown upon AC Grid Disconnect				
STANDARD COMPLIANCE							
Safety			UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AECI according to T.I.L. M 07				
Grid Connection Standards			IEEE1547, Rule 21, Rule 14 (H)				
Emissions			FCC Part 15 Class B				
INSTALLATION SPECIFICATIONS							
AC Output Conduit Size / AWG Range			3/4" minimum / 20-4 AWG			3/4" minimum / 1-3 strings / 14-6 AWG	in / mm
DC Input Conduit Size / # of Strings / AWG Range			3/4" minimum / 1-2 strings / 14-6 AWG			21.3 x 14.6 x 7.3 / 540 x 370 x 185 38.8 / 17.6	lb / kg dBA
Dimensions with Safety Switch (HxWxD)			17.7 x 14.6 x 6.8 / 450 x 370 x 174				
Weight with Safety Switch	22 / 10		25.1 / 11.4	26.2 / 11.9			
Noise			< 25			< 50	
Cooling			Natural Convection			Natural convection	
Operating Temperature Range			13 to +140 / -35 to +60 ³⁾ (-40 ³⁾ / -40 ³⁾ option ⁴⁾				°F / °C
Protection Rating			NEMA 3R (Inverter with Safety Switch)				

¹⁾ For other regional settings please contact SolarEdge support

²⁾ Revenue grade inverter only. See www.solaredge.com for details

³⁾ For power derating information refer to: <https://www.solaredge.com/sites/default/files/for-temperature-derating-note-ma.pdf>

⁴⁾ See version 1.0.1 of the datasheet

RoHS

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RESOURCE DOCUMENT

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DESIGN BY: V.P.

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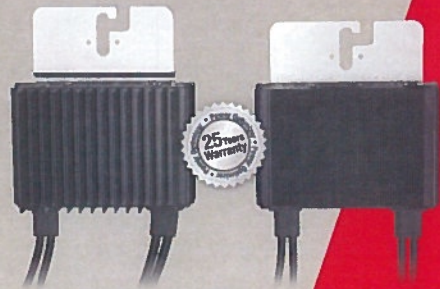
(SHEET 11)



SolarEdge Power Optimizer

Module Add-On For North America

P320 / P370 / P400 / P405 / P505



POWER OPTIMIZER

PV power optimization at the module-level

- Specifically designed to work with SolarEdge Inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Compliant with arc fault protection and rapid shutdown NEC requirements (when installed as part of the SolarEdge system)
- Module-level voltage shutdown for installer and firefighter safety

USA CANADA GERMANY UK ITALY THE NETHERLANDS JAPAN CHINA AUSTRALIA ISRAEL FRANCE BELGIUM TURKEY INDIA BULGARIA ROMANIA HUNGARY
SWEDEN SOUTH AFRICA POLAND CZECH REPUBLIC www.solaredge.us



SolarEdge Power Optimizer

Module Add-On for North America

P320 / P370 / P400 / P405 / P505

OPTIMIZER MODEL (typical module compatibility)	P320 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for thin film modules)	P505 (for higher current modules)	
INPUT						
Rated Input DC Power ¹	320	370	400	405	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48	60	80	125	83	Vdc
MPPT Operating Range	8 - 48	8 - 60	8 - 80	12.5 - 105	12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11	10.1	10.1	14	14	Adc
Maximum DC Input Current	13.75		99.5	12.63	17.5	Adc
Maximum Efficiency			98.8		98.6	%
Weighted Efficiency			98.8		98.6	%
Overvoltage Category			II			
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREGE INVERTER)						
Maximum Output Current			15			Adc
Maximum Output Voltage			60		85	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREGE INVERTER OR SOLAREGE INVERTER OFF)						
Safety Output Voltage per Power Optimizer			1 ± 0.1			Vdc
STANDARD COMPLIANCE						
EMC			FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3			
Safety			IEC62109-1 (class II safety), UL1741			
RoHS			Yes			
INSTALLATION SPECIFICATIONS						
Maximum Allowed System Voltage			1000			Vdc
Compatible Inverters			All SolarEdge Single Phase and Three Phase Inverters			
Dimensions (W x L x H)	128 x 152 x 28 / 5 x 5.97 x 1.1		128 x 152 x 36 / 5 x 5.97 x 1.42	128 x 152 x 50 / 5 x 5.97 x 1.96	128 x 152 x 59 / 5 x 5.97 x 2.32	mm / in
Weight (including cables)	630 / 1.4		750 / 1.7	845 / 1.9	1064 / 2.3	gr / lb
Input Connector			MC4 ¹²			
Output Wire Type / Connector			Double Insulated, MC4			
Output Wire Length	0.95 / 3.0		1.2 / 3.9			m / ft
Operating Temperature Range			-40 +85 / -40 +185			°C / °F
Protection Rating			IP68 / NEMA6P			
Relative Humidity			0 - 100			%

¹ Rated STC power of the module. Module of up to 15% power tolerance allowed.

¹² For other connector types please contact SolarEdge.

PV SYSTEM DESIGN USING A SOLAREGE INVERTER ¹³		SINGLE PHASE HD-WAVE	SINGLE PHASE	THREE PHASE 208V	THREE PHASE 480V	
Minimum String Length (Power Optimizers)	P320, P370, P400 P405 / P505	8 6 25	8 6 25	10 8 25	18 14 50 ¹⁴	
Maximum String Length (Power Optimizers)		5700 (6000 with SE7600H-LTS, SE10000H-LTS)	5750	6000	12750	W
Maximum Power per String						
Parallel Strings of Different Lengths or Orientations			Yes			

¹³ For detailed string sizing information refer to http://www.solaredge.com/sites/default/files/string_sizing_us.pdf

¹⁴ It is not allowed to use P405/P505 with P320/P370/P400/P405/P505 in one string.

¹⁵ A string with more than 30 optimizers does not meet NEC rapid shutdown requirements, safety voltage will be about the 32V requirement.



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DESIGN BY: V.P.

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(SHEET 12)

2-Piece Standoff Technical Datasheet

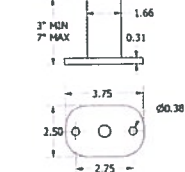
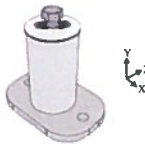
Pub 101626-1nd V1.0 October 2010

2-Piece Aluminum Standoffs	1
2-Piece Aluminum Standoff with SolarMount-I 1-flange connection	2
2-Piece Aluminum Standoff with L-foot connection	2

Standoffs

2-Piece Aluminum Standoffs

Part No. 310503, 310504, 310506, 310507, 310553, 310554, 310556, 310557, 310603, 310604, 310606, 310607, 310653, 310654, 310656, 310657



Dimensions specified in inches unless noted

Standoff and Base Material:

- One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- Ultimate tensile: 38 ksi; Yield: 35 ksi
- Clear or Dark anodized

Weight:

- 3" Standoff (as shown): 0.522 pounds (237 g)
- Add 0.086 pounds per inch (39 g/inch)

Allowable and design loads are valid for a Unirac 2-piece aluminum standoff

Attach with zinc plated carbon steel or stainless steel fasteners

Resistance and safety factors are determined according to Part 1A section 9 of the 2005 Aluminum Design Manual

NOTE: Loads are given for the standoff only. Check load limits for lag screw or other attachment method.

Applied Load Direction	Average Ultimate Load lbs (N)	Allowable Load lbs (N)	Safety Factor, W	Design Load lbs (N)	Resistance Factor, F
Tension/Compression, Y _z	3266 (14528)	1089 (4844)	3.00	1633 (7264)	0.500
U/Z Bending, Applied Moment*	559 ft lbs (758 Nm)	250 ft lbs (339 Nm)	2.24	378 ft lbs (512 Nm)	0.676

*Example: If the module is mounted 6" (0.5 ft) from the base of the standoff, the allowable side load is 250 ft lbs/ 0.5 ft = 500 lbs

1 Delivering Value through Innovation

2-Piece Aluminum Standoff with SolarMount-I 1-flange connection
Part No. 05013C, 05014C, 05016C, 05017C

Reference the SolarMount-I series datasheet for 1-flange connection specifications.

For the 1-flange connection to standoff:

- Use included 1 1/2" EPDM washer between the 1-flange connection and standoff
- Assemble with included 300 series stainless steel 1/2"-16 flanged hex head screw
- Use anti-seize and tighten to 30 ft-lbs of torque

Allowable and design loads are valid when components are assembled according to authorized Unirac documents.

1-Flange connections are compatible with SolarMount-I series beams.

Resistance factors and allowable loads are determined according to part 1A section 9 of the 2005 Aluminum Design Manual.

NOTE: Loads are for the connection and standoff only. Check load limits for the lag screw or other attachment method.

Applied Load Direction	Average Ultimate Load lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor, Φ
Tension, Y _z	1415 (6294)	635 (2825)	2.23	960 (4270)	0.678
Compression, Y _z	1949 (8670)	873 (3883)	2.23	1320 (5872)	0.677
Transverse, X _z , downhill	635 (2825)	313 (1392)	2.03	473 (2104)	0.745
Transverse, X _z , uphill	42 (187)	20 (89)	2.15	30 (133)	0.705
U/Z Bending, Applied Moment	559 ft lbs (758 Nm)	250 ft lbs (339 Nm)	2.24	378 ft lbs (512 Nm)	0.676

2-Piece Aluminum Standoff with L-foot connection

Reference the SolarMount datasheet for L-foot specifications.

For the L-foot to standoff connection:

- Use included 1 1/2" EPDM washer between the L-foot and standoff
- Assemble with included 300 series stainless steel 1/2"-16 flanged hex head screw
- Use anti-seize and tighten to 30 ft-lbs of torque

Allowable and design loads are valid when components are assembled according to authorized Unirac documents.

L-foot are compatible with SolarMount, SolarMount Heavy Duty, and SunFrame rails.

Resistance factors and allowable loads are determined according to part 1A section 9 of the 2005 Aluminum Design Manual.

NOTE: Loads are for the connection and standoff only. Check load limits for the lag screw or other attachment method.

Applied Load Direction	Average Ultimate Load lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor, Φ
Tension, Y _z	1850 (8269)	707 (3144)	2.63	1069 (4755)	0.575
Compression, Y _z	3258 (14492)	1325 (5883)	2.46	2004 (8913)	0.615
Sliding, Z _z	1786 (7856)	756 (3356)	2.34	1141 (5077)	0.646
Transverse, X _z	486 (2162)	213 (949)	2.28	323 (1436)	0.664
U/Z Bending, Applied Moment	559 ft lbs (758 Nm)	250 ft lbs (339 Nm)	2.24	378 ft lbs (512 Nm)	0.676

2 Delivering Value through Innovation

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(SHEET 13)

SOLARMOUNT Technical Datasheets



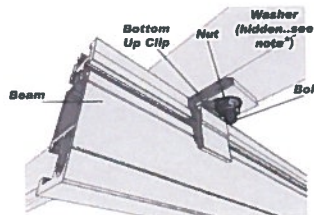
SOLARMOUNT Technical Datasheet

Pub 130817

SOLARMOUNT Module Connection Hardware	1
Bottom Up Module Clip	1
Mid Clamp	2
End Clamp	2
SOLARMOUNT Beam Connection Hardware	3
L-Foot	3
SOLARMOUNT Beams	4

SOLARMOUNT Module Connection Hardware

SOLARMOUNT Bottom Up Module Clip Part No. 302000C



- Bottom Up Clip material: One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- Ultimate tensile: 38ksi, Yield: 35 ksi
- Finish: Clear Anodized
- Bottom Up Clip weight: ~0.031 lbs (14g)
- Allowable and design loads are valid when components are assembled with SOLARMOUNT series beams according to authorized UNIRAC documents
- Assemble with one 1/4"-20 ASTM F593 bolt, one 1/4"-20 ASTM F594 serrated flange nut, and one 1/4" flat washer
- Use anti-seize and tighten to 10 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory
- Module edge must be fully supported by the beam
- NOTE ON WASHER:** Install washer on bolt head side of assembly. DO NOT install washer under serrated flange nut

Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor, ϕ
Tension, Y+	1566 (6967)	686 (3052)	2.28	1038 (4615)	0.662
Transverse, X±	1128 (5019)	329 (1463)	3.43	497 (2213)	0.441
Sliding, Z±	66 (292)	27 (119)	2.44	41 (181)	0.619

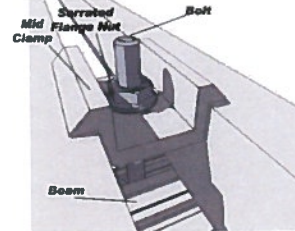


Dimensions specified in inches unless noted

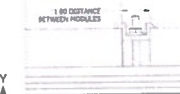
SOLARMOUNT Technical Datasheets



SOLARMOUNT Mid Clamp Part No. 302101C, 302101D, 302103C, 302104D 302105D, 302106D



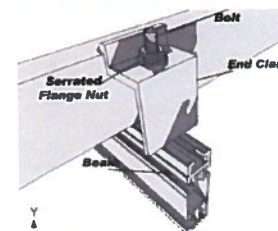
- Mid clamp material: One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- Ultimate tensile: 38ksi, Yield: 35 ksi
- Finish: Clear or Dark Anodized
- Mid clamp weight: 0.050 lbs (23g)
- Allowable and design loads are valid when components are assembled according to authorized UNIRAC documents
- Values represent the allowable and design load capacity of a single mid clamp assembly when used with a SOLARMOUNT series beam to retain a module in the direction indicated
- Assemble mid clamp with one Unirac 1/4"-20 T-bolt and one 1/4"-20 ASTM F594 serrated flange nut
- Use anti-seize and tighten to 10 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory



Dimensions specified in inches unless noted

Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor, ϕ
Tension, Y+	2020 (8987)	891 (3963)	2.27	1348 (5994)	0.667
Transverse, Z±	520 (2313)	229 (1017)	2.27	346 (1539)	0.665
Sliding, X±	1194 (5312)	490 (2179)	2.44	741 (3295)	0.620

SOLARMOUNT End Clamp Part No. 302001C, 302002C, 302002D, 302003C, 302003D, 302004C, 302004D, 302005C, 302005D, 302006C, 302006D, 302007D, 302008C, 302008D, 302009C, 302009D, 302010C, 302011C, 302012C



- End clamp material: One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- Ultimate tensile: 38ksi, Yield: 35 ksi
- Finish: Clear or Dark Anodized
- End clamp weight: varies based on height: ~0.058 lbs (26g)
- Allowable and design loads are valid when components are assembled according to authorized UNIRAC documents
- Values represent the allowable and design load capacity of a single end clamp assembly when used with a SOLARMOUNT series beam to retain a module in the direction indicated
- Assemble with one Unirac 1/4"-20 T-bolt and one 1/4"-20 ASTM F594 serrated flange nut
- Use anti-seize and tighten to 10 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory
- Modules must be installed at least 1.5 in from either end of a beam

Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor, ϕ
Tension, Y+	1321 (5876)	529 (2352)	2.50	800 (3557)	0.605
Transverse, Z±	63 (279)	14 (61)	4.58	21 (92)	0.330
Sliding, X±	142 (630)	52 (231)	2.72	79 (349)	0.555

Dimensions specified in inches unless noted

CONTRACTOR

SOLAR ELECTRIC TEXAS LLC

PHONE: 2102699842

ADDRESS: 1874 GRANDSTAND
SAN ANTONIO, TEXAS 78238

LIC. NO.: TECL 18011

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: 4.680 kWp

LO RESIDENCE

505 BURNET STREET
SAN ANTONIO, TX 78202

APN: 005370220161

ENGINEER OF RECORD

RESOURCE DOCUMENT

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

DATE: 8.15.2018

DESIGN BY: V.P.

REVISIONS

R 005.00

(SHEET 14)