

HISTORIC AND DESIGN REVIEW COMMISSION

August 19, 2015

Agenda Item No: 10

HDRC CASE NO: 2015-316
ADDRESS: 628 E GUENTHER ST
LEGAL DESCRIPTION: NCB 939 BLK 2 LOT 13
ZONING: RM4 H
CITY COUNCIL DIST.: 1
DISTRICT: King William Historic District
APPLICANT: S Rapier
OWNER: Linda Couch
TYPE OF WORK: Solar panel installation
REQUEST:

The applicant is requesting a Certificate of Appropriateness for approval to install a roof mounted solar photovoltaic system on the south side of the primary historic structure.

APPLICABLE CITATIONS:

Historic Design Guidelines, Chapter 3, Guidelines for Additions

6. Designing for Energy Efficiency

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 has proposed to mount a solar photovoltaic system to the roof at the south side of the single story historic structure. According to the Guidelines for Additions 6.C.i., solar collectors should be located on the side or rear roof pitch of the primary historic structure to minimize visibility from the public right of way. While the applicant has proposed a mounting location on the south roof pitch, the proposed system would be clearly visible from the public right of way. This is not consistent with the Guidelines for Additions.
- b. Staff finds that an appropriate solution could potentially be found in the shifting of the panels further toward the rear of the side roof pitch and lower the visibility from the public right of way.

RECOMMENDATION:

Staff does not recommend approval based on findings a and b.

CASE MANAGER:

Edward Hall





Flex Viewer

Powered by ArcGIS Server

Printed: Aug 11, 2015

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1903 S. St . Marys San Antonio TX, 78210

NABCEP 091110-206

TECL# 29584

Written Narrative Describing Work-

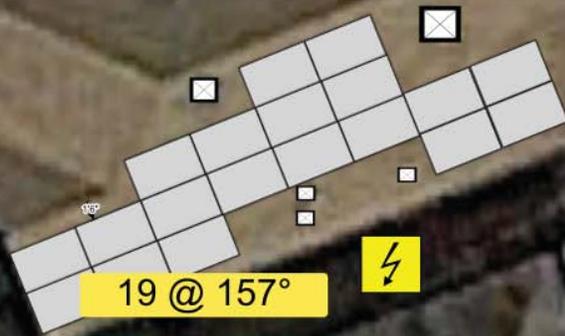
The proposed project for 628 E Guenther is a 5.42 kW Solar PV System. The solar system will be installed on the existing shingle roof. The solar system will only be visible from the south side of the house. It will not be visible from street view due to tree and other roof-related obstructions.

Office. 210.338.8810

Fax. 210.485.1379

www.therenewablerepublic.com

TheRenewableRepublic.com



19 @ 157°



The Couch Residence
628 E Gunther, San Antonio, TX 78210
19 (65"x40") - Solar Modules Possible

GENERAL NOTES:

1. SOLAR PHOTOVOLTAIC SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF ARTICLE 690 OF THE 2011 NEC.
2. ACCESS TO THE WIRE WILL BE RESTRICTED TO QUALIFIED PERSONNEL ONLY. AS REQUIRED BY ARTICLE 690 OF 2011 NEC
3. ALL LOCATION ARE APPROXIMATE AND REQUIRE FIELD VERIFICATION.
4. WIRE SIZES AND CALCULATED VALUES ARE NOMINAL AND SHOULD BE VERIFIED OR RECALCULATED BASED ON FIELD INSTALLATIONS AND MEASURED CONDUIT RUN IN ACCORDANCE WITH REQUIREMENTS OF ARTICLE 310 OF THE 2011 NEC

CPS Energy's ESMS Review Disclaimer: CPS Energy reviews distributed generation designs including PV installations for adherence to CPS Energy specifications and standards. A drawing or design approved by CPS Energy's Electric Service and Metering Standards Section does not imply that the installation meets minimum requirements of the NEC and other applicable codes. The Customer is responsible for coordinating with the proper authority having jurisdiction (AHJ) to make sure that the installation meets all minimum requirements.

PROJECT SCOPE

1. THE INSTALLATION CONSISTS OF SOLAR PHOTOVOLTAIC MODULES MOUNTED ON THE GROUND AND CONNECTED ON AC/DC INVERTER AND RELATED ELECTRICAL SWITCHGEAR AS REQUIRED BY APPLICABLE CODES AND BY THE ELECTRICAL UTILITY COMPANY.
2. THE SYSTEM WILL BE INTERCONNECTED AND OPERATED IN PARALLEL WITH THE UTILITY ELECTRICAL GRID PER THE REQUIREMENTS OF THE UTILITY AND APPLICABLE CODES

SYSTEM INFORMATION

ARRAY	PITCH	TRUE ORIENTATION
AR01	20°	157°

TABLE OF CONTENTS

PAGE #	DESCRIPTION
PV-01	SITE PLAN
PV-02	PLAN VIEW AND ATTACHMENT DETAIL
PV-02A	DIMENSION LAYOUT
PV-03	ELEVATIONS
PV-04	PV ELECTRICAL, EQUIP SPEC, LABELS & NOTES

SYSTEM COMPONENT SPECIFICATION

MAJOR SYSTEM COMPONENTS	SPECIFICATIONS	QUANTITY
MODULES	SOLARWORLD SW285 MONO, 285W	19
INVERTER	ENPHASE M250, 240V INVERTERS	19
JUNCTION BOX	NEMA 3R MIN. REQUIRED WITH WATERPROOF	1
SUBPANEL	125A INVERTER SUBPANEL WITH 1X20A, 1X10A BREAKER	1
BREAKER OCPD	30A, 240V, 2 POLE	1
AC DISCONNECT	30A / 240V, FUSED LOCKABLE	1
PV PRODUCTION METER	200A / 240V	1

FILE NAME: RR-129-COUCH_072915

REVISIONS	NO.	DATE	BY

NOTES:

- 1) 5.42 kW @ STC RATING SOLAR PHOTOVOLTAIC SYSTEM
- 2) SOLAR MODULES MOUNTED ON IRON RIDGE (XRL AL) RACKING SYSTEM @ 20° ANGLE.
- 3) PHOTOVOLTAIC SYSTEM CONNECTED TO THE MAIN SERVICE PANEL VIA ONE 30 AMP (PV BREAKER)
- 4) INSTALL RACKING COMPONENTS IN ACCORDANCE WITH MANUFACTURER INSTRUCTIONS AND BEST INSTALLATION PRACTICE

- LEGEND:**
- ROOF OUTLINE
 - SOLAR MODULE
 - - - EXISTING FENCE
 - ▨ EXISTING SOLAR WATER HEATER (SWH)
 - ▩ EXISTING GARAGE ROOF



CUSTOMER:
THE COUCH RESIDENCE

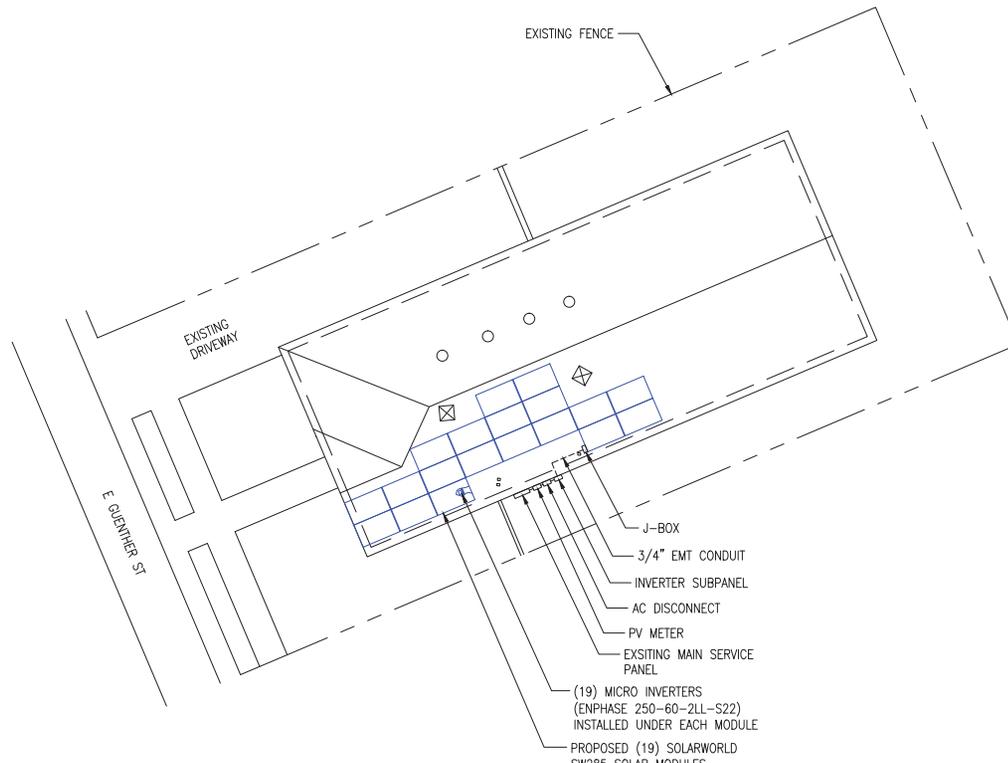
BUILDING:
SINGLE FAMILY RESIDENCE

LOCATION:
628 E GUENTHER, SAN ANTONIO, TX 78210

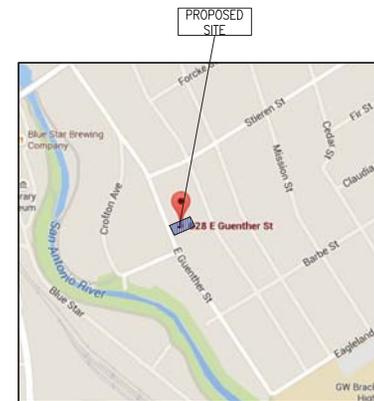
DRAWN BY: TMG **DATE DRAWN:** 07/29/2015

APPROVED: [Signature] **SURVEY DATE:** [Blank] **DATE VERIFIED:** [Blank]

PV-01



SITE PLAN
SCALE: 1/8"=1'-0"

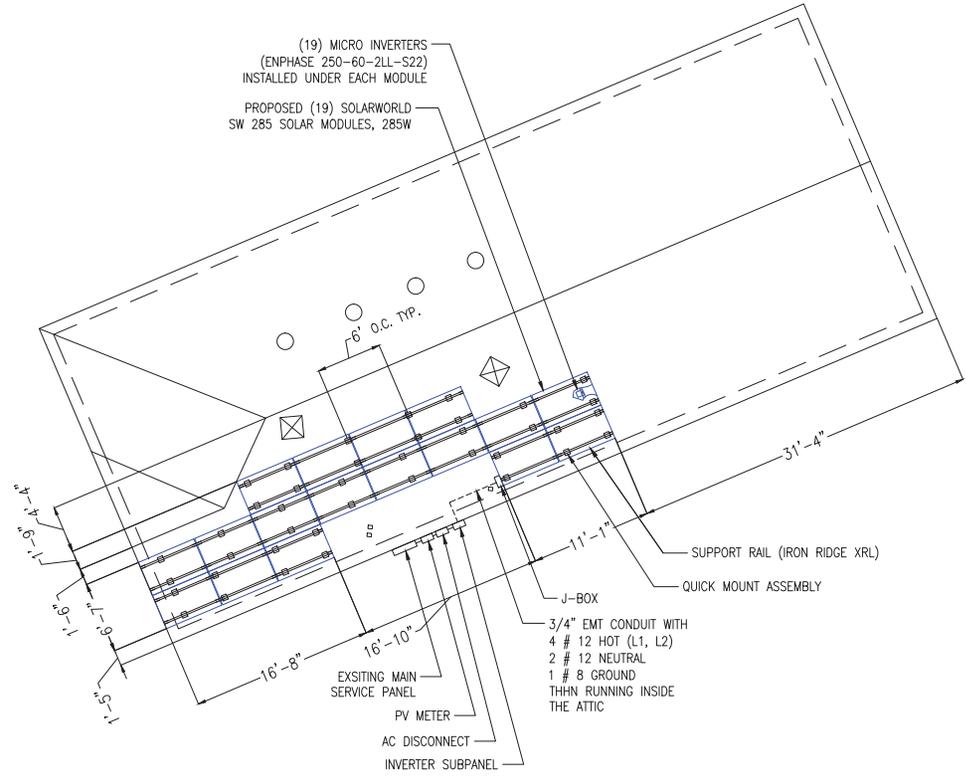


VICINITY MAP

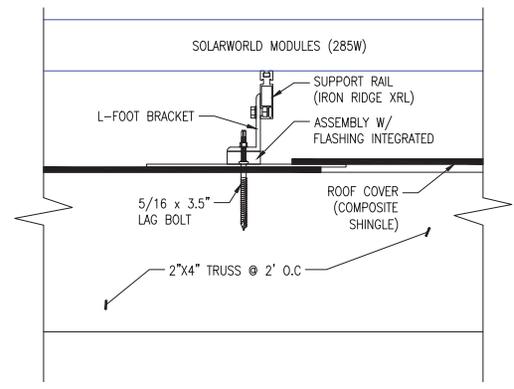


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

- GENERAL NOTES:**
1. SOLAR PHOTOVOLTAIC SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF ARTICLE 690 OF THE 2011 NEC.
 2. ACCESS TO THE WIRE WILL BE RESTRICTED TO QUALIFIED PERSONNEL ONLY, AS REQUIRED BY ARTICLE 690 OF 2011 NEC
 3. ALL LOCATION ARE APPROXIMATE AND REQUIRE FIELD VERIFICATION.



ATTACHMENT LAYOUT SCALE: 3/16"=1'-0"



ATTACHMENT DETAIL
NOT TO SCALE

SYSTEM INFORMATION	
EXISTING ROOF	RECTANGULAR SHAPE
ENGINEERED TRUSS SIZE	2" x 4"
TRUSS SPACING O.C	2'-0"
TRUSS SPAN	7'-0"
ROOF HEIGHT	20'-0"
WIND SPEED	90 MPH
METHOD OF WATERPROOFING	FLASHING
ROOF TYPE	COMPOSITION SINGLE
ARRAY INFORMATION	
MODULE WEIGHT	39.5 LBS
MODULE LENGTH	65.9"
MODULE WIDTH	39.4"
MODULE HEIGHT	1.2"
TOTAL MODULE	19
SUM: MODULES WEIGHT	750.5 LBS
SUM: MOUNTS AND RAIL WEIGHT	148.40 LBS
SUM: MICRO INVERTERS WEIGHT	83.6 LBS
MOUNTING SYSTEM MANUFACTURER	IRON RIDGE
PRODUCT NAME AND MODEL	IRON RIDGE XRL
SUM: MODULES SURFACE AREA	346.71 FT ²
INSTALLATION WEIGHT	983 LBS
SUM: ATTACHMENT POINT	40
WEIGHT PER ATTACHMENT	24.56 LBS
INSTALLATION AREA	APPRX 1110 FT ²
DISTRIBUTE WEIGHT	0.885 LBS FT ²

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- 4) INSTALL RACKING COMPONENTS IN ACCORDANCE WITH MANUFACTURER INSTRUCTIONS AND BEST INSTALLATION PRACTICE

LEGEND:

- ROOF OUTLINE
- ▭ SOLAR MODULE
- - - EXISTING FENCE
- ▨ EXISTING SOLAR WATER HEATER (SWH)
- ▩ EXISTING GARAGE ROOF

RENEWABLE REPUBLIC
1903 S. SAINT MARY'S ST.
SAN ANTONIO, TX 78210

CUSTOMER: THE COUCH RESIDENCE

BUILDING: SINGLE FAMILY RESIDENCE

LOCATION: 628 E. GUENTHER, SAN ANTONIO, TX 78210

DRAWN BY: TMG **DATE DRAWN:** 07/29/2015

APPROVED: _____ **SURVEY DATE:** _____ **DATE VERIFIED:** _____

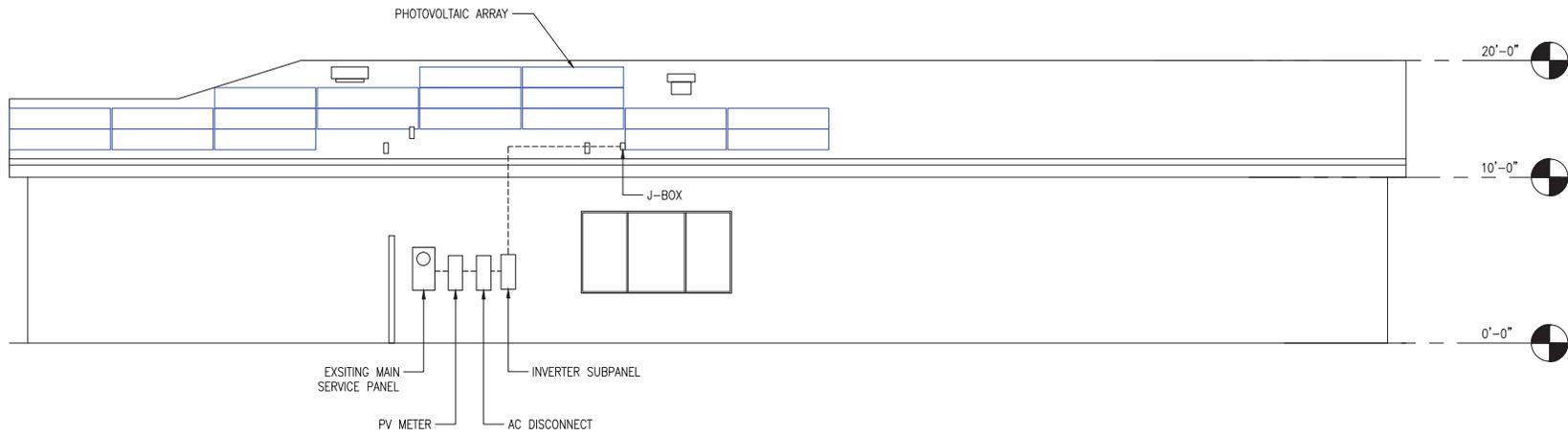
PV-02



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- LEGEND:
- ROOF OUTLINE
 - SOLAR MODULE
 - EXISTING FENCE
 - EXISTING SOLAR WATER HEATER (SWH)
 - EXISTING GARAGE ROOF



CUSTOMER: THE COUCH RESIDENCE		
BUILDING: SINGLE FAMILY RESIDENCE		
LOCATION: 628 E. GUENTHER, SAN ANTONIO, TX 78210		
DRAWN BY: TMG	DATE DRAWN: 07/29/2015	
APPROVED	SURVEY DATE	DATE VERIFIED

SOUTH EAST ELEVATION SCALE: 1/4"=1'-0"

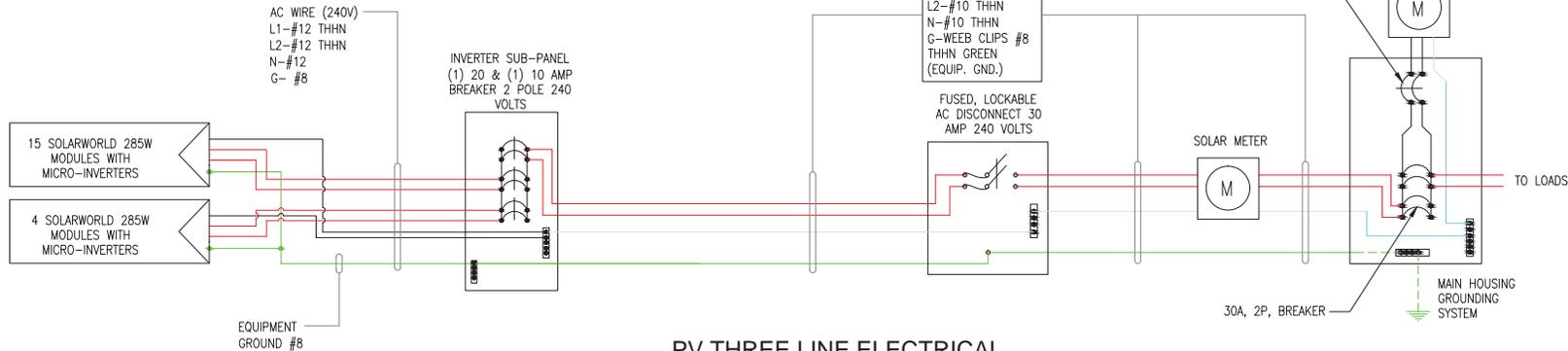
PV-03

GENERAL NOTES

- PERFORMED ALL THE ELECTRICAL INSTALLATION WITH ALL LOCAL ELECTRICAL CODES AND THE NATIONAL ELECTRICAL CODE (NEC), ANSI, NFPA 70.
- ALL GROUNDING CONDUCTORS SHALL BE GREEN IN COLOR OR BARE, ATTACHED TO ALL METAL PARTS AND REFERENCED TO MAIN SERVICE PANEL GROUND.
- ALL STATED CONDUIT SIZES SATISFY REQUIREMENTS PER CHAPTER 9, TABLE 1.0, ANNEX C (TABLE C.1), OF THE 2011 NEC. LARGER DIAMETER CONDUIT MAY BE USED TO FACILITATE EASE OF INSTALLATION
- 10 AWG, 90° CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH I_{sc} OF 9.6 AMPS OR LESS WHEN PROTECTED BY A 15 AMP OR SMALLER FUSE

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WARNING DUAL POWER SUPPLY PHOTOVOLTAIC SYSTEM
 MAXIMUM AC OUTPUT/OPERATING CURRENT 23 AMPS
 OPERATING VOLTAGE: 240 VOLTS



PV THREE LINE ELECTRICAL

FILE NAME: RR-129-COUCH_072915

REVISIONS	NO.	DATE	BY

NOTES:

- 5.42 kW @ STC RATING SOLAR PHOTOVOLTAIC SYSTEM
- INSTALL INVERTER ACCORDING TO MANUFACTURER INSTRUCTIONS AND INSTALLATION BEST PRACTICE

EQUIPMENT SPECIFICATIONS

SOLARWORLD (SW 285 MONO), 285W MODULE RATING @ STC		
MAX POWER CURRENT	I _{mp}	9.20A
MAX POWER VOLTAGE	V _{mp}	31.3V
OPEN-CIRCUIT VOLTAGE	V _{oc}	39.7V
SHORT-CIRCUIT CURRENT	I _{sc}	9.84A
MAX POWER	P _{max}	285Wp
MAX SYSTEM VOLTAGE		1000VDC
SERIES FUSE RATING		15A
TEMPERATURE COEFFICIENT	V _{oc}	-0.30%/°C
TEMPERATURE COEFFICIENT	I _{sc}	+0.04%/°C
ENPHASE MICRO INVERTER M250-60-2LL-S22 (240V) RATING @ STC		
MAX DC VOLTAGE		48V
MAX POWER DC		210-300W
AC NOMINAL POWER		240W
NOMINAL OUTPUT CURRENT @ 240V		1A
CEC EFFICIENCY @ 240V		96.5%
ARRAY SUMMARY		
TOTAL NUMBER OF MODULES		19
NUMBER OF INVERTERS		19
TOTAL NUMBER OF UNITS PER BRANCH/ARRAY (ARRAY 1)		15
TOTAL NUMBER OF UNITS PER BRANCH/ARRAY (ARRAY 2)		4

ELEC. CALCULATIONS

ARRAY 1 CIRCUIT CURRENT CALCULATION
 15 SOLARWORLD SOLAR MODULES, 285W CONNECTED TO 15 ENPHASE MICRO-INVERTER

- MAXIMUM OUTPUT POWER PER INVERTER 240W
- NOMINAL VOLTAGE 240V
- 240 / 240 = 1.0 AMPS
- 1 X 15 = 15 AMPS

OVERCURRENT PROTECTION

- 15 X 1.25 = 18.75 AMPS
- 2 POLE 20 AMPS CIRCUIT BREAKER

ARRAY 2 CIRCUIT CURRENT CALCULATION
 04 SOLARWORLD SOLAR MODULES, 285W CONNECTED TO 04 ENPHASE MICRO-INVERTER

- MAXIMUM OUTPUT POWER PER INVERTER 240W
- NOMINAL VOLTAGE 240V
- 240 / 240 = 1 AMPS
- 1 X 4 = 4 AMPS

OVERCURRENT PROTECTION

- 4 X 1.25 = 5 AMPS
- 2 POLE 10 AMPS CIRCUIT BREAKER

ELECTRICAL NOTES

- COMPLIES WITH 2011 NEC-NATIONAL ELECTRICAL CODE
- GROUNDING WIRE WILL BE BONDED DIRECTLY TO FACILITY GROUND
 - ELECTRICAL SYSTEM GROUNDING WILL BE COMPLY WITH 2011 NEC 250
 - MODULE INTERCONNECTIONS WILL BE MADE WITH 10 AWG RHW/USE-2 WIRE
 - ARRAY CONDUCTORS ARE SIZED FOR DERATED CURRENT PER STRING
 - > 8.65 AMPS SHORT CIRCUIT CURRENT
 - > 125% DERATING FOR EXTREME IRRADIANCE CONDITIONS (NEC 690-8 (a))
 - > 125% DERATING, CONTINUOUS PHOTOVOLTAIC SOURCE CURRENT (NEC 690-8 (B))
 - > 156% TOTAL DERATING (COMBINATION OF ABOVE)
 - > 13.49 AMPS TOTAL CAPACITY
 - > (AMPS TOTAL CAPACITY = STRING SHORT CIRCUIT CURRENT MULTIPLIED BY TWO ABOVE DERATES, 1.25 X 1.25 X SHORT CIRCUIT CURRENT)
 - INVERTER PROVIDES NECESSARY GROUND FAULT PROTECTION AS REQUIRED BY 2011 NEC 690.5 GROUND FAULT PROTECTION.
 - PHOTOVOLTAIC SYSTEM HAS CONDUCTOR BONDED TO GROUND IN INVERTER AS REQUIRED BY 2011 NEC 690.41 SYSTEM GROUNDING, AND 690.41 POINT OF SYSTEM GROUNDING CONNECTION
 - WHERE DC PHOTOVOLTAIC OUTPUT CIRCUITS ARE RUN INSIDE A BUILDING THEY SHALL BE CONTAINED IN A METALLIC RACEWAY OR ENCLOSURE FROM THE POINT OF PENETRATION TO THE FIRST READILY ACCESSIBLE DISCONNECTING MEANS. 2011 NEC 690.31 (E)
 - USE UL APPROVED BONDING FITTINGS AT ALL CONDUIT/BOXES JUNCTION
 - MODULES CONFORM TO AND LISTED UNDER UL 1703
 - INVERTER CONFORMS TO AND IS LISTED UNDER UL 1741

LABEL

- WARNING -
 THIS EQUIPMENT IS POWERED BY A PHOTOVOLTAIC POWER SOURCE
 LABEL: MAIN SERVICE PANEL EXISTING SUBPANEL, AND EXISTING EQUIPMENT TIED INTO.

- WARNING -
 DO NOT ENTER
 THE EQUIPMENT IS POWERED BY A PHOTOVOLTAIC POWER SOURCE
 LABEL: INSTALLED JUNCTION BOXES, COMBINER BOXES AND GUTTER BOXES.

- WARNING -
 ELECTRIC SHOCK HAZARD
 DO NOT TOUCH TERMINALS. TERMINALS ON BOTH LINE AND LOAD SIDE MAY BE ENERGIZED
 LABEL: INSTALLED SUBPANELS AND FUSE BOXES.

PHOTOVOLTAIC DISCONNECT
- WARNING -
 ELECTRIC SHOCK HAZARD
 DO NOT TOUCH TERMINALS. TERMINALS ON BOTH LINE AND LOAD SIDE MAY BE ENERGIZED
 LABEL: AC, DC DISCONNECT OR OTHER DISCONNECTING MEANS.

LEGEND:

	GROUNDING CONDUCTOR
	A PV MODULE
	INVERTER UNIT
	DISCONNECT
	FUSE
	CIRCUIT BREAKER
	GROUND BONDING



CUSTOMER: THE COUCH RESIDENCE

BUILDING: SINGLE FAMILY RESIDENCE

LOCATION: 628 E. GUENTHER, SAN ANTONIO, TX 78210

DRAWN BY: TMG	DATE DRAWN: 07/29/2015
APPROVED:	SURVEY DATE:
	DATE VERIFIED:











Example of PV Installation

① 215 Groveton, SA, TX, 78210

EEGU



Sunmodule[®] Plus

SW 285 MONO



TUV Power controlled:
Lowest measuring tolerance in industry



Every component is tested to meet
3 times IEC requirements



Designed to withstand heavy
accumulations of snow and ice



Sunmodule Plus:
Positive performance tolerance



25-year linear performance warranty
and 10-year product warranty



Glass with anti-reflective coating



World-class quality

Fully-automated production lines and seamless monitoring of the process and material ensure the quality that the company sets as its benchmark for its sites worldwide.

SolarWorld Plus-Sorting

Plus-Sorting guarantees highest system efficiency. SolarWorld only delivers modules that have greater than or equal to the nameplate rated power.

25-year linear performance guarantee and extension of product warranty to 10 years

SolarWorld guarantees a maximum performance digression of 0.7% p.a. in the course of 25 years, a significant added value compared to the two-phase warranties common in the industry. In addition, SolarWorld is offering a product warranty, which has been extended to 10 years.*

*in accordance with the applicable SolarWorld Limited Warranty at purchase.
www.solarworld.com/warranty



- Qualified, IEC 61215
- Safety tested, IEC 61730
- Periodic Inspection
- Blowing sand resistant



- Ammonia resistance tested
- Periodic Inspection
- Power Controlled



Sunmodule[®] Plus SW 285 MONO



PERFORMANCE UNDER STANDARD TEST CONDITIONS (STC)*

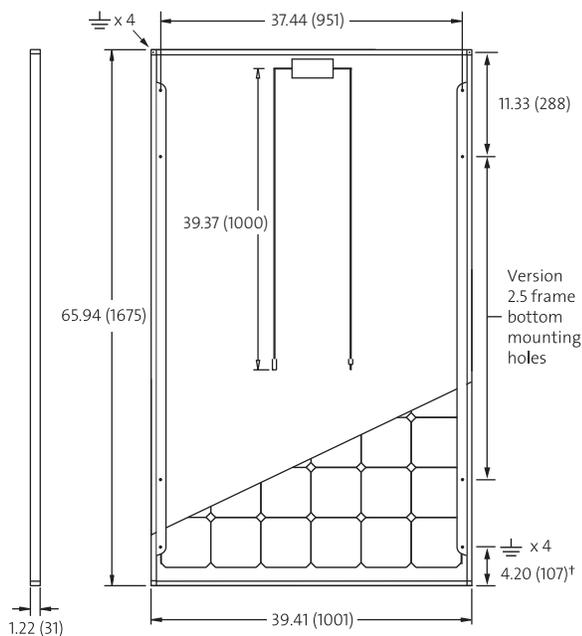
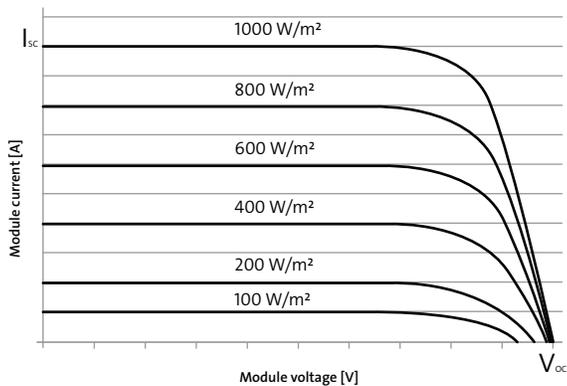
Maximum power	P_{max}	285 Wp
Open circuit voltage	V_{oc}	39.7 V
Maximum power point voltage	V_{mpp}	31.3 V
Short circuit current	I_{sc}	9.84 A
Maximum power point current	I_{mpp}	9.20 A
Module efficiency	η_m	17.0 %

*STC: 1000 W/m², 25°C, AM 1.5

1) Measuring tolerance (P_{max}) traceable to TUV Rheinland: +/- 2% (TUV Power Controlled).

THERMAL CHARACTERISTICS

NOCT	46 °C
TC I_{sc}	0.04 %/°C
TC V_{oc}	-0.30 %/°C
TC P_{mpp}	-0.41 %/°C
Operating temperature	-40°C to 85°C



PERFORMANCE AT 800 W/m², NOCT, AM 1.5

Maximum power	P_{max}	213.1 Wp
Open circuit voltage	V_{oc}	36.4 V
Maximum power point voltage	V_{mpp}	28.7 V
Short circuit current	I_{sc}	7.96 A
Maximum power point current	I_{mpp}	7.43 A

Minor reduction in efficiency under partial load conditions at 25°C: at 200 W/m², 100% (+/-2%) of the STC efficiency (1000 W/m²) is achieved.

COMPONENT MATERIALS

Cells per module	60
Cell type	Mono crystalline
Cell dimensions	6.17 in x 6.17 in (156.75 x 156.75 mm)
Front	Tempered glass (EN 12150)
Frame	Clear anodized aluminum
Weight	39.5 lbs (17.9 kg)

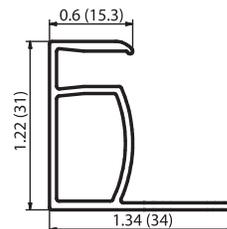
SYSTEM INTEGRATION PARAMETERS

Maximum system voltage SC II / NEC	1000 V	
Maximum reverse current	25 A	
Number of bypass diodes	3	
Design Loads*	Two rail system	113 psf downward 64 psf upward
Design Loads*	Three rail system	170 psf downward 71 psf upward
Design Loads*	Edge mounting	30 psf downward 30 psf upward

*Please refer to the Sunmodule installation instructions for the details associated with these load cases.

ADDITIONAL DATA

Power sorting ¹	-0 Wp / +5 Wp
J-Box	IP65
Module leads	PV wire per UL4703 with H4 connectors
Module type (UL 1703)	1
Glass	Low iron tempered with ARC



VERSION 2.5 FRAME

- Compatible with both "Top-Down" and "Bottom" mounting methods
- ⚡ Grounding Locations:
 - 4 corners of the frame
 - 4 locations along the length of the module in the extended flange†

Enphase® M250



The **Enphase® M250 Microinverter** delivers increased energy harvest and reduces design and installation complexity with its all-AC approach. With the M250, the DC circuit is isolated and insulated from ground, so **no Ground Electrode Conductor (GEC) is required for the microinverter**. This further simplifies installation, enhances safety, and saves on labor and materials costs.

The Enphase M250 integrates seamlessly with the Engage® Cable, the Envoy® Communications Gateway™, and Enlighten®, Enphase's monitoring and analysis software.

PRODUCTIVE

- Optimized for higher-power modules
- Maximizes energy production
- Minimizes impact of shading, dust, and debris

SIMPLE

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

RELIABLE

- 4th-generation product
- More than 1 million hours of testing and 3 million units shipped
- Industry-leading warranty, up to 25 years

INPUT DATA (DC)	M250-60-2LL-S22/S23/S24	
Recommended input power (STC)	210 - 300 W	
Maximum input DC voltage	48 V	
Peak power tracking voltage	27 V - 39 V	
Operating range	16 V - 48 V	
Min/Max start voltage	22 V / 48 V	
Max DC short circuit current	15 A	
Max input current	9.8 A	
OUTPUT DATA (AC)	@208 VAC	@240 VAC
Peak output power	250 W	250 W
Rated (continuous) output power	240 W	240 W
Nominal output current	1.15 A (A rms at nominal duration)	1.0 A (A rms at nominal duration)
Nominal voltage/range	208 V / 183-229 V	240 V / 211-264 V
Nominal frequency/range	60.0 / 57-61 Hz	60.0 / 57-61 Hz
Extended frequency range*	57-62.5 Hz	57-62.5 Hz
Power factor	>0.95	>0.95
Maximum units per 20 A branch circuit	24 (three phase)	16 (single phase)
Maximum output fault current	850 mA rms for 6 cycles	850 mA rms for 6 cycles
EFFICIENCY		
CEC weighted efficiency, 240 VAC	96.5%	
CEC weighted efficiency, 208 VAC	96.0%	
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	
Operating temperature range (internal)	-40°C to +85°C	
Dimensions (WxHxD)	171 mm x 173 mm x 30 mm (without mounting bracket)	
Weight	2.0 kg	
Cooling	Natural convection - No fans	
Enclosure environmental rating	Outdoor - NEMA 6	
FEATURES		
Compatibility	Compatible with 60-cell PV modules.	
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.	
Monitoring	Free lifetime monitoring via Enlighten software	
Compliance	UL1741/IEEE1547, FCC Part 15 Class B, CAN/CSA-C22.2 NO. 0-M91, 0.4-04, and 107.1-01	

* Frequency ranges can be extended beyond nominal if required by the utility

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