



Hello Paradise Valley Committee,

Subject: Formal plan review for the proposed solar installation at the Irvin Kessler residents (6210 E. Indian Bend Rd, Paradise Valley)

Thank you for taking the time to review the proposed Kessler solar submittal. The following submittal represents a low profile fully concealed rooftop solar electric system. Aneva Solar will make all efforts to keep the solar installation totally discrete. Our goal is to completely satisfy the committee's requirements and the Homeowners expectations.

- All solar panels and racking will be concealed per section 2207.II.E by a 20" metal fascia installed at the roof level by the builder (Racking height 13"). This roof level fascia will have a LRV of 23.
- All solar arrays will not be visible from the same or lower elevation
- The solar racking system used will match the fascia's LRV rating of 23.
- The LG solar panels used will have black frames.
- The solar systems inverters will be located in the utility room of the home.
- The solar meter and disconnect will be screened in to match the home.
- There will be no exterior conduit visible at the same or lower elevations of the home.
- The solar meter and disconnect will be located in the homes utility corridor along with existing HVAC and electrical equipment. Please see the note on page three of the plans.

Thank you for your time.

Best regards,

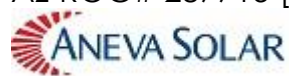
Anthony Iannucci

Owner/Project Manager

Phone: 480 390 4822

www.anevasolar.com

AZ ROC# 287715 [K-11]



TOWN OF PARADISE VALLEY HILLSIDE BUILDING CONSTRUCTION APPLICATION AND PLAN CHECK SHEETS

(This document is to be used after April 1, 2007)

DATE: 8/23/17

SUBDIVISION NAME: INDIAN BEND VISTAS 1

ADDRESS OF PROPERTY 6210 E. Indian Bend Rd. Paradise Valley

LEGAL DESCRIPTION: _____

ARCHITECT: Charles S. Stinson 952 473 9503
NAME PHONE NUMBER

18304 Minnetonka Blvd, DeepHaven, MN 55391 info@charlesrstinson.com
ADDRESS E-MAIL ADDRESS

ENGINEER/OTHER: _____
NAME PHONE NUMBER

ADDRESS _____
E-MAIL ADDRESS

OWNER: Irvin Kessler _____
PRINT NAME PHONE NUMBER

6210 E. Indian Bend Rd, Paradise Valley kessler@providentadvisors.com
ADDRESS E-MAIL ADDRESS

[Signature] 8/23/17
SIGNATURE OF OWNER OR REPRESENTATIVE DATE



Hello Paradise Valley Committee,

Subject: Formal plan review for the proposed solar installation at the Irvin Kessler residents (6210 E. Indian Bend Rd, Paradise Valley)

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Thank you for your time.

Best regards,

Anthony Iannucci
Owner/Project Manager
Phone: 480 390 4822
www.anevasolar.com
AZ ROC# 287715 [K-11]



Combined Plan Review Notification

Date

Address of recipient

Subject: Formal Plan review for the proposed Kessler residents roof top solar project

An application has been submitted to the Town of Paradise Valley for a new home at 6210 East Indian Bend Rd, Paradise Valley. In compliance with Town Requirements, this letter is being sent to you as a courtesy to inform you of the pending application. The Hillside Building Committee will be reviewing this application on Wednesday, September 28th 2017 AM at the Paradise Valley Town Hall Located at 6401 East Lincoln Drive.

The purpose of the combined Plan Review meeting is for the Hillside Committee to review the submittal for compliance with goals, purposes, and specific criteria of the Town of Paradise Valley Hillside Development Regulations.

The Hillside Committee will approve, approve with stipulations, or deny the submittal.

This meeting is open to the public and you may feel free to attend.

If you have any questions, please call me at 480-390-4822

Sincerely,

Anthony Iannucci

Owner/Project Manager

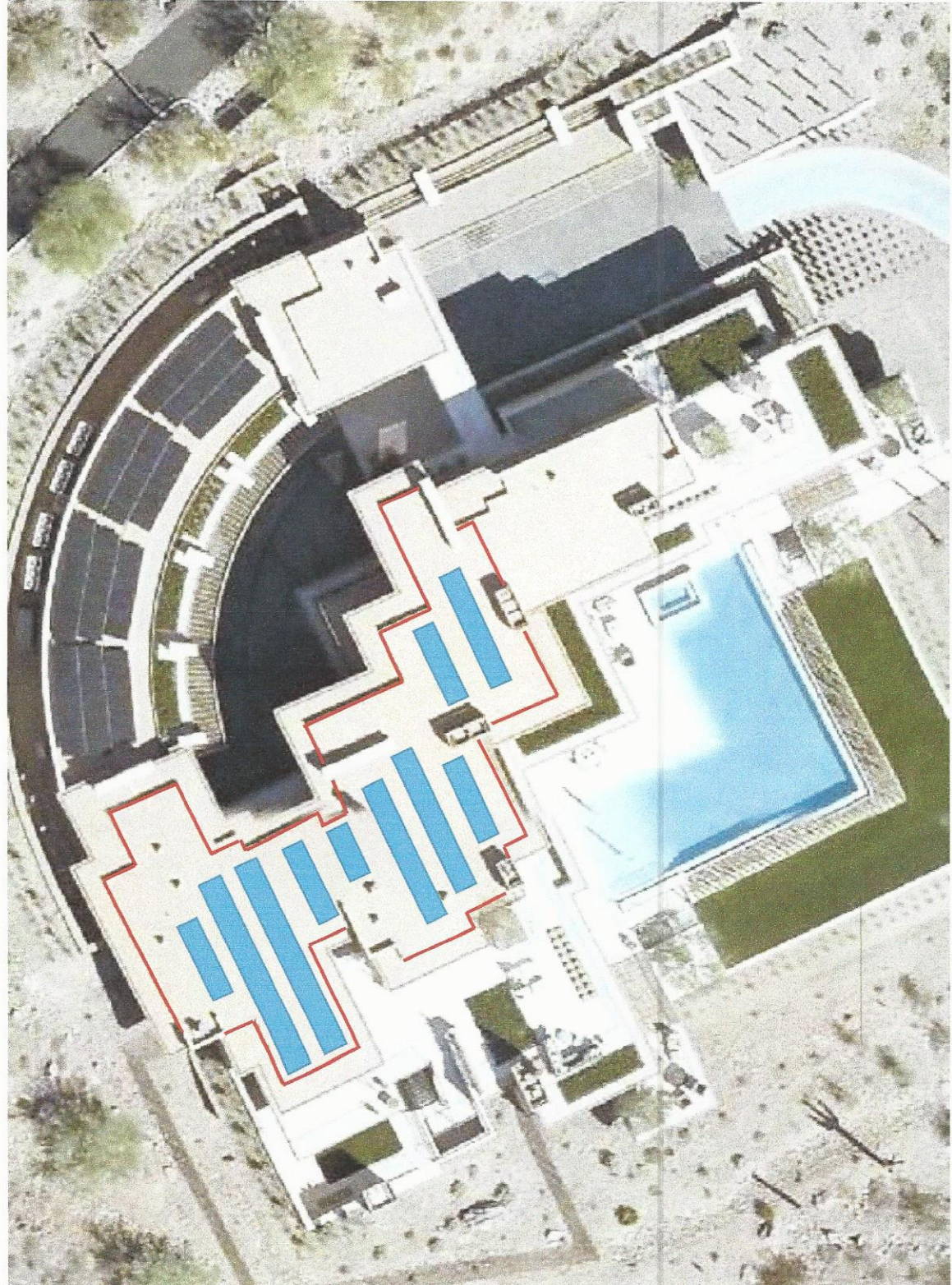
Phone: 480 390 4822

www.anevasolar.com

AZ ROC# 287715 [K-11]



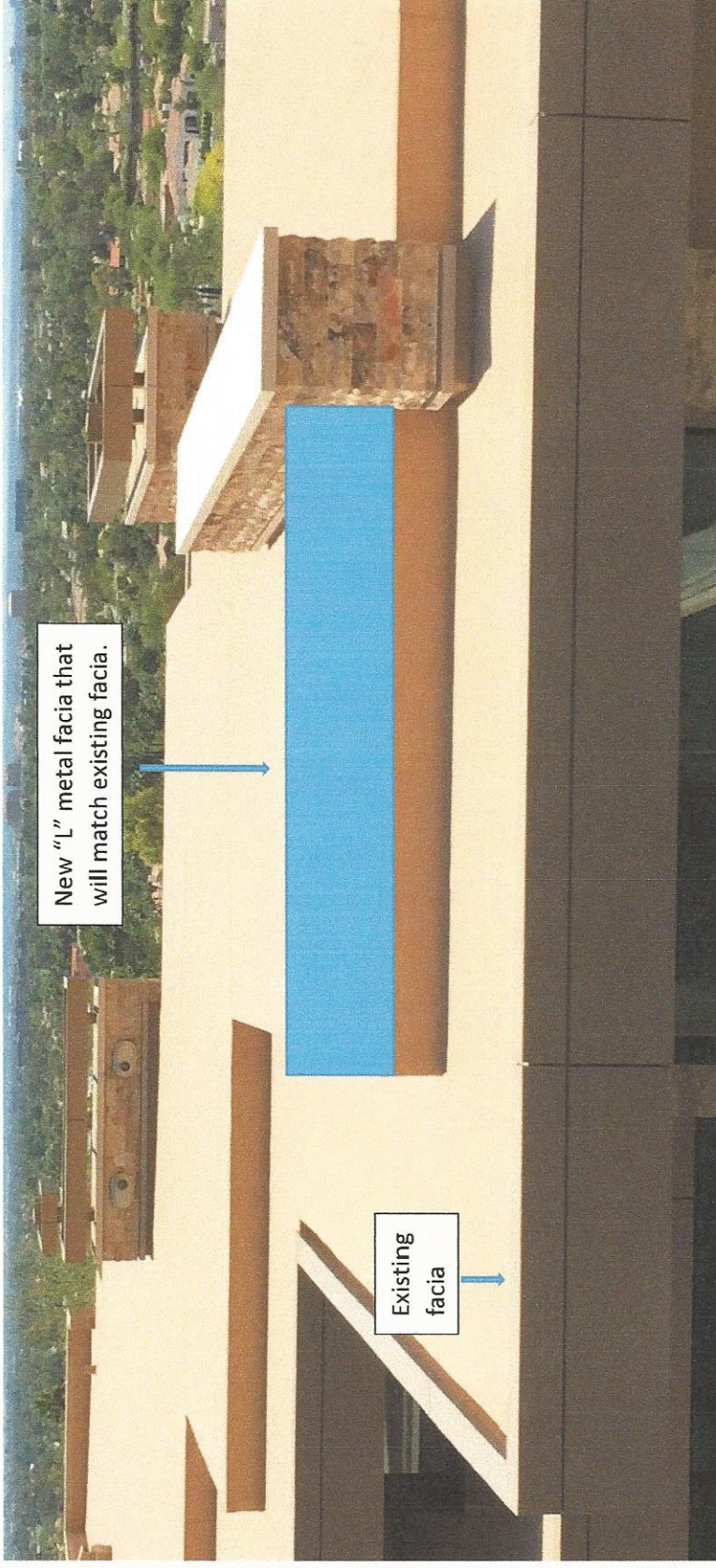
Kessler Residents Proposed solar project-6210 E. Indian Bend Rd, Paradise Valley, Arizona



Proposed solar module locations-

Proposed "L" facia location to screen solar array-

Kessler Residents Proposed solar project-6210 E. Indian Bend Rd, Paradise Valley, Arizona



Anthony Iannucci

Owner/Project Manager

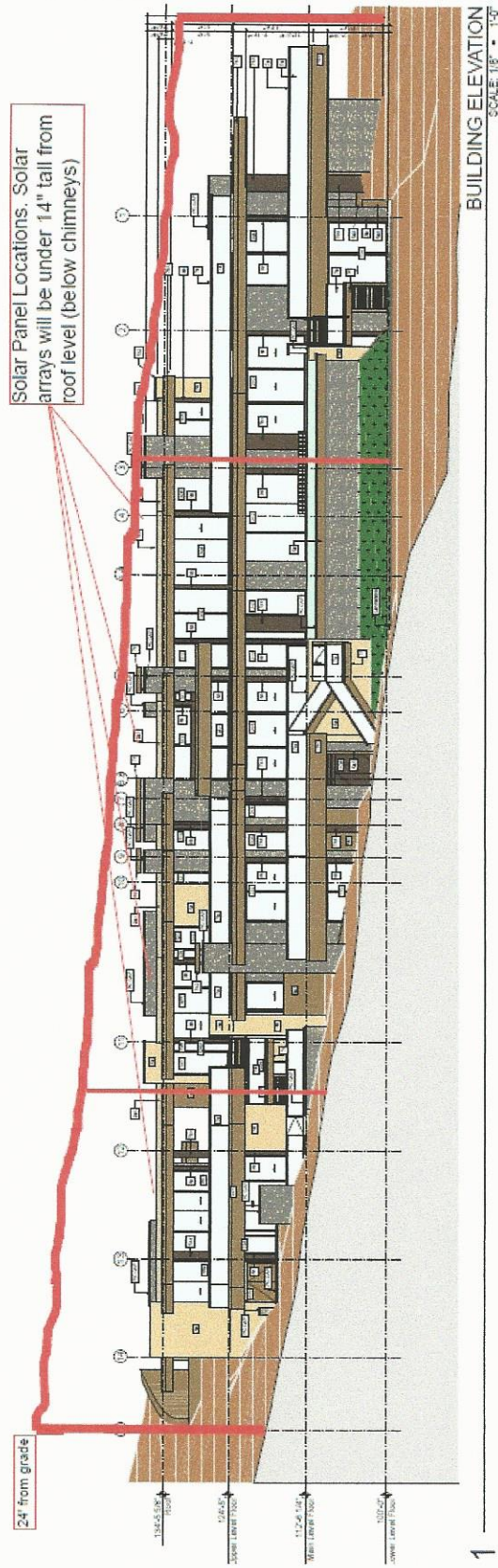
Phone: 480 390 4822

www.anevasolar.com

AZ ROC# 287715 [CR-11]



Kessler cross section



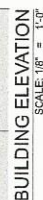
Solar Panel Locations



Solar Panel
Locations



Solar Panel locations



GENERAL REQUIREMENTS

- [illegible]

BUILDING ELEVATION

BUILDING ELEVATION
SCALE: 1/8" = 1'-0"

BUILDING ELEVATION
SCALE: 1/8" = 1'-0"

CHARLES R. STINSON ARCHITECT
18304 MINNETONKA BLVD, DEERHAVEN, MN 55391
P: 952-473-9503
WWW.CRSEARCH.COM

**KESSLER
RESIDENCE**
IRV & BARB KESSLER
6210 EAST NUDAN BEND ROAD
PARADISE VALLEY, ARIZONA

DATE: 12/21/2011
REVISIONS:

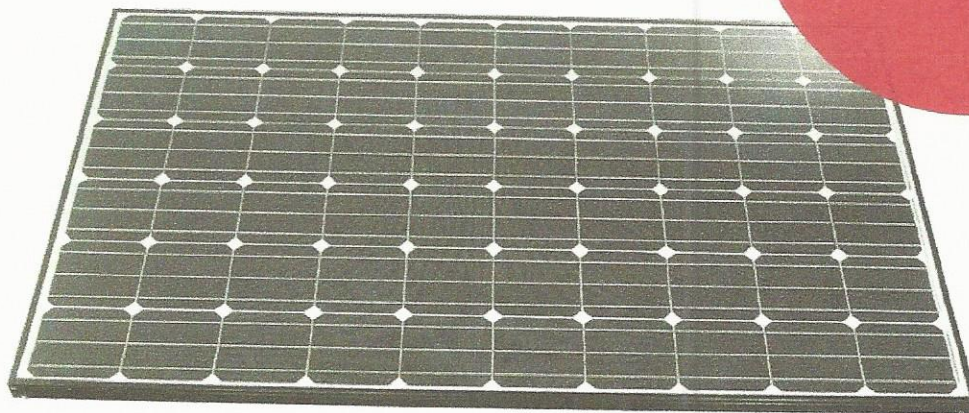
Δ 12/11/2013
06/11/2013

A201





Innovation for
a Better Life



LG Mono X[®] Plus

LG285S1C-G4

60 cell

LG Mono X[®] Plus is LG Electronics' high-quality monocrystalline module. The quality is the result of our strong commitment to developing a module to improve benefits for customers. Features of LG Mono X[®] Plus include durability, convenient installation, and aesthetic exterior.



Enhanced Performance Warranty

LG Mono X[®] Plus provides the enhanced performance warranty. The initial degradation has been improved from -3% to -2%, and the annual degradation has also changed from -0.7%/yr to -0.6%/yr.



Reduced LID (LiLY Technology)

LG Mono X[®] Plus has improved the initial degradation by applying LG's new LiLY (LID-improvement for Lifetime Yield) Technology, which controls formation of Boron-Oxygen pair, the key factor of LID.



Improved Product Warranty

In addition to the enhanced performance warranty, LG has extended the product warranty of LG Mono X[®] Plus for additional 2 years with its newly reinforced frame design.



Aesthetic Roof

LG Mono X[®] Plus may increase the house value with its shiny black frames. Also, it looks similar to all-black module from a long distance.



Outstanding Durability

With newly reinforced frame design, LG Mono X[®] Plus can endure the static snow load up to 6000 Pa, and the static wind load up to 5400 Pa.



Light and Convenient

LG Mono X[®] Plus is carefully designed to benefit installers by allowing quick installation with a weight of just 17kg and better grips.

Mechanical Properties

Cells	6 x 10
Cell Vendor	LG
Cell Type	Monocrystalline / P-type
Cell Dimensions	156.75 x 156.75 mm / 6 inches
# of Busbar	3
Dimensions (L x W x H)	1640 x 1000 x 40 mm 64.57 x 39.37 x 1.57 inch
Front Load	6000 Pa / 125 psf
Rear Load	5400 Pa / 113 psf
Weight	17.0 ± 0.5 kg / 37.48 ± 1.1 lbs
Connector Type	MC4, MC4 Compatible, IP67
Junction Box	IP67 with 3 Bypass Diodes
Length of Cables	2 x 1000 mm / 2 x 39.37 inch
Glass	High Transmission Tempered Glass
Frame	Anodized Aluminum

Certifications and Warranty

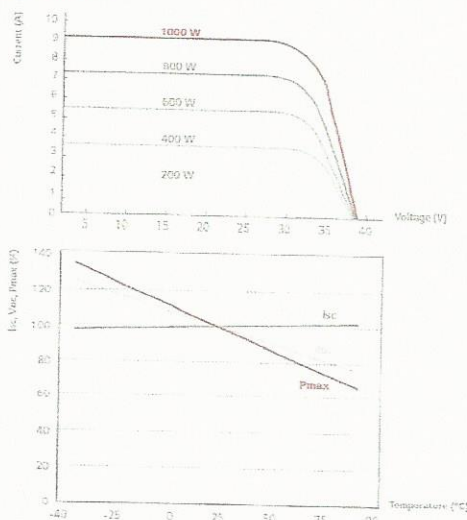
Certifications	IEC 61215, IEC 61730-1/-2 IEC 62716 (Ammonia Test) IEC 61701 (Salt Mist Corrosion Test) ISO 9001 UL 1703
Module Fire Performance (USA)	Type 2 (UL 1703)
Fire Rating (for CANADA)	Class C (ULC/ORD C1703)
Product Warranty	12 years 
Output Warranty of Pmax	Linear warranty* 

* 1) 1st year 98% 2) After 2nd year 0.6% annual degradation, 3) 93.6% for 25 years

Temperature Characteristics

NOCT	$46 \pm 3^\circ\text{C}$
Pmpp	$-0.42\% / ^\circ\text{C}$
Voc	$-0.30\% / ^\circ\text{C}$
Isc	$0.03\% / ^\circ\text{C}$

Characteristic Curves



Electrical Properties (STC *)

Module Type	285 W
MPP Voltage (Vmpp)	32.3
MPP Current (Impp)	8.88
Open Circuit Voltage (Voc)	39.0
Short Circuit Current (Isc)	9.43
Module Efficiency (%)	17.4
Operating Temperature (°C)	-40 ~ +90
Maximum System Voltage (V)	1000 (IEC, UL)
Maximum Series Fuse Rating (A)	15
Power Tolerance (%)	0 ~ +3

* STC (Standard Test Condition): irradiance 1000 W/m², module temperature 25 °C, AM 1.5

* The typical change in module efficiency at 300 MHz is about 1.0% per MHz.

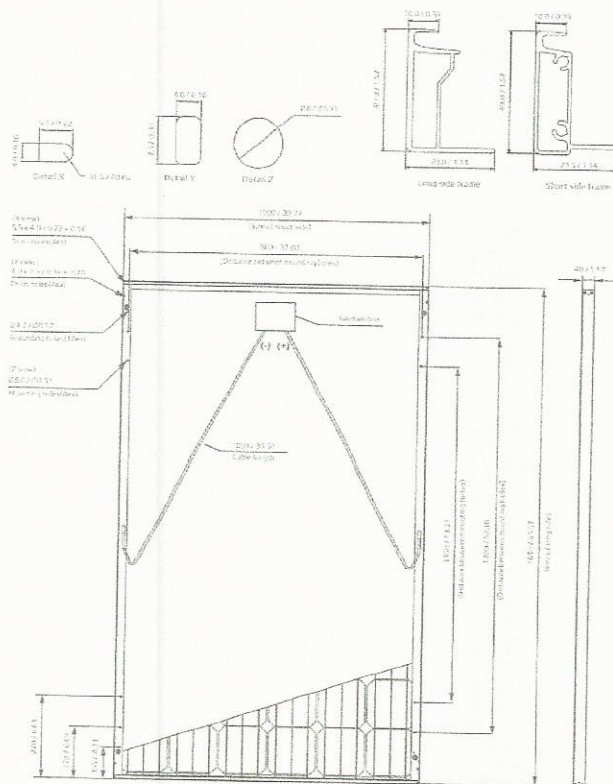
* The typical change in module efficiency at 200 W/m² in relation to 1000 W/m² is -4.5%

Electrical Properties (NOCT*)

Module Type	285 W
Maximum Power (Pmax)	209
MPP Voltage (Vmpp)	29.5
MPP Current (Impp)	7.08
Open Circuit Voltage (Voc)	36.1
Short Circuit Current (Isc)	7.56

* NOCT (Nominal Operating Cell Temperature) Irradiance 800 W/m², ambient temperature 20°C, wind speed 1 m/s

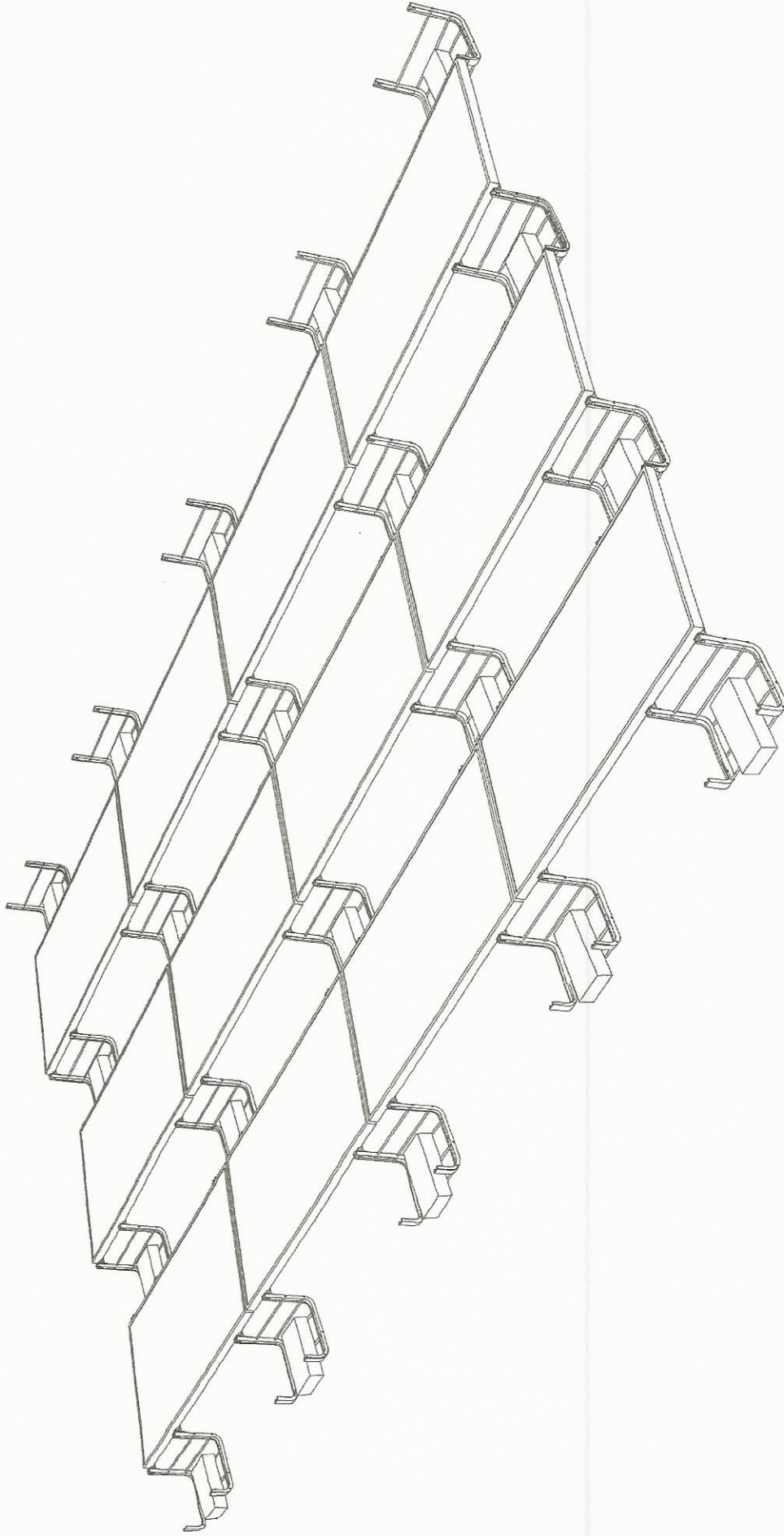
Dimensions (mm/in)



* The distance between the center of the mounting/grounding holes.



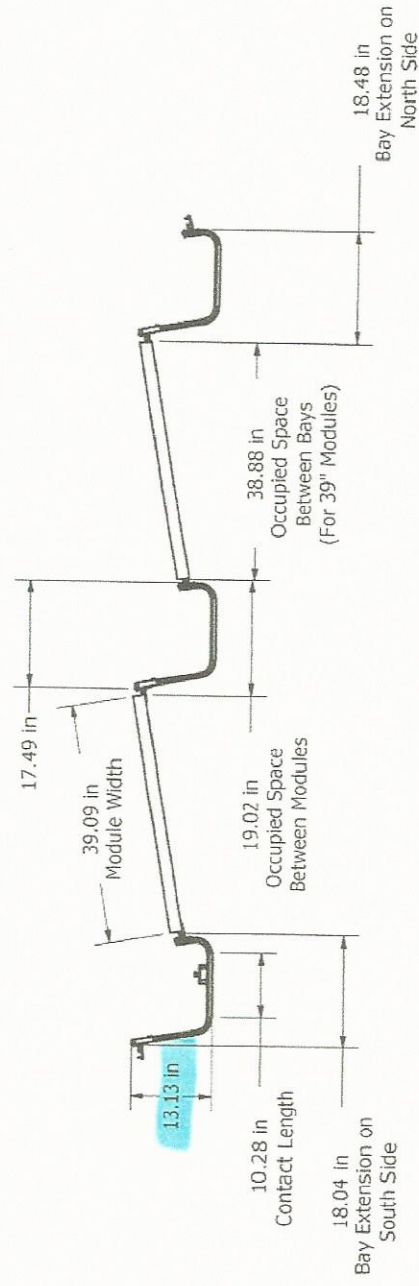


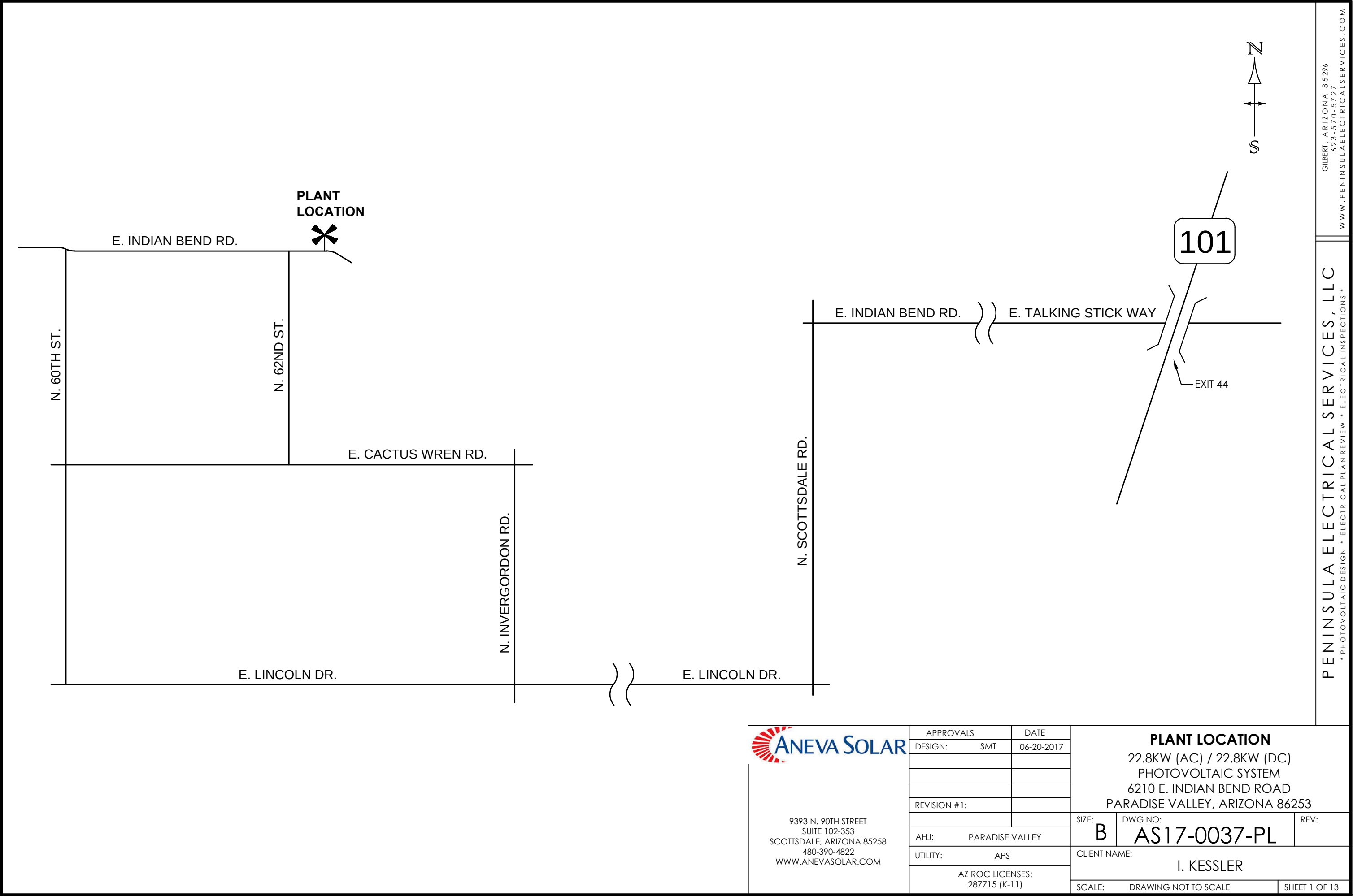


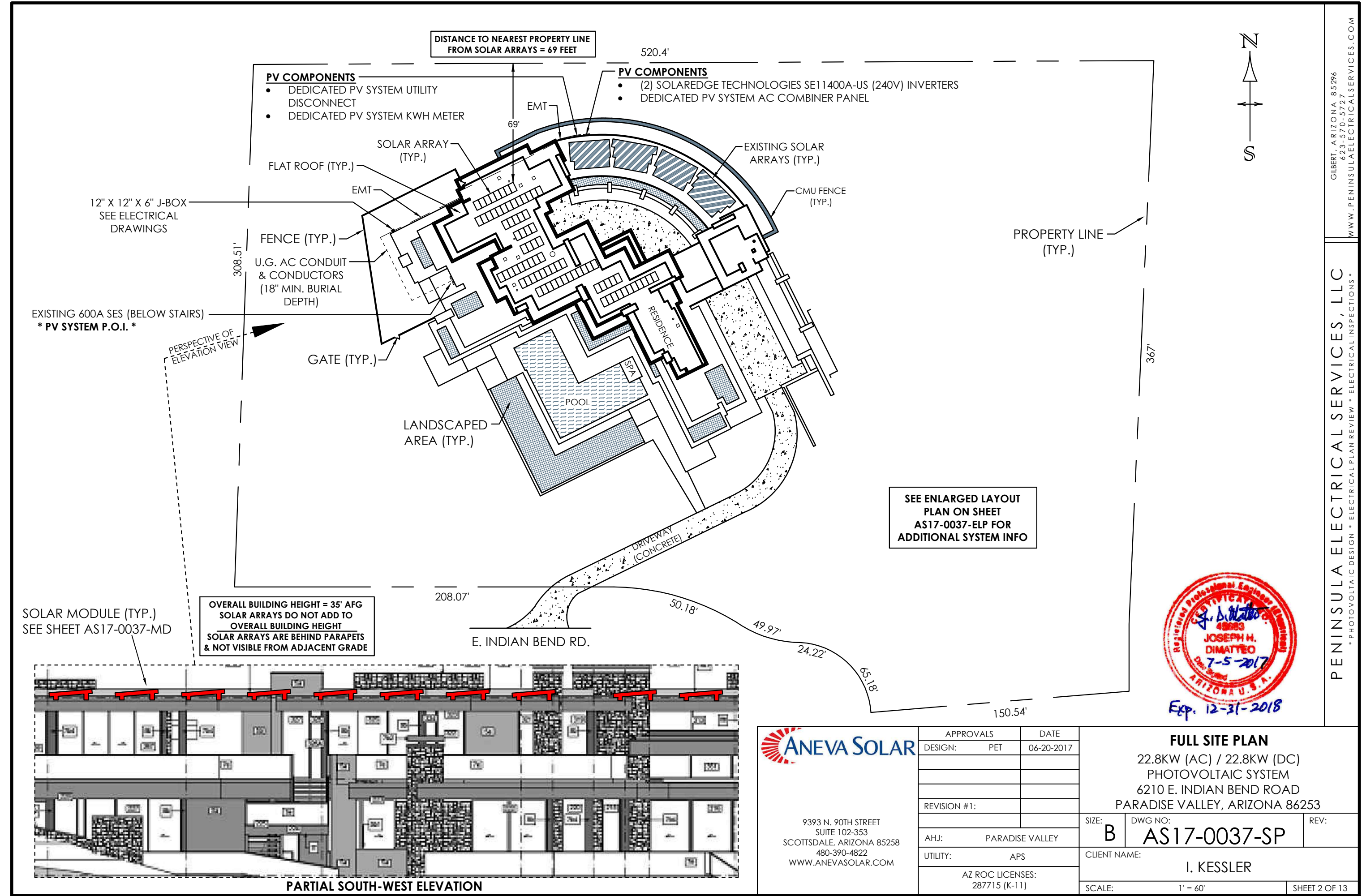
4.2 ROW SPACING BASED ON BAY DIMENSIONS

The RM ballast bay will dictate the spacing between rows. The figure below shows the typical spacing between modules rows:

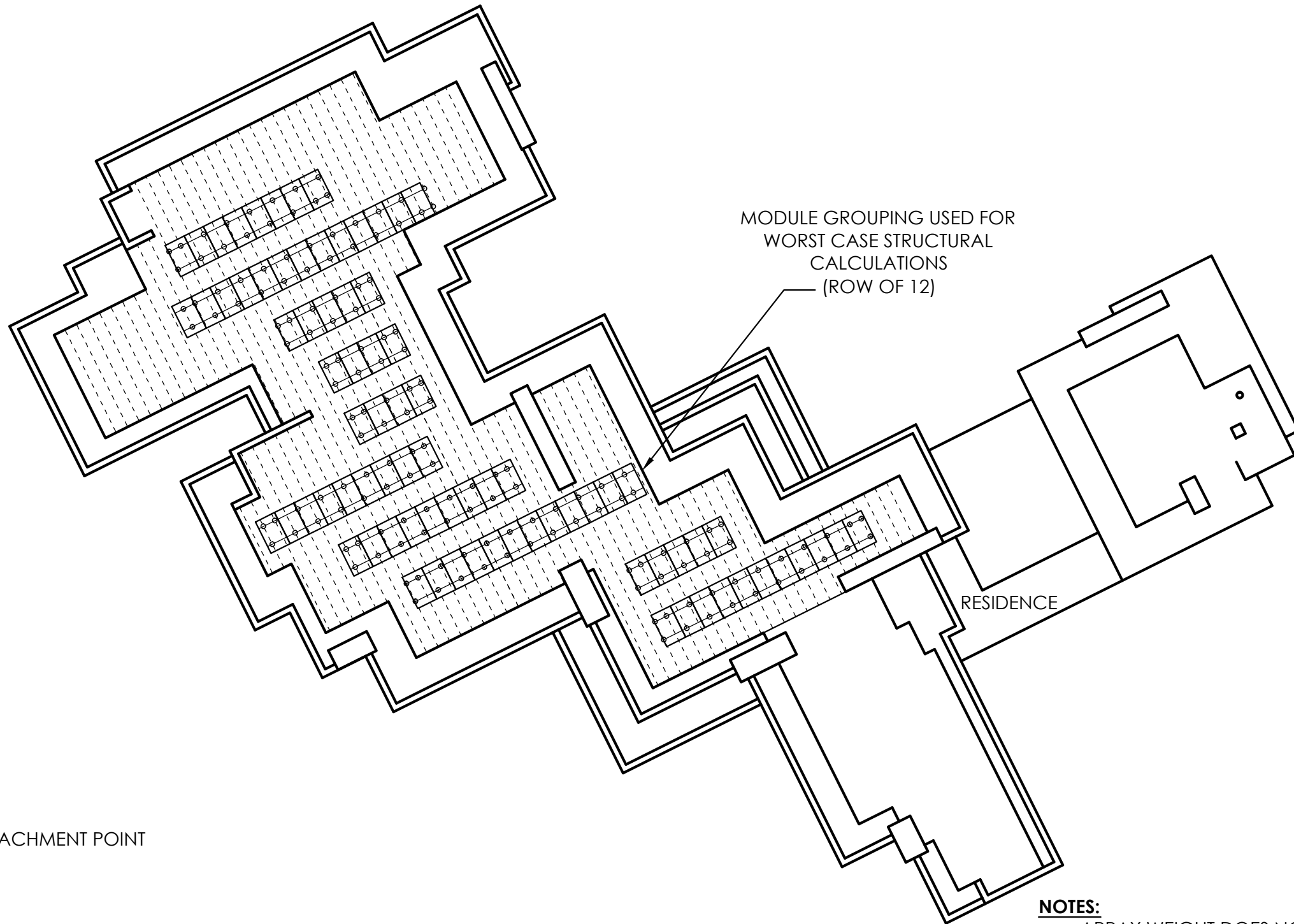
Be sure to take this spacing into account when determining how to occupy your roof space effectively in the North-South direction.







SHEET 3 OF 13



○ - ROOF ATTACHMENT POINT

--- - 24" O.C. 2X4 MANUFACTURED TRUSS

□ - LG SOLAR LG285 S1C-G4 285W MODULE

- NOTES:**
- ARRAY WEIGHT DOES NOT EXCEED 5 LBS PER SQUARE FOOT AND DOES NOT EXCEED A POINT LOAD OF 40 LBS.
 - ROOF ATTACHMENT POINTS SPACED AT 4' INTERVALS.



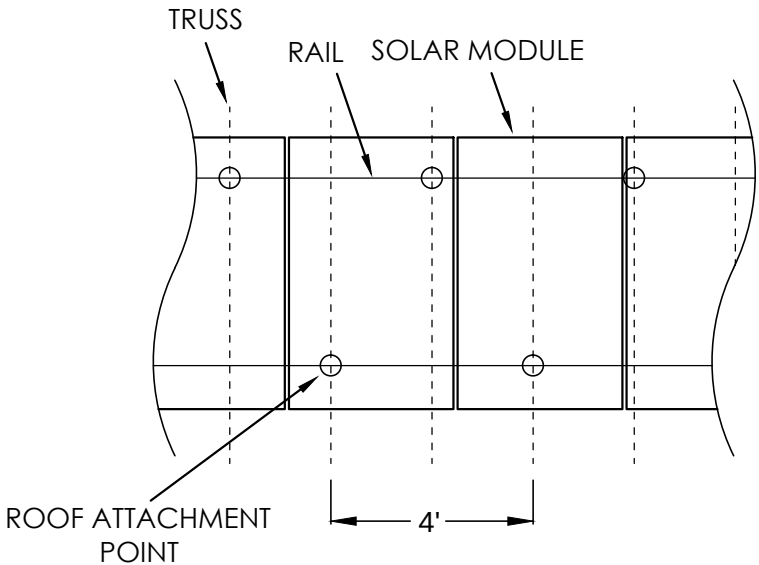
9393 N. 90TH STREET
SUITE 102-353
SCOTTSDALE, ARIZONA 85258
480-390-4822
WWW.ANEVASOLAR.COM

APPROVALS		DATE
DESIGN:	SMT	06-20-2017
REVISION #1:		
AHJ:	PARADISE VALLEY	
UTILITY:	APS	
AZ ROC LICENSES:		287715 (K-11)

ROOF LAYOUT PLAN
22.8KW (AC) / 22.8KW (DC)
PHOTOVOLTAIC SYSTEM
6210 E. INDIAN BEND ROAD
PARADISE VALLEY, ARIZONA 86253

SIZE: B	DWG NO: AS17-0037-RL	REV:
CLIENT NAME: I. KESSLER		
SCALE: DRAWING NOT TO SCALE		SHEET 4 OF 13

Module Grouping	
Solar Module:	LG Solar LG285 S1C-G4
Layout Orientation:	Tilt - Portrait
Truss/Rafter:	2x4 Manufactured Truss
Spacing:	24" o.c.
Roof Type:	Flat
Roof Material:	TPO
Load Distribution	
Total Modules In Array:	12
Module weight (lbs) - With Optimizer:	39.18
Racking Weight per module (lbs):	14.0
Total weight per module (lbs):	53.2
Total Array Weight (lbs):	638.2
Module Area (sf):	17.65
Total Array Area (sf):	211.8
Distributed Load (psf):	3.0
Total Number of vertical supports:	22
Point Load (psf):	29.01
Uplift Connections:	
Panel grouping area (sf):	211.8
Total Load @ 21 psf max. wind load:	4,448
Required pullout strength per vert. support:	202.2
Connector Type:	5/16" x 4" lag bolts



RACKING INFORMATION - FLUSH PORTRAIT

- SNAP N RACK 100 SERIES - WITH STANDOFF KITS
- MAX. RAIL CANTILEVER = 24" PER MANUF.
- TRUSS SPACING = 24" O.C.
- ROOF ATTACHMENT POINTS = 4' SPACING - STAGGERED

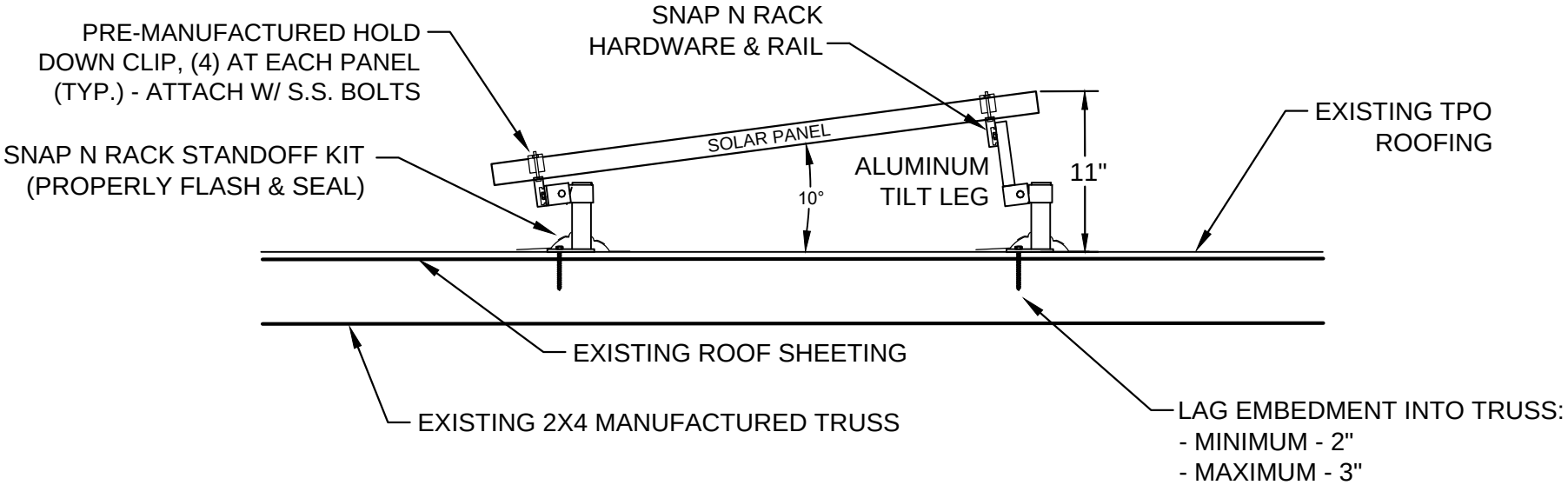


9393 N. 90TH STREET
SUITE 102-353
SCOTTSDALE, ARIZONA 85258
480-390-4822
WWW.ANEVASOLAR.COM

APPROVALS		DATE
DESIGN:	SMT	06-20-2017
REVISION #1:		
AHJ:	PARADISE VALLEY	
UTILITY:	APS	
	AZ ROC LICENSES: 287715 (K-11)	

STRUCTURAL CALCS & DETAILS		
22.8KW (AC) / 22.8KW (DC) PHOTOVOLTAIC SYSTEM 6210 E. INDIAN BEND ROAD PARADISE VALLEY, ARIZONA 86253		
SIZE: B	DWG NO: AS17-0037-SC	REV:
CLIENT NAME: I. KESSLER		
SCALE:	DRAWING NOT TO SCALE	SHEET 5 OF 13

MOUNTING DETAIL - PORTRAIT (TILT-UP MOUNT)



9393 N. 90TH STREET
SUITE 102-353
SCOTTSDALE, ARIZONA 85258
480-390-4822
WWW.ANEVASOLAR.COM

APPROVALS		DATE
DESIGN:	SMT	06-20-2017
REVISION #1:		
AHJ:	PARADISE VALLEY	
UTILITY:	APS	
AZ ROC LICENSES:		
287715 (K-11)		

MOUNTING DETAILS		
22.8KW (AC) / 22.8KW (DC) PHOTOVOLTAIC SYSTEM 6210 E. INDIAN BEND ROAD PARADISE VALLEY, ARIZONA 86253		
SIZE: B	DWG NO: AS17-0037-MD	REV:
CLIENT NAME: I. KESSLER		
SCALE:	DRAWING NOT TO SCALE	SHEET 6 OF 13

TOTAL SYSTEM AC WATTAGE: 22,800 WATTS (22.8 KW)

NOTE: POWER OPTIMIZERS CONTROL THE CENTRAL INVERTER DC VOLTAGE. APPROXIMATELY 350VDC IS INPUT TO THE INVERTER. SEE AS17-0037-AD.

MODULES - ELECTRICAL CHARACTERISTICS

VOC = 39.00V VMP = 32.30V
ISC = 9.43A IMP = 8.88A

PV STRINGS #1, #2, #4 & #5

LG SOLAR LG285S1C-G4 (285W) MODULES
WITH ADD-ON SOLAREEDGE P300 OPTIMIZERS
(1) MODULE PER OPTIMIZER MAX.
(13) MODULE STRING LENGTH
VOC = 500VDC VMP = 350VDC
ISC = 15.0A IMP = 10.59A

PV STRING #3 & #6

LG SOLAR LG285S1C-G4 (285W) MODULES
WITH ADD-ON SOLAREEDGE P300 OPTIMIZERS
(1) MODULE PER OPTIMIZER MAX.
(14) MODULE STRING LENGTH
VOC = 500VDC VMP = 350VDC
ISC = 15.0A IMP = 11.40A

PV STRING #1
SEE DWG AS17-0037-AD

PV STRING #2
SEE DWG AS17-0037-AD

PV STRING #3
SEE DWG AS17-0037-AD

PV STRING #4
SEE DWG AS17-0037-AD

PV STRING #5
SEE DWG AS17-0037-AD

PV STRING #6
SEE DWG AS17-0037-AD

EXISTING ELECTRICAL SERVICE PANEL
AND UTILITY REVENUE METER
SUN VALLEY - MODEL #SVWCTML600-1D
600A - 120/240V - 3W - 1PH - NEMA 3R - 100kAIC

PULL SECTION

METERING SECTION

CT SECTION

BI-DIRECTIONAL METER

A PLACARD OR DIRECTORY IS TO BE INSTALLED AT THE SERVICE ENTRANCE WITH EXPLICIT DIRECTIONS TO THE LOCATION OF THE PHOTOVOLTAIC SYSTEM UTILITY DISCONNECT SWITCH, AS REQUIRED BY THE LOCAL UTILITY.

A PERMANENT PLACARD OR DIRECTORY, DENOTING ALL ELECTRIC POWER SOURCES IS TO BE INSTALLED AT THE SES PER NEC 705.10.

NEW FUSIBLE PULL-OUT
BOLTSWITCH #PT224
WITH CLASS "T" 110A FUSES

NEMA 3R J-BOX
12" x 12" x 6" MIN. SIZE
WITH SCREW-ON COVER
USE ILSCO INSULATED
CONNECTORS #PBT-1/0
(OR EQUIV.)

AVAILABLE FAULT
CURRENT = 32,755A
(PER APS TABLE 800.2-1)

UTILITY GRID
120/240V
SINGLE PHASE

3 - 1/0 AWG CU THWN-2
1 - 1/0 AWG CU THWN-2 EGC/GEC
1 1/2" EMT-PVC-EMT

6 - 10 AWG CU XHHW-2
1 - 10 AWG CU. GND.
3/4" EMT

6 - 10 AWG CU XHHW-2
1 - 10 AWG CU. GND.
3/4" EMT

ALL EQUIPMENT TERMINATIONS
SHALL BE LISTED & LABELED
AS 75 DEGREE C. MINIMUM

SEE FAULT CURRENT
CALCULATIONS ON
SHEET AS17-0037-FC

<4>, <5>
PHOTOVOLTAIC SYSTEM
UTILITY DISCONNECT SWITCH
SQUARE-D #DU324RB
3-POLE, 200A, 240VAC (NON-FUSED)

<8>
DEDICATED PHOTOVOLTAIC
SYSTEM KWH METER
FORM 2S, 200A, 240V
(MILBANK - #R4518-O-W)

<4>, <10>
DEDICATED PV SYSTEM
AC COMBINER PANEL
SQUARE-D - HOM12L200RB
(OR EQUIVALENT)
200A, 240V, NEMA 3R
10kAIC PANEL & BREAKERS



9393 N. 90TH STREET
SUITE 102-353
SCOTTSDALE, ARIZONA 85258
480-390-4822
WWW.ANEVASOLAR.COM

APPROVALS		DATE
DESIGN:	PET	06-20-2017
REVISION #1:		
AHJ:	PARADISE VALLEY	
UTILITY:	APS	
AZ ROC LICENSES:		287715 (K-11)

ONE-LINE ELECTRICAL DIAGRAM

22.8KW (AC) / 22.8KW (DC)
PHOTOVOLTAIC SYSTEM
6210 E. INDIAN BEND ROAD
PARADISE VALLEY, ARIZONA 86253

SIZE: B	DWG NO: AS17-0037-1L	REV:
CLIENT NAME: I. KESSLER		
SCALE: DRAWING NOT TO SCALE	SHEET 7 OF 13	

PENINSULA ELECTRICAL SERVICES, LLC

GILBERT, ARIZONA 85296
623-570-5727
WWW.PENINSULAELECTRICALSERVICES.COM

TOTAL SYSTEM AC WATTAGE: 22,800 WATTS (22.8 KW)

NOTE: POWER OPTIMIZERS CONTROL THE CENTRAL INVERTER DC VOLTAGE. APPROXIMATELY 350VDC IS INPUT TO THE INVERTER. SEE AS17-0037-AD.

MODULES - ELECTRICAL CHARACTERISTICS

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ISC = 9.43A IMP = 8.88A

PV STRINGS #1, #2, #4 & #5

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WITH ADD-ON SOLAREDGE P300 OPTIMIZERS
(1) MODULE PER OPTIMIZER MAX.
(13) MODULE STRING LENGTH
VOC = 500VDC VMP = 350VDC
ISC = 15.0A IMP = 10.59A

PV STRING #3 & #6

LG SOLAR LG285S1C-G4 (285W) MODULES
WITH ADD-ON SOLAREDGE P300 OPTIMIZERS
(1) MODULE PER OPTIMIZER MAX.
(14) MODULE STRING LENGTH
VOC = 500VDC VMP = 350VDC
ISC = 15.0A IMP = 11.40A

PV STRING #1 SEE DWG AS17-0037-AD
PV STRING #2 SEE DWG AS17-0037-AD
PV STRING #3 SEE DWG AS17-0037-AD

6 - 10 AWG CU XHHW-2
1 - 10 AWG CU. GND.
3/4" EMT

PV STRING #4 SEE DWG AS17-0037-AD
PV STRING #5 SEE DWG AS17-0037-AD
PV STRING #6 SEE DWG AS17-0037-AD

6 - 10 AWG CU XHHW-2
1 - 10 AWG CU. GND.
3/4" EMT

EXISTING ELECTRICAL SERVICE PANEL
AND UTILITY REVENUE METER
SUN VALLEY - MODEL #SVWCTML600-1D
600A - 120/240V - 3W - 1PH - NEMA 3R - 100kAIC

ALL EQUIPMENT TERMINATIONS
SHALL BE LISTED & LABELED
AS 75 DEGREE C. MINIMUM

A PLACARD OR DIRECTORY IS TO BE INSTALLED AT
THE SERVICE ENTRANCE WITH EXPLICIT DIRECTIONS
TO THE LOCATION OF THE PHOTOVOLTAIC SYSTEM
UTILITY DISCONNECT SWITCH, AS REQUIRED BY THE
LOCAL UTILITY.
A PERMANENT PLACARD OR DIRECTORY, DENOTING
ALL ELECTRIC POWER SOURCES IS TO BE INSTALLED
AT THE SES PER NEC 705.10.

NEW FUSIBLE PULL-OUT
BOLTSWITCH #PT224
WITH CLASS "T" 110A FUSES

NEMA 3R J-BOX
12" x 12" x 6" MIN. SIZE
WITH SCREW-ON COVER
USE ILSICO INSULATED
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CURRENT = 32,755A
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3 - 1/0 AWG CU THWN-2
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SEE FAULT CURRENT
CALCULATIONS ON
SHEET AS17-0037-FC



9393 N. 90TH STREET
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SCOTTSDALE, ARIZONA 85258
480-390-4822
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APPROVALS		DATE
DESIGN:	PET	06-20-2017
REVISION #1:		
AHJ:	PARADISE VALLEY	
UTILITY:	APS	
AZ ROC LICENSES:		287715 (K-11)

THREE-LINE ELECTRICAL DIAGRAM

22.8KW (AC) / 22.8KW (DC)
PHOTOVOLTAIC SYSTEM
6210 E. INDIAN BEND ROAD
PARADISE VALLEY, ARIZONA 86253

SIZE: B	DWG NO: AS17-0037-3L	REV:
CLIENT NAME: I. KESSLER		
SCALE: DRAWING NOT TO SCALE	SHEET 8 OF 13	

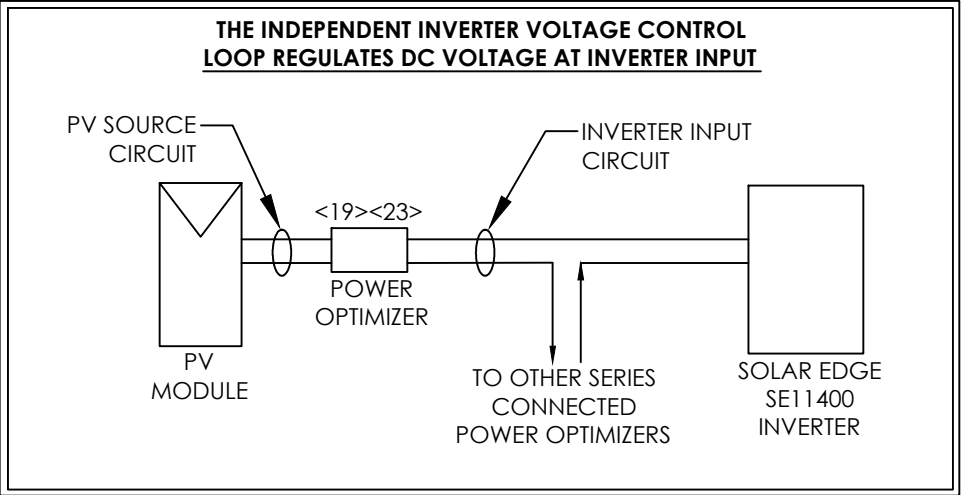
TOTAL SYSTEM AC WATTAGE: 22,800 WATTS (22.8 KW)

PV STRINGS #1, #2, #4 & #5

3705 WATT (DC) PHOTOVOLTAIC STRING
(13) LG SOLAR LG285S1C-G4 (285W) MODULES
WITH (13) ADD-ON SOLAREEDGE P300 OPTIMIZERS
1 MODULE PER OPTIMIZER
VOC=500 VDC MAX. (LIMITED BY INVERTER)
ISC=15A MAX. (LIMITED BY POWER OPTIMIZER)

PV STRINGS #3 & #6

3990 WATT (DC) PHOTOVOLTAIC STRING
(14) LG SOLAR LG285S1C-G4 (285W) MODULES
WITH (14) ADD-ON SOLAREEDGE P300 OPTIMIZERS
1 MODULE PER OPTIMIZER
VOC=500 VDC MAX. (LIMITED BY INVERTER)
ISC=15A MAX. (LIMITED BY POWER OPTIMIZER)

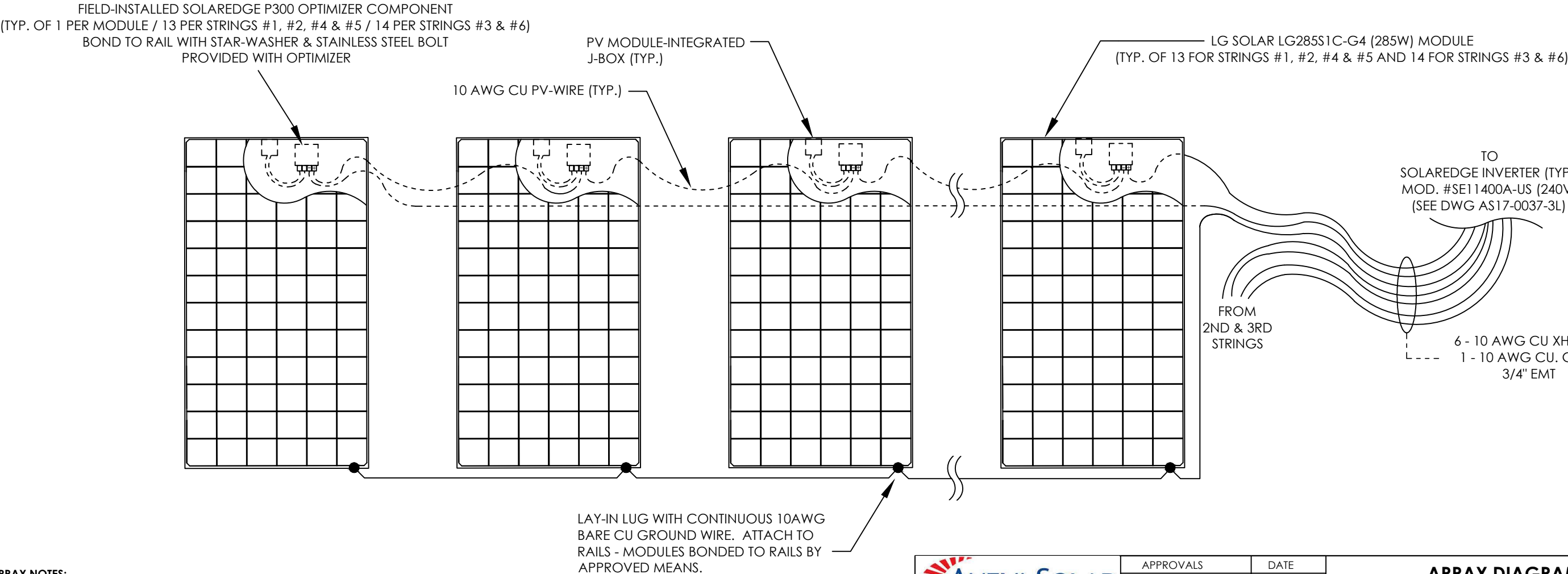


MODULES - ELECTRICAL CHARACTERISTICS

VOC = 39.00V VMP = 32.30V
ISC = 9.43A IMP = 8.88A

PV STRING

VOC=500 VDC MAX. (LIMITED BY INVERTER)
ISC=15A MAX. (LIMITED BY POWER OPTIMIZER)



ARRAY NOTES:

- EQUIPMENT INSTALLED IN ACCORDANCE WITH THE NEC SECTION 690 AND ALL APPLICABLE REQUIREMENTS OF SERVICE UTILITY AND AUTHORITY HAVING JURISDICTION (AHJ).
- GROUND WIRE MUST BE CONTINUOUS AND INSTALLED TO ALLOW FOR PANEL REMOVAL WITHOUT DISRUPTING CONTINUITY. ALL MODULE GROUND CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH NEC 690.4 (C).
- FOLLOW MANUFACTURERS SUGGESTED INSTALLATION PRACTICES AND WIRING SPECIFICATIONS.
- WIRES SHALL BE RATED AND LABELED "SUNLIGHT RESISTANT" WHERE EXPOSED TO AMBIENT CONDITIONS.
- PHOTOVOLTAIC SOURCE CIRCUIT CONDUCTORS, WHICH ARE EXPOSED TO DIRECT SUNLIGHT, SHALL BE LISTED AND IDENTIFIED AS PHOTOVOLTAIC (PV) WIRE.

ALSO SEE KEYED NOTES <19> & <23> ON DWG AS17-0037-NT



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SUITE 102-353
SCOTTSDALE, ARIZONA 85258
480-390-4822
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APPROVALS		DATE
DESIGN:	PET	06-20-2017
REVISION #1:		
AHJ:	PARADISE VALLEY	
UTILITY:	APS	
AZ ROC LICENSES:		287715 (K-11)

ARRAY DIAGRAM		
22.8KW (AC) / 22.8KW (DC) PHOTOVOLTAIC SYSTEM 6210 E. INDIAN BEND ROAD PARADISE VALLEY, ARIZONA 86253		
SIZE: B	DWG NO: AS17-0037-AD	REV:
CLIENT NAME: I. KESSLER		
SCALE: DRAWING NOT TO SCALE	SHEET 9 OF 13	

NOTES:

1.

PHOTOVOLTAIC SYSTEM EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH NEC 2014 ARTICLES 690 AND 705, AND THE 2012 IRC & 2012 IFC, AND APPLICABLE REQUIREMENTS OF THE SERVICE UTILITY AND AUTHORITY HAVING JURISDICTION. PHOTOVOLTAIC SYSTEM EQUIPMENT WILL BE POSTED WITH APPLICABLE WARNINGS, SIGNAGE AND PLAQUES PER NEC ARTICLES 690 & 705.
2.

PHOTOVOLTAIC SOURCE AND OUTPUT CIRCUITS SHALL COMPLY WITH THE WIRING METHODS AND INSTALLATION AND MARKING REQUIREMENTS OF NEC 690.31.
3.

BREAKER LABELED "PHOTOVOLTAIC ELECTRIC POWER SOURCE" AND "BREAKERS ARE BACK FED" PER NEC 705.12. BREAKER ALSO LABELED "MAXIMUM AC OUTPUT CURRENT AND OPERATING AC VOLTAGE" PER NEC 690.54. BREAKER SHALL BE POSITIONED AT THE OPPOSITE (LOAD) END FROM THE INPUT FEEDER OR MAIN CIRCUIT BREAKER LOCATION, AND LABELED "WARNING INVERTER OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE", PER NEC 705.12(D)(2)(3)(b).
4.

WARNING SIGN PER NEC 690.17(E) READING "WARNING - ELECTRIC SHOCK HAZARD - DO NOT TOUCH TERMINALS - TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION."
5.

LABEL "PHOTOVOLTAIC SYSTEM UTILITY DISCONNECT SWITCH." SWITCH TO BE LOCKED PER 2014 NEC 690.7(D). SWITCH TO BE VISIBLE BLADE DISCONNECT PER UTILITY REQUIREMENTS AND CONFORM TO NEC 705.22.
6.

LABEL "PHOTOVOLTAIC ARRAY DC DISCONNECT SWITCH" PER NEC690.13(B). LABEL WITH OPERATING CURRENT, OPERATING VOLTAGE, MAXIMUM SYSTEM VOLTAGE, AND SHORT CIRCUIT CURRENT PER NEC 690.53. SWITCH LOCKED PER NEC 690.7(D).
7.

LISTING AGENCY NAMES AND NUMBERS TO BE INDICATED ON POWER INVERTER(S) AND SOLAR MODULES PER NEC 110.3 (B).
8.

LABELED PHOTOVOLTAIC SYSTEM DEDICATED KWH METER.
9.

BI-DIRECTIONAL METER TO BE INSTALLED BY UTILITY.
10.

DEDICATED PHOTOVOLTAIC COMBINER SUB-PANEL. LABEL "LOADS NOT TO BE ADDED TO THIS PANEL."
11.

ALL LABELS EXPOSED TO SUNLIGHT MUST BE ENGRAVED AND ATTACHED PER APPROVED METHOD.
12.

GEC INSTALLED AS REQUIRED BY MANUFACTURER INSTRUCTIONS AND NEC 690.47.
13.

LABEL "BREAKER HAS BEEN DE-RATED PER NEC 705.12(D)(2)." NO NEW LOADS.
14.

EXISTING EQUIPMENT IS NOTED WITH A DASHED LINE. SOLID LINES DENOTE EQUIPMENT INSTALLED BY ANEVA SOLAR.
15.

WIRE MAY BE RUN SHORT DISTANCES OUTSIDE OF CONDUIT IF WIRE READS "SUNLIGHT RESISTANT."
16.

THE GROUNDING ELECTRODE CONDUCTOR SHALL BE CONTINUOUS AND TERMINATE WITH AN IRREVERSIBLE CONNECTION TO THE AC GROUNDING ELECTRODE SYSTEM PER NEC 250.64.
17.

AMBIENT TEMPERATURE ADJUSTED FOR CONDUITS EXPOSED TO SUNLIGHT ON OR ABOVE ROOFTOPS PER TABLE 310.15 (B)(3)(c). CONDUIT ELEVATED MIN. 3 1/2"; ADDER 30 DEG F.
18.

ALL EXTERIOR EQUIPMENT TO BE NEMA 3R.
19.

THE PHOTOVOLTAIC POWER SOURCE SHALL BE LABELED WITH THE FOLLOWING WARNING AT EACH JUNCTION BOX, COMBINER BOX, DISCONNECT AND DEVICE WHERE ENERGIZED, UNGROUNDED CIRCUITS MAY BE EXPOSED DURING SERVICE, PER NEC 690.35(F):

WARNING: ELECTRIC SHOCK HAZARD. THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED



20.

DC CIRCUITS SHALL BE PROTECTED BY A LISTED (DC) ARC-FAULT CIRCUIT INTERRUPTER AND SHALL COMPLY WITH NEC 690.11.
21.

PV SYSTEM CIRCUITS IN STALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION THAT CONTROLS SPECIFIC CONDUCTORS IN ACCORDANCE WITH NEC 690.12. THE RAPID SHUTDOWN METHOD SHALL BE LABELED IN ACCORDANCE WITH NEC 690.56(C). SEE AS17-0006-LB FOR EXAMPLE
22.

GROUNDING PV ARRAYS SHALL BE PROVIDED WITH DC GROUND-FAULT PROTECTION MEETING THE REQUIREMENTS OF NEC 690.5. UNGROUNDED PV POWER SYSTEMS SHALL INCLUDE GROUND FAULT PROTECTION FOR ALL PV SOURCE & OUTPUT CIRCUITS PER NEC 690.35.
23.

SEE SHEET AS17-0037-DC

KEYS:

	- IRREVERSIBLE CRIMP
	- WIRE SPLICE
GFDI	- GROUND FAULT DETECTOR & INTERRUPTER
GFPD	- GROUND FAULT PROTECTION DEVICE
MCB	- MAIN CIRCUIT BREAKER
OCPD	- OVERCURRENT PROTECTION DEVICE
MLO	- MAIN LUG ONLY
PV	- PHOTOVOLTAIC
SES	- SERVICE ENTRANCE SECTION
GND	- GROUND
NEU	- NEUTRAL
GEC	- GROUNDING ELECTRODE CONDUCTOR



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REVISION #1:		
AHJ:	PARADISE VALLEY	
UTILITY:	APS	
AZ ROC LICENSES:		287715 (K-11)

NOTES & KEYS		
22.8KW (AC) / 22.8KW (DC) PHOTOVOLTAIC SYSTEM 6210 E. INDIAN BEND ROAD PARADISE VALLEY, ARIZONA 86253		
SIZE: B	DWG NO: AS17-0037-NT	REV:
CLIENT NAME: I. KESSLER		
SCALE:	DRAWING NOT TO SCALE	SHEET 10 OF 13

Dedicated kWh meter
(Black with White Lettering)

PHOTOVOLTAIC SYSTEM METER

LABEL SIZE: 1 X 3-1/2 INCHES
TEXT HEIGHT: 1/4 INCHES

Label To Be Placed At The
Inverter / DC Disconnect
(TYP. OF BOTH INVERTERS)

Operating Current: 45.0A MAX.
Operating Voltage: 350VDC
Maximum System Voltage: 500VDC
Short Circuit Current: 45.0A MAX.

Utility Disconnect switch
(Black with White Lettering)

PHOTOVOLTAIC SYSTEM
UTILITY DISCONNECT SWITCH

LABEL SIZE: 1 X 3-1/2 INCHES
TEXT HEIGHT: 1/4 INCHES

Utility Disconnect switch
(Orange with Black Lettering)

WARNING
ELECTRIC SHOCK HAZARD
- DO NOT TOUCH TERMINALS -
TERMINALS ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OFF POSITION

LABEL SIZE: 1-1/2 X 3-1/2 INCHES
TEXT HEIGHT:
"WARNING" 1/4 INCHES
OTHER TEXT - 3/16 INCHES

Backfed Breaker
(Black with White Lettering)

PHOTOVOLTAIC POWER SOURCE
BREAKERS ARE BACKFEEDING

LABEL SIZE: 1/2 X 1-3/4 INCHES
TEXT HEIGHT: 1/8 (OR 1/16) INCHES

Backfed Breaker
(Orange with Black Lettering)

WARNING
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS
OVERCURRENT DEVICE

LABEL SIZE: 7/8 X 2 INCHES
TEXT HEIGHT: 1/8 (OR 1/16) INCHES

AC Panel
(Black with White Lettering)

PHOTOVOLTAIC ELECTRIC
POWER SOURCE
MAXIMUM AC CURRENT **95.0** A
SYSTEM AC VOLTAGE **240** V

LABEL SIZE: 1-1/2 X 3-1/2 INCHES
TEXT HEIGHT: 3/16 INCHES



Main Bkr De-rate
(Black with White Lettering)

BREAKER HAS BEEN DE-RATED
PER NEC **705.12**

LABEL SIZE: 1/2 X 1-3/4 INCHES
TEXT HEIGHT: 1/8 (OR 1/16) INCHES

DC Disconnects, Combiners,
Junction Boxes
(Orange with Black Lettering)

WARNING: ELECTRIC SHOCK HAZARD.
THE DC CONDUCTORS OF THIS
PHOTOVOLTAIC SYSTEM ARE
UNGROUND AND MAY BE ENERGIZED.

LABEL SIZE: 1 X 2 INCHES
TEXT HEIGHT: 1/8 INCHES

Place Plaque At Electrical Service Location
Reflective - 3/8" High White Letters On Red Background - All CAPS

**PHOTOVOLTAIC SYSTEM EQUIPPED
WITH RAPID SHUTDOWN**

(Per 2014 NEC 690.12)



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480-390-4822
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APPROVALS		DATE		ELECTRICAL EQUIPMENT LABELS 22.8KW (AC) / 22.8KW (DC) PHOTOVOLTAIC SYSTEM 6210 E. INDIAN BEND ROAD PARADISE VALLEY, ARIZONA 86253		
DESIGN:	PET	06-20-2017				
REVISION #1:						
				SIZE:	DWG NO:	REV:
AHJ:		PARADISE VALLEY		B	AS17-0037-LB	
UTILITY:		APS		CLIENT NAME:		
AZ ROC LICENSES:		287715 (K-11)		I. KESSLER		
				SCALE:	DRAWING NOT TO SCALE	SHEET 11 OF 13

23. PROVIDE IDENTIFICATION PLACARDS WHICH COMPLY WITH THE FOLLOWING, AS REQUIRED BY THE 2012 EDITION OF THE INTERNATIONAL FIRE CODE.

605.11.1 MARKING

MARKING IS REQUIRED ON INTERIOR AND EXTERIOR DIRECT-CURRENT (DC) CONDUIT, ENCLOSURES, RACEWAYS, CABLE ASSEMBLIES, JUNCTION BOXES, COMBINER BOXES AND DISCONNECTS.

605.11.1.2 MARKING CONTENT

THE MARKING SHALL CONTAIN THE WORDS "WARNING: PHOTOVOLTAIC POWER SOURCE."

605.11.1.3 MAIN SERVICE DISCONNECT

THE MARKING SHALL BE PLACED ADJACENT TO THE MAIN SERVICE DISCONNECT IN A LOCATION CLEARLY VISIBLE FROM THE LOCATION WHERE THE DISCONNECT IS OPERATED.

605.11.1.4 LOCATION OF MARKING

MARKING SHALL BE PLACED ON INTERIOR AND EXTERIOR DC CONDUIT, RACEWAYS, ENCLOSURES AND CABLE ASSEMBLIES EVERY 10 FEET, WITHIN 1 FOOT OF TURNS OR BENDS AND WITHIN 1 FOOT ABOVE AND BELOW PENETRATIONS OF ROOF/CEILING ASSEMBLIES, WALLS OR BARRIERS.

SAMPLE LABEL

WARNING: PHOTOVOLTAIC
POWER SOURCE





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APPROVALS		DATE
DESIGN:	PET	06-20-2017
REVISION #1:		
AHJ:		PARADISE VALLEY
UTILITY:		APS
AZ ROC LICENSES:		287715 (K-11)

DC WARNING MARKINGS
22.8KW (AC) / 22.8KW (DC)
PHOTOVOLTAIC SYSTEM
6210 E. INDIAN BEND ROAD
PARADISE VALLEY, ARIZONA 86253

SIZE: **B**

DWG NO: **AS17-0037-DC**

REV:

CLIENT NAME: **I. KESSLER**

SCALE: **DRAWING NOT TO SCALE**

SHEET 12 OF 13

I. Kessler

6210 E. Indian Bend Road - Paradise Valley, AZ 86253

Fault Current Calculation - F1

Available Fault Current - F1

32,755 amperes

kVA =

240

(Available Fault Current at SES - Per APS Table 800.2-1)

E =

0

I = kVA x 1000 = trans. FLA

E

I_{sc} = trans. FLA x 100 x PF

=

PF =

Z =

I_{sc} = ampere short-circuit current RMS symmetrical.

I_{sc} = 0 amperes

Point to Point Method

Length (distance)

FEET

L = 110

(ASC)

I_{sc} = 32,755

conductors per phase

N = 1

Phase conductor constant

C = 9,317

Phase Conductor

1/0

Volt Line to Line

E L - L = 240

Volt

f = 3.223

Neutral conductor constant

C = 9,317

Neutral Conductor

1/0

Volt Line to Neutral

E L - N = 120

Volt

f = 9.668

Multiplier

M = 1

1 + f

Line to Line

M = 0.237

Line to Neutral

M = 0.094

Fault Current at J-box (1/0 to 1AWG Transition)

I_{sc} x M =

7,757 amperes

I_{sc} x M =

3,070 amperes

I. Kessler

6210 E. Indian Bend Road - Paradise Valley, AZ 86253

Fault Current Calculation - F2

Available Fault Current - F1

7,757 amperes

kVA =

240

(Available Fault Current at J-Box - See Fault Calc F1)

E =

0

I = kVA x 1000 = trans. FLA

E

I_{sc} = trans. FLA x 100 x PF

=

PF =

Z =

I_{sc} = ampere short-circuit current RMS symmetrical.

I_{sc} = 0 amperes

Point to Point Method

Length (distance)

FEET

L = 75

(ASC)

I_{sc} = 7,757

conductors per phase

N = 1

Phase conductor constant

C = 7,493

Phase Conductor

1

Volt Line to Line

E L - L = 240

Volt

f = 0.647

Neutral conductor constant

C = 7,493

Neutral Conductor

1

Volt Line to Neutral

E L - N = 120

Volt

f = 1.941

Multiplier

M = 1

1 + f

Line to Line

M = 0.607

Line to Neutral

M = 0.340

Fault Current at Line-Side of PV System Utility Disc. Switch

I_{sc} x M =

4,710 amperes

I_{sc} x M =

2,638 amperes

I. Kessler

6210 E. Indian Bend Road - Paradise Valley, AZ 86253

Fault Current Calculation - F3

Available Fault Current - F1

4,710 amperes

kVA =

240

(Avail. Fault Current at Line Side of Utility Disco - See F2)

E =

0

I = kVA x 1000 = trans. FLA

E

I_{sc} = trans. FLA x 100 x PF

=

PF =

Z =

I_{sc} = ampere short-circuit current RMS symmetrical.

I_{sc} = 0 amperes

Point to Point Method

Length (distance)

FEET

L = 15

(ASC)

I_{sc} = 4,710

conductors per phase

N = 1

Phase conductor constant

C = 7,493

Phase Conductor

1

Volt Line to Line

E L - L = 240

Volt

f = 0.079

Neutral conductor constant

C = 7,493

Neutral Conductor

1

Volt Line to Neutral

E L - N = 120

Volt

f = 0.236

Multiplier

M = 1

1 + f

Line to Line

M = 0.927

Line to Neutral

M = 0.809

Fault Current at PV System AC Combiner Panel

I_{sc} x M =

4,367 amperes

I_{sc} x M =

3,812 amperes



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REVISION #1:		
AHJ:	PARADISE VALLEY	
UTILITY:	APS	
AZ ROC LICENSES:		287715 (K-11)

FAULT CURRENT CALCULATIONS		
22.8KW (AC) / 22.8KW (DC) PHOTOVOLTAIC SYSTEM 6210 E. INDIAN BEND ROAD PARADISE VALLEY, ARIZONA 86253		
SIZE: B	DWG NO: AS17-0037-FC	REV:
CLIENT NAME: I. KESSLER		
SCALE: DRAWING NOT TO SCALE	SHEET 13 OF 13	