AERIAL VIEW

STREET VIEW

SHEET INDEX	
PAGE NUMBER	**PAGE TITLE**
PV01	TITLE PAGE
PV02	PROPERTY LINE
PV03	SITE PLAN
PV04	SINGLE LINE & ELECTRICAL
PV05	ARRAY & STRINGING DETAIL
PV06	LABEL PLAN
PV07	EQUIPMENT DETAIL

APPLICABLE CODES

2011 NATIONAL ELECTRIC CODE (NEC)
2012 INTERNATIONAL BUILDING CODE (IBC)

OCCUPANCY & CONSTRUCTION TYPE

OCCUPANCY - R3
CONSTRUCTION - V-B

GENERAL NOTES

A. ALL WORK SHALL COMPLY WITH STATE AND LOCAL CODES.
B. DRAWINGS HAVE BEEN DETAILED ACCORDING TO UL LISTING REQUIREMENTS.
C. PRIOR TO COMMENCMENT OF WORK CONTRACTOR SHALL VERIFIY EXISITNG CONDITIONS AND NOTIFY DBM OF ANY INCONSISTENCIES.
D. ALL EQUIPMENT SHALL BE INSTALLED AS SHOWN.
E. WARNINGS PER NEC 690 AND IRC 2012.
F. WIRING SHALL NOT BE INSTALLED WITHIN 10 OF ROOF DECKING EXCEPT WHERE DIRECTLY BELOW PV EQUIPMENT

SCOPE OF WORK

System Size: 7.705kW
Asphalt/Comp shingle roof pitch: 5/12
Anchored on 48 centers using UL listed racking system
UV resistant cable ties used for wire management
Junction boxes mounted flush w/roof surface

DESIGN CRITERIA

WIND SPEED: 90 MPH
EXPOSURE CATEGORY: C
SEISMIC DESIGN CATEGORY: D

SYSTEM SUMMARY

MODULE: (23) SUNP0WER 33W MODULES (X21-335)
INVERTER: (1) SMA SB7700TL-US-22-240VAC
RACKING: Snap N Rack 100

DBM DESIGN

COMPANY ADRESS
P: (XXX) XXX-XXX | F: (XXX) XXX-XXXX
WWW.XXXXXXXXXXXX.COM

SITE INFORMATION:
JOHN D. DOE
123 UNKNOWN BLVD.
CITY, STATE 00000

DESCRIPTION:
7.705kW ROOF MOUNT PV SYSTEM
RESIDENTIAL

DBM DESIGN

DBM SOLAR DESIGN AND CONSULTING COMPANY, LLC
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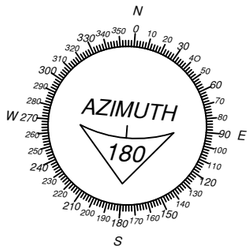
WWW.DBMSOLAR.COM

DESIGNED BY: A. MEANS
DATE: 04/15/2014
PROJECT #: 2015-0000
SHEET NAME: COVER PAGE
PAGE #: PV01
REVISION: 0

PROPERTY LINE



50'

10'

20'

145'

LEGEND

(23) SunPower 335W Modules = 61.4" × 41.2"

METER WALL EQUIPMENT =

SOLADECK =

AZIMUTH COMPASS=

TURTLE VENT (ON ROOF) =

DISTANCE FROM PROPERTY LINE TO CLOSEST EDGE = #'

VICINITY MAP

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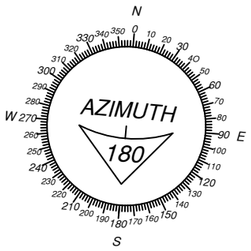
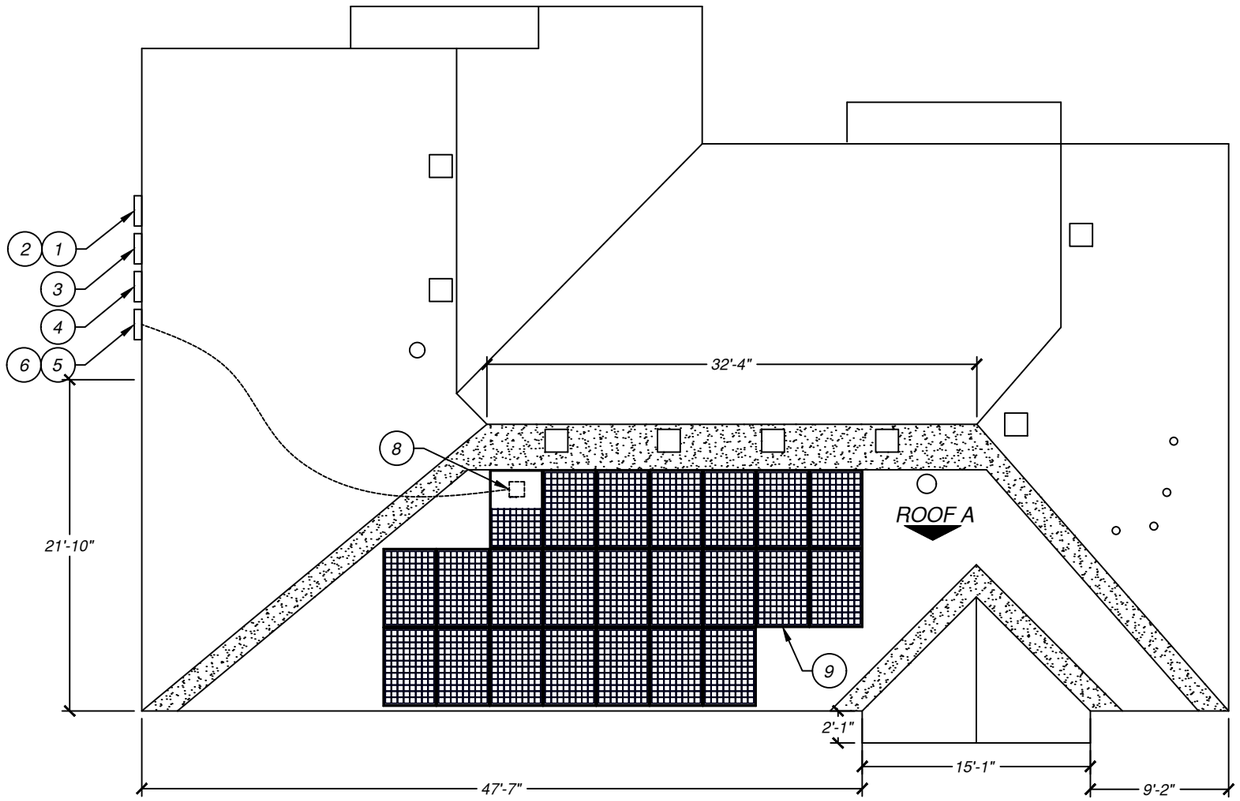
PROJECT #: 2015-0000

SHEET NAME: *PROPERTY DETAIL*

PAGE #: *PV02*

REVISION: 0





SITE INDEX

1. MAIN SERVICE PANEL
2. UTILITY METER
3. PRODUCTION METER (IF USED)
4. AC DISCONNECT
5. DC DISCONNECT
6. INVERTER
7. NOT USED
8. SOLADECK ("JUNCTION BOX")
9. PV MODULES
10. NOT USED
11. CONDUIT RUN (ACTUAL CONDUIT RUNS DETERMINED IN THE FIELD)

3' UTAH FIRE CODE SETBACKS

ROOF DETAIL				
	A	B	C	D
AZIMUTH	176°			
TILT ANGLE	22°			
MODULE COUNT	23			
MODULE TYPE	SUNPOWER X21-335			
INVERTER TYPE	SMA SB 7700TL-US-22-240VAC			

SCOPE OF WORK

System Size: 7.705kW

Asphalt/Comp shingle roof pitch: 5/12

Anchored on 48 centers using UL listed racking system

UV resistant cable ties used for wire management

Junction boxes mounted flush w/roof surface

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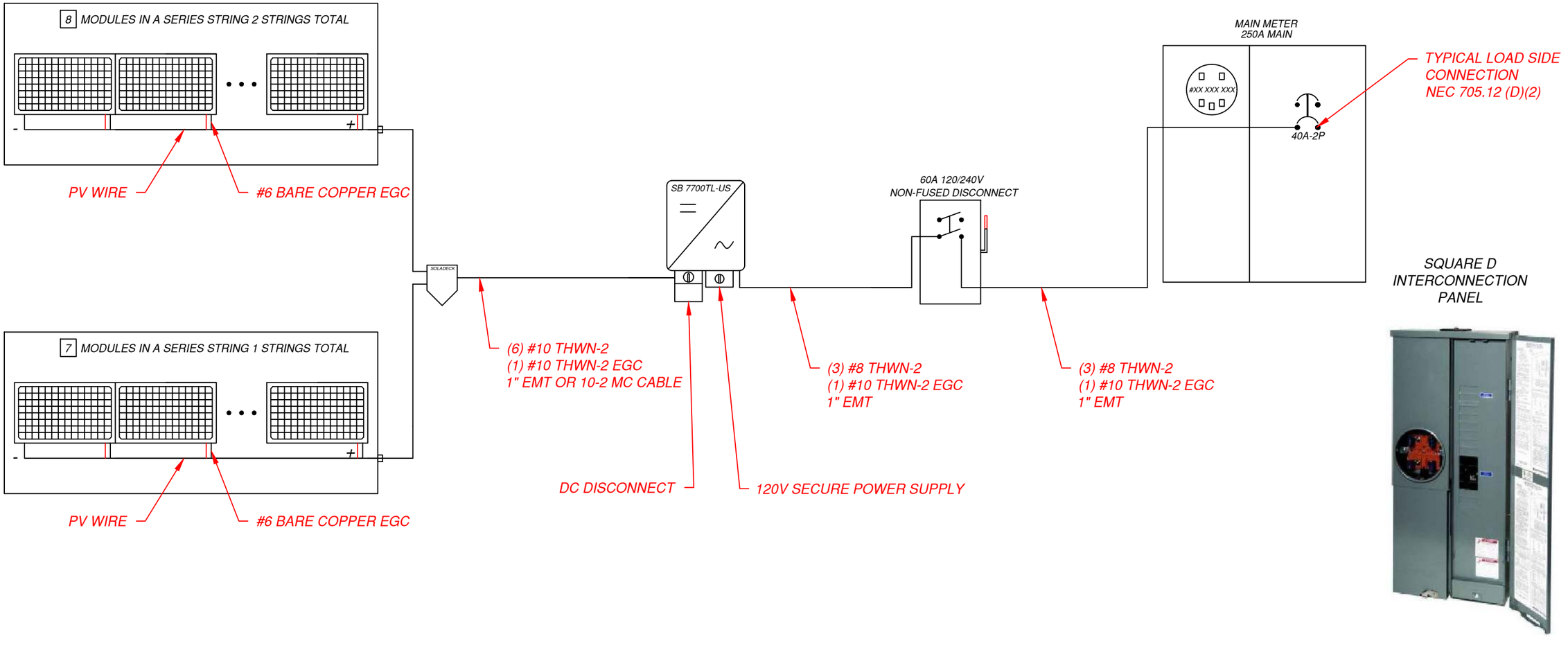
SHEET NAME: SITE PLAN
PAGE #: PV03
REVISION: 0

PV MODULE SPECIFICATIONS	
MANUFACTURER	SunPower
MODEL	X21-335
MAX POWER-POINT CURRENT (Imp)	5.85 A
MAX POWER-POINT VOLTAGE (Vmp)	57.3 V
OPEN CIRCUIT VOLTAGE (Voc)	67.9 V
SHORT CIRCUIT CURRENT (Isc)	6.23 A
MAX SERIES FUSE (OCPD)	20 A
MAX POWER (Pmax)	335 W
MAX VOLTAGE (Vdc)	600 V

INVERTER SPECIFICATIONS	
MANUFACTURER	SMA AMERICA (TL)
MODEL	SB7700TL-US (240V)
MAX DC INPUT VOLTAGE	600 V
MAX OUTPUT POWER	8000 W
NOMINAL AC OUTPUT VOLTAGE	240 V
NOMINAL AC OUTPUT CURRENT	32 A
MAX FUSE (OCPD)	40 A

PV POWER SOURCE LABEL	
RATED MAXIMUM PP CURRENT (IMP)	17.9A
RATED MAXIMUM PP VOLTAGE (VMP)	248.0V
MAXIMUM SYSTEM VOLTAGE (VOC)	354.3V
SHORT-CIRCUIT CURRENT (ISC)	24.0A

PV LOAD CALCULATIONS
250A RATED MAIN PANEL
200A * 120% = 240
240A - 200 = 40A (MAIN BUS ALLOWABLE SOLAR)
50A SERVICE DISCONNECT (OPEN)
40A + 50A = 90A AVAILABLE FOR PV
705.12(D)(2)



SQUARE D
INTERCONNECTION
PANEL

ELECTRICAL NOTES
A. ALL COMPONENTS SHALL COMPLY WITH NEC AS AMENDED.
B. PHASE CONDUCTORS SHALL BE IDENTIFIED.
C. ALL WIRES SHALL BE PROVIDED WITH STRAIN RELIEF UPON ENTRY INTO BOXES, REFER TO MANUFACTURERS INSTALLATION MANUAL FOR REQUIRED TORQUE VALUES.
D. THE DC GEC SHALL BE CONTINUOUS FROM THE INVERTER GROUND BUS TO THE MAIN SERVICE GROUNDING ELECTRODE SYSTEM.
E. ATTACHMENT TO GROUND ELECTRODE SHALL USE IRREVERSIBLE CLAMP.

ELECTRICAL NOTES
F. ALL EXPOSED METAL PARTS SHALL BE GROUNDED USING TIN PLATED COPPER LAY IN LUGS OR GROUNDING CLIPS LISTED FOR THE PURPOSE.
G. MIN #10 BARE COPPER EGC AT SOURCE CIRCUITS SHALL BE ROUTED SECURELY TO MOUNTING HARDWARE THAT PROTECTS FROM PHYSICAL DAMAGE.
H. #6 FOR AREAS THAT MAY BE SUBJECT TO DAMAGE.
I. BOTH ENDS OF ALL METALLIC CONDUIT SHALL BE BONDED PER NEC 250.
J. INTERCONNECTION PER NEC 690.64; 705.12.
K. ALL WIRES WILL BE RATED AT THHN/THWN-2.

SECURE POWER SUPPLY TECHNICAL DATA	
MAXIMUM AC VOLTAGE	125V
MAXIMUM AC CURRENT	12A
MAXIMUM POWER OUTPUT	1500W

PHOTOVOLTAIC AC OUTPUT LABEL	
AC OUTPUT CURRENT	32A
NOMINAL AC VOLTAGE	240V

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DESIGNED BY: A. MEANS
DATE: 04/15/2014
PROJECT #: 2015-0000
SHEET NAME: SLD/ ELECTRICAL DETAIL
PAGE #: PV04
REVISION: 0

ARRAY DETAIL

Design Location and Temperatures

Option 1: Select ASHRAE 2% or 4% and select Country, State and Airport
Option 2: Select Manual Entry or Custom site and enter desired temperatures

Temperature Data Source	ASHRAE 2% High Temp
Country	United_States
State	Utah
Weather Station	SALT LAKE CITY INT'L ARPT
ZIP Code Reference	84103
Weather Information	Solar ABC's | Weather.com
ASHRAE Extreme Low Temp	-16.3 °C
ASHRAE 2% High Temp	35.7 °C
Average Summer Time High	30.7 °C

Equipment Selection

Low Temp for Calculations	-16.3 °C
High Temp for Calculations	35.7 °C
Average Summer Time High	30.7 °C
Roof, Rack or Pole mount?	Roof
Module Manufacturer	Custom_Module
Module Model Number	Solarworld 275 Mono
Inverter Manufacturer	Custom_Inverter
Inverter Model Number	SB7700TL-US (240V)

System Design Parameters

	Single MPPT	Dual MPPT
Minimum String Size	5	5
Maximum String Size	13	13
Est. Maximum Strings in Parall	3	1
Maximum Number of Modules	29	14 per MPPT

Array Design Options

	MPPT 1	MPPT 2
MPPT Setup	Dual MPPT	
Select String Size	8	7
Select Total Strings in Parallel	2	1
Number of Modules per MPPT	16	7
Power Rating per MPPT (STC)	4,400 W	1,925 W

Total Number of Modules: 23
STC Rating of Array: **Resize Array**

Array will operate within the parameters of the selected inverter

Module Specifications

Module Name	Solarworld 275 Mono
Rated Power (STC)	275 W
Module Voc	39.40 VDC
Module Vmp	31.00 VDC
Module Imp	8.94 ADC
Module Isc	9.58 ADC
Voc Correction (%/°C)	-0.3%
Vmp Correction (%/°C)	-0.41%
Rated Power Tolerance (+/- %)	+5 /-0
Series fuse rating	20
Adj. Module Voc @ ASHRAE Low Temp	44.28 VDC
Adj. Module Vmp @ ASHRAE 2% High Temp	25.20 VDC
Adj. Module Vmp @ ASHRAE Avg. High Temp	25.83 VDC

Inverter Specifications

Inverter Name	SB7700TL-US (240V) @ 240
Number of MPPT's	Two
Maximum Power Point Tracking (MPPT)	125 Min. 500 Max.
Maximum Input Voltage	600 VDC
Maximum Input Current Per MPPT	18.00 ADC
Maximum Input Power	8,000 WDC
Maximum Output Current	32.00 AAC
AC Overcurrent Protection	40 AAC
Maximum Output Power	7,680 WAC
CEC Weighted Efficiency	95.5%

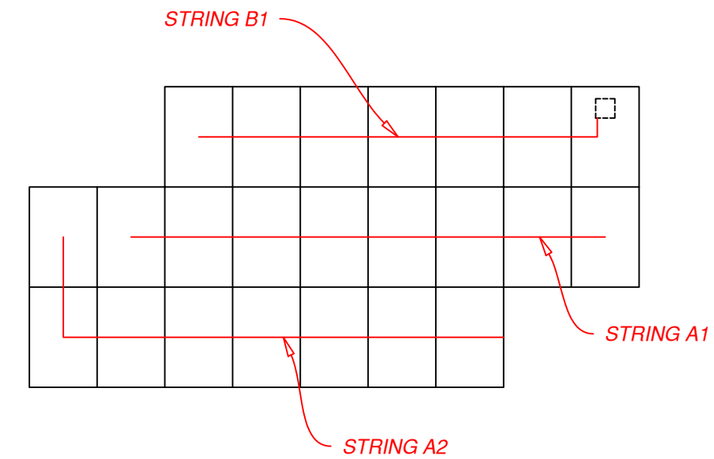
System Electrical Specifications

	MPPT 1	MPPT 2
String Configuration:	2 x 8	1 x 7
Power Rating per MPPT (STC)	4,400 W	1,925 W
Adj. Array Vmp @ ASHRAE 2% High Temp	201.6 VDC	176.4 VDC
Adj. Array Vmp @ ASHRAE Avg. High Temp	206.7 VDC	180.8 VDC
Rated Isc For Specified Array	19.2 ADC	9.6 ADC
DC Disconnect Calculations:		
Max. System Voc @ ASHRAE Low Temp	354.3 VDC	310.0 VDC
Voltage @ Rated Max Power (Typ. Op. Vmp)	248.0 VDC	217.0 VDC
Maximum Short Circuit Current	24.0 ADC	12.0 ADC
Current @ Maximum Power Point (Imp for arra	17.9 ADC	8.9 ADC

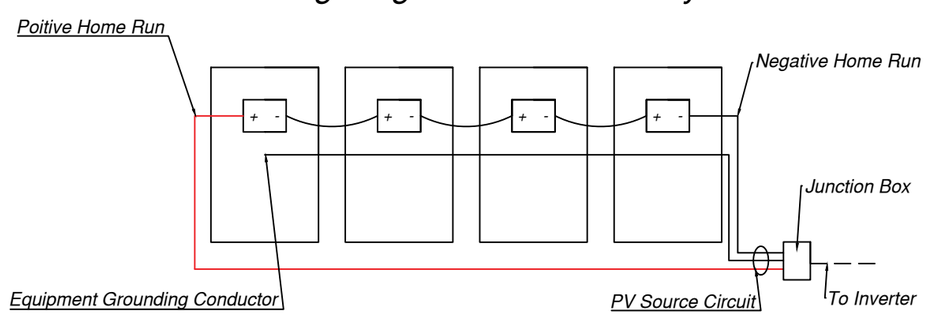
Photovoltaic Array Detail
Total Area of Array = 399.947 sq ft

ROOF SUPPORT DETAIL
Truss = 2X4 @ 24" O.C.

Photovoltaic Array String Detail
(8) Modules Input A1
(8) Modules Input A2
(7) Modules Input B1



Basic String Diagram of Grid-Tied System



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DESIGNED BY: A. MEANS
DATE: 04/15/2014
PROJECT #: 2015-0000
SHEET NAME: *ARRAY/STRINGING DETAIL*
PAGE #: *PV05*
REVISION: 0

3"

WARNING
ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH LINE AND
LOAD SIDE MAY BE ENERGIZED
IN THE OPEN POSITION

LOCATION: (1) COMBINER BOX (2) JUNCTION BOX
(3) BREAKER PANEL (4) DISCONNECT SWITCH
(5) INVERTER (IF USED)

A

4.5"

WARNING: PHOTOVOLTAIC
POWER SOURCE

LOCATION: DC CONDUIT
(REFLECTIVE CONDUIT LABEL)
PER NEC 690.31(B)(1-4)

B

3"

RATED MAX POWER POINT CURRENT (Imp) 27A
MAXIMUM POWER POINT VOLTAGE (Vmp) 620V
MAXIMUM SYSTEM VOLTAGE (Voc) 886V
SHORT-CIRCUIT CURRENT (Isc) 36A

LOCATION: STRING INVERTER (IF USED)

C

4.5"

CAUTION
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

LOCATION: (1) MAIN SERVICE

D

4.5"

WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LOCATION: MAIN SERVICE

E

4.5"

PHOTOVOLTAIC AC DISCONNECT
MAXIMUM AC OPERATING CURRENT: XXXA
NOMINAL AC OPERATING VOLTAGE: 240V

LOCATION: MAIN SERVICE

F

4.5"

WARNING
DO NOT ADD ADDITIONAL CIRCUITS TO PANEL

LOCATION: (1) MAIN SERVICE
(2) AC COMBINER PANEL

G

4.5"

WARNING
DO NOT RELOCATE SOLAR BREAKER

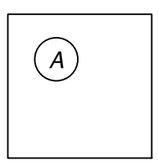
LOCATION: (1) MAIN SERVICE
(2) AC COMBINER PANEL

H

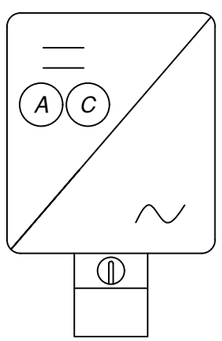
LABEL NOTES

A. RED BACKGROUND
B. WHTE LETTERING
C. MINIMUM 3/8 LETTER HEIGHT
D. ALL CAPITAL LETTERS
E. NON BOLD
F. MATERIAL SUITABLE FOR ENVIRONMENT

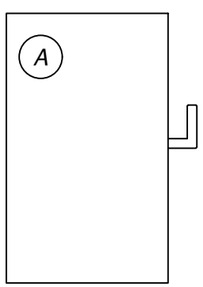
JUNCTION BOX (IF USED)



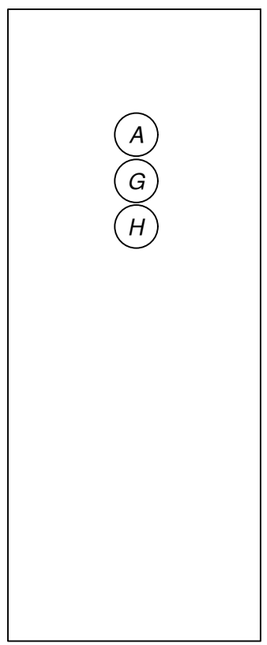
STRING INVERTER



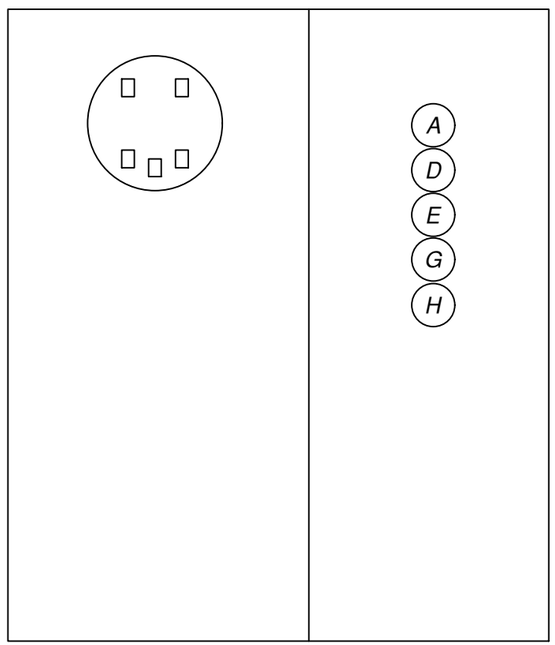
AC DISCONNECT (IF USED)



PV SUB PANEL (IF USED)



FOR ILLUSTRATION ONLY
(NOT ACTUAL MSP)
MAIN SERVICE PANEL



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DATE: 04/15/2014
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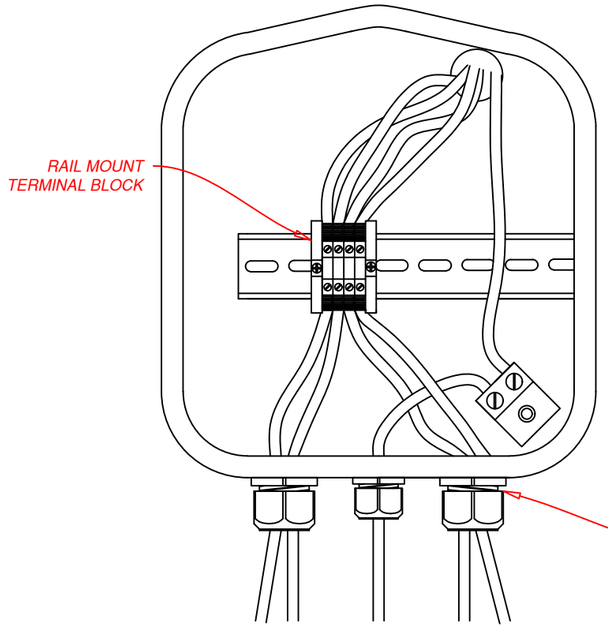
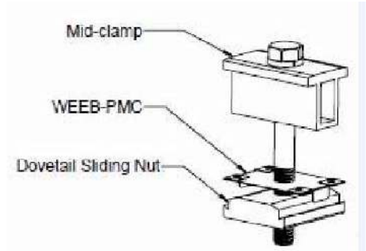
SHEET NAME: LABEL PLAN
PAGE #: PV06
REVISION: 0

SOLADECK ("JUNCTION BOX") DETAIL

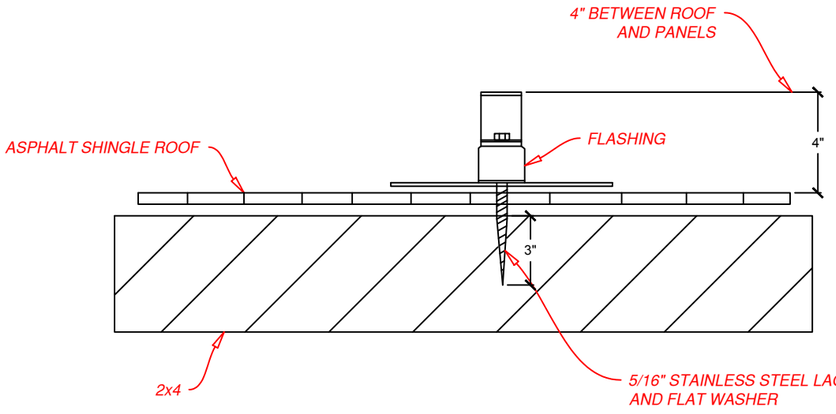


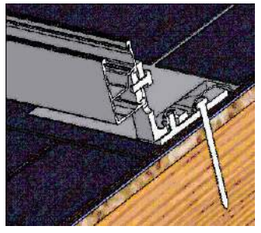
HEYCO-TITE UL LISTED/RECOGNIZED AND
CSA CERTIFIED LIQUID TIGHT CORDGRIPS

GROUNGING DETAIL (SNAP N' RACK)



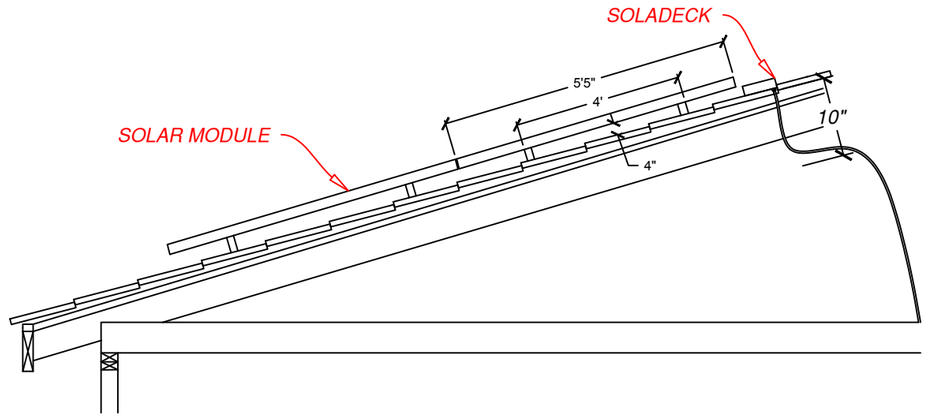
ATTACHMENT DETAIL





NOTE: FOR MORE DETAILS SEE RACKING ATTACHMENT

PV ATTIC DETAIL



NOTE: FOR MORE DETAILS SEE NEC 690.31 (E)(1)

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DATE: 04/15/2014

PROJECT # 2015-0000

SHEET NAME: EQUIPMENT DETAIL

PAGE # PV07

REVISION: 0