

ABBREVIATIONS

ADJ	ADJACENT	MAX	MAXIMUM
APPROX	APPROXIMATE	MFR	MANUFACTURER
ARCH	ARCHITECT, ARCHITECTURAL	MIN	MINIMUM
ASSY	ASSEMBLY	MISC	MISCELLANEOUS
B.U.R.	BUILT UP ROOF	MPPT	MAXIMUM POWER POINT TRACKING
BLDG	BUILDING	(N)	NEW
BRKR	CIRCUIT BREAKER	N.I.C.	NOT IN CONTRACT
C	CONDUIT	N.T.S.	NOT TO SCALE
CAT	CATEGORY	NOM	NOMINAL
CB	COMBINER BOX	O.C.	ON CENTER
CBC	CALIFORNIA BUILDING CODE	PB	PULL BOX
COL	COLUMN	P.L.F.	POUNDS PER LINEAR FOOT
CONC	CONCRETE	P.S.F.	POUNDS PER SQUARE FOOT
CONT	CONTINUOUS	PNL	PANEL
DAS	DATA ACQUISITION SYSTEM	PV	PHOTOVOLTAIC
DISC	DISCONNECT	PVC	POLYVINYL CHLORIDE DUCT
DN	DOWN	RAD.	RADIUS
DWG	DRAWING	REF	REFERENCE
(E) OR EXIST	EXISTING	RGS	RIGID GALVANIZED STEEL
E.C.	ELECTRICAL CONTRACTOR	RMC	RIGID METALLIC CONDUIT
E.J.	EXPANSION JOINT	S.A.D.	SEE ARCHITECTURAL DRAWINGS
EL OR ELEV	ELEVATION	S.E.D.	SEE ELECTRICAL DRAWINGS
ELEC	ELECTRICAL	SECT	SECTION
EMT	ELECTRICAL METALLIC CONDUIT	SHT	SHEET
EQUIV	EQUIVALENT	SYM	SYMMETRICAL
FLASH'G	FLASHING	SYS	SYSTEM
FLEX	FLEXIBLE	TG&G	TONGUE & GROOVE
FT	FEET	TX	TRANSFORMER
GCR	GROUND COVER RATIO	TYP	TYPICAL
GEN.	GENERAL	U.O.N.	UNLESS OTHERWISE NOTED
GND	GROUND	V.I.F.	VERIFY IN FIELD
HT	HEIGHT	VERT	VERTICAL
IMC	INTERMEDIATE METALLIC CONDUIT	W/	WITH
KW	KILOWATT	W/O	WITHOUT
L.F. OR LIN. FT.	LINEAR FEET	WT	WEIGHT

REFERENCE CODES AND CONSTRUCTION NOTES:

THIS PROJECT SHALL COMPLY WITH THE FOLLOWING CODES:

2008 INTERNATIONAL BUILDING CODE
2008 NATIONAL ELECTRICAL CODE

PROJECT SHALL BE INSTALLED BY A LOUISIANA STATE LICENSED CONTRACTOR.

SHEET INDEX

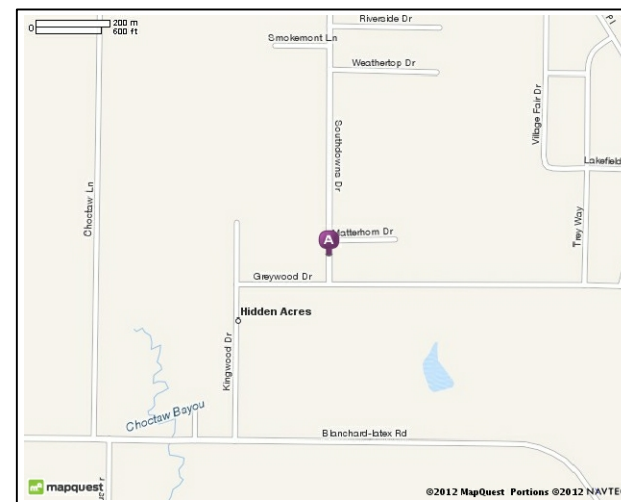
- PV-1 COVER
- PV-2 SITE PLAN
- PV-3 ARRAY LAYOUT
- PV-4 ATTACHMENT DETAIL
- PV-5 SINGLE LINE DIAGRAM
- PV-6 ELECTRICAL NOTES & SIGNAGE

- ATTACHMENTS:**
- + MODULE SPEC SHEET
 - + INVERTER SPEC SHEET

AERIAL IMAGE:



VICINITY MAP: (NOT TO SCALE)



SYSTEM INFORMATION: 5.9 kW (DC) - (24) Q-CELLS Q PRO-G2-240 SOLAR MODULES AND(1) POWER ONE AURORA PVI-4.6-OUTD-US INVERTER

ARRAY	PITCH	ORINATION
1	22°	90°

JURISDICTION

CITY OF SHREVEPORT

PROJECT NOTES

CUSTOMER: CUSTOMER NAME
SPECIAL PROJECT NOTES - SERVICE UPGRADE, ETC.



14268 VALLEY CENTER DRIVE
VICTORVILLE, CA 92395
(888) 955-3471

CUSTOMER APPROVAL

PROJECT FOREMAN

PLANS REVIEWED

BOM REVIEWED

PROJECT ADDRESS

1234 SUNNYSIDE
ANYWHERE, USA 56789

REV DATE

1/25/2013

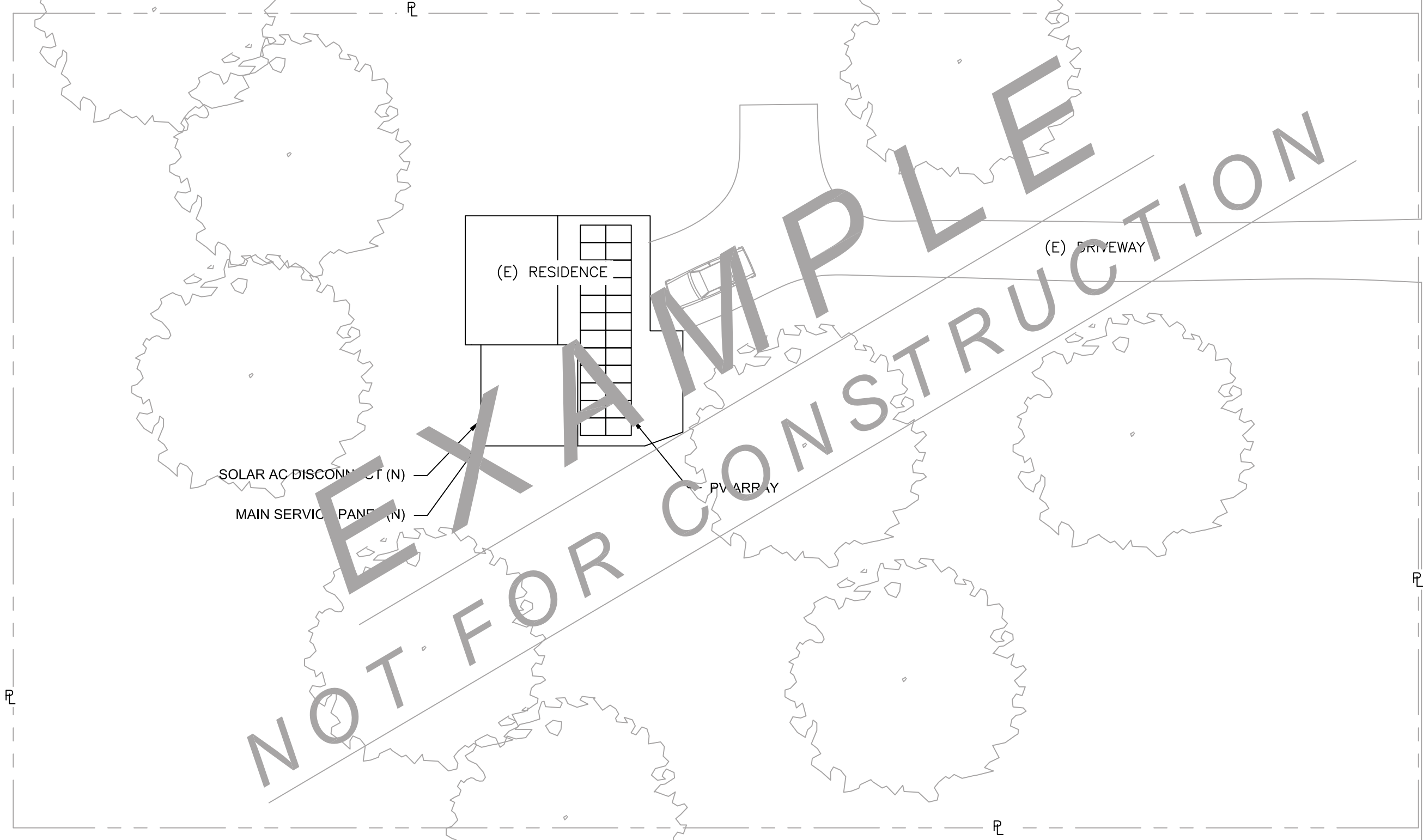
DRAWING TYPE

COVER SHEET

SHEET NUMBER

PV-1

1 SITE PLAN
SCALE: 1" = 20'



SOUTH DOWNS DR.

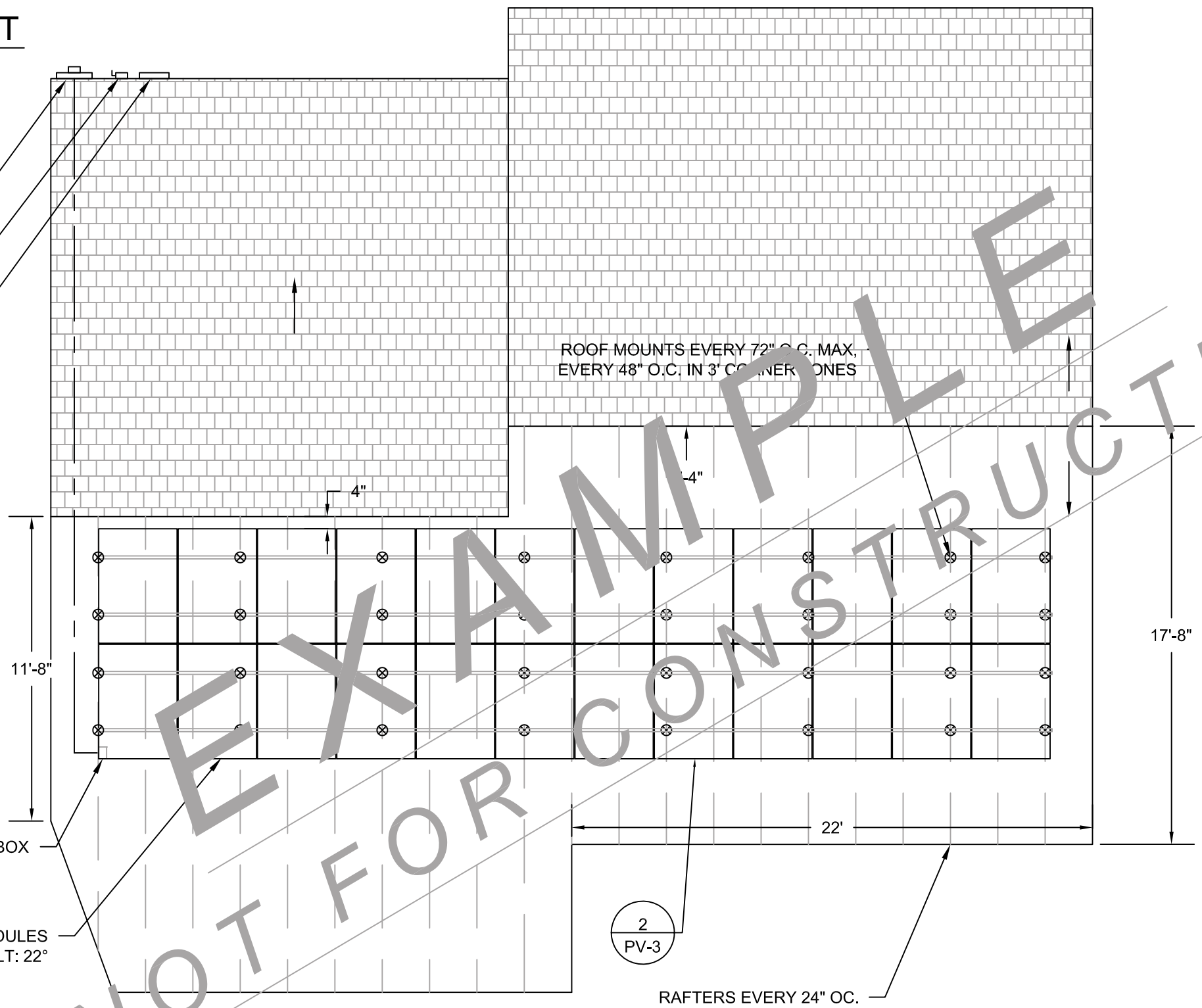


	14268 VALLEY CENTER DRIVE VICTORVILLE, CA 92395 (888) 955-3471	CUSTOMER APPROVAL	PLANS REVIEWED	PROJECT ADDRESS 1234 SUNNYSIDE ANYWHERE, USA 56789	REV DATE 1/25/2013	SHEET NUMBER PV-2
	PROJECT FOREMAN	BOM REVIEWED	DRAWING TYPE SITE PLAN			

1 ARRAY LAYOUT

SCALE: 3/16"

MAIN SERVICE PANEL (N) IS SOLAR POINT OF CONNECTION
 SOLAR AC DISCONNECT (N)
 INVERTER (N)

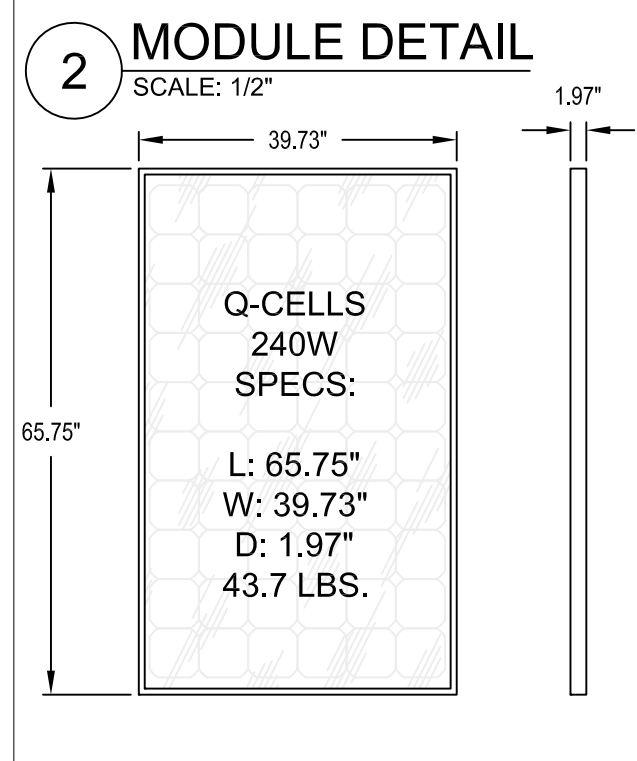


- CONSTRUCTION NOTES**
- ROOF PITCH: 22°
 - ROOF CLADDING: COMP SHINGLE
 - RAFTERS: 2X AT 24" O.C.
 - MOUNTS ARE ON GRID SPACING, OCCURRING AT RAFTERS. VERIFY RAFTER LOCATIONS IN FIELD.
 - REFER TO MODULE AND RACKING MFR'S INSTALL MANUALS.
 - MAX SPAN BETWEEN MOUNTS: 72", 48" IN 3' CORNER ZONES.
 - APPROX (32) MOUNTS TOTAL
 - ALL FASTENERS STAINLESS STEEL U.O.N.

JUNCTION BOX/TRANSITION BOX
 (24) 245W MODULES
 AZIMUTH: 90° / TILT: 22°

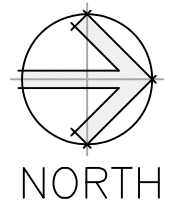
2 PV-3

RAFTERS EVERY 24" OC.



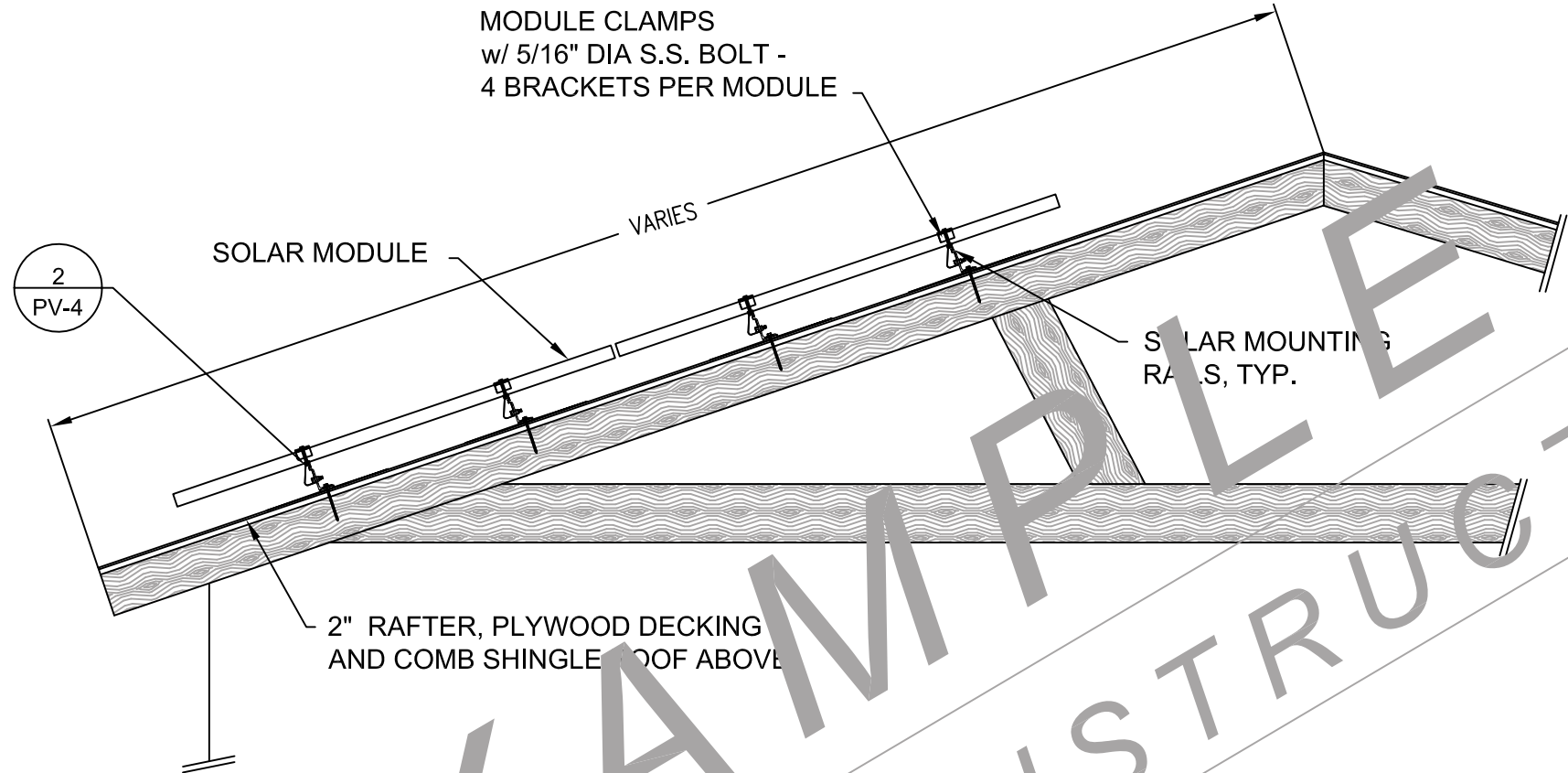
LAG BOLT SCHEDULE FOR CONNECTIONS TO RAFTERS

LOCATION	INFIELD	3' SIDE ZONES	3' CORNER ZONES
BOLT SIZE	5/16" X 4"	5/16" X 4"	5/16" X 4"
MIN EMBED	2-1/2"	2-1/2"	2-1/2"



1 ATTACHMENT DETAIL

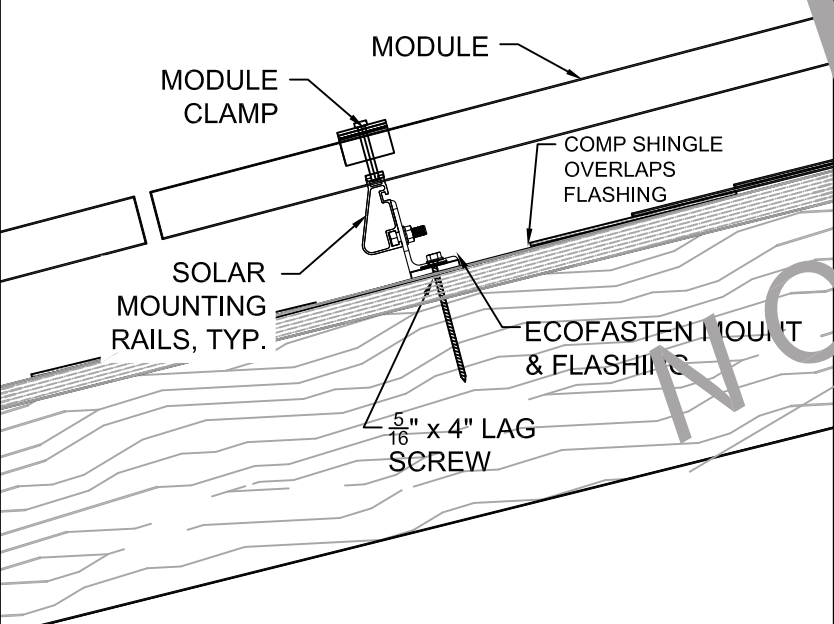
SCALE: 1/2"




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- ROOF PITCH: 22°
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 - REFER TO MODULE AND RACKING MFR'S INSTALL MANUALS.
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 - APPROX (32) MOUNTS TOTAL
 - ALL FASTENERS STAINLESS STEEL U.O.N.

2 MOUNT DETAIL

SCALE: 1-1/2"

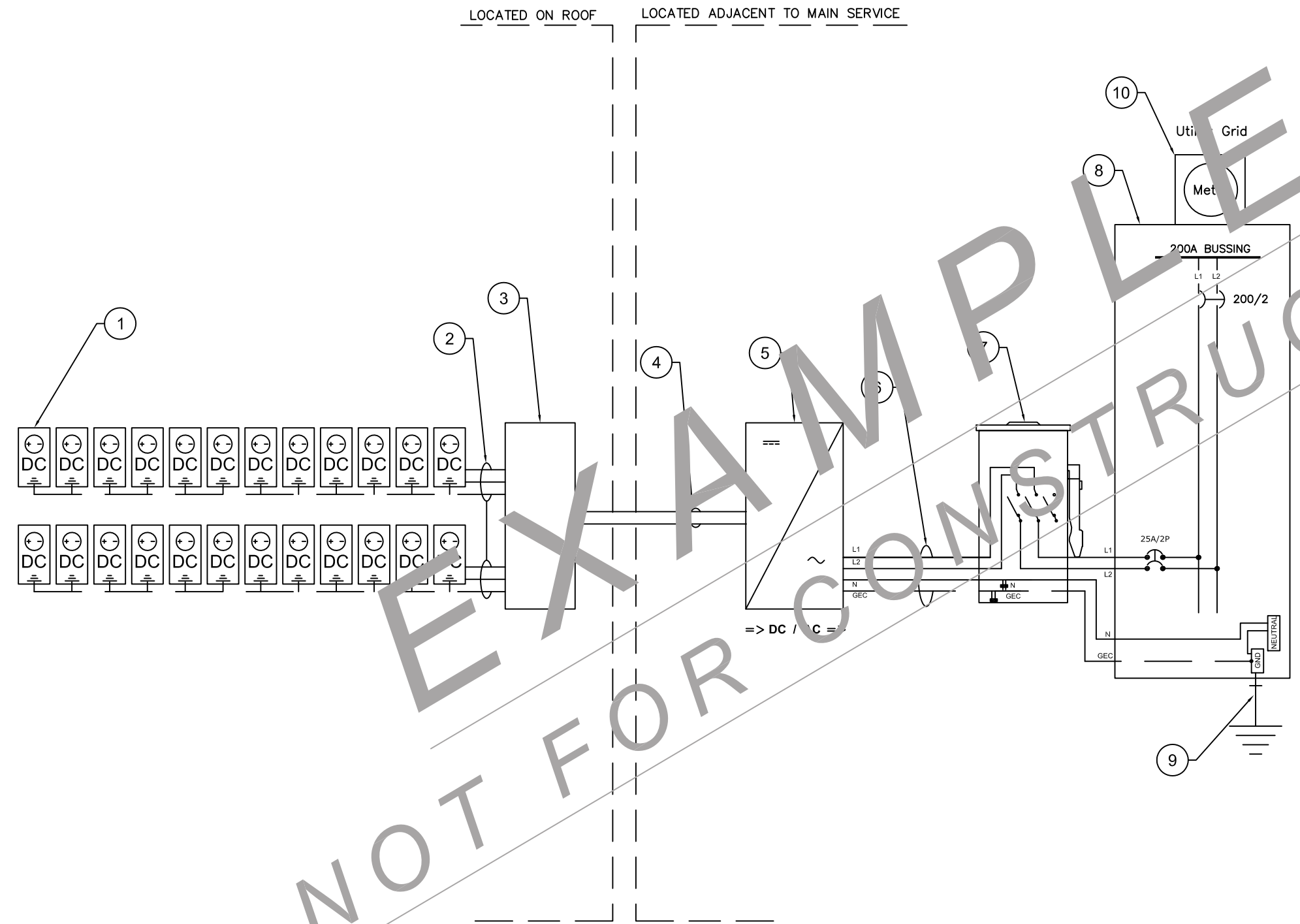


EXAMPLE NOT FOR CONSTRUCTION

 <small>Bringing you the power of the sun at down to earth prices...</small>	14268 VALLEY CENTER DRIVE VICTORVILLE, CA 92395 (888) 955-3471	CUSTOMER APPROVAL		PLANS REVIEWED		PROJECT ADDRESS	REV DATE	SHEET NUMBER
		PROJECT FOREMAN		BOM REVIEWED		1234 SUNNYSIDE ANYWHERE, USA 56789	1/25/2013	DRAWING TYPE ATTACHMENT DETAIL

1 ELECTRICAL DIAGRAM
NO SCALE

5.9 kW (DC) SOLAR ARRAY:
(24) Q CELLS 240 WALL PV MODULES: Q PRO-G2 240,
(1) POWER ONE AURORA PVI-4.6-OUTD-US INVERTER
(2) STRINGS OF (12) MODULES IN SERIES



NUMBERED ELECTRICAL DIAGRAM NOTES

1. PV ARRAY 1 IS (24) Q-2CELLS 240W MODULES: (2) STRINGS OF (12) MODULES IN SERIES. EACH ROW OF MODULES TO BE GROUNDING WITH ILSCO GBL-4DBT (OR EQUIVALENT - SUITABLE FOR DIRECT BURIAL AND CONTACT WITH COPPER OR ALUMINUM) LAY IN TYPE GROUNDING LUG AT MODULE GROUNDING POINT.
2. ALL DC CONDUCTORS IN FREE AIR: #10 AWG PV WIRE IN FREE AIR AND #8 AWG BARE COPPER TO MODULE GROUNDING POINT.
3. NEMA 3R RATED ROOFTOP JUNCTION BOX OR TRANSITION BOX.
4. (4) 10 AWG (COPPER) THWN-2 CONDUCTORS + #8 GROUND THWN-2 GREEN IN 3/4" EMT. 40% MAX COND FILL.
5. (1) POWER ONE AURORA PVI-4.6-OUTD-US TRANSFORMERLESS INVERTER, WITH INTEGRATED DC/AC DISCONNECT SWITCH.
6. (3) 10 AWG (COPPER) THWN-2 CONDUCTORS: BLACK - L1, RED - L2, WHITE - NEUTRAL + #8 AWG GROUND THWN-2 GREEN IN 3/4" EMT. 40% MAX COND FILL.
7. SOLAR AC DISCONNECT IS SQUARE D DU221RB (OR EQUIVALENT), 2-POLE, 2-WIRE, RATED 240V, 30A, NEMA 3R.
8. EXISTING MAIN SERVICE PANE:L120/240 VAC SINGLE PHASE, 200A BUS, 200A MAIN OCPD, CONTRACTOR TO INSTALL NEW 2-POLE 25A SOLAR OCPD.
9. EXISTING GROUNDING ELECTRODE
10. BI-DIRECTIONAL UTILITY METER

EXAM PLE NOT FOR CONSTRUCTION

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		PROJECT FOREMAN		BOM REVIEWED		1234 SUNNYSIDE ANYWHERE, USA 56789	1/25/2013	DRAWING TYPE ELECTRICAL LINE DIAGRAM

5.9 kW (DC) SOLAR ARRAY:

- (24) Q CELLS 240 WALL PV MODULES: Q PRO-G2 240,
- (1) POWER ONE AURORA PVI-4.6-OUTD-US INVERTER
- (2) STRINGS OF (12) MODULES IN SERIES**

ELECTRICAL NOTES

- ALL PV MODULES, ARRAY FRAMING AND RACKING SHALL BE GROUNDED PER MFR'S SPECIFICATIONS.
- ALL WIRE TERMINATIONS, SPLICES AND CONNECTIONS SHALL BE MADE USING A LISTED DEVICE or ELECTRICAL BOX SUITED FOR THE PURPOSE. ALL WIRES NOT IN CONDUIT TO BE PROVIDED WITH STRAIN RELIEF AT ENTRY INTO JUNCTION BOXES.
- INSTALL CONDUIT EXPANSION FITTINGS, PER MANUFACTURER'S SPECIFICATIONS, IN LINEAR CONDUIT RUNS OVER 100'
- BOTH ENDS OF ALL METALLIC CONDUIT CONTAINING GROUNDING ELECTRODE CONDUCTORS SHALL BE BONDED PER NEC 250.64(E).
- PROVIDE AND INSTALL ALL GROUNDING AS REQUIRED BY NEC ARTICLES 250, 690 AND SYSTEM MANUFACTURER. INSTALL NEW GROUND ROD IF SERVICE PANEL DOES NOT HAVE GROUND ROD OR UFER.
- THIS INSTALLATION USES TRANSFORMER-LESS INVERTERS - PV WIRE TYPE IS REQUIRED FOR ALL DC WIRE RUNS IN FREE AIR, OR NOT IN CONDUIT.
- CONTRACTOR SHALL VERIFY EXISTENCE OF UNDERGROUND UTILITIES PRIOR TO ANY EXCAVATIONS.
- THE INSTALLATION OF THE PV SYSTEM SHALL CONFORM TO THE REQUIREMENTS OF THE 2008 NEC, ARTICLE 690 AND ANY OTHER APPLICABLE STANDARDS.
- INSTALLATION SHALL BE PERFORMED BY A LOUISIANA STATE LICENSED CONTRACTOR.

PV MODULE SPECS

MAKE	Q CELLS
MODEL	Q PRO-G2 240
SHORT CIRCUIT CURRENT	8.76 A
OPEN CIRCUIT VOLTAGE	37.35 VDC
OPERATING CURRENT	8.20 A
OPERATING VOLTAGE	29.57 VDC
NOMINAL POWER	240 W

INVERTER SPECS

MAKE	POWER ONE - AURORA
MODEL	PVI-4.6-OUTD-US
RATED AC POWER	4600 W
NUMBER OF INDEPENDENT MPPT	2
DC INPUT VOLTAGE RANGE	200 - 530 VDC
MAX INPUT CURRENT PER MPPT	17 A
RATED AC VOLTAGE	240 VAC
AC VOLTAGE RANGE	211 - 264 VAC
MAX AC OUTPUT CURRENT	20 A
AC OVERCURRENT PROTECTION	25 A

AC AMPACITY CALCULATION 4.6 KW INVERTER

INVERTER OUTPUT CURRENT	20 A
CONTINUOUS DUTY FACTOR	0.25
MULTIPLE CONDUCTOR FACTOR	1.0
DESIGN HIGH TEMPERATURE (TEMPERATURE 2% DRY BULB)	35° C
ROOF TEMP ADJUSTMENT	22° C
ADJUSTED CONDUCTOR TEMP	57° C
TEMP CORRECTION FACTOR	.58
MINIMUM AMPACITY	20 A X 1.25 = 25 A
ADJUSTED AMPACITY	20 A / 0.58 = 34.5 A
GREATER OF 2	35 A
AMPACITY OF #10 WIRE (USE 75°)	35A > 34.5A SO OK
INVERTER OCPD RATING	25 A

ALLOWABLE SOLAR BACKFEED CALCULATION

MAIN SERVICE BUS BAR RATING	200 A
MAIN BREAKER RATING	200 A
SOLAR BACKFEED BREAKER	25 A
MAX ALLOWABLE BACKFEED	200A X 120% = 240A > 25A SO OK

SIGNAGE NOTES

- SIGNAGE SHALL BE PERMANENTLY AFFIXED TO EQUIPMENT, OUTDOOR SIGNAGE SHALL BE REFLECTIVE, UV STABLE AND SUITABLE FOR ITS ENVIRONMENT.
- MINIMUM FONT SIZE SHALL BE 22 POINT UNLESS OTHERWISE NOTED OR REQUIRED FOR LEGIBILITY. SIGNAGE SHALL BE RED BACKGROUND WITH WHITE LETTERING.

WARNING SIGN FOR DC DISCONNECT - AT INVERTER

PHOTOVOLTAIC POWER SOURCE	
RATED MPP CURRENT	16.6 A
RATED MPP VOLTAGE	414 V
MAX SYSTEM VOLTAGE	497 V
MAX SYSTEM CURRENT	27.3 A
WARNING: ELECTRIC SHOCK HAZARD. LINE AND LOAD SIDE MAY BE ENERGIZED IN THE OPEN POSITION.	

AC DISCONNECT

SOLAR AC DISCONNECT -WARNING- ELECTRIC SHOCK HAZARD! DO NOT TOUCH TERMINALS. TERMINALS ON BOTH LINE AND LOAD SIDE MAY BE ENERGIZED IN THE OPEN POSITION.
--

WARNING SIGN FOR AC POINT OF CONNECTION

SOLAR PV SYSTEM AC POINT OF CONNECTION	
AC OUTPUT CURRENT	20 A
NOMINAL AC VOLTAGE	240 V
THIS PANEL FED BY MULTIPLE SOURCES (UTILITY AND SOLAR)	

AT MAIN SERVICE PANEL AND ALL OTHER PANELS SUBJECT TO SOLAR BACK-FEED

-WARNING- DUAL POWER SOURCES SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

ALL DC RACEWAYS

CAUTION: SOLAR CIRCUIT

ALL DC DISCONNECTS

SOLAR DC DISCONNECT -WARNING- ELECTRIC SHOCK HAZARD! DO NOT TOUCH TERMINALS. TERMINALS ON LINE AND LOAD SIDE MAY BE ENERGIZED IN THE OPEN POSITION. DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT.
--

INVERTER


WARNING: ELECTIC SHOCK HAZARD! IF A GROUND FAULT IS INDICATED, NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED.
--

LOAD CENTERS USED AS PV AC COMBINING PANELS

PHOTOVOLTAIC CIRCUITS ONLY. DO NOT ADD LOADS.

SOLAR OCPD

WARNING: INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE
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REV DATE

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DRAWING TYPE

ELECTRICAL NOTES

SHEET NUMBER

PV-6