

INSTALLATION OF NEW ROOF MOUNTED PV SOLAR SYSTEM

5883 E BONIWOOD TURN
CLINTON, MD 20735

E BONIWOOD TURN●



 **VICINITY MAP**
SCALE: NTS

—SITE

GENERAL NOTES

1. THE INSTALLATION CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL EQUIPMENT AND FOLLOWING ALL DIRECTIONS AND INSTRUCTIONS CONTAINED IN THE DRAWING PACKAGE AND INFORMATION RECEIVED FROM TRINITY.
2. THE INSTALLATION CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL EQUIPMENT AND FOLLOWING ALL DIRECTIONS AND INSTRUCTION CONTAINED IN THE COMPLETE MANUAL.
3. THE INSTALLATION CONTRACTOR IS RESPONSIBLE FOR READING AND UNDERSTANDING ALL DRAWINGS, COMPONENT AND INVERTER MANUALS PRIOR TO INSTALLATION. THE INSTALLATION CONTRACTOR IS ALSO REQUIRED TO HAVE ALL COMPONENT SWITCHES IN THE OFF POSITION AND FUSES REMOVED PRIOR TO THE INSTALLATION OF ALL FUSES BEARING SYSTEM COMPONENTS.
4. ONCE THE PHOTOVOLTAIC MODULES ARE MOUNTED, THE INSTALLATION CONTRACTOR SHOULD HAVE A MINIMUM OF ONE ELECTRICIAN WHO HAS ATTENDED A SOLAR PHOTOVOLTAIC INSTALLATION COURSE ON SITE.
5. FOR SAFETY, IT IS RECOMMENDED THAT THE INSTALLATION CREW ALWAYS HAVE A MINIMUM OF TWO PERSONS WORKING TOGETHER AND THAT EACH OF THE INSTALLATION CREW MEMBERS BE TRAINED IN FIRST AID AND CPR.
6. THIS SOLAR PHOTOVOLTAIC SYSTEM IS TO BE INSTALLED FOLLOWING THE CONVENTIONS OF THE NATIONAL ELECTRICAL CODE. ANY LOCAL CODE WHICH MAY SUPERSEDE THE NEC SHALL GOVERN.
7. ALL SYSTEM COMPONENTS TO BE INSTALLED WITH THIS SYSTEM ARE TO BE "UL" LISTED. ALL EQUIPMENT WILL BE NEMA 3R OUTDOOR RATED UNLESS INDOORS.

GENERAL NOTES

IF ISSUED DRAWING IS MARKED WITH A REVISION CHARACTER OTHER THAN "A", PLEASE BE ADVISED THAT FINAL EQUIPMENT AND/OR SYSTEM CHARACTERISTICS ARE SUBJECT TO CHANGE DUE TO AVAILABILITY OF EQUIPMENT.

GENERAL NOTES CONTINUED

8. THE DC VOLTAGE FROM THE PANELS IS ALWAYS PRESENT AT THE DC DISCONNECT ENCLOSURE AND THE DC TERMINALS OF THE INVERTER DURING DAYLIGHT HOURS. ALL PERSONS WORKING ON OR INVOLVED WITH THE PHOTOVOLTAIC SYSTEM ARE WARNED THAT THE SOLAR MODULES ARE ENERGIZED WHENEVER THEY ARE EXPOSED TO LIGHT.
9. ALL PORTIONS OF THIS SOLAR PHOTOVOLTAIC SYSTEM SHALL BE MARKED CLEARLY IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE ARTICLE 690 & 705.
10. PRIOR TO THE INSTALLATION OF THIS PHOTOVOLTAIC SYSTEM, THE INSTALLATION CONTRACTOR SHALL ATTEND A PRE-INSTALLTION MEETING FOR THE REVIEW OF THE INSTALLATION PROCEDURES, SCHEDULES, SAFETY AND COORDINATION.
11. PRIOR TO THE SYSTEM START UP THE INSTALLATION CONTRACTOR SHALL ASSIST IN PERFORMING ALL INITIAL HARDWARE CHECKS AND DC WIRING CONDUCTIVITY CHECKS.
12. FOR THE PROPER MAINTENANCE AND ISOLATION OF THE INVERTERS REFER TO THE ISOLATION PROCEDURES IN THE OPERATION MANUAL.
13. THE LOCATION OF PROPOSED ELECTRIC AND TELEPHONE UTILITIES ARE SUBJECT TO FINAL APPROVAL OF THE APPROPRIATE UTILITY COMPANIES AND OWNERS.
14. ALL MATERIALS, WORKMANSHIP AND CONSTRUCTION FOR THE SITE IMPROVEMENTS SHOWN HEREIN SHALL BE IN ACCORDANCE WITH:
 - A) CURRENT PREVAILING MUNICIPAL AND/OR COUNTY SPECIFICATIONS, STANDARDS AND REQUIREMENTS

GENERAL NOTES CONTINUED

14. B) CURRENT PREVAILING UTILITY COMPANY SPECIFICATIONS, STANDARDS, AND REQUIREMENTS
15. THIS SET OF PLANS HAVE BEEN PREPARED FOR THE PURPOSE OF MUNICIPAL AND AGENCY REVIEW AND APPROVAL. THIS SET OF PLANS SHALL NOT BE UTILIZED AS CONSTRUCTION DRAWINGS UNTIL REVISED TO INDICATE "ISSUED FOR CONSTRUCTION".
16. ALL INFORMATION SHOWN MUST BE CERTIFIED PRIOR TO USE FOR CONSTRUCTION ACTIVITIES.

ABBREVIATIONS

AMP	AMPERE
AC	ALTERNATING CURRENT
AL	ALUMINUM
AF	AMP. FRAME
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AWG	AMERICAN WIRE GAUGE
C	CONDUIT (GENERIC TERM OF RACEWAY, PROVIDE AS SPECIFIED)
CB	COMBINER BOX
CKT	CIRCUIT
CT	CURRENT TRANSFORMER
CU	COPPER
DC	DIRECT CURRENT
DISC	DISCONNECT SWITCH
DWG	DRAWING
EC	ELECTRICAL SYSTEM INSTALLER
EMT	ELECTRICAL METALLIC TUBING
FS	FUSIBLE SWITCH
FU	FUSE
GND	GROUND
GFI	GROUND FAULT INTERRUPTER
HZ	FREQUENCY (CYCLES PER SECOND)

ABBREVIATIONS CONTINUED

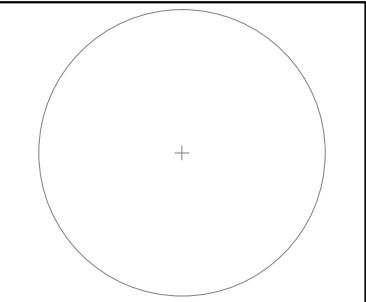
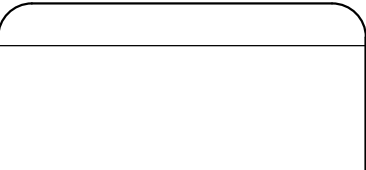
JB	JUNCTION BOX
KCMIL	THOUSAND CIRCULAR MILS
KVA	KILO-VOLT AMPERE
KW	KILO-WATT
KWH	KILO-WATT HOUR
L	LINE
MCB	MAIN CIRCUIT BREAKER
MDP	MAIN DISTRIBUTION PANEL
MLO	MAIN LUG ONLY
MTD	MOUNTED
MTG	MOUNTING
N	NEUTRAL
NEC	NATIONAL ELECTRICAL CODE
NIC	NOT IN CONTRACT
NO #	NUMBER
NTS	NOT TO SCALE
OCP	OVER CURRENT PROTECTION
P	POLE
PB	PULL BOX
PH ∅	PHASE
PVC	POLY-VINYL CHLORIDE CONDUIT
PWR	POWER
QTY	QUANTITY
RGS	RIGID GALVANIZED STEEL
SN	SOLID NEUTRAL
JSWBD	SWITCHBOARD
TYP	TYPICAL
U.O.I.	UNLESS OTHERWISE INDICATED
WP	WEATHERPROOF
XFMR	TRANSFORMER
+72	MOUNT 72 INCHES TO BOTTOM OF ABOVE FINISHED FLOOR OR GRADE

SHEET INDEX

PV-1	COVER SHEET W/ SITE INFO & GENERAL NOTES
PV-2	PLOT PLAN W/ DWELLING & EQUIPMENT / ELEVATION
PV-3	ROOF PLAN W/ MODULE LOCATIONS & DIMENSIONS
PV-4	STRUCTURAL DETAILS
PV-5	ELECTRICAL 3 LINE DIAGRAM
AP	APPENDIX

PV SYSTEM SUMMARY

SYSTEM SIZE	: 7.125kWDC / 6kW AC
MODULE TYPE	: HANWHA (Q.PEAK-BLK G4.1 285)
INVERTER TYPE	: SOLAREEDGE
# OF ARRAYS	: 2
ATTACHMENT METHOD	: IRON RACK MOUNTING SYSTEM
INTERCONNECTION	: LINE-SIDE TAP
UTILITY COMPANY	: PEPCO



Issued / Revisions		
P1	ISSUED TO TOWNSHIP FOR PERMIT	1/27/2017
NO.	DESCRIPTION	DATE

Project Title:

DADWAL, BALBIR KAUR

TRINITY ACCT #: 2017-01-115651

Project Address:

5883 E BONIWOOD TURN
CLINTON, MD 20735

Drawing Title:

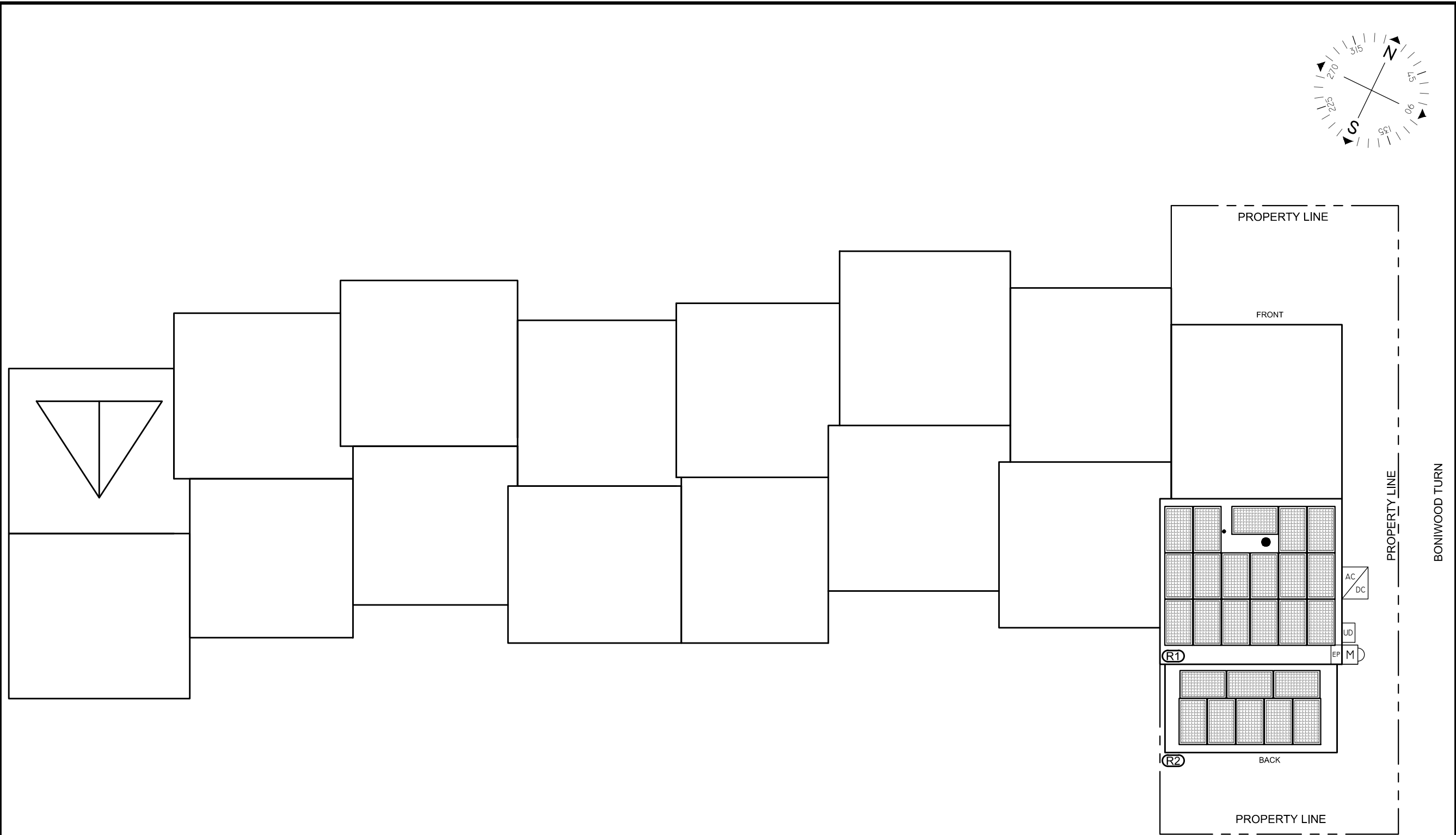
COVER SHEET

Drawing Information	
DRAWING DATE:	1/27/2017
DRAWN BY:	JC
REVISED BY:	









System Information:	
DC SYSTEM SIZE:	7.125kW
AC SYSTEM SIZE:	6kW
TOTAL MODULE COUNT:	25
MODULES USED:	HANWHA
MODULE SPEC #:	Q.PEAK-BLK G4.1 285
UTILITY COMPANY:	PEPCO
UTILITY ACCT #:	55022358414
UTILITY METER #:	NXA111235457
DEAL TYPE:	IGS

Rev. No.	Sheet
P1	PV - 1





- NOTES:
- 1.) ALL LOCATIONS ARE APPROXIMATE AND REQUIRE FIELD VERIFICATION.
 - 2.) ROOFTOP SOLAR INSTALLATION ONLY PV ARRAY AND ALL ASSOCIATED RACKING WILL NOT EXTEND BEYOND THE EXISTING BUILDING ENVELOPE

ARRAY SCHEDULE		SYMBOL LEGEND		PLUMBING SCHEDULE	EQUIPMENT SCHEDULE			
<u>R1</u> ARRAY ORIENTATION = 153.4° MODULE PITCH = 20° <u>R2</u> ARRAY ORIENTATION = 153.4° MODULE PITCH = 15°			INDICATES ROOF DESIGNATION . REFER TO ARRAY SCHEDULE FOR MORE INFORMATION			QTY	SPEC #	
			INDICATES EXISTING METER LOCATION			INDICATES NEW PV SOLAR MODULE. RED MODULES INDICATE PANELS THAT USE MICRO INVERTERS. REFER TO EQUIPMENT SCHEDULE FOR SPECS.	25	HANWHA (Q.PEAK-BLK G4.1 285)
			INDICATES EXISTING ELECTRICAL PANEL LOCATION: IN BASEMENT			INDICATES NEW PRODUCTION METER TO BE INSTALLED OUTSIDE.	1	SE6000A-US000NNR2
			INDICATES NEW MAIN DISCONNECT TO BE GROUPED WITH MAIN PANEL			INDICATES NEW INVERTER TO BE INSTALLED OUTSIDE. REFER TO EQUIPMENT SCHEDULE FOR SPECS.		
				OTHER OBSTRUCTIONS				

Issued / Revisions

P1	ISSUED TO TOWNSHIP FOR PERMIT	1/27/2017
NO.	DESCRIPTION	DATE

Project Title:

DADWAL, BALBIR KAUR
TRINITY ACCT #: 2017-01-115651

Project Address:

5883 E BONIWOOD TURN
CLINTON, MD 20735

Drawing Title:

PLOT PLAN

Drawing Information

DRAWING DATE:	1/27/2017
DRAWN BY:	JC
REVISED BY:	

System Information:

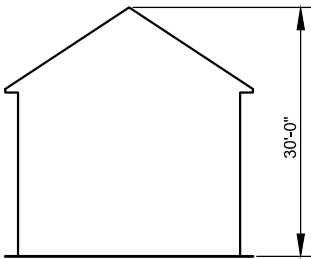
DC SYSTEM SIZE:	7.125kW
AC SYSTEM SIZE:	6kW
TOTAL MODULE COUNT:	25
MODULES USED:	HANWHA
MODULE SPEC #:	Q.PEAK-BLK G4.1 285
UTILITY COMPANY:	PEPCO
UTILITY ACCT #:	55022358414
UTILITY METER #:	NXA111235457
DEAL TYPE:	IGS

Rev. No.	Sheet
P1	PV - 2


Trinity[®]
SOLAR

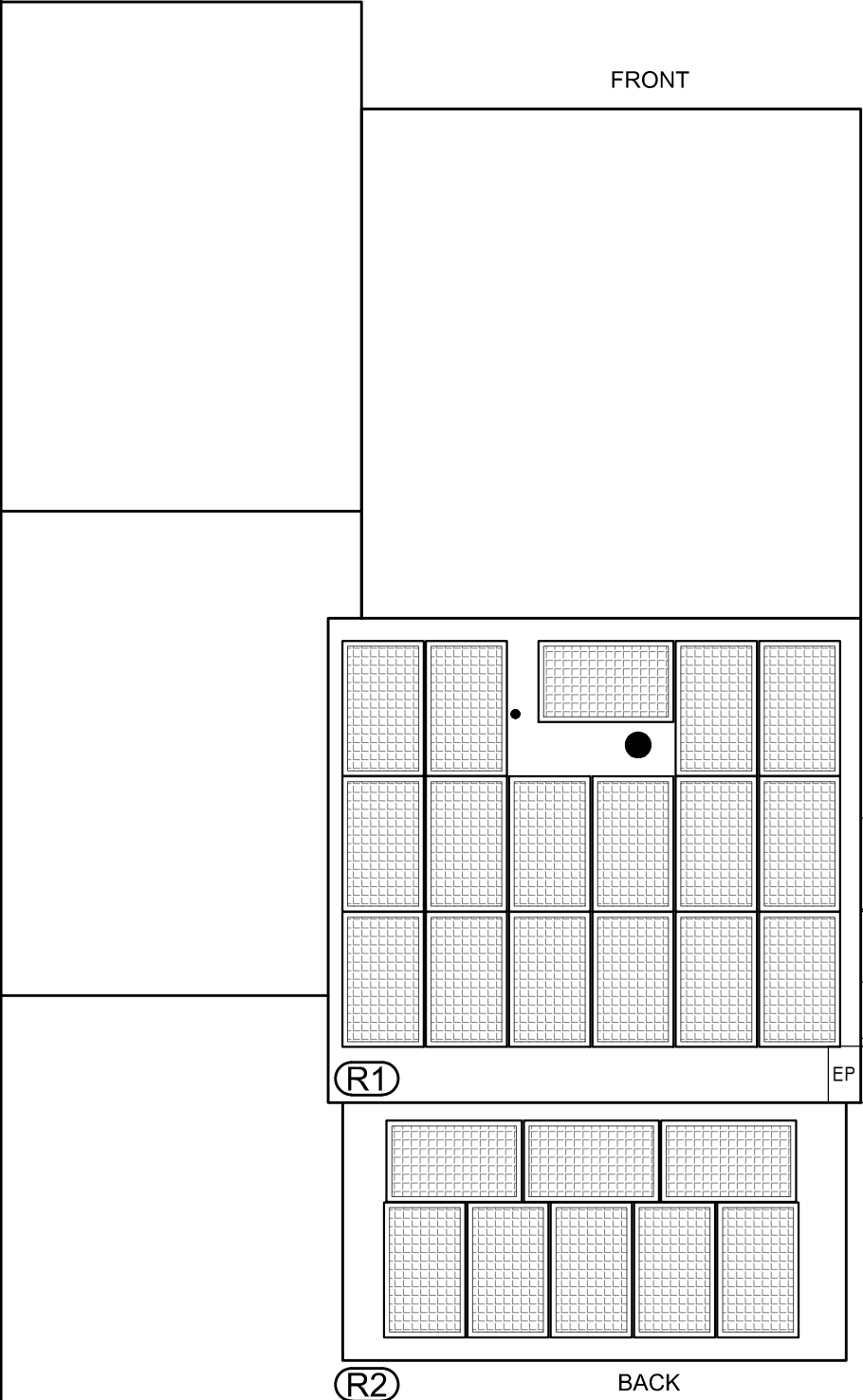
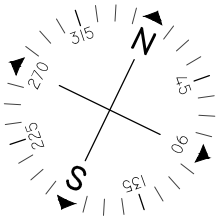
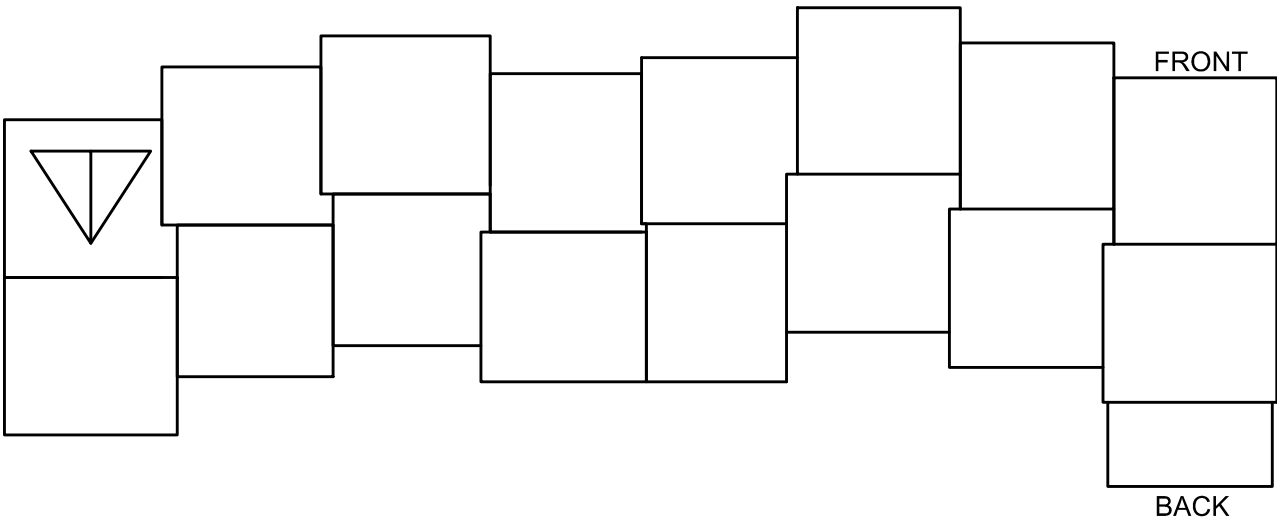
2211 Allenwood Road
Wall, New Jersey 07719

877-797-2978
www.Trinity-Solar.com



SOLAR MODULES SHALL NOT EXCEED PEAK HEIGHT.

 HEIGHT FROM GROUND LEVEL TO PEAK OF ROOF
SCALE: NOT TO SCALE



NOTES:









- 1.) ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
- 2.) ARRAY BONDING TO COMPLY WITH MANUFACTURER SPECIFICATION.
- 3.) ALL LOCATIONS ARE APPROXIMATE AND REQUIRE FIELD VERIFICATION.
- 4.) AN AC DISCONNECT SHALL BE GROUPED WITH INVERTER (S) NEC 690.13 (E) .
- 5.) ALL OUTDOOR EQUIPMENT SHALL BE RAIN TIGHT WITH MINIMUM NEMA 3R RATING.
- 6.) OVERCURRENT PROTECTION FOR CONDUCTORS CONNECTED TO THE SUPPLY SIDE OF A SERVICE SHALL BE LOCATED WITHIN 10' OF THE POINT OF CONNECTION NEC 705.31.
- 7.) ROOFTOP SOLAR INSTALLATION ONLY PV ARRAY SHALL NOT EXTEND BEYOND THE EXISTING ROOF EDGE.

ARRAY SCHEDULE

R1
ARRAY ORIENTATION = 153.4°
MODULE PITCH = 20°

R2
ARRAY ORIENTATION = 153.4°
MODULE PITCH = 15°

SYMBOL LEGEND

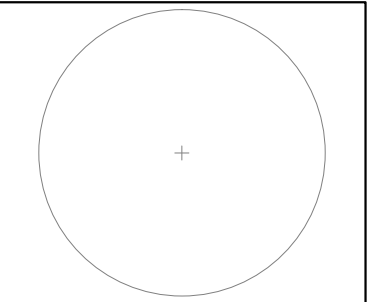
	INDICATES ROOF DESIGNATION . REFER TO ARRAY SCHEDULE FOR MORE INFORMATION		INDICATES NEW UTILITY DISCONNECT TO BE INSTALLED OUTSIDE
	INDICATES EXISTING METER LOCATION		INDICATES NEW PV SOLAR MODULE. RED MODULES INDICATE PANELS THAT USE MICRO INVERTERS. REFER TO EQUIPMENT SCHEDULE FOR SPECS.
	INDICATES EXISTING ELECTRICAL PANEL LOCATION: IN BASEMENT		INDICATES NEW PRODUCTION METER TO BE INSTALLED OUTSIDE.
	INDICATES NEW MAIN DISCONNECT		INDICATES NEW INVERTER TO BE INSTALLED OUTSIDE. REFER TO EQUIPMENT SCHEDULE FOR SPECS.

PLUMBING SCHEDULE

QTY	SPEC #
25	HANWHA (Q.PEAK-BLK G4.1 285)
1	SE6000A-US000NNR2
OTHER OBSTRUCTIONS	

EQUIPMENT SCHEDULE

QTY	SPEC #
25	HANWHA (Q.PEAK-BLK G4.1 285)
1	SE6000A-US000NNR2



Issued / Revisions		
P1	ISSUED TO TOWNSHIP FOR PERMIT	1/27/2017
NO.	DESCRIPTION	DATE

Project Title:

DADWAL, BALBIR KAUR

TRINITY ACCT #: 2017-01-115651

Project Address:

5883 E BONIWOOD TURN

CLINTON, MD 20735

Drawing Title:

MODULE LAYOUT

Drawing Information

DRAWING DATE:	1/27/2017
DRAWN BY:	JC
REVISED BY:	

System Information:

DC SYSTEM SIZE:	7.125kW
AC SYSTEM SIZE:	6kW
TOTAL MODULE COUNT:	25
MODULES USED:	HANWHA
MODULE SPEC #:	Q.PEAK-BLK G4.1 285
UTILITY COMPANY:	PEPCO
UTILITY ACCT #:	55022358414
UTILITY METER #:	NXA111235457
DEAL TYPE:	IGS

Rev. No.	Sheet
P1	PV - 3



2211 Allenwood Road
Wall, New Jersey 07719

877-797-2978
www.Trinity-Solar.com



Issued / Revisions		
P1	ISSUED TO TOWNSHIP FOR PERMIT	1/27/2017
NO.	DESCRIPTION	DATE

Project Address:
5883 E BONIWOOD TURN CLINTON, MD 20735

Drawing Information	
DRAWING DATE:	1/27/2017
DRAWN BY:	JC
REVISED BY:	

Rev. No.	Sheet
P1	PV - 4



ARRAY CIRCUIT WIRING NOTES

1.) LICENSED ELECTRICIAN ASSUMES ALL RESPONSIBILITY FOR DETERMINING ONSITE CONDITIONS AND EXECUTING INSTALLATION IN ACCORDANCE WITH NEC 2014

2.) LOWEST EXPECTED AMBIENT TEMPERATURE BASED ON ASHRAE MINIMUM MEAN EXTREME DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. LOWEST EXPECTED AMBIENT TEMP = -16°C

3.) HIGHEST CONTINUOUS AMBIENT TEMPERATURE BASED ON ASHRAE HIGHEST MONTH 2% DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. HIGHEST CONTINUOUS TEMP = 33°C

4.) 2005 ASHRAE FUNDAMENTALS 2% DESIGN TEMPERATURES DO NOT EXCEED 47°C IN THE UNITED STATES (PALM SPRINGS, CA IS 44.1°C). FOR LESS THAN 9 CURRENT-CARRYING CONDUCTORS IN A ROOF-MOUNTED SUNLIT CONDUIT AT LEAST 0.5" ABOVE ROOF AND USING THE OUTDOOR DESIGN TEMPERATURE OF 47°C OR LESS (ALL OF UNITED STATES)

5.) PHOTOVOLTAIC POWER SYSTEMS SHALL BE PERMITTED TO OPERATE WITH UNGROUNDED PHOTOVOLTAIC SOURCE AND OUTPUT CIRCUIT AS PER NEC 690.35

6.) ALL EQUIPMENT INSTALLED OUTDOORS SHALL HAVE A NEMA 3R RATING

7.) ALL SOLAR SYSTEM LOAD CENTERS TO CONTAIN ONLY GENERATION CIRCUITS AND NO UNUSED POSITIONS OR LOADS

8.) PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION THAT CONTROLS SPECIFIC CONDUCTORS IN ACCORDANCE WITH NEC 690.12(1) THROUGH (5)

9.) ALL WIRE LENGTHS SHALL BE LESS THAN 100' UNLESS OTHERWISE NOTED

10.) ARRAY AND SUB ARRAY CONDUCTORS SHALL BE #10 PV WIRE TYPE RHW-2 OR EQUIVELANT AND SHALL BE PROTECTED BY CONDUIT WHERE EXPOSED TO DIRECT SUNLIGHT. SUB ARRAY CONDUIT LONGER THAN 24" SHALL CONTAIN ≤ 20 CURRENT CARRYING CONDUCTORS AND WHERE EXPOSED TO DIRECT SUNLIGHT SHALL CONTAIN ≤ 9 CURRENT CARRYING CONDUCTORS.

11.) FLEXIBLE CONDUIT SHALL NOT BE INSTALLED ON ROOFTOP AND SHALL BE LIMITED TO 12" IF USED OUTDOORS

12.) WHERE TWO SOURCES FEED A BUSSBAR, ONE A UTILITY AND THE OTHER AN INVERTER, PV BACKFEED BREAKER(S) SHALL BE LOCATED OPPOSITE FROM UTILITY NEC 705.12(D)(2)(3)(b)

13.) UNGROUNDED DC CIRCUIT CONDUCTORS SHALL BE IDENTIFIED WITH THE FOLLOWING OUTER FINISH: POSITIVE CONDUCTORS = RED NEGATIVE CONDUCTORS = BLACK NEC 210.5(C)(2)

CALCULATIONS FOR CURRENT CARRYING CONDUCTORS
REQUIRED CONDUCTOR AMPACITY PER STRING
[NEC 690.8(B)(1)]: (15.00*1.25)1 = 18.75A

AWG #10, DERATED AMPACITY
AMBIENT TEMP: 33°C, TEMP DERATING FACTOR: .96
RACEWAY DERATING = 4 CCC: 0.80
(40*.96)0.80 = 30.72A

30.72A ≥ 18.75A, THEREFORE WIRE SIZE IS VALID

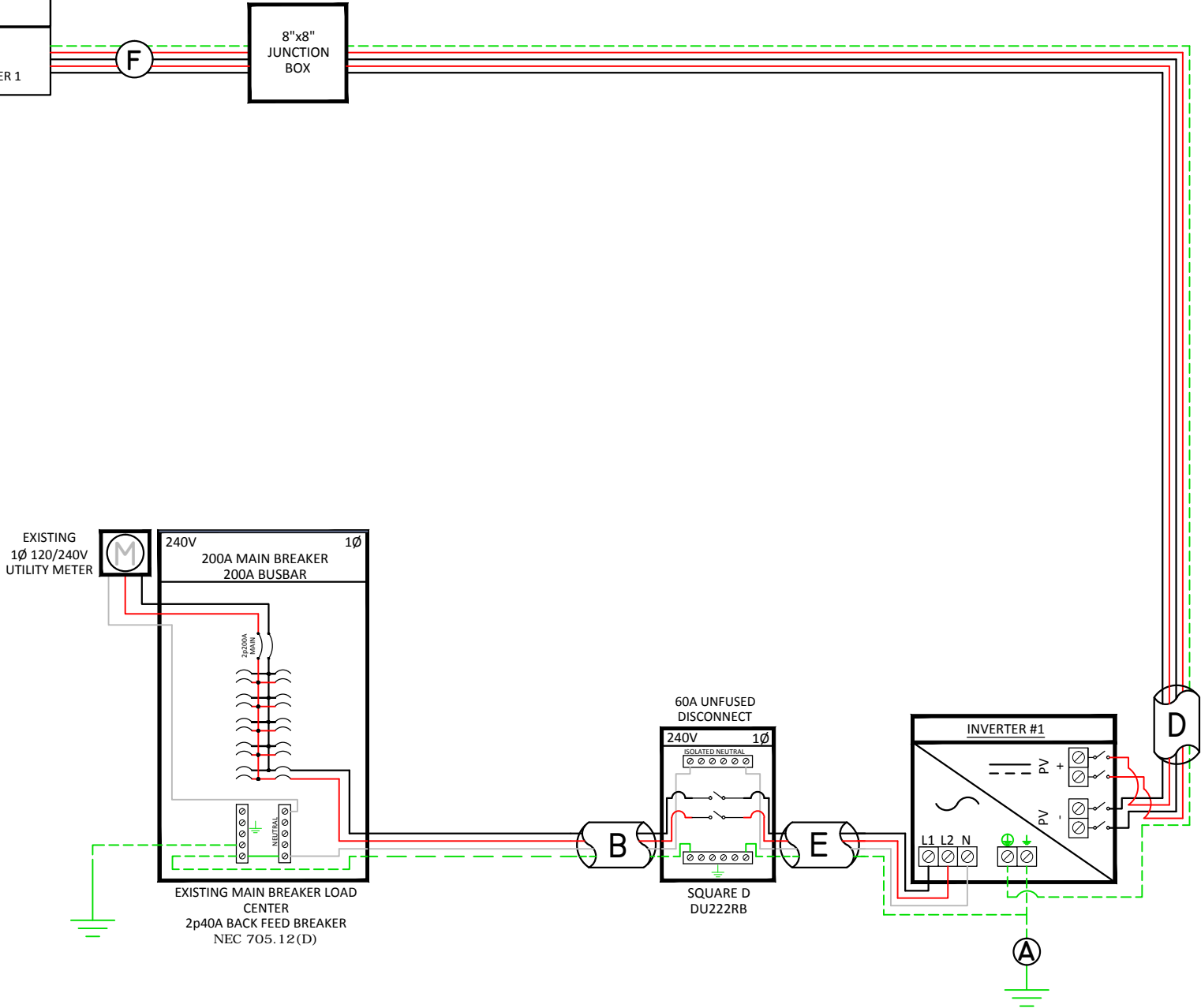
TOTAL AC REQUIRED CONDUCTOR AMPACITY
25.00A*1.25 = 31.25A

AWG #8, DERATED AMPACITY
AMBIENT TEMP: 30°C, TEMP DERATING: 1.0
RACEWAY DERATING ≤ 3 CCC: N/A
55A*1.0 = 55A

55A ≥ 31.25A, THEREFORE AC WIRE SIZE IS VALID

CALCULATION FOR PV OVERCURRENT PROTECTION
TOTAL INVERTER CURRENT: 25.00A
25.00A*1.25 = 31.25A
--> 40A OVERCURRENT PROTECTION IS VALID

SOLAR MODULES MOUNTED TO ROOF ON 2 ARRAYS 25 - 285W MODULES W/ 1 SOLAR EDGE P300 PER MODULE 15 ADC MAX PER STRING
1 STRING OF 17 MODULES IN SERIES - 350 Vmax 1 STRING OF 8 MODULES IN SERIES - 350 Vmax *2 STRINGS TO BE TERMINATED IN PARALLEL INSIDE INVERTER 1



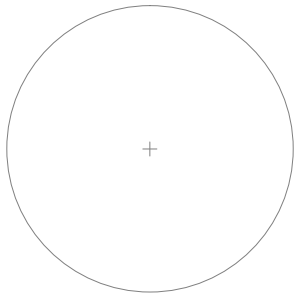
NOTE: CONDUIT TYPE SHALL BE CHOSEN BY THE INSTALLATION CONTRACTOR TO MEET OR EXCEED NEC AND LOCAL AHJD REQUIREMENTS

A	#6 THWN-2 GEC TO EXISTING GROUND ROD
B	3/4" CONDUIT W/ 2-#8 THWN-2, 1-#10 THWN-2, 1-#10 THWN-2 GROUND
C	3/4" CONDUIT W/ 4-#10 THWN-2, 1-#10 THWN-2 GROUND
D	3/4" CONDUIT W/ 4-#10 THWN-2, 1-#10 THWN-2 GROUND
E	3/4" CONDUIT W/ 2-#8 THWN-2, 1-#10 THWN-2, 1-#10 THWN-2 GROUND
F	#10 PV WIRE (FREE AIR) W/ #6 BARE COPPER BOND TO ARRAY

PV MODULE SPECIFICATIONS	
HANWHA (Q.PEAK-BLK G4.1 285)	
Imp	8.98
Vmp	31.73
Voc	38.91
Isc	9.56

INVERTER #1 - SE6000A-US000NNR2			
DC		AC	
Imp	18	Pout	6000
Vmp	350	Imax	25
Voc	500	OCPDmin	31.25
Isc	30	Vnom	240

Engineer / License Holder:



Issued / Revisions

NO.	DESCRIPTION	DATE
P1	ISSUED TO TOWNSHIP FOR PERMIT	1/27/2017

Project Title:

DADWAL, BALBIR KAUR

TRINITY ACCT #: 2017-01-115651

Project Address:

5883 E BONIWOOD TURN
CLINTON, MD 20735

Drawing Title:

PROPOSED PV SOLAR SYSTEM

Drawing Information

DRAWING DATE:	1/27/2017
DRAWN BY:	JC
REVISED BY:	

System Information:

DC SYSTEM SIZE:	7.125kW
AC SYSTEM SIZE:	6kW
TOTAL MODULE COUNT:	25
MODULES USED:	HANWHA
MODULE SPEC #:	Q.PEAK-BLK G4.1 285
UTILITY COMPANY:	PEPCO
UTILITY ACCT #:	55022358414
UTILITY METER #:	NXA111235457
DEAL TYPE:	IGS

Rev. No.

P1

Sheet

PV - 5



2211 Allenwood Road
Wall, New Jersey 07719

877-797-2978
www.Trinity-Solar.com