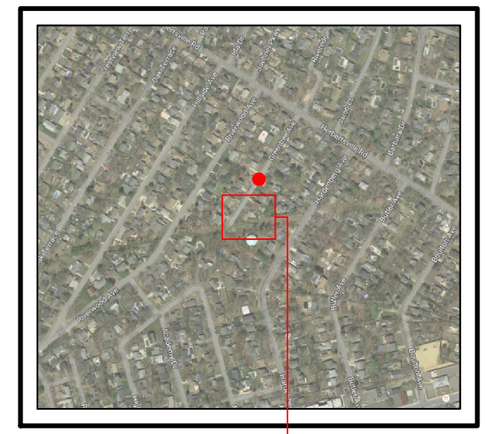
INSTALLATION OF NEW ROOF MOUNTED PV SOLAR SYSTEM

520 GREENTREE AVENUE
POINT PLEASANT, NJ 08742



VICINITY MAP
SCALE: NTS

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 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 INVERTS 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)

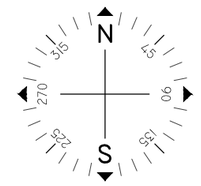
ABBREVIATIONS CONTINUED

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

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 AVAILABLITY OF EQUIPMENT.



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NO.	DESCRIPTION	DATE
A2	REVISED AS PER IGS	10/24/2016
A1	AS BUILT	10/17/2016
P2	ADDITIONAL PANELS	9/8/2016
P1	ISSUED TO TOWNSHIP FOR PERMIT	9/7/2016

Project Title:

VITALE, STACEY

TRINITY ACCT #: 2016-158730

Project Address:

520 GREENTREE AVENUE
POINT PLEASANT, NJ 08742

Drawing Title:

AS BUILT SOLAR SYSTEM

Drawing Information

DRAWING DATE:	9/7/2016
DRAWN BY:	JC
REVISED BY:	JES

System Information:

DC SYSTEM SIZE:	8.265kW
AC SYSTEM SIZE:	7.6kW
TOTAL MODULE COUNT:	29
MODULES USED:	TRINA 285
MODULE SPEC #:	TSM-285 DD05A.05
UTILITY COMPANY:	JCP&L
UTILITY ACCT #:	100 117 657 377
UTILITY METER #:	D12729451
DEAL TYPE:	IGS

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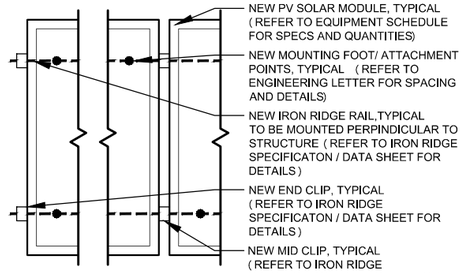
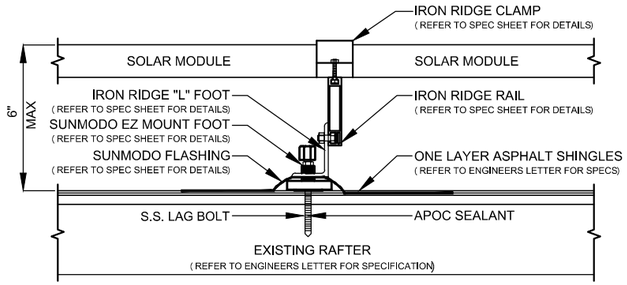
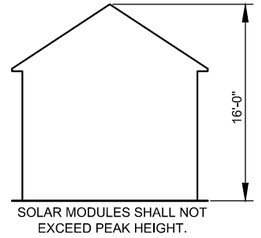
NOTES : *REFER TO MODULE SPECS FOR ACTUAL MODULE DIMENSIONS
*DEPICTED MODULES MAY BE PORTRATE OR LANDSCAPE



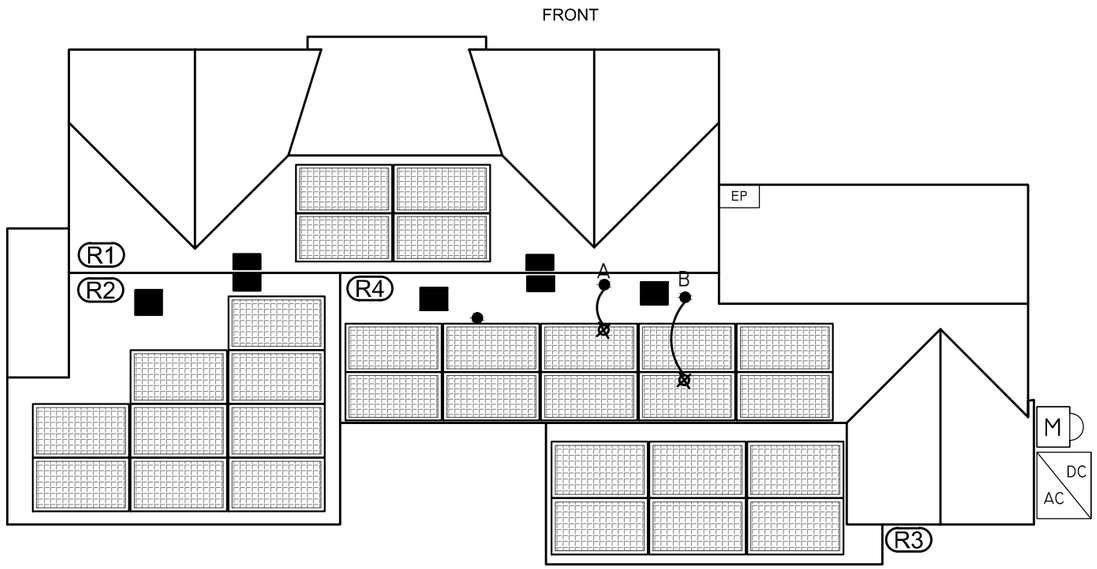
ATTACHMENT & CLIP DETAIL
SCALE: NOT TO SCALE



PV MODULE ATTACHMENT ON ASPHALT SHINGLE ROOF
SCALE: NOT TO SCALE



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



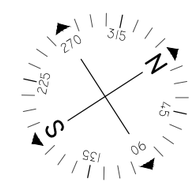
NOTES:
1.) ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
2.) ARRAY BONDING TO COMPLY WITH MANUFACTURER SPECIFICATION.
3.) ALL LOCATIONS ARE APPROXIMATE AND REQUIRE FIELD VERIFICATION.
4.) AN AC DISCONNECT SHALL BE GROUPED WITH INVERTER (S) NEC 690.13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

ARRAY SCHEDULE
R1 ARRAY ORIENTATION = 304° MODULE PITCH = 34°
R2 ARRAY ORIENTATION = 124° MODULE PITCH = 23°
R3 ARRAY ORIENTATION = 124° MODULE PITCH = 14°
R4 ARRAY ORIENTATION = 124° MODULE PITCH = 34°

SYMBOL LEGEND			
R1	INDICATES ROOF DESIGNATION . REFER TO ARRAY SCHEDULE FOR MORE INFORMATION	UD	INDICATES NEW UTILITY DISCONNECT TO BE INSTALLED OUTSIDE
M	INDICATES EXISTING METER LOCATION		INDICATES NEW PV SOLAR MODULE. RED MODULES INDICATE PANELS THAT USE MICRO INVERTERS. REFER TO EQUIPMENT SCHEDULE FOR SPECS.
EP	INDICATES EXISTING ELECTRICAL PANEL LOCATION: INSIDE	P	INDICATES NEW PRODUCTION METER TO BE INSTALLED OUTSIDE.
D	INDICATES NEW MAIN DISCONNECT	DC/AC	INDICATES NEW INVERTER TO BE INSTALLED OUTSIDE. REFER TO EQUIPMENT SCHEDULE FOR SPECS.

PLUMBING SCHEDULE
OTHER OBSTRUCTIONS
A - RELOCATE 3" PVC B - RELOCATE 3" PVC

EQUIPMENT SCHEDULE	
QTY	SPEC #
29	TRINA 285 (TSM-285 DD05A.05)
1	SE7600A-US



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REVISED BY:	JES

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UTILITY ACCT #:	100 117 657 377
UTILITY METER #:	D12729451
DEAL TYPE:	IGS

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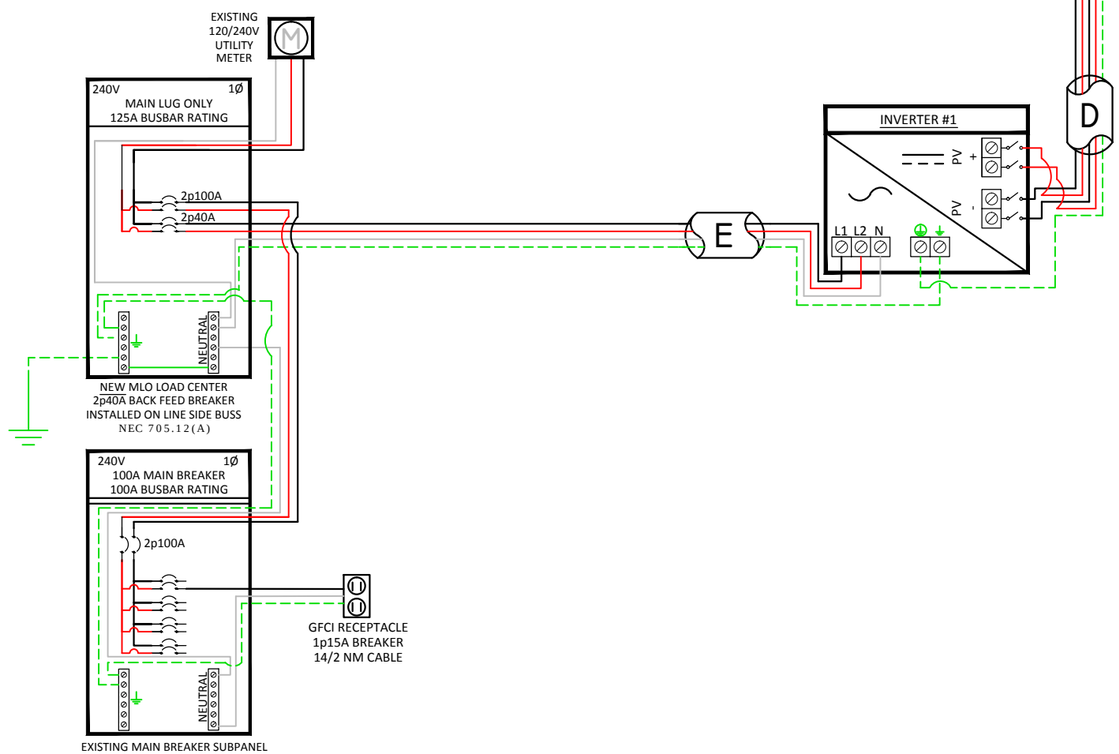
SOLAR MODULES MOUNTED TO ROOF ON 4 ARRAYS
29 - 285W MODULES W/ 1 SOLAR EDGE P300 PER MODULE
15 ADC MAX PER STRING

1 STRING OF 15 MODULES IN SERIES - 350 Vmax
1 STRING OF 14 MODULES IN SERIES - 350 Vmax
*2 STRINGS TO BE TERMINATED IN PARALLEL INSIDE INVERTER 1

F

8"x8" JUNCTION BOX



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.) ALL PV WIRE SHALL BE PROTECTED BY CONDUIT WHERE EXPOSED TO SUNLIGHT

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: 55°C, TEMP DERATING FACTOR: .76
RACEWAY DERATING = 4 CCC: 0.80
(40*.76)0.80 = 24.32A

24.32A ≥ 18.75A, THEREFORE WIRE SIZE IS VALID

TOTAL AC REQUIRED CONDUCTOR AMPACITY
32.00A*1.25 = 40.00A

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

55A ≥ 40.00A, THEREFORE AC WIRE SIZE IS VALID

CALCULATION FOR PV OVERCURRENT PROTECTION

TOTAL INVERTER CURRENT: 32.00A
32.00A*1.25 = 40.00A
--> 40A OVERCURRENT PROTECTION IS VALID

PV MODULE SPECIFICATIONS	
TRINA 285 (TSM-285 DD05A.05)	
Imp	8.97
Vmp	31.8
Voc	39.3
Isc	9.45

INVERTER #1 - SE7600A-US			
DC		AC	
Imp	23.5	Pout	7600
Vmp	350	Imax	32
Voc	500	OCPDmin	40
Isc	30	Vnom	240

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

A	NOT USED
B	NOT USED
C	NOT USED
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	#12 PV WIRE (FREE AIR) W/ #6 BARE COPPER BOND TO ARRAY
G	NOT USED

Engineer / License Holder:

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www.Trinity-Solar.com

Richard B. Gordon, P.E.

P.O. Box 264•Farmville•VA 23901
Ph: 434.574.6138•E-mail: grichardpe@aol.com

September 7, 2016

Point Pleasant Building Dept.
Point Pleasant, NJ

Re: Solar Panels Roof Structural Framing Support

To Whom It May Concern:

I hereby certify that I am a Licensed Professional Engineer in the State of New Jersey. Please note the following conclusions regarding framing structure, roof loading, and proposed site location of installation:

1. Existing roof framing: Conventional framing is 2x4 at 24" o.c. with 9'-6" span (horizontal rafter projection). This existing structure is definitely capable to support all of the loads that are indicated below for this photovoltaic project after sister rafters with a 2x4 using (2)10d nails 1' o.c. Use of (2) Guard Dog™ FMGD002 screws is approved, or equal shear strength of approx. 120 lb, 1' o.c. at areas where little space is available only with remainder of member secured with (2)10d nails 1' o.c. If do not sister, then install a 2x4 @ 24" o.c. knee wall over an interior bearing wall to limit span of rafters between supports to 7'-10".
2. Roof Loading
   - 4.33 psf dead load (modules plus all mounting hardware)
   - 12 psf snow live load (20 psf ground snow live load reference)
   - 4.5 psf roof materials
   - Exposure Category B, 125 mph wind uplift live load of 23.09 psf (wind resistance)
3. Address of proposed installation: Residence of Stacey Vitale, 520 Greentree Avenue, Point Pleasant, NJ

This installation design will be in general conformance to the manufacturer's specifications, and is in compliance with all applicable laws, codes, and ordinances, and specifically N.J.A.C. 5:23-6 (Rehabilitation Subcode), International Residential Code/ IRC 2015 NJ Edition, N.J.A.C. 5:23-3.21. The spacing and fastening of the mounting brackets is to have a maximum of 64" o.c. span between mounting brackets and secured using 5/16" diameter corrosive resistant steel lag bolts. In order to evenly distribute the load across the roof rafters, there shall be a minimum of 2 mounting brackets per rafter & min. 3" penetration of lag bolt per bracket, which is adequate to resist all 125 mph wind live loads including wind shear. The mounting brackets shall alternate between adjacent rafters for better distribution of roof load.

Very truly yours,

Richard B. Gordon, P.E.
New Jersey P.E. License No. 29483