

NATIONAL ELECTRICAL  
CODE (NEC 2014)  
ENGINEER

ALLEN GEZELMAN  
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PE 59180

MAR 05 2019

Electrical Design  
Drawing  
DATE: 03/05/2019  
BY: Allen Gezelman  
CHECKED: Allen Gezelman  
APPROVAL: Allen Gezelman

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IT IS TO BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED.  
NO OTHER USE MAY BE MADE OF THE INFORMATION, DRAWINGS, OR IDEAS WITHOUT THE EXPRESS WRITTEN PERMISSION OF ALLEN GEZELMAN PE.

**WARNING: PHOTOVOLTAIC POWER SOURCE**  
Markings shall comply with 690.31(E)(3) and (4), and shall be placed on ALL interior and exterior DC conduit, raceways, enclosures, and cable assemblies at least every 10 feet, at turns and above/below penetrations and all junction boxes.

**WARNING**  
ELECTRICAL SHOCK HAZARD  
DO NOT TOUCH TERMINALS.  
TERMINALS OF BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.

**WARNING**  
ELECTRICAL SHOCK HAZARD  
IF A GROUND FAULT IS INDICATED, NORMALLY GROUNDED CONDUCTORS MAY BE ENERGIZED AND ENERGIZED.

**WARNING**  
DC SHOCK HAZARD  
V<sub>oc</sub> 351.4 V  
V<sub>mp</sub> 320 V  
V<sub>sc</sub> 351.4 V

**PV AC DISCONNECT**  
LABEL PLACEMENT: COMBINER BOX  
V<sub>oc</sub> 340V  
V<sub>mp</sub> 320V  
I<sub>sc</sub> 47.5A

**PHOTOVOLTAIC POWER SOURCE**  
LABEL PLACEMENT: RACEWAY & COMBINER BOX

**WARNING**  
ELECTRICAL SHOCK HAZARD  
NO USER-SERVICEABLE PARTS INSIDE  
CONTACT AUTHORIZED SERVICE PERSON FOR ASSISTANCE

LABEL PLACEMENT: MAIN PANEL NEAR METER

LABEL PLACEMENT: COMBINER BOX

RECEIVED FOR FILE  
COLUMBIA COUNTY BUILDING DEPARTMENT  
COMMUNITY DEVELOPMENT  
PLANNING & ZONING  
APR 03 2019  
41 Modules @ 3000 Watts STC  
41 Modules per Inverter = 12300 Watts STC

| System Voltage-Fixed String Voltage                                              |                  |       |    |
|----------------------------------------------------------------------------------|------------------|-------|----|
| Inverter Model                                                                   | SolarEdge        |       |    |
| String #1                                                                        | V <sub>mps</sub> | 350   | V  |
| String #2                                                                        | V <sub>mps</sub> | 350   | V  |
| String #3                                                                        | V <sub>mps</sub> | 350   | V  |
| String #4                                                                        | V <sub>mps</sub> | 350   | V  |
| System Current = #Strings x Module Current (I <sub>sc</sub> or I <sub>mp</sub> ) |                  |       |    |
| ARRAY #1                                                                         | I <sub>mp</sub>  | 35.14 | A  |
| String #1                                                                        | I <sub>mp</sub>  | 12.00 | A  |
| String #2                                                                        | I <sub>mp</sub>  | 12.00 | A  |
| String #3                                                                        | I <sub>mp</sub>  | 12.00 | A  |
| String #4                                                                        | I <sub>mp</sub>  | 11.14 | A  |
| Circuit ampacity (DC) = I <sub>max</sub> x 1.56                                  |                  |       |    |
| ARRAY #1                                                                         | I <sub>max</sub> | 54.9  | A  |
| String #1                                                                        | I <sub>max</sub> | 18.8  | A  |
| String #2                                                                        | I <sub>max</sub> | 18.8  | A  |
| String #3                                                                        | I <sub>max</sub> | 17.4  | A  |
| Array Watts = #Modules x Module STC Watts x .95 x Inverter Efficiency            |                  |       |    |
| ARRAY #1                                                                         |                  | 11.39 | kW |

| PHOTOVOLTAIC AC OUTPUT |       |
|------------------------|-------|
| NOMINAL AC VOLTAGE     | 240 V |
| AC OUTPUT CURRENT      | 42 A  |

| OPTIMIZER SPECIFICATIONS                         |           |
|--------------------------------------------------|-----------|
| Optimizer Make                                   | SolarEdge |
| Optimizer Model                                  | P320      |
| Rated Input DC Power                             | 320 W     |
| Absolute Maximum Input Voltage                   | 48 Vdc    |
| Maximum Short Circuit Current (I <sub>sc</sub> ) | 11 Adc    |
| MPP Operating Range                              | 8-48 Vdc  |
| Maximum DC Input Current                         | 13.75 Vdc |
| Maximum Output Voltage                           | 60 Vdc    |
| Maximum Output Current                           | 15 Adc    |

| STRING OPTIONS    |       |
|-------------------|-------|
| Number of Modules | 41    |
| Number of strings | 3     |
| String #1         | 14    |
| String #2         | 14    |
| String #3         | 13    |
| STC DC POWER (kW) | 12.3  |
| DC/AC SIZING      | 100.5 |

## 02 SPECIFICATIONS, CALCULATIONS, & LABELS

02.01 LABELS

| VOLTAGE DROP CALCULATIONS (Vd=2*V <sub>mp</sub> *R*1000) NEC 2011 215.2(A)(4) |                 |                 |       |        |      |      |           |  |  |
|-------------------------------------------------------------------------------|-----------------|-----------------|-------|--------|------|------|-----------|--|--|
| WIRE RUN                                                                      | V <sub>mp</sub> | I <sub>mp</sub> | R     | L (ft) | Vd   | %Vd  | WIRE SIZE |  |  |
| PV STRING TO COMBINER (TYP. OF 2)                                             | 350             | 12.0            | 1.26  | 75     | 2.27 | 0.65 | #10       |  |  |
| COMBINER TO INVERTER                                                          | 350             | 35.1            | 0.521 | 15     | 0.55 | 0.16 | #6        |  |  |
| INVERTER TO PV AC DISCONNECT                                                  | 240             | 47.5            | 0.321 | 20     | 0.61 | 0.25 | #4        |  |  |
| PV AC DISCONNECT TO INTERCONNECTION                                           | 240             | 47.5            | 0.321 | 15     | 0.46 | 0.19 | #4        |  |  |

CONTRACTOR SHALL COMPLY WITH SOLAR PROVISIONS 2015 NFPA 1. <http://gezelmanpe.com/Generic/NFPA1.pdf>

SYSTEM: 41-SILFAB SLA-M 300W +  
41-SE P320 OPTIMIZER +  
1-SE114000A-US

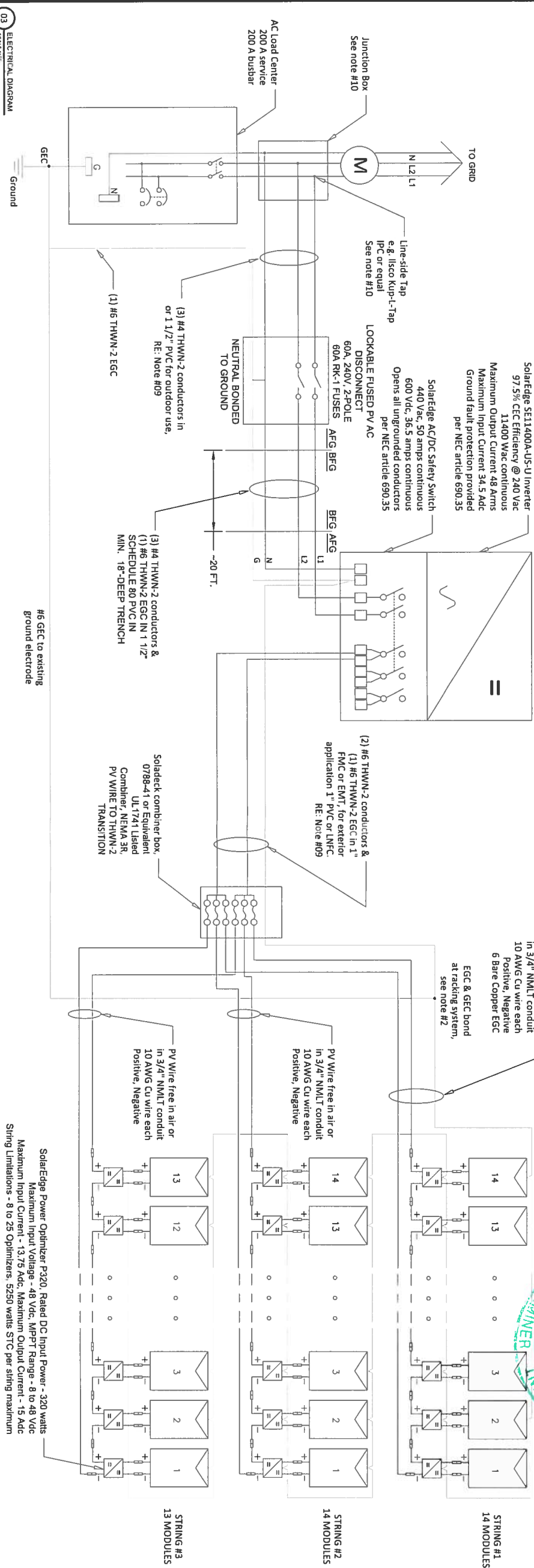
## PV SYSTEM ELECTRICAL DESIGN

THIS PLAN IS CERTIFIED BY ENGINEER OF RECORD AS CODE COMPLIANT & APPROVED FOR FLORIDA USE IN ACCORDANCE WITH HB 1021 ON ELECTRICAL PLANS.  
[http://www.floridabuilding.org/floridacode/2017-education/HB1021\\_Construction.pdf](http://www.floridabuilding.org/floridacode/2017-education/HB1021_Construction.pdf)

1. ALL ASPECTS OF THE ELECTRICAL WORK REQUIRED TO COMPLETE THE PROJECT REPRESENTED IN THIS DOCUMENT SHALL COMPLY WITH THE MANUFACTURER'S RECOMMENDATIONS/SPECIFICATIONS AND ALL CODES, STATUTES, AND STANDARDS ADOPTED BY THE STATE AND THE LOCAL AUTHORITY HAVING JURISDICTION.
2. ALL COMPONENTS MUST BE GROUNDED PER NEC 690.4(D).
3. ALL EQUIPMENT SHALL BE LISTED PER NEC 690.4(D).
4. THE INFORMATION PROVIDED IN THESE DOCUMENTS IS NOT EXHAUSTIVE. IT REMAINS THE CONTRACTOR'S RESPONSIBILITY TO ACHIEVE THE PROPOSED INSTALLATION, IN FULL EXERCISE OF AND COMPLIANCE WITH THE ITEMS IDENTIFIED IN NOTE 1.
5. PER NEC690.17, PROVIDE A WARNING SIGN AT ALL LOCATIONS WHERE TERMINALS OF THE DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION. SIGN SHALL READ "WARNING- ELECTRIC SHOCK HAZARD- DO NOT TOUCH TERMINALS- TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN OPEN POSITION" OR EQUIVALENT.
6. PER NEC705.10, PROVIDE A PERMANENT PLAQUE OR DIRECTORY SHOWING ALL ELECTRIC POWER SOURCES ON THE PREMISES AT SERVICE ENTRANCE.
7. INTERCONNECTION METHOD SHALL COMPLY WITH NEC705.12.
8. PV METER MAY OR MAY NOT BE REQUIRED BY THE AHJ AND/OR UTILITY FOR INTERCONNECTION.
9. CONDUCTOR SIZING OF THIS DESIGN IS BASED ON RACEWAYS LOCATED OUTSIDE ATTICS OR NOT EXPOSED TO DIRECT SUNLIGHT. Exception: Where two different ampacities apply to adjacent portions of a circuit, the higher ampacity shall be permitted to be used beyond the point of transition, a distance equal to 3.0 m (10 ft) or 10 percent of the circuit length figured at the higher ampacity, whichever is less. NEC 310.15 (B)(2)
10. UTILITY CONNECTION SHALL BE MADE BY LINE-SIDE TAP PER NEC ARTICLE 690.64(B)(2) LOCATED WITHIN CODE COMPLIANT ENCLOSURE.
11. ALL CONDUCTORS AND RACEWAYS SHALL BE SUPPORTED ON INTERVALS AND BY METHODS REQUIRED BY THE NEC.
12. CONTRACTOR SHALL PROVIDE ADDITIONAL INFORMATION IF REQUIRED BY AHJ.
13. EOR PREFERS EMAIL COMMUNICATIONS [allen@gezelmanpe.com](mailto:allen@gezelmanpe.com)

## 01 ELECTRICAL NOTES

01.01 SCALE: N/A



## 03 ELECTRICAL DIAGRAM

03.01 SCALE: N/A



SCOPE OF WORK: PV STRUCTURAL PLAN

DESIGNED PER: ASCE 7-14

CONTRACTOR SHALL CHANGE/ADJUST THIS PLAN AS REQUIRED TO SATISFY FBC (INCLUDING REFERENCED STANDARDS), AHJ, JOBSITE CONSTRAINTS, & OEM DOCUMENTATION

I CERTIFY THAT THE SHEETING AND FRAMING OF THIS STRUCTURE WILL SAFELY ACCOMMODATE CALCULATED WIND UPLIFT AND LATERAL FORCES AND EQUIPMENT DEAD LOADS. THIS IS ATTESTED TO BY MY SIGNATURE AND SEAL ON THIS DRAWING AT THE UPPER RIGHT.

FBC 2017 (6<sup>TH</sup> EDITION)  
FLORIDA BUILDING CODE  
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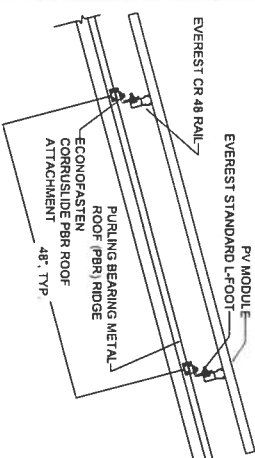
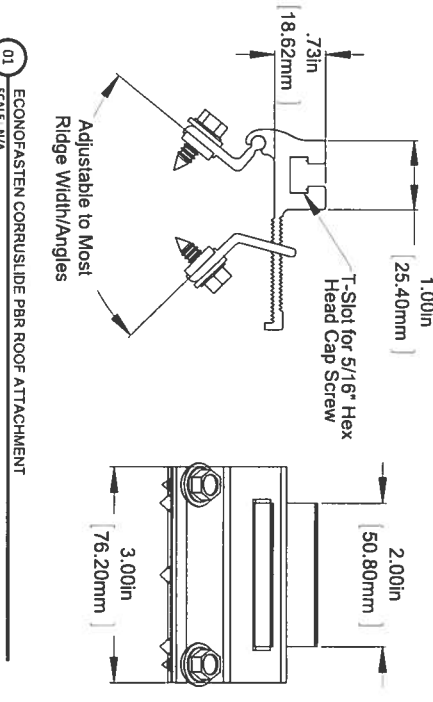
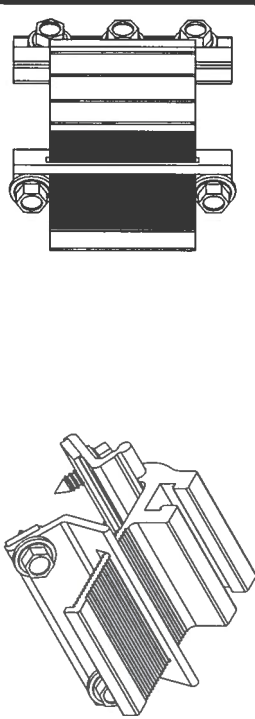
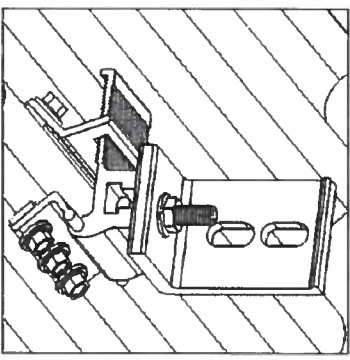
- THIS PLAN SET IS COPYRIGHT PROTECTED AND CONTAINS INTELLECTUAL PROPERTY WHICH BELONGS TO ALLEN GEZELMAN PE.
- ACCESS IS GIVEN TO THE INFORMATION HEREON SOLELY FOR THE PURPOSE OF COMPLETION OF THE PROJECT FOR WHICH IT IS INTENDED.
- NO OTHER USE MAY BE MADE OF THE INFORMATION, DRAWINGS, OR IDEAS WITHOUT THE EXPRESS WRITTEN PERMISSION OF ALLEN GEZELMAN PE.

CONTACT DESIGN TEAM @  
www.GezelmanPE.com

ENGINEER LIABILITY FOR ERROR/OMISSION/FBC LIMITED BY ADEQUACY/ACCURACY OF INFORMATION PROVIDED ENGINEER BY OWNER/CONTRACTOR & TO RESPONSIBILITIES PER EJCDC C-700.  
http://gezelmanpe.com/reference/ag/c-700.pdf

INSTALLATION NOTES - PHOTO-VOLTAIC (PV) SOLAR ENERGY SYSTEM

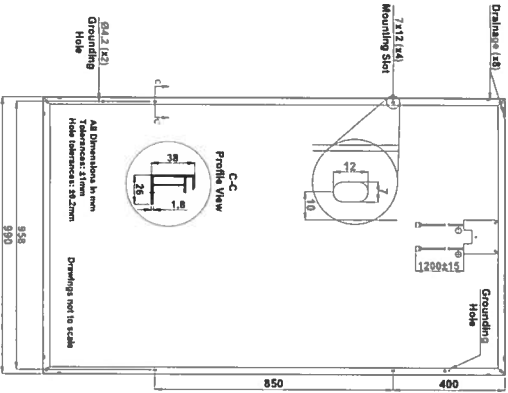
- THIS IS A STRUCTURAL PLAN FOR INSTALLATION OF PV MODULES ON PURLIN BEARING (PBR) METAL ROOF.
- SOLAR EQUIPMENT ADDS LESS THAN 4-PSF GRAVITY LOAD TO STRUCTURE.
- MODULES MAY BE LANDSCAPE OR PORTRAIT.
- CONTRACTOR SHALL ENSURE A MINIMUM 3-FEET CLEARANCE FROM THE ROOF RIDGES AS PER NFPA FIRE ACCESS REQUIREMENTS.
- MODULE GRAVITY & WIND LOADS SHALL BE TRANSMITTED TO RIBS OF PURLIN BEARING R' (PBR) ROOFING METAL OR STANDING SEAMS OF ROOFING METAL USING CORRUSLIDE CLAMPS/BRAKETS SHOWN HEREON.
- CONTRACTOR SHALL INSTALL CORRUSLIDE CLAMPS PER OEM INSTRUCTIONS.
- CONTRACTOR SHALL INSTALL RAILS PERPENDICULAR TO PBR RIBS ON EVEREST CR 48 RAILS ON TOP OF CORRUSLIDE CLAMPS.
- CONTRACTOR TO ENSURE CONTINUITY OF ALL METAL PARTS AND CONNECTIONS OF THIS INSTALLATION TO BE ELECTRICALLY GROUNDED AND BONDED TOGETHER, FOLLOWING LIST OF MATERIALS PER ATTACHMENT ARE TO BE USED BY THE CONTRACTOR:
  - A. Corruslide Slide, Flipper, and Slot Bracket - 6000 Series Aluminum
  - B. 5/16"-18 x 1.5" Fully Threaded Hex Bolt - 18-8 SS
  - C. 5/16"-18 Serrated Flange Nut - 18-8 SS
  - D. #14 x 3/4" Self Tapping Sheet Metal Screws - 18-8 SS
- MAXIMUM ROOF ATTACHMENT SPACING SHALL BE 4-FT CENTER-CENTER (C-C) IN PZ1& PZ2, & NO INSTALLATION IN PZ3. ADJUST C-C SPACING PLUS WINDS UP TO 4-INCHES TO HIT PBR METAL ROOF RIDGES.
- EACH MODULE SHALL ATTACH TO RAILS BY 4-EVEREST STANDARD OR UNIVERSAL MID-CLAMPS &/OR END CLAMPS.
- ADJOINING MODULES SHALL SHARE MODULE CLAMPS.
- IF A CONFLICT SHOULD OCCUR BETWEEN A DRAWING AND/OR SPECIFICATION HEREON AND AN OEM DETAIL, OEM SHALL PREVAIL.
- CONTRACTOR SHALL PROVIDE AHJ SUCH OTHER INFORMATION AS REQUIRED.
- FOR (ENGINEER OF RECORD) PREFERRED EMAIL COMMUNICATIONS: allen@gezelmanpe.com



03 SHINGLE FRAMING ATTACHMENT  
SCALE NTS

| LOAD       | Roof Slope 7 - 37 Degrees  | Key   |
|------------|----------------------------|-------|
|            | Rail Spacing, Zone 1, Ep 8 |       |
| Wind (mph) | 4"                         | 8"    |
| 110        | CR 48 S                    | CR 48 |
| 130        |                            | CR 80 |
| 150        |                            |       |
| 170        |                            |       |

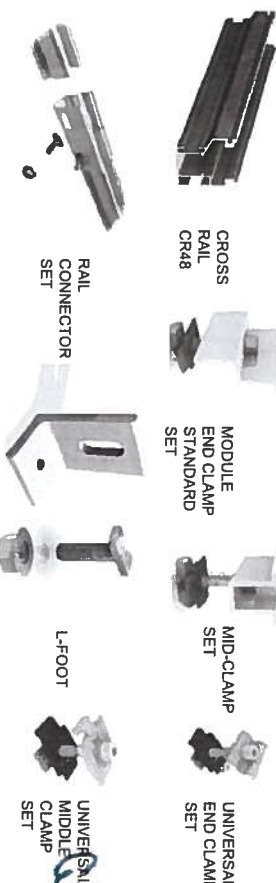
PROJECT RAIL TYPE: CR 48  
PROJECT ATTACHMENT SPACING:  
PZ1: 4 FEET  
PZ2: 4 FEET  
PZ3: NO INSTALLATION



07 SILEX SLAM 300W  
SCALE NTS

WIND  
V<sub>ult</sub> 120 / V<sub>asf</sub> 93.0-MPH, RISK II,  
EXPOSURE B, PZ2-WIDTH 3 FT,  
H<sub>wc</sub> < 15 FT. & 7' < ROOF SLOPE < 27°  
WORST CASE WIND FORCE IS UPLIFT (PSF):  
PZ1-11.8, PZ2-21.1, PZ3-30.8

EVEREST™ CROSSRAIL COMPONENTS.  
SCALE N/A

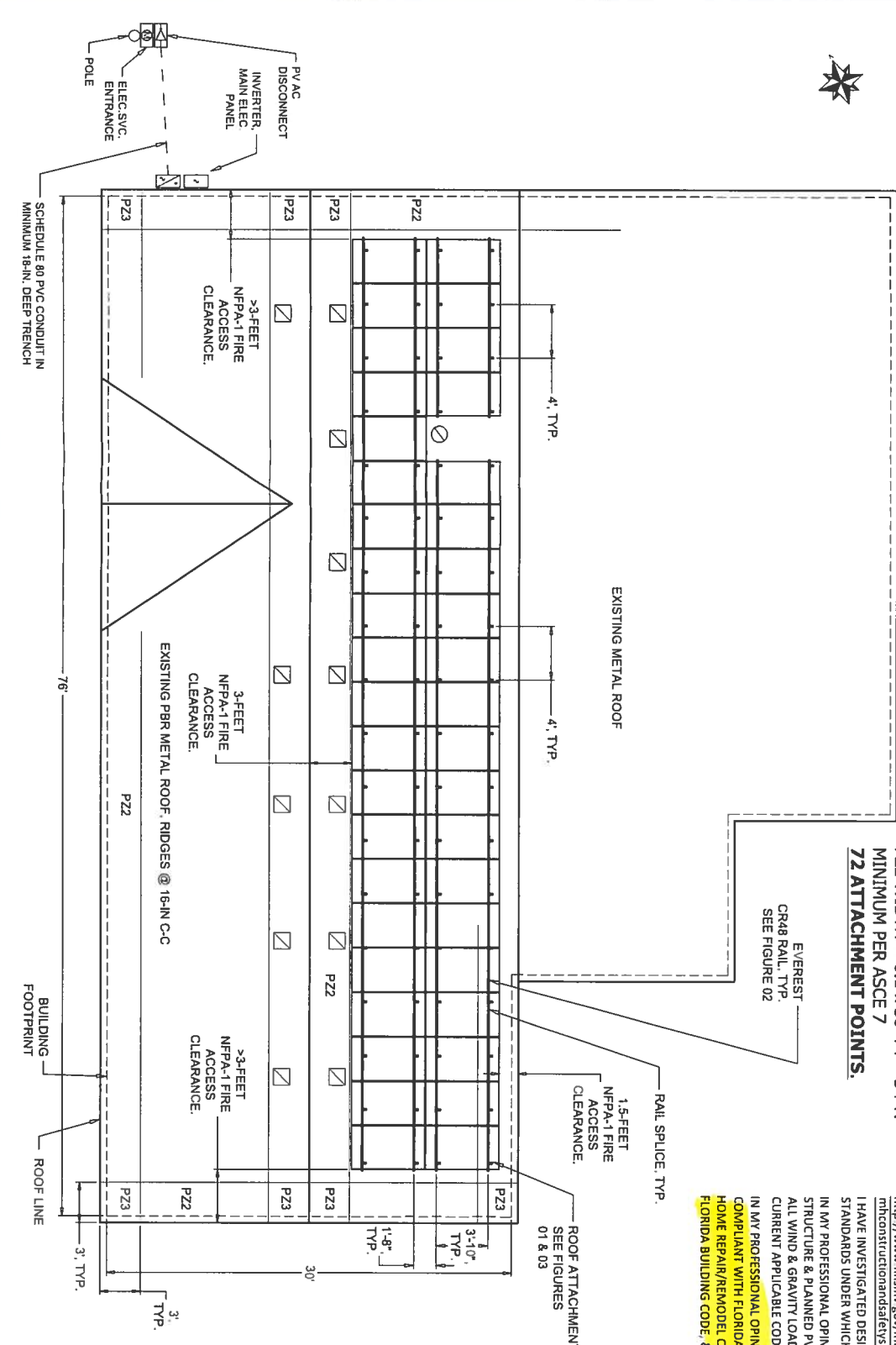


06 SITE AERIAL VIEW  
SCALE NTS



41- 60-CELL PV MODULES.  
TOTAL 740-SF OF PV  
PZ2 WIDTH = 0.1 x LEAST HOR. DIM.  
PZ2 WIDTH = 0.1 x 30 FT = 3 FT.  
MINIMUM PER ASCE 7  
72 ATTACHMENT POINTS.

MOBILE HOME HUD TAG ID # GE01488672  
MOBILE HOME IN QUESTION IS CERTIFIED BY HUD/FL INSPECTION LABEL TO MEET HIGH CONSTRUCTION STANDARDS AS EXPLAINED PROGRAM SUMMARY  
http://www.fhmy.gov/mobilehome/mhconstructionstandards.pdf  
I HAVE INVESTIGATED DESIGN, CONSTRUCTION, & INSPECTION STANDARDS UNDER WHICH THIS MOBILE HOME WAS BUILT.  
IN MY PROFESSIONAL OPINION, SUBJECT MOBILE HOME STRUCTURE & PLANNED PV INSTALLATION ARE ADEQUATE FOR ALL WIND & GRAVITY LOADING CASES PREDICTED PER CURRENT APPLICABLE CODE & ASCE 7.  
IN MY PROFESSIONAL OPINION, PLANNED PV INSTALLATION IS COMPLIANT WITH FLORIDA STATUTE 15C-2.0081 (MOBILE HOME REPAIR/REMODEL CODE, MEETS 2017 (6TH EDITION) FLORIDA BUILDING CODE, & SATISFIES MY DESIGN INTENT.



08 PLAN VIEW  
SCALE 3/16" = 1'-0"

CONTRACTOR:  
SolarTechElec LLC  
SOLAR TECH ELEC LLC  
Clearwater, Florida  
FL 33759  
Tel: (727) 488-8634

GREENE JAMES A & CHERYL J  
1021 NW EVERETT TERR  
WHITE SPRINGS, FL 32096  
PARCEL ID:20-2S-16-01657-011

AL-SITE-GREENE  
STRUCTURAL  
19.MAR.19