

*Timothy Horstman*  
*64 E Bay Front Rd*  
*Deale, MD 20751*

To Whom it May Concern,

I am writing this letter to request a variance for us to put a ground mounted solar array on our property. At this time, the only existing structure is our house which has a 1246 square foot footprint and is 28 feet two inches high. The house is setback 40 feet or greater from all of the property lines. There is no concern for high water or critical area at our location. The panels themselves are angled and are 24 inches high at the lowest and 113 inches high at the highest. They will account for approximately 992 square feet in two arrays. One is approximately 448 square feet and the other is 544 square feet.

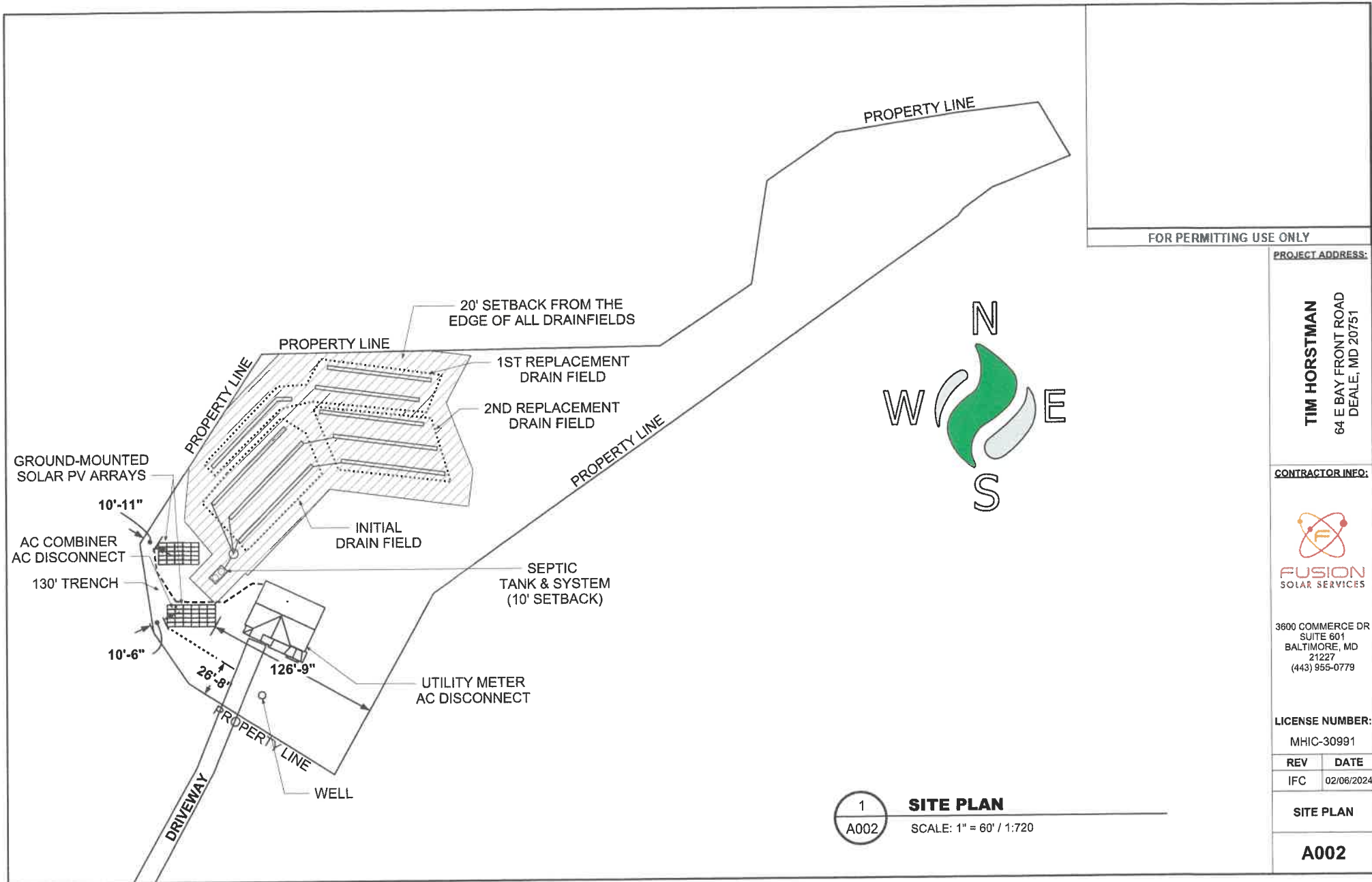
In consultation with Lumina Solar, our solar contractor, we evaluated several different locations on the property and settled on the current location due to it being the optimal location for solar production. The location provides for the best solar exposure throughout the year compared to the other locations and, in turn, will provide the highest efficiency for solar energy. The neighboring property completely surrounds our tract and all of the wooded area surrounding is in property conservation. Our neighbor who owns that property has been out to see the proposed location and has not voiced any concerns that she has. Our original location would have been set back a little further and potentially avoided protruding into the front yard, however we are confined to an area so as to not encroach on the septic system and the 20 foot septic setback.

Finally, this location is also ideal because we will be able to relatively isolate it from the play area. We want the ability to isolate the array from the yard to keep our kids from being enticed into playing on or around the arrays. Although they are intrinsically safe, we do not want potential injuries from climbing or falling from any of the equipment. The proposed location puts the arrays away from the kids' play area and therefore will be safer for our family.

Thank you for considering our request and please feel free to reach out to us with any questions regarding our proposal.

Respectfully,

Timothy Horstman



FOR PERMITTING USE ONLY

PROJECT ADDRESS:

**TIM HORSTMAN**  
 64 E BAY FRONT ROAD  
 DEALE, MD 20751

CONTRACTOR INFO:



3600 COMMERCE DR  
 SUITE 601  
 BALTIMORE, MD  
 21227  
 (443) 955-0779

LICENSE NUMBER:

MHIC-30991

REV	DATE
IFC	02/06/2024

SITE PLAN

**A002**

1  
A002

**SITE PLAN**

SCALE: 1" = 60' / 1:720

# SOLAR PV SYSTEM: 20.35 kWp

## HORSTMAN RESIDENCE

64 E BAY FRONT ROAD DEALE MD UNITED STATES 20751

### PROJECT INFORMATION

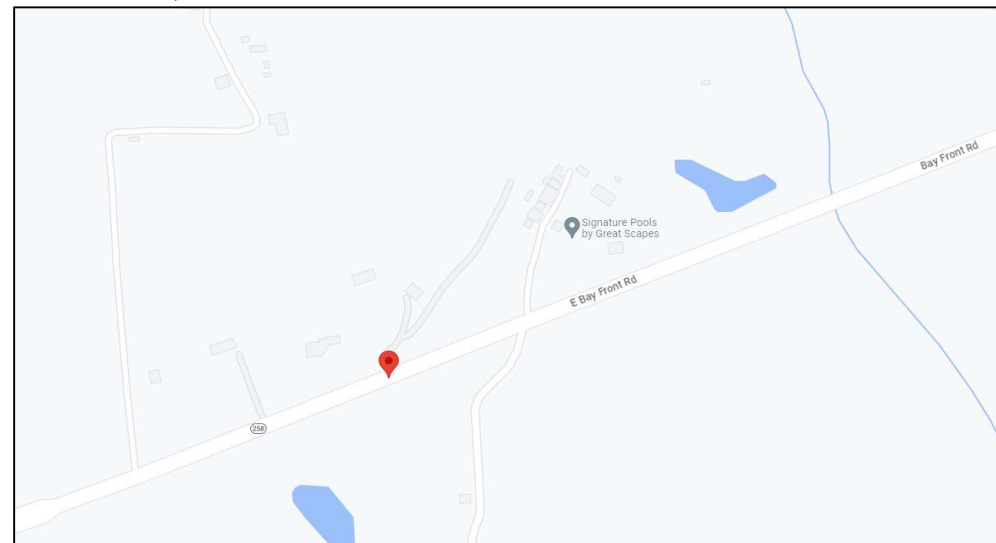
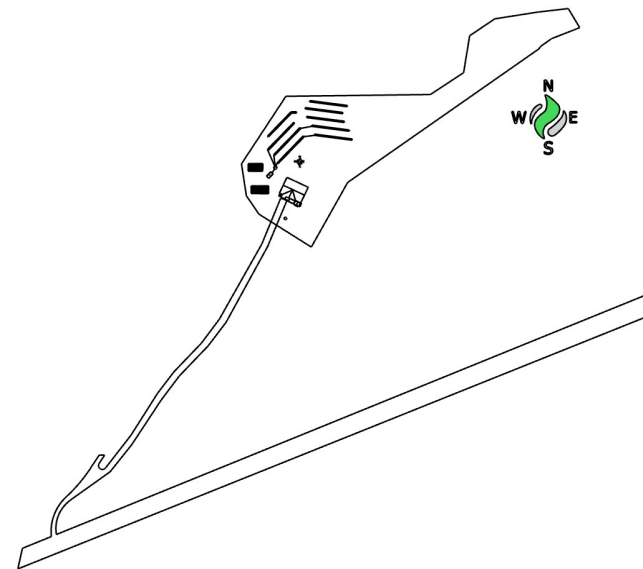
**OWNER:** TIM HORSTMAN  
**ADDRESS:** 64 E BAY FRONT ROAD DEALE MD UNITED STATES 20751

**AHJ:** ANNE ARUNDEL COUNTY  
**ADDRESS:** 2664 RIVA ROAD ANNAPOLIS, MARYLAND 21401

**ZONING:** RESIDENTIAL  
**BUILDING CODE:** IBC 2018  
**ELECTRICAL CODE:** NEC 2017  
**ASCE VERSION:** ASCE 7-16

**SNOW LOAD:** 25 PSF  
**WIND SPEED:** 115 MPH  
**WIND EXPOSURE:** B

**DC RATING:** 20.35 kW  
**AC RATING:** 15.95 kW  
**RACKING:** SOLAR FOUNDATIONS GROUND MOUNT  
**MODULE:** (55) ZXMG-NH120 Series 370W  
**INVERTER:** (55) IQ8PLUS-72-2-US



### FOR PERMITTING USE ONLY

### PROJECT SCOPE

THIS PROJECT INVOLVES THE INSTALLATION OF (55) ZNSHINE 370W ALL BLACK SOLAR MODULES. THE SOLAR MODULES WILL BE RACKED USING A PRE-ENGINEERED RACKING SYSTEM. THE RACKED MODULES WILL BE ELECTRICALLY CONNECTED TO (55) ENPHASE DC TO AC POWER INVERTERS, AND INTERCONNECTED TO THE LOCAL UTILITY USING MEANS AND METHODS CONSISTENT WITH THE RULES ENFORCED BY THE LOCAL UTILITY AND PERMITTING JURISDICTION.

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**FUSION**  
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IFC	11/14/2023

### COVER

**Z001**

INDEX OF PAGES	
Z001	COVER PAGE
A001 - A002	ATTACHMENT & SITE PLAN
S001 - S003	ASSEMBLY & LOAD CALCS
E001	ELECTRICAL - LINE DIAGRAM
E002	ELECTRICAL - WIRE CALCS
E003	STRING & CONDUIT LAYOUT
E004	EQUIP. RATINGS & SIGNAGE

### GENERAL NOTES

- 1) THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURERS'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION (AHJ).
- 2) ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE AND AS REQUIRED BY THE NEC AND AHJ.

3) PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE SHOCK HAZARD FOR EMERGENCY RESPONDERS

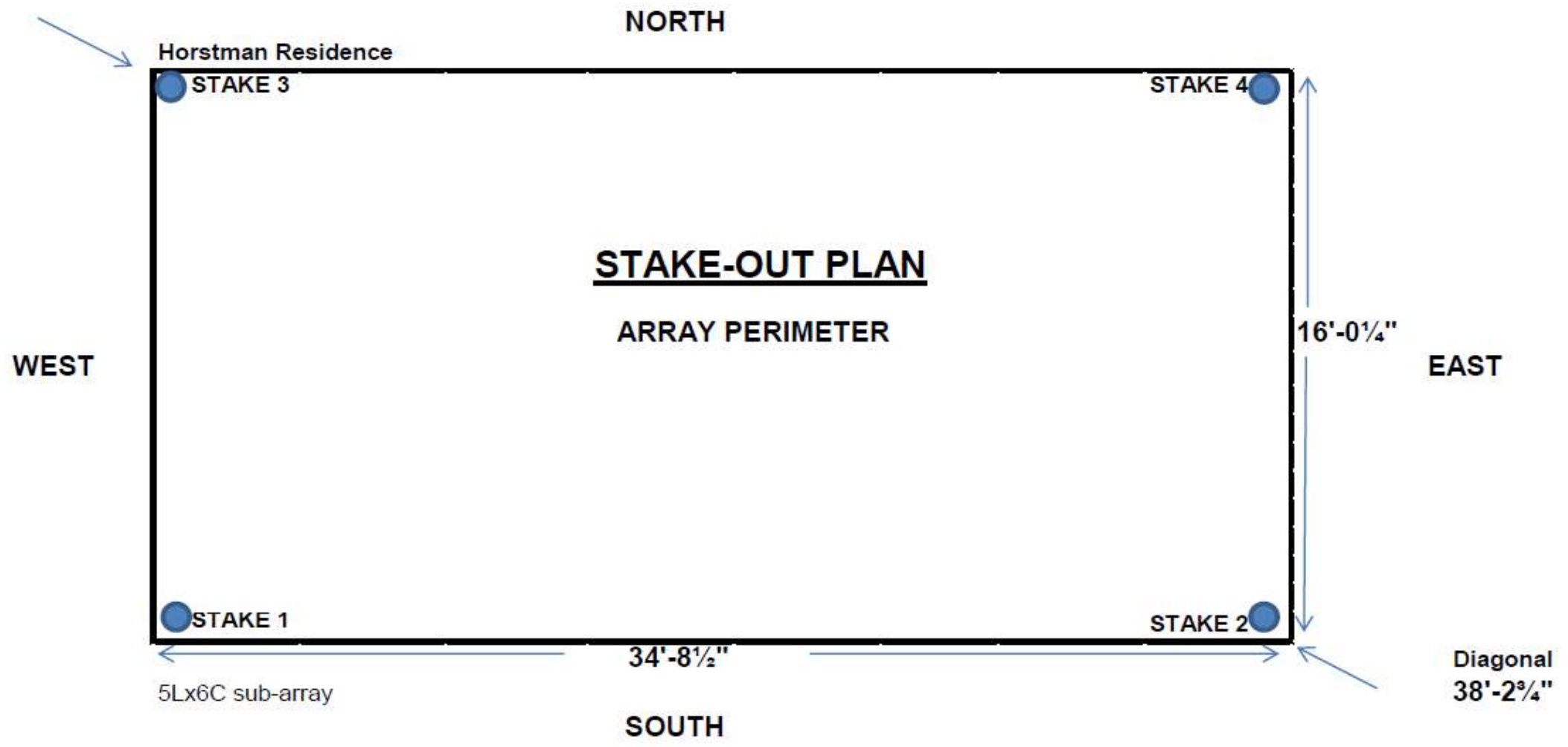
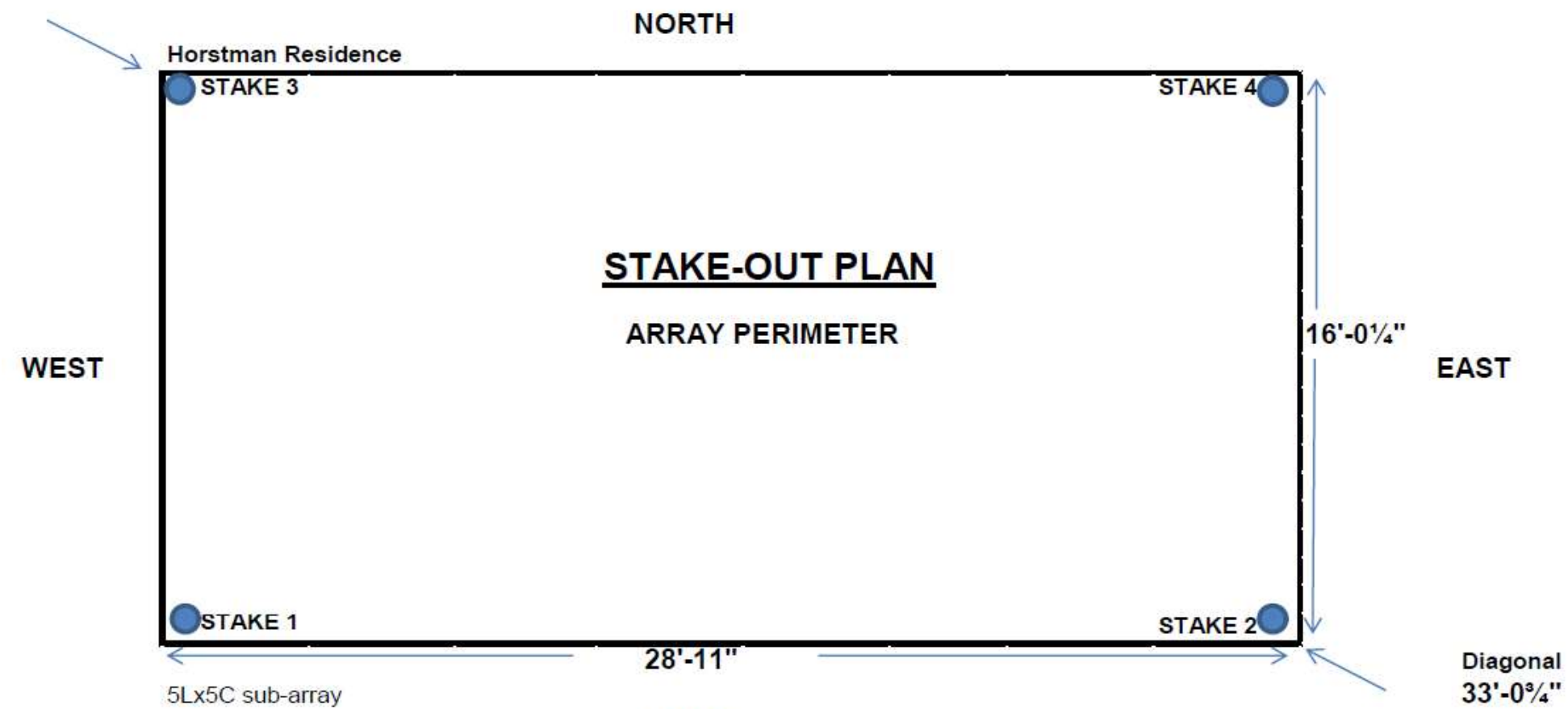
4) THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM, AND THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE.

James C Douglas



Professional Certification. I hereby certify that these documents were prepared or approved by me and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 40027, Expiration Date: 3/15/25.

FOR ENGINEERING USE ONLY



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TIM HORSTMAN  
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 DEALE MD UNITED  
 STATES 20751

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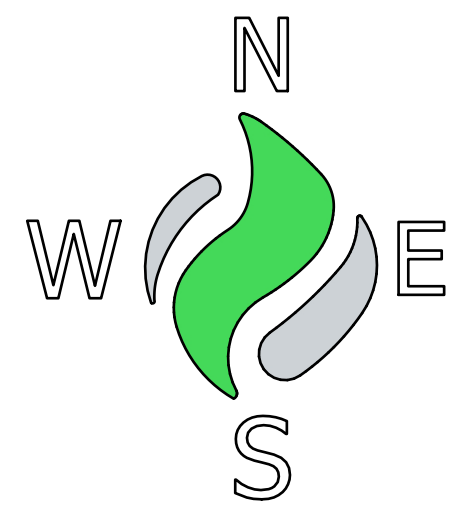
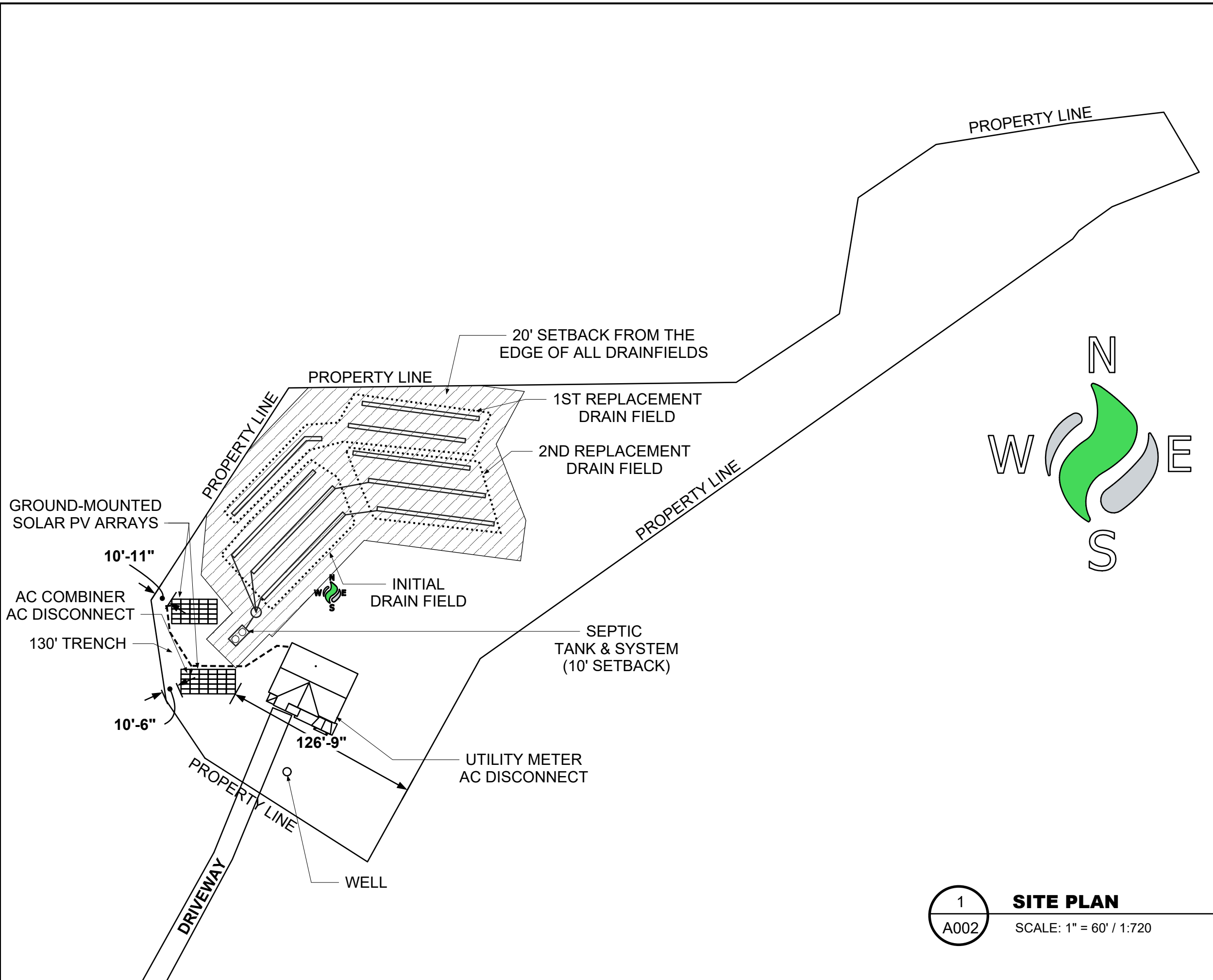
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**ATTACHMENT PLAN**

**A001**



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SITE PLAN

**A002**

1  
A002

**SITE PLAN**

SCALE: 1" = 60' / 1:720



FOR PERMITTING USE ONLY

**PROJECT ADDRESS:**

TIM HORSTMAN  
64 E BAY FRONT ROAD  
DEALE MD UNITED  
STATES 20751

**CONTRACTOR INFO:**



**FUSION**  
SOLAR SERVICES

3600 COMMERCE DR  
SUITE 601  
BALTIMORE, MD 21227  
(443) 955-0779

**LICENSE NUMBER:**

MHIC-30991

REV	DATE
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**ASSEMBLY &  
LOAD CALCS**

**S001**

Site Design Conditions

Basic Wind Speed: (Risk Category II)	112 MPH	Max. Leg Axial Bearing:	3,490 lbs
Basic Wind Speed: (Risk Category I)	104 MPH	Max. Leg Uplift:	2,325 lbs
Exposure Category:	C	Max. Lateral Resistance:	1,715 lbs
Ground Snow Load:	25 PSF	Top Rail Max. Loading:	95.5 plf
Flat Roof Snow Load:	N/A	Helical Pile Depth:	60" Min
Site Contour:	<5 Degree Slope		

5Lx5C Sub-Array Design Conditions

Front Leg Height:	34½"	Array Tilt Angle:	25 Degrees
Rear Leg Height:	82"	Front Edge Ground Clearance:	24"
North-South Leg Spacing:	102"	Overall Array East-West Dim:	28'-11"
West Span Leg Spacing:	10'-6"	Number of Modules/Sub-Array:	25
East Span Leg Spacing:	10'-6"	Number of Sub-Arrays:	1
Quantity Center Spans:	0	Module Columns/Sub-Array:	5
Center Span Leg Spacing:	N/A	Number of Module Rows:	5
East & West Overhang:	3'-3"	Module Orientation:	Landscape
Overall Beam Length:	27'-6"	Module Column Spacing:	3"
Horizontal Beam Material:	5"x4"½" HSS	Module Row Spacing:	4"
Top Rail Material:	SF Rails	Module Model:	ZXM6-NH120
Qty Rails per Panel:	2	Module Size:	40.87" x 69.09"
Top Rail Length:	212"	Individual Module Rating:	370 watt
Top Rail Center Span:	112½"	Sub Array Power Rating:	9.25 kw
Top Rail Overhangs:	49¾"	Total System Power Rating:	20.35 kw

5Lx6C Sub-Array Design Conditions

Front Leg Height:	34½"	Array Tilt Angle:	25 Degrees
Rear Leg Height:	82"	Front Edge Ground Clearance:	24"
North-South Leg Spacing:	102"	Overall Array East-West Dim:	34'-9"
West Span Leg Spacing:	12'-6"	Number of Modules/Sub-Array:	30
East Span Leg Spacing:	12'-6"	Number of Sub-Arrays:	1
Quantity Center Spans:	0	Module Columns/Sub-Array:	6
Center Span Leg Spacing:	N/A	Number of Module Rows:	5
East & West Overhang:	4'-0"	Module Orientation:	Landscape
Overall Beam Length:	33'-0"	Module Column Spacing:	3"
Horizontal Beam Material:	5"x4"½" HSS	Module Row Spacing:	4"
Top Rail Material:	SF Rails	Module Model:	ZXM6-NH120
Qty Rails per Panel:	2	Module Size:	40.87" x 69.09"
Top Rail Length:	212"	Individual Module Rating:	370 watt
Top Rail Center Span:	112½"	Sub Array Power Rating:	11.10 kw
Top Rail Overhangs:	49¾"	Total System Power Rating:	20.35 kw

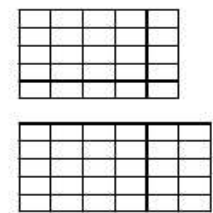
1. Additional North Column is to be installed per field direction. The Column is to support equipment mounting needs. It is not required for North beam support.

James C Douglas  
Professional Engineer

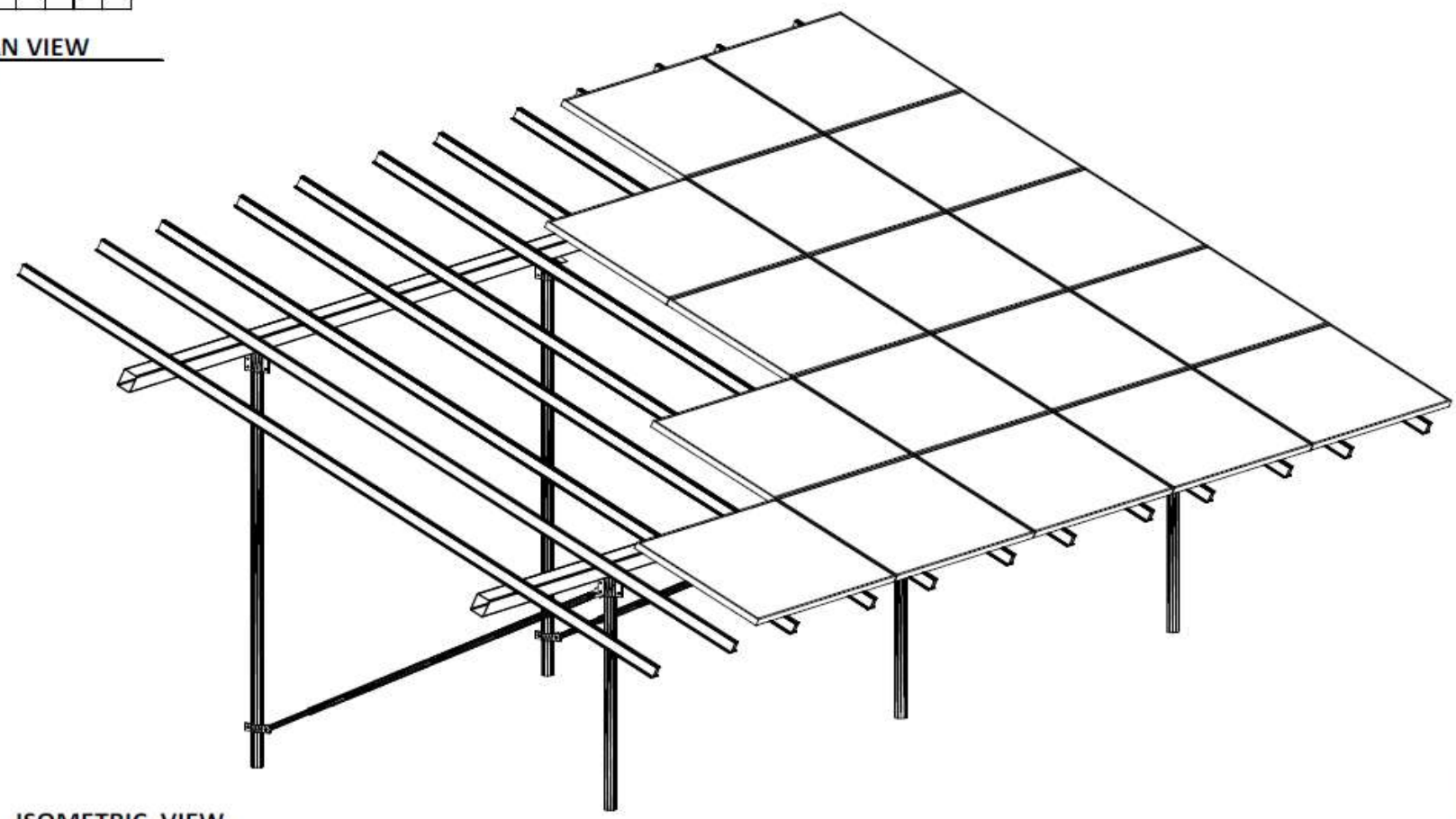


Professional Certification. I hereby certify that these documents were prepared or approved by me and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 40027, Expiration Date: 3/15/25.

All design work has been performed in accordance with the Maryland Building Performance Standards Regulations including, but not limited to, the 2018 International Building Code with the Department of Labor, Licensing and Regulation modifications (ref: COMAR 09.12.51).  
Net design pressures were calculated in accordance with ASCE 7-16 section 27.3.2, "Open Buildings with Monoslope, Fitched, or Troughed Roofs". All load cases were evaluated in determining the limiting design conditions. The data table above provides the results for the limiting load case. Maximum leg reaction forces represent the highest load condition seen by any leg in the structure. All legs in the structure are designed to meet the maximum load conditions.



PLAN VIEW  
N.T.S.



ISOMETRIC VIEW  
N.T.S.

**SHEET 1 OF 3**

DATE	REVISION	DRAWN BY	REVIEW BY
07/03/2023	ORIGINAL	JB	JD
09/06/2023	REV 1 - CHANGED TO (1)-5Lx5C & (1)-5Lx6C	JB	JD

**LUMINA SOLAR**

-PROJECT-  
HORSTMAN RESIDENCE  
64 EAST BAY FRONT ROAD  
DEALE, MD 20751

**Solar Foundations USA**

1142 River Road, New Castle, DE 19720 Ph: (855) 738-7200 Fax: (866) 644-5665

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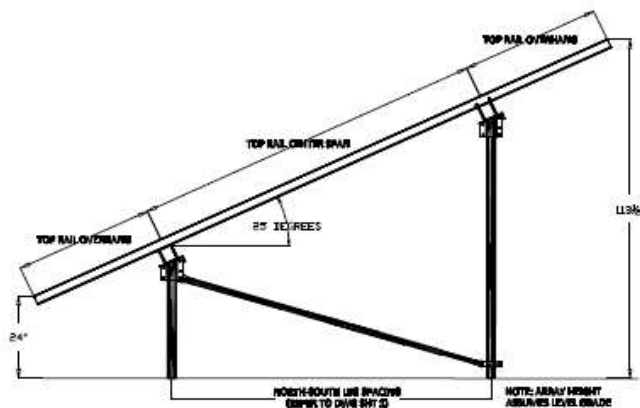
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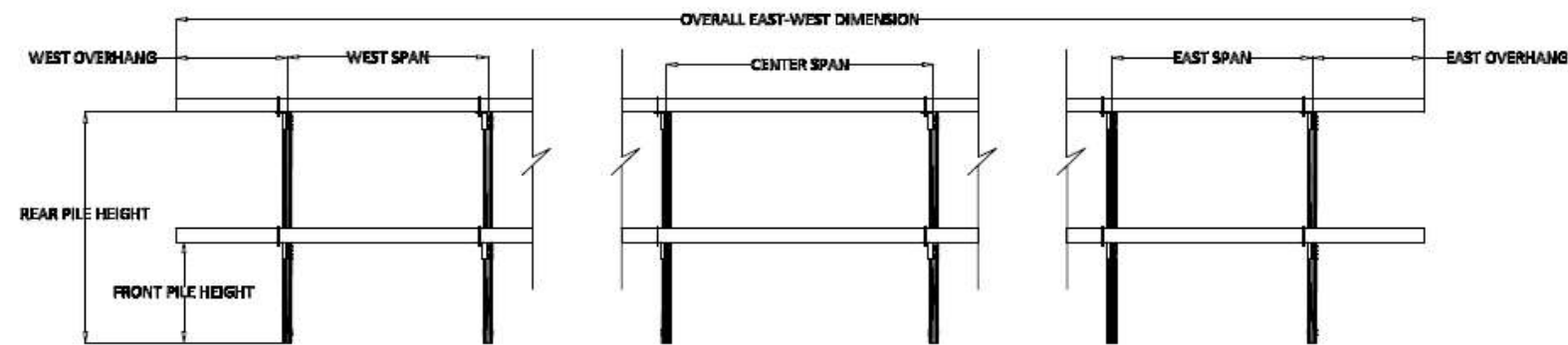
**ASSEMBLY & LOAD CALCS**

**S002**



**SIDE ELEVATION**

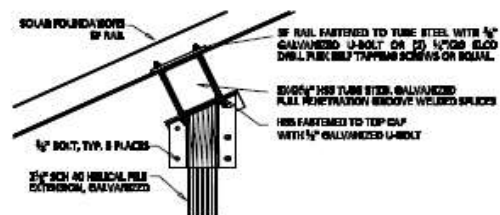
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**PILE SPACING ELEVATION**

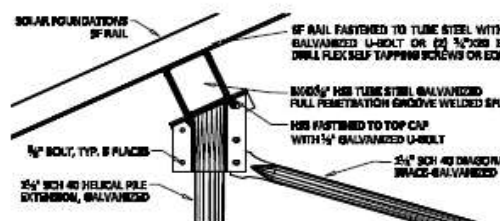
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REFER TO DWG SHEET 1 FOR EAST-WEST PILE SPANS AND FRONT AND REAR PILE HEIGHTS



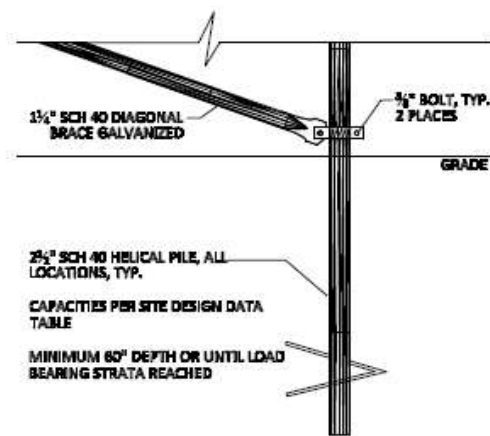
**UPPER CAP DETAIL**

N.T.S.



**LOWER CAP DETAIL**

N.T.S.



**HELICAL PILE DETAIL**

N.T.S.

2 1/2" SCH 40 HELICAL PILE, ALL LOCATIONS, TYP.  
 CAPACITIES PER SITE DESIGN DATA TABLE  
 MINIMUM 60" DEPTH OR UNTIL LOAD BEARING STRATA REACHED

James C Douglas  
Digitally signed by James C Douglas  
 DN: c=US, o=New York, ou=Professional Engineers, cn=James C Douglas  
 Date: 2023.08.07 12:13:54 -0400



Professional Certification. I hereby certify that these documents were prepared or approved by me and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 40027, Expiration Date: 3/15/25.

**SHEET 2 OF 3**

DATE	REVISION	DRAWN BY:	REVIEW BY:
07/03/2023	ORIGINAL	JB	JD
09/06/2023	REV 1 - CHANGED TO (1)-5Lx5C & (1)-5Lx6C	JB	JD

**LUMINA SOLAR**

-PROJECT-  
 HORSTMAN RESIDENCE  
 64 EAST BAY FRONT ROAD  
 DEALE, MD 20751

**Solar Foundations USA**

1142 River Road, New Castle, DE 19720 Ph: (855) 738-7200 Fax: (866) 644-5665



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**PROJECT ADDRESS:**

**TIM HORSTMAN**  
 64 E BAY FRONT ROAD  
 DEALE MD UNITED  
 STATES 20751

**CONTRACTOR INFO:**



**FUSION**  
 SOLAR SERVICES

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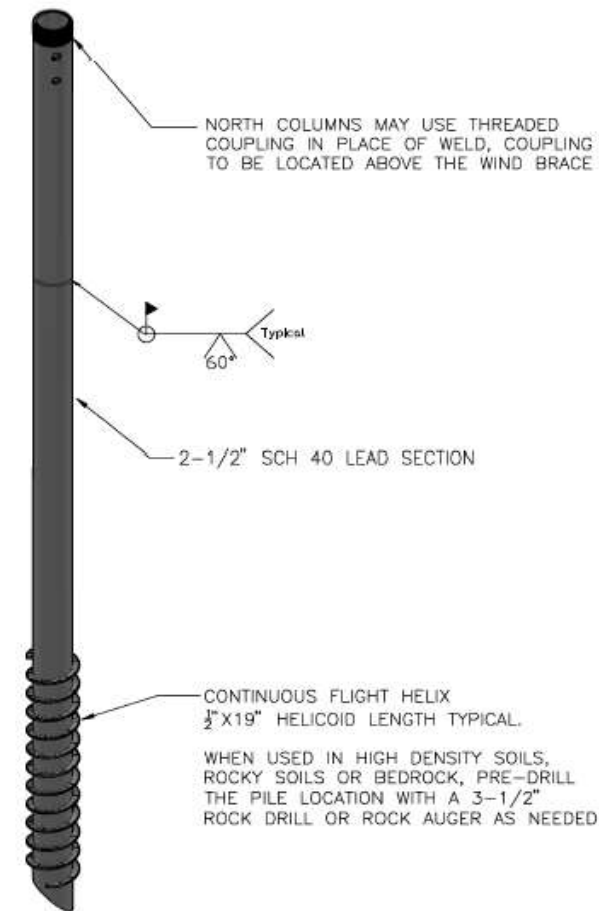
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**ASSEMBLY &  
 LOAD CALCS**

**S003**



**HELICAL PILE DETAIL**  
 N.T.S.

**SPECIFICATION REQUIREMENTS:**

THE FOLLOWING MATERIAL SPECIFICATION REQUIREMENTS PERTAIN TO THE FABRICATION OF THE SOLAR FOUNDATIONS USA GROUND MOUNT SOLAR SUPPORT STRUCTURE AS INDICATED ON THESE DRAWINGS.

1. SOLAR FOUNDATION ALUMINUM RAILS SHALL CONFORM TO ASTM B221.
2. STRUCTURAL STEEL TUBING SHALL BE ASTM A500 HIGH YIELD (60 KSI).
3. STEEL PIPE FOR PILES SHALL CONFORM TO ASTM A500 GRADE C.
4. STEEL PILE EXTENSIONS SHALL BE ASTM A53 GRADE B.
5. STEEL PIPE FOR DIAGONAL BRACING SHALL BE ASTM A53 GRADE A.
6. FABRICATED STEEL PLATE FOR COLUMN CAP ASSEMBLIES, BRACING CLAMPS, ETC. SHALL BE ASTM A36 OR A1011.
7. STEEL BOLTS FOR CAP FASTENERS SHALL CONFORM TO SAE J429 GRADE 5. ALL OTHER BOLTS SHALL CONFORM TO SAE J429 GRADE 5 OR BETTER.
8. STEEL U-BOLTS SHALL CONFORM TO ASTM 1018.
9. USS FLAT STEEL WASHERS SHALL CONFORM TO ASTM F844 AND NUTS FOR STEEL CONNECTIONS SHALL CONFORM TO ASTM A563 GRADE A.
10. ALL FIELD WELDING SHALL CONFORM TO AWS D1.1/D1.1M -STRUCTURAL WELDING CODE REQUIREMENTS.
11. ALL STEEL SHALL BE HOT-DIP GALVANIZED PER ASTM A123 OR A153 AFTER ALL FABRICATION HAS BEEN COMPLETED.

**INSTALLATION REQUIREMENTS:**

1. THE MINIMUM AVERAGE INSTALLATION TORQUE REQUIRED TO OBTAIN THE REQUIRED INDICATED CAPACITIES AND THE MINIMUM INSTALLATION DEPTH SHOWN ON THE PLANS SHALL BE SATISFIED PRIOR TO TERMINATION OF THE INSTALLATION. THE INSTALLATION TORQUE SHALL BE AN AVERAGE OF THE INSTALLATION TORQUES INDICATED DURING THE LAST 1 FOOT OF INSTALLATION.
2. THE TORSIONAL STRENGTH RATING OF THE TORQUE ANCHOR SHALL NOT BE EXCEEDED DURING THE INSTALLATION. IF THE TORSIONAL STRENGTH LIMIT OF THE ANCHOR HAS BEEN REACHED, BUT THE ANCHOR HAS NOT REACHED THE TARGET DEPTH, PERFORM THE FOLLOWING:
  - 2.1. IF THE TORSIONAL STRENGTH LIMIT IS ACHIEVED PRIOR TO REACHING THE TARGET DEPTH, THE INSTALLATION MAY BE ACCEPTABLE IF REVIEWED AND APPROVED BY THE ENGINEER.
  - 2.2. THE INSTALLER MAY REMOVE THE TORQUE ANCHOR AND INSTALL A NEW ONE WITH SMALLER DIAMETER HELICAL PLATE.
  - 2.3. IF USING A CONTINUOUS FLIGHT PILE, PRE-DRILL THE PILE LOCATION WITH A 3-1/2" ROCK AUGER OR 3-5/8" ROCK DRILL AS NEEDED.
3. IF THE TARGET DEPTH IS ACHIEVED, BUT THE TORSIONAL REQUIREMENT HAS NOT BEEN MET THE INSTALLER MAY DO ONE OF THE FOLLOWING:
  - 3.1. INSTALL THE TORQUE ANCHOR DEEPER TO OBTAIN THE REQUIRED CAPACITY
  - 3.2. REMOVE THE TORQUE ANCHOR AND INSTALL A NEW ONE WITH A LARGER DIAMETER HELICAL PLATE OR ONE WITH MULTIPLE HELICAL PLATES.
  - 3.3. REDUCE THE LOAD CAPACITY ON THE INDIVIDUAL TORQUE ANCHOR BY PROVIDING ADDITIONAL TORQUE ANCHORS AT A REDUCED SPACING.

James C Douglas  
Digitally signed by James C Douglas  
 DN: cn=JD, o=New York, email=jd@141302800136323.ATC000MAG05.cru, James C Douglas  
 Date: 2023.06.07 13:11:04 -0400



Professional Certification. I hereby certify that these documents were prepared or approved by me and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 40027, Expiration Date: 3/15/25.

**SHEET 3 OF 3**

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**CONDUCTOR AND CONDUIT SCHEDULE**

TAG	WIRE SIZE	GROUND SIZE	WIRE TYPE	DESCRIPTION	CONDUIT SIZE	CONDUIT TYPE	LENGTH
SEU	#2/0 AL	N/A	SEU	(2) PHASE CONDUCTORS & (1) NEUTRAL	N/A	N/A	5'
A	#12 AWG	#6 AWG	Q-CABLE	(2) PHASE CONDUCTORS & (1) BARE COPPER IN FREE AIR	N/A	N/A	77' (MAX)
B	#10 AWG	#8 AWG	THWN-2	(6) PHASE CONDUCTORS & (1) GROUND	0.75"	EMT	15'
C	#3 AWG	#8 AWG	THWN-2	(2) PHASE CONDUCTORS & (1) NEUTRAL & (1) GROUND	1.25"	EMT	5'
D	#3 AWG	#8 AWG	THWN-2	(2) PHASE CONDUCTORS & (1) NEUTRAL & (1) GROUND	1.25"	EMT	5'
E	#2 AWG	#8 AWG	THWN-2	(2) PHASE CONDUCTORS & (1) NEUTRAL & (1) GROUND	1.25"	Sch40PVC	70'
F	#2 AWG	#8 AWG	THWN-2	(2) PHASE CONDUCTORS & (1) NEUTRAL & (1) GROUND	1.25"	EMT	90'
G	#8 AWG	#8 AWG	THWN-2	(4) PHASE CONDUCTORS & (1) GROUND	0.75"	EMT	25'
H	#8 AWG	#8 AWG	THWN-2	(4) PHASE CONDUCTORS & (1) GROUND	1"	Sch40PVC	60'

**EQUIPMENT SCHEDULE**

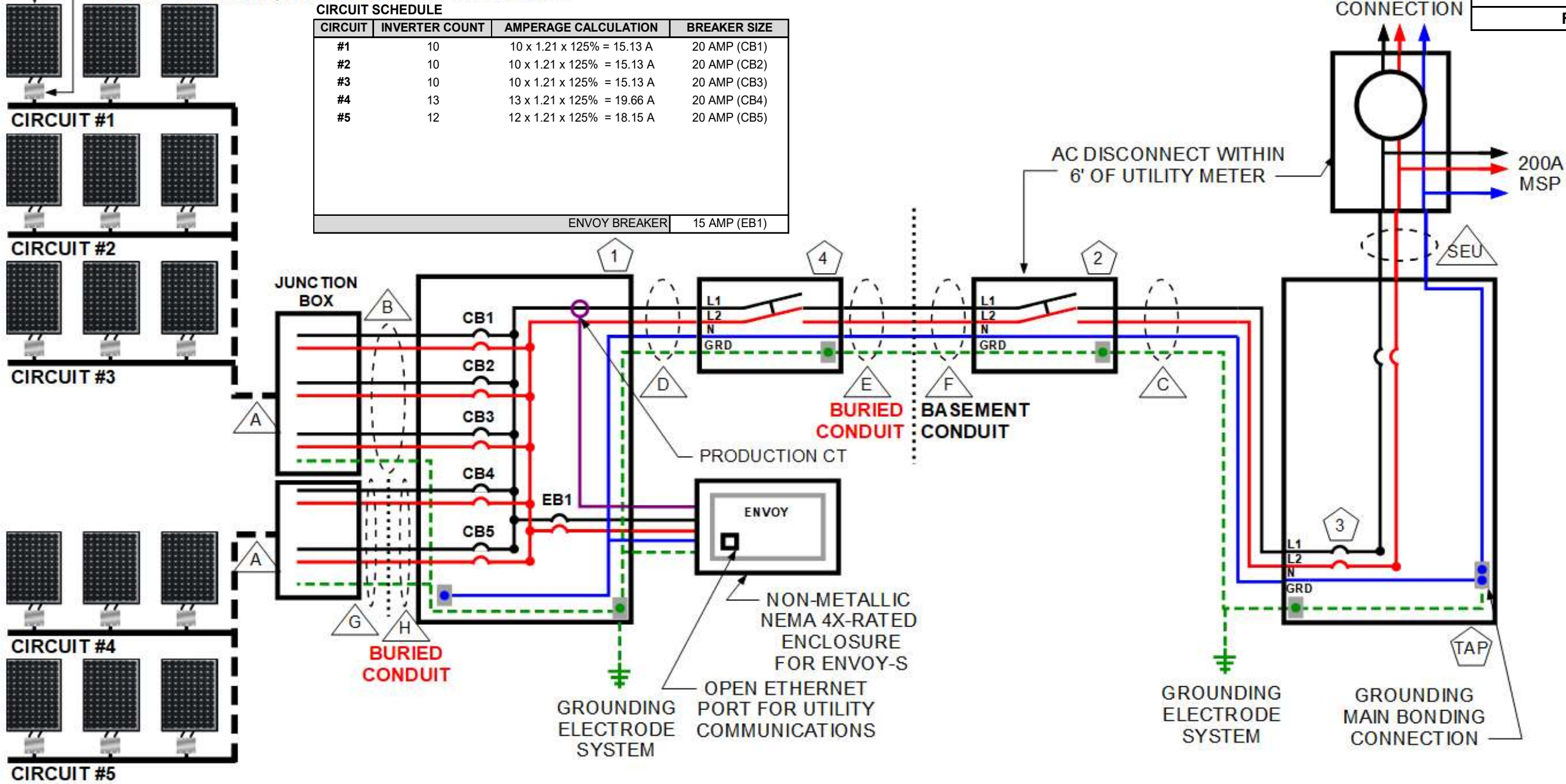
TAG	EQUIPMENT DETAILS	MOUNTING LOCATION
TAP	200 AMP EATON BR MAIN SERVICE PANEL WITH 150 AMP MAIN BREAKER (400 AMP SERVICE)	SURFACE-MOUNTED ON WALL OPPOSITE UTILITY METER
1	100A MAIN LUG LOADCENTER PV COMBINER PANEL WITH CIRCUITS AS LISTED IN TABLE	MOUNTED AT GROUND-MOUNTED SOLAR PV ARRAY
2	SERVICE RATED 100A NEMA3R NON-FUSED DISCO (MODEL #DU323RB)	MOUNTED ADJACENT TO UTILITY METER
3	90A SOLAR PV BACKFED BREAKER	INSTALLED IN EATON BR MAIN SERVICE PANEL
4	SERVICE RATED 100A NEMA3R NON-FUSED DISCO (MODEL #DU323RB)	MOUNTED AT GROUND-MOUNTED SOLAR PV ARRAY

SOLAR MODULE; SEE PAGE E004 FOR RATINGS  
MICRO-INVERTER; SEE PAGE E004 FOR RATINGS

**CIRCUIT SCHEDULE**

CIRCUIT	INVERTER COUNT	AMPERAGE CALCULATION	BREAKER SIZE
#1	10	10 x 1.21 x 125% = 15.13 A	20 AMP (CB1)
#2	10	10 x 1.21 x 125% = 15.13 A	20 AMP (CB2)
#3	10	10 x 1.21 x 125% = 15.13 A	20 AMP (CB3)
#4	13	13 x 1.21 x 125% = 19.66 A	20 AMP (CB4)
#5	12	12 x 1.21 x 125% = 18.15 A	20 AMP (CB5)

ENVOY BREAKER 15 AMP (EB1)



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**ELECTRICAL - LINE DIAGRAM**

**E001**

**ELECTRICAL NOTES**

- WHEN THE AC UTILITY SOURCE IS REMOVED FROM THE INVERTER OUTPUT CIRCUITS VIA ANY MEANS, SUCH AS AN AC BREAKER, AC DISCONNECT, OR REMOVAL OF THE SOLAR OR MAIN UTILITY SERVICE METER, THIS EQUIPMENT
- ARRAY BONDED WITH #6 BARE Cu
- TWO UNGROUNDED CONDUCTORS PER CIRCUIT OF INVERTERS (TYP)
- ALL CONDUIT SIZING WILL BE IN ACCORDANCE TO THE NEC, CHAPTER 9
- PVC OR LFMC MAY BE USED INSTEAD OF EMT CONDUIT
- THE AC DISCONNECT IS LOCKABLE, TAGGABLE, 24/7 UTILITY ACCESSIBLE, LOAD BREAK CAPABLE, AND HAS VISIBLE BREAK.

**CALCULATION FOR PV BREAKER**

SYSTEM CURRENT	1.21	x	55	=	66.55 A
DESIGN AMPERAGE (FLA)	66.55	x	125%	=	83.1875 A
MAIN BUSS RATING	200	x	120%	=	240 A
EXISTING MAIN BREAKER					150 A
MAX SOLAR BREAKER	240	-	150	=	90 A

ARRAY TO COMBINER	
WIRE LENGTH	15 FT
WIRE SIZE	#10 AWG
SYSTEM PROPERTIES	
FULL LOAD AMPERAGE	12.1
SOURCE VOLTAGE	240
LENGTH OF RUN (FT)	15
LOAD DUTY	CONTINUOUS
CONDUCTOR TYPE	THWN-2
CONDUCTOR MATERIAL	COPPER
CONDUCTOR LOCATION	DRY OR WET
CONDUCTOR INSULATION TEMP	75°C
DISTANCE ABOVE ROOF	ALL INTERIOR CONDUIT
AVERAGE OUTSIDE TEMP (°F)	94
TEMP ADDER (°F)	N/A
ADJUSTED AMBIENT TEMP (°F)	94
TERMINAL TEMP RATING	75°C
CIRCUIT TYPE	SINGLE PHASE 2-WIRE
QTY. OF CURRENT-CARRYING CONDUCTORS	2
ADDITIONAL CURRENT-CARRYING CONDUCTORS	4
TOTAL # OF CURRENT-CARRYING CONDUCTORS	6
CONDUCTOR CONDITIONS OF USE	
LARGEST CIRCUIT FULL LOAD AMPS	12.10
LOAD DUTY MULTIPLIER	1.25
AMBIENT TEMP FACTOR	0.94
QTY. CONDUCTORS IN CONDUIT FACTOR	0.80
CONDUCTOR SELECTION	
MINIMUM REQUIRED CONDUCTOR AMPACITY	17.00
SELECTED CONDUCTOR AMPACITY	35.00
SELECTED CONDUCTOR SIZE (AWG)	10
TERMINAL REQUIREMENT	
LARGEST CIRCUIT FULL LOAD AMPS	12.10
LOAD DUTY MULTIPLIER	1.25
REQUIRED TERMINAL AMPACITY	15.13
VOLTAGE DROP	
OHMS/MILFT	1.240
LENGTH OF RUN (FT)	15
LOAD CURRENT	12.10
VOLTAGE DROP	0.45
VOLTS AT LOAD TERMINAL	239.55
PERCENT VOLTAGE DROP	0.19%

INTERCONNECTION	
METHOD	BREAKER TAP
WIRE SIZE	#3 AWG
SYSTEM PROPERTIES	
FULL LOAD AMPERAGE	66.55
SOURCE VOLTAGE	240
LENGTH OF RUN (FT)	15
LOAD DUTY	CONTINUOUS
CONDUCTOR TYPE	THWN-2
CONDUCTOR MATERIAL	COPPER
CONDUCTOR LOCATION	DRY OR WET
CONDUCTOR INSULATION TEMP	75°C
AMBIENT TEMP	26-30°C
TERMINAL TEMP RATING	75°C
CIRCUIT TYPE	SINGLE PHASE 3-WIRE
QTY. OF CURRENT-CARRYING CONDUCTORS	2
CONDUCTOR CONDITIONS OF USE	
FULL LOAD AMPS	66.55
LOAD DUTY MULTIPLIER	1.25
AMBIENT TEMP FACTOR	1.00
QTY. CONDUCTORS IN CONDUIT FACTOR	1.00
CONDUCTOR SELECTION	
MINIMUM REQUIRED CONDUCTOR AMPACITY	84.00
SELECTED CONDUCTOR AMPACITY	100.00
SELECTED CONDUCTOR SIZE (AWG)	3
TERMINAL REQUIREMENT	
FULL LOAD AMPS	66.55
LOAD DUTY MULTIPLIER	1.25
REQUIRED TERMINAL AMPACITY	83.19
VOLTAGE DROP	
OHMS/MILFT	0.245
LENGTH OF RUN (FT)	15
LOAD CURRENT	66.55
VOLTAGE DROP	0.49
VOLTS AT LOAD TERMINAL	239.51
PERCENT VOLTAGE DROP	0.20%

TRENCH	
WIRE LENGTH	70 FT
WIRE SIZE	#2 AWG
SYSTEM PROPERTIES	
FULL LOAD AMPERAGE	66.55
SOURCE VOLTAGE	240
LENGTH OF RUN (FT)	70
LOAD DUTY	CONTINUOUS
CONDUCTOR TYPE	THWN-2
CONDUCTOR MATERIAL	COPPER
CONDUCTOR LOCATION	DRY OR WET
CONDUCTOR INSULATION TEMP	75°C
AMBIENT TEMP	26-30°C
TERMINAL TEMP RATING	75°C
CIRCUIT TYPE	SINGLE PHASE 3-WIRE
QTY. OF CURRENT-CARRYING CONDUCTORS	2
CONDUCTOR CONDITIONS OF USE	
FULL LOAD AMPS	66.55
LOAD DUTY MULTIPLIER	1.25
AMBIENT TEMP FACTOR	1.00
QTY. CONDUCTORS IN CONDUIT FACTOR	1.00
CONDUCTOR SELECTION	
MINIMUM REQUIRED CONDUCTOR AMPACITY	83.19
SELECTED CONDUCTOR AMPACITY	115.00
SELECTED CONDUCTOR SIZE (AWG)	2
TERMINAL REQUIREMENT	
FULL LOAD AMPS	66.55
LOAD DUTY MULTIPLIER	1.25
REQUIRED TERMINAL AMPACITY	83.19
VOLTAGE DROP	
OHMS/MILFT	0.194
LENGTH OF RUN (FT)	70
LOAD CURRENT	66.55
VOLTAGE DROP	1.81
VOLTS AT LOAD TERMINAL	238.19
PERCENT VOLTAGE DROP	0.76%

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**PROJECT ADDRESS:**

TIM HORSTMAN  
64 E BAY FRONT ROAD  
DEALE MD UNITED  
STATES 20751

**CONTRACTOR INFO:**



3600 COMMERCE DR  
SUITE 601  
BALTIMORE, MD 21227  
(443) 955-0779

**LICENSE NUMBER:**

MHIC-30991

REV	DATE
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**ELECTRICAL - WIRE CALCS**

**E002**

**ELECTRICAL NOTES**

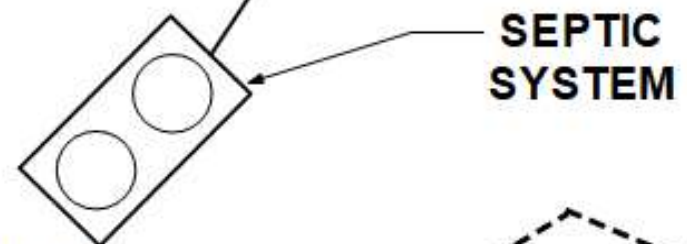
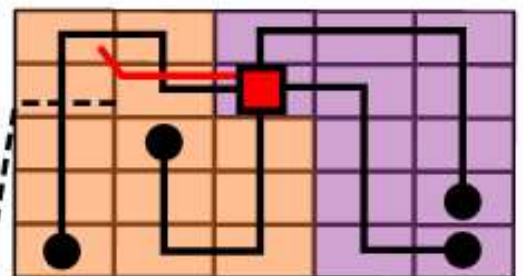
1) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 75°C AND WET ENVIRONMENT, UNLESS OTHERWISE NOTED.

2) ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.

3) MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER MANUFACTURER'S INSTRUCTION.



PROPERTY LINE



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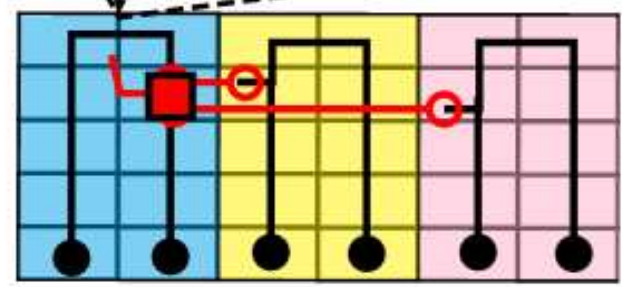
COLOR	CIRCUIT	MODULE COUNT
Blue	#1	10
Yellow	#2	10
Pink	#3	10
Orange	#4	13
Purple	#5	12

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AC COMBINER  
AC DISCONNECT

TRENCH



LEGEND

	JUNCTION BOX
	SOLADECK
	END CAP
	EXTERIOR CONDUIT
	INTERIOR CONDUIT
	BASEMENT CONDUIT
	TRUNK CABLE

DRIVEWAY

UTILITY METER  
AC DISCONNECT

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CIRCUIT & CONDUIT  
LAYOUT

E003



SOLAR MODULE RATINGS		
Znshine 370w All Black Specifications		
Length:	69.09	in
Width:	40.87	in
Thickness:	1.38	in
Weight:	45.19	lbs
Imp:	10.82	A
Vmp:	34.2	V
Voc:	41	V
Isc:	11.42	A
OCPD:	20	A
Pmax:	370	W
Vmax:	1500	V
Temp. Coefficient:	-0.29	%Voc/°C

INVERTER 1 RATINGS		
Enphase IQ8+ Specifications		
Max # Per String:	13	
I <sub>max</sub> (ac):	1.21	A
V <sub>max</sub> (dc):	60	V
P <sub>max</sub> :	290	W
Nom. AC Voltage:	240	V
OCPD:	20	A
Weight (Optimizer):	2.38	lbs
I <sub>max</sub> (Input):	15	A
P <sub>max</sub> (dc) Input:	440	V

**WARNING: PHOTOVOLTAIC POWER SOURCE**

LABEL TO BE INSTALLED AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.

LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE

**PHOTOVOLTAIC DC DISCONNECT**

LABEL TO BE INSTALLED AT EACH DC DISCONNECTING MEANS

**PHOTOVOLTAIC AC DISCONNECT**

LABEL TO BE INSTALLED AT EACH AC DISCONNECTING MEANS

**PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN**

LABEL TO BE INSTALLED AT RAPID SHUTDOWN SWITCH

LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE

**SOLAR PV SYSTEM DISCONNECT**

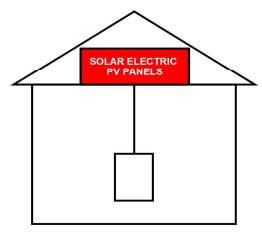
**RATED AC OUTPUT CURRENT: 66.55 A**

**NOMINAL OPERATING AC VOLTAGE: 240 V**

LABEL TO BE INSTALLED AT AN ACCESSIBLE LOCATION AT THE DISCONNECTING MEANS AS A POWER SOURCE

**SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN**

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN ARRAY.



LABEL TO BE INSTALLED ON NO MORE THAN 3FT FROM THE SERVICE DISCONNECTING MEANS

**WARNING**

**ELECTRICAL SHOCK HAZARD**

**DO NOT TOUCH TERMINALS! TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION**

LABEL TO BE INSTALLED AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT

**WARNING**

**ELECTRICAL SHOCK HAZARD**

**IF GROUND FAULT IS INDICATED NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED**

LABEL TO BE INSTALLED AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT

**WARNING**

**DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM**

**WARNING**

**INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE**

**INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED**

LABEL TO BE INSTALLED AT UTILITY METER

**SOLAR PV LOADCENTER**  
20.35 kW DC SOLAR ARRAY

**240 VOLT AC SYSTEM**

INSTALLED COMPONENTS  
(55) Znshine 370w All BlackW Modules  
(55) Enphase IQ8+ Micro-inverters

EMERGENCY CONTACT  
LUMINA SOLAR: 800-971-6118

<u>CIRCUIT CALCULATIONS</u>				
SYSTEM CURRENT:	1.21	x	55	= 66.55 A
DESIGN AMPERAGE:	66.55	x	125%	= 83.1875 A
CIRCUIT #1 =	10		12.1	15.13
CIRCUIT #2 =	10		12.1	15.13
CIRCUIT #3 =	10		12.1	15.13
CIRCUIT #4 =	13		15.73	19.66
CIRCUIT #5 =	12		14.52	18.15

**RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM**

LABEL TO BE INSTALLED ON OR NO MORE THAN 3FT FROM THE RAPID SHUTDOWN SWITCH

**SIGNAGE NOTES**

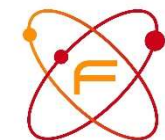
- 1) ALL PLAQUES AND LABELS SHALL HAVE A RED BACKGROUND (OR AS SHOWN HERE)
- 2) ALL LETTERING SHALL BE WHITE AND HAVE A MINIMUM HEIGHT OF 3/8" (OR AS SHOWN HERE)
- 3) FONT SHALL BE ARIAL (OR SIMILAR ) AND ALL LETTERING SHALL BE CAPITALIZED
- 4) ALL PLAQUES AND LABELS SHALL BE OF A MATERIAL SUITABLE FOR THE ENVIRONMENT INSTALLED

**FOR PERMITTING USE ONLY**

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DEALE MD UNITED STATES 20751

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**EQUIP. RATINGS & SIGNAGE**

**E004**



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INSTALL LEAD SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

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**SERVICE BOM**

**X002**



NOTE: CONSUMPTION CTs WILL NOT BE INSTALLED

**RAIL AND SPLICE QUANTITY COUNTING METHOD**

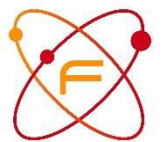
Module Count	PORTRAIT			LANDSCAPE		
	14" Rail	20" Rail	Splice	14" Rail	20" Rail	Splice
1	1			1		
2		1		2		
3	2				2	
4	1	1	1	4		2
5		2		2	2	2
6	2	1	2		4	2
7	1	2	2	2	3	4
8		3	2			
9	2	2	2			
10		4	2			
11		4	2			
12	2	3	4			

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**PROJECT NOTES**

**X003**