

BRUCE STEINER - 22.110kW DC, 15.840kW AC

SITE PLAN-1



SYSTEM INFORMATION

DC SYSTEM SIZE: 22110W
 AC SYSTEM SIZE: 15840W
 MODULES:
 (66) LG LG335N1K-V5
 INVERTER:
 (66) ENPHASE IQ7-60-2-US
 BRANCH DETAILS:
 (3) BRANCH OF 12 MICROINVERTER(12 MODULES)
 (1) BRANCH OF 13 MICROINVERTER(13 MODULES)
 (1) BRANCH OF 9 MICROINVERTER(9 MODULES)
 (1) BRANCH OF 8 MICROINVERTER(8 MODULES)

ENGINEER OF RECORD



10361 JAMESTOWN ST NE BLAINE, MN 55449
 763-450-9763
 LIC:ELEC#EA006457
 LIC:GEN#BC638279

CUSTOMER INFORMATION

NAME&ADDRESS:
 BRUCE STEINER
 144 EDGEWOOD AVE, WAYZATA, MN 55391.

44°58'23.90"N 93°31'13.71"W
 APN: 061-172-223-0019

AHJ:MN-CITY OF WAYZATA

UTILITY:XCEL ENERGY

PROJECT NUMBER:CCEN-001138

SITE PLAN-1

DESIGNER/CHECKED BY:

GA/RR

SCALE:AS NOTED

PAPER SIZE:17"x11"

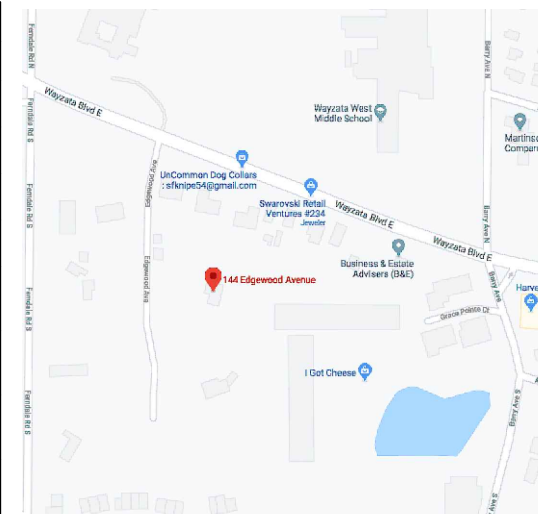
DATE:09/01/20

REV:A

PV-1.0

CASE	#3984995
ACCOUNT	#6007054
PREMISE	#303274565
METER	#90381949

DISTANCE BETWEEN EQUIPMENT		
FROM	TO	DISTANCE(FT)
MODULE-1	LOAD CENTER-1	45
MODULE-2	LOAD CENTER-1	1
LOAD CENTER-1	PV AC DISCONNECT	1
PV AC DISCONNECT	LOAD CENTER-2	195
MODULE-3	LOAD CENTER-2	15
LOAD CENTER-2	UTILITY AC DISCONNECT	1
UTILITY AC DISCONNECT	UTILITY PRODUCTION METER	1
UTILITY PRODUCTION METER	S.R FUSED DISCONNECT	1
S.R FUSED DISCONNECT	UTILITY METER	1
UTILITY METER	MAIN SERVICE PANEL	1



A1 VICINITY MAP

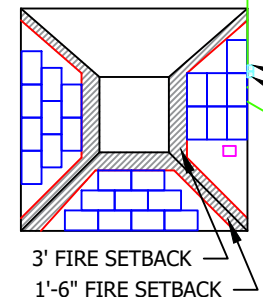
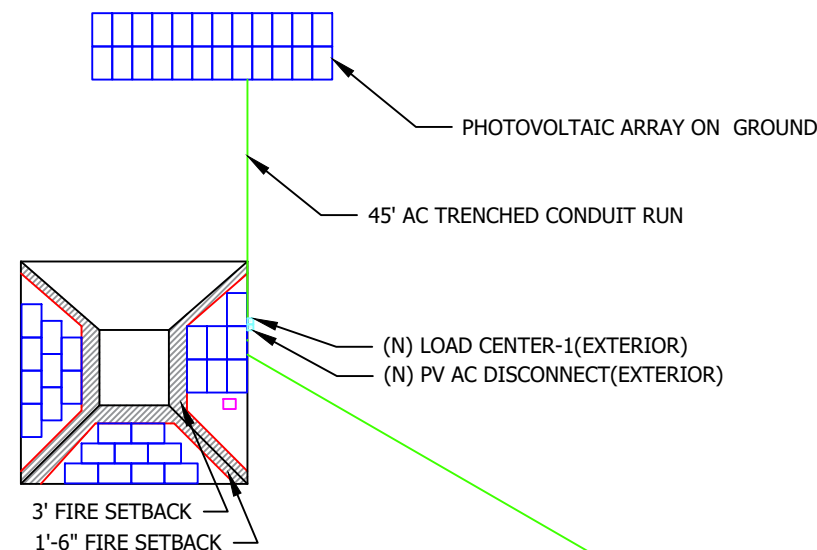
PV-1.0 SCALE: NTS

GENERAL INFORMATION

ELECTRIC CODE	NEC 2017
FIRE CODE	IFC 2018
RESIDENTIAL CODE	MNRC 2020
BUILDING CODE	MNBC 2020
WIND SPEED	109 MPH
SNOW LOAD	50 PSF

INDEX

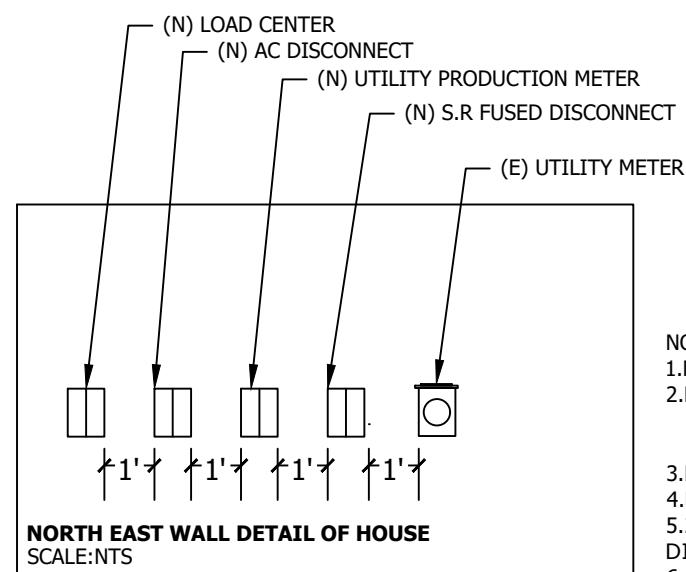
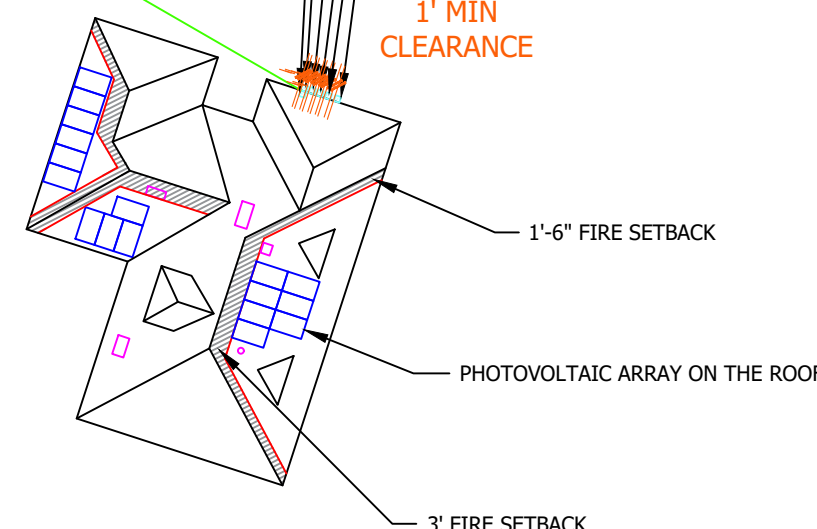
INDEX NO.	DESCRIPTION
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PV-2.0	GENERAL NOTES
PV-3.0	MOUNTING DETAILS-1
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PV-3.2	STRUCTURAL DETAILS-1
PV-3.3	STRUCTURAL DETAILS-2
PV-4.0	SINGLE LINE DIAGRAM
PV-5.0	WARNING PLACARDS
SS	SPEC SHEET(S)



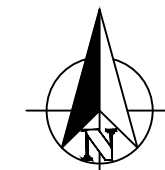
195' AC TRUNCHED CONDUIT RUN

- (N) LOAD CENTER-1(EXTERIOR)
- (N) PV AC DISCONNECT(EXTERIOR)
- (N) LOAD CENTER-2(EXTERIOR)
- (N) UTILITY AC DISCONNECT(EXTERIOR)
- (N) UTILITY PRODUCTION METER(EXTERIOR)
- (N) S.R FUSED DISCONNECT(EXTERIOR)
- (E) UTILITY METER(EXTERIOR)
- (E) MAIN SERVICE PANEL(INTERIOR)

1' MIN CLEARANCE



NOTE:
 1.NO CLEARANCE ISSUES WITH EXITING OVERHEAD LINES
 2.PRODUCTION METER AND PV UTILITY DISCONNECTS ARE
 • LOCATED WITHIN 10' OF MAIN SERVICE/BILLING METER
 • VISIBLE,LOCKABLE,READILY ACCESSIBLE AND 24/7 ACCESS
 3.DESIGN COMPLY WITH NEC AND NEC690
 4.LABELS SHALL BE WEATHERPROOF,DURABLE,AND PERMANENTLY MOUNTED
 5.24/7 UNSCORTED KEYLESS ACCESS TO METERS AND UTILITY AC DISCONNECTS.
 6.SECONDARY INTERCONNECTION



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DESIGNER/CHECKED BY:

GA/RR

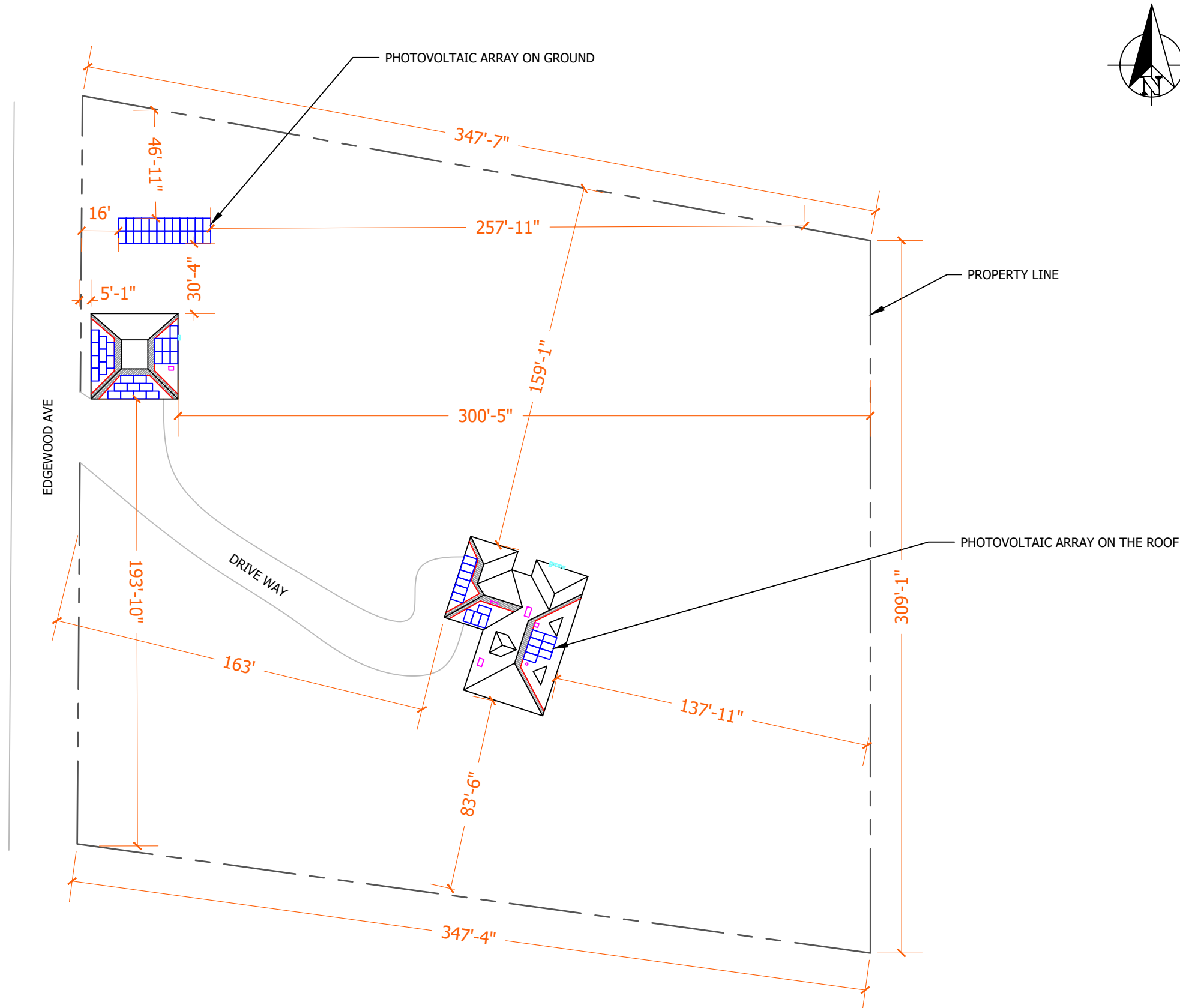
SCALE: AS NOTED

PAPER SIZE: 17"x11"

DATE: 09/01/20

REV: A

PV-1.1



A | SITE PLAN-2

PV-1.1 | SCALE: 1"=50'-0"

GENERAL NOTES

GENERAL NOTES

1. MODULES ARE LISTED UNDER UL 1703 AND CONFORM TO THE STANDARDS.
2. INVERTERS ARE LISTED UNDER UL 1741 AND CONFORM TO THE STANDARDS.
3. DRAWINGS ARE DIAGRAMMATIC, INDICATING GENERAL ARRANGEMENT OF THE PV SYSTEM AND THE ACTUAL SITE CONDITION MIGHT VARY.
4. WORKING CLEARANCES AROUND THE NEW PV ELECTRICAL EQUIPMENT WILL BE MAINTAINED IN ACCORDANCE WITH NEC 110.26.
5. ALL GROUND WIRING CONNECTED TO THE MAIN SERVICE GROUNDING IN MAIN SERVICE PANEL/ SERVICE EQUIPMENT.
6. ALL CONDUCTORS SHALL BE 600V, 75°C STANDARD COPPER UNLESS OTHERWISE NOTED.
7. THE SYSTEM WILL NOT BE INTERCONNECTED BY THE CONTRACTOR UNTIL APPROVAL FROM THE LOCAL JURISDICTION AND/OR THE UTILITY.
8. PV ARRAY COMBINER/JUNCTION BOX PROVIDES TRANSITION FROM ARRAY WIRING TO CONDUIT WIRING

EQUIPMENT LOCATION:

9. ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.
10. WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31 (A),(C) AND NEC TABLES 310.15 (B)(2)(A) AND 310.15 (B)(3)(C).
11. JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.
12. ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.
13. ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.
14. ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE

WIRING & CONDUIT NOTES:

15. ALL CONDUIT AND WIRE WILL BE LISTED AND APPROVED FOR THEIR PURPOSE. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING.
16. CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.
17. DC WIRING LIMITED TO MODULE FOOTPRINT. MICRO INVERTER WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY WITH SUITABLE WIRING CLIPS.
18. AC CONDUCTORS COLORED OR MARKED AS FOLLOWS: PHASE A OR L1- BLACK PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE PHASE C OR L3- BLUE, YELLOW, ORANGE**, OR OTHER CONVENTION NEUTRAL- WHITE OR GREY IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].

INTERCONNECTION NOTES:

24. LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 690.64 (B)]
25. THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS INPUT MAY NOT EXCEED 120% OF BUSBAR RATING [NEC705.12(D)(2)(3)].
26. WHEN SUM OF THE PV SOURCES EQUALS >100% OF BUSBAR RATING, PV DEDICATED BACKFFED BREAKERS MUST BE LOCATED OPPOSITE END OF THE BUS FROM THE UTILITY SOURCE OCPD [NEC 705.12(D)(2)(3)].
27. AT MULTIPLE PV OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVER CURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE COMBINED OVER CURRENT DEVICE MAY BE EXCLUDED ACCORDING TO NEC 705.12 (D)(2)(3)(C).
28. FEEDER TAP INTER CONNECTION (LOAD SIDE) ACCORDING TO NEC 705.12 (D)(2)(1)
29. SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42
30. BACK FEEDING BREAKER FOR UTILITY-INTERACTIVE INVERTER OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (D)(5)].

GROUNDING NOTES:

31. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.
32. PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.
33. EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45 AND MICRO INVERTER MANUFACTURER'S INSTRUCTIONS.
34. THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.
35. GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119]
36. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).
37. DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
38. RAPID SHUTDOWN OF ENERGIZED CONDUCTORS BEYOND 10 FT OF PV ARRAY OR 5 FT INSIDE A BUILDING WITHIN 10 SECONDS. CONTROLLED CONDUCTORS $\leq 30V$ AND $\leq 240VA$ [NEC 690.12]. LOCATION OF LABEL ACCORDING TO AHJ.
39. ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9



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LIC:GEN#BC638279

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AHJ:MN-CITY OF WAYZATA

UTILITY:XCEL ENERGY

PROJECT NUMBER:CCEN-001138

GENERAL NOTES

DESIGNER/CHECKED BY:

GA/RR

SCALE:AS NOTED

PAPER SIZE:17"x11"

DATE:09/01/20

REV:A

PV-2.0

**DEAD LOAD CALCULATIONS
(MP-01,MP-02&MP-03)**

BOM	QUANTITY	LBS/UNIT	TOTAL WEIGHT (LBS)
MODULES	17	37.69	640.73
MID-CLAMP	122	0.050	6.10
END-CLAMP	20	0.050	1.00
RAIL LENGTH	122	0.680	82.96
SPLICE BAR	2	0.360	0.72
SNAPNRACK L-FOOT	38	1.47	55.86
MICROINVERTER	17	2.3800	40.46
TOTAL WEIGHT OF THE SYSTEM (LBS)			787.37
TOTAL ARRAY AREA ON THE ROOF (SQ. FT.)			1216.78
WEIGHT PER SQ. FT.(LBS)			0.65
WEIGHT PER PENETRATION (LBS)			20.72

UPLIFT CALCULATIONS

UPLIFT	36503.5	LBS
PULL OUT STRENGTH	73800	LBS
POINT LOADING	21	LBS

MODULES DATA

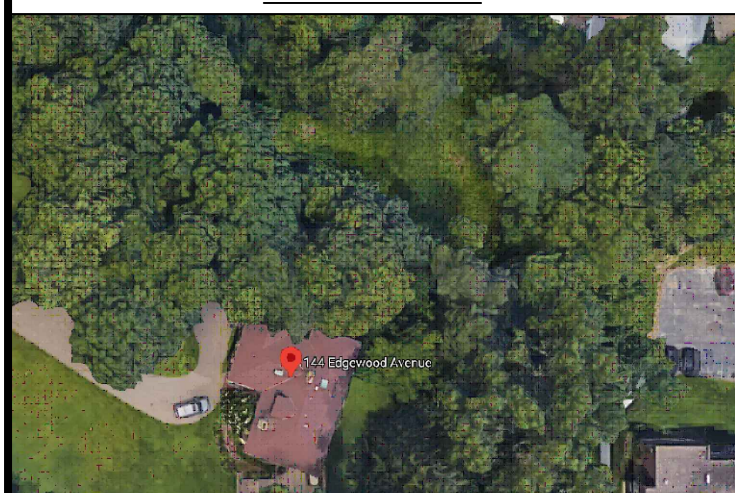
LG LG335N1K-V5	
MODULE DIMS	66.37"x40"x1.57"
LAG SCREWS	5/16"x3.5":2.5"MIN EMBEDMENT

FIRE SETBACK

MINIMUM FIRE ACCESS PATHWAYS PER IFC 2018
 RIDGE TO ARRAY: 3'-0"
 EAVE TO ARRAY : 3'-0"
 HIP/VALLEY W/ ADJACENT ARRAY: 1'-6"
 EACH SIDE HIP/VALLEY W/O ADJACENT ARRAY: 0'-0"

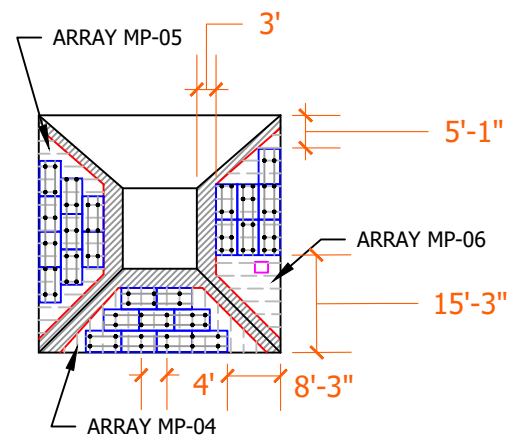
NOTE: INSTALLER TO VERIFY RAFTER SIZE, SPACING AND SLOPED SPANS, AND NOTIFY ANY DISCREPANCIES BEFORE PROCEEDING.

AERIAL VIEW



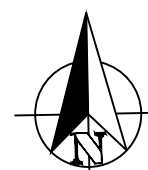
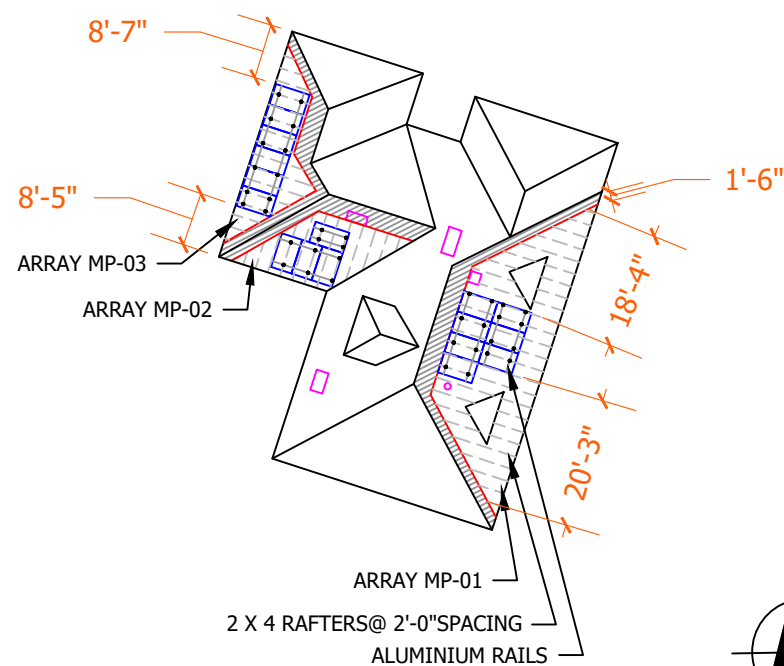
SITE INFORMATION

SR.NO	AZIMUTH	PITCH	NO. OF MODULES	ARRAY AREA (SQ. FT.)	ROOF TYPE	ATTACHMENT	ROOF EXPOSURE	FRAME TYPE	FRAME SIZE	FRAME SPACING	MAX RAIL SPAN	OVER HANG
MP-01	102°	18°	7	129.1	COMPOSITION SHINGLE	SNAPNRACK L-FOOT	ATTIC	RAFTERS	2 X 4	2'-0"	4'-0"	2'-0"
MP-02	192°	18°	4	73.7	COMPOSITION SHINGLE	SNAPNRACK L-FOOT	ATTIC	RAFTERS	2 X 4	2'-0"	4'-0"	2'-0"
MP-03	282°	27°	6	110.6	COMPOSITION SHINGLE	SNAPNRACK L-FOOT	ATTIC	RAFTERS	2 X 4	2'-0"	4'-0"	2'-0"
MP-04	180°	27°	9	165.9	COMPOSITION SHINGLE	SNAPNRACK L-FOOT	ATTIC	RAFTERS	2 X 4	2'-0"	4'-0"	2'-0"
MP-05	270°	27°	9	165.9	COMPOSITION SHINGLE	SNAPNRACK L-FOOT	ATTIC	RAFTERS	2 X 4	2'-0"	4'-0"	2'-0"
MP-06	90°	27°	7	129.1	COMPOSITION SHINGLE	SNAPNRACK L-FOOT	ATTIC	RAFTERS	2 X 4	2'-0"	4'-0"	2'-0"



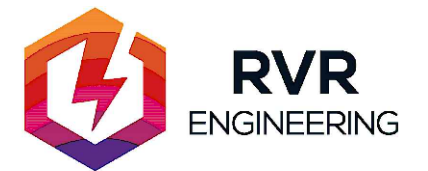
**DEAD LOAD CALCULATIONS
(MP-04,MP-05&MP-06)**

BOM	QUANTITY	LBS/UNIT	TOTAL WEIGHT (LBS)
MODULES	25	37.69	942.25
MID-CLAMP	114	0.050	5.70
END-CLAMP	36	0.050	1.80
RAIL LENGTH	283	0.680	192.44
SPLICE BAR	10	0.360	3.60
SNAPNRACK L-FOOT	82	1.47	120.54
MICROINVERTER	25	2.38	59.50
TOTAL WEIGHT OF THE SYSTEM (LBS)			1266.33
TOTAL ARRAY AREA ON THE ROOF (SQ. FT.)			1216.78
WEIGHT PER SQ. FT.(LBS)			1.04
WEIGHT PER PENETRATION (LBS)			15.44



B | MOUNTING DETAILS

PV-3.0 SCALE: 1"=30'-0"



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REV:A

PV-3.0

SITE INFORMATION	
AZIMUTH	180°
PITCH	30°
NO. OF MODULES	24

MODULES DATA	
LG LG335N1K-V5	
MODULE DIMS	66.37"x40"x1.57"



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MOUNTING DETAILS-2

DESIGNER/CHECKED BY:

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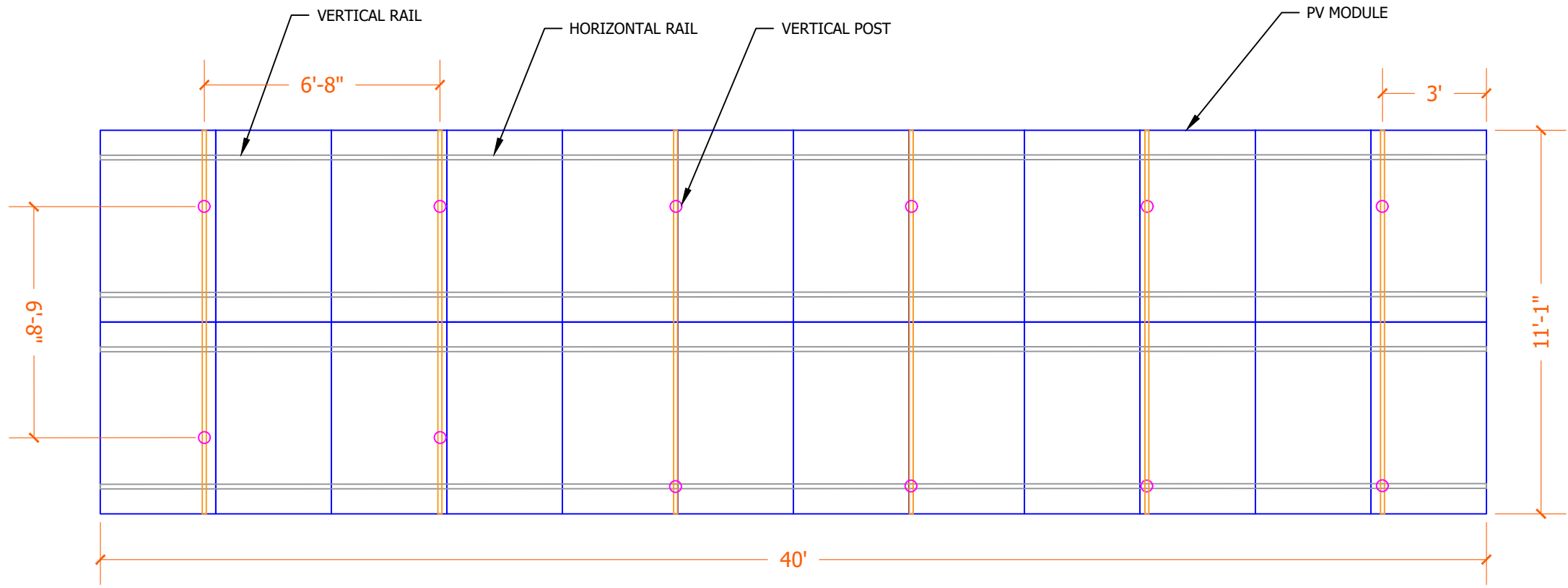
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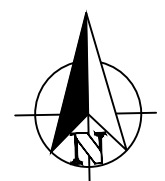


AERIAL VIEW



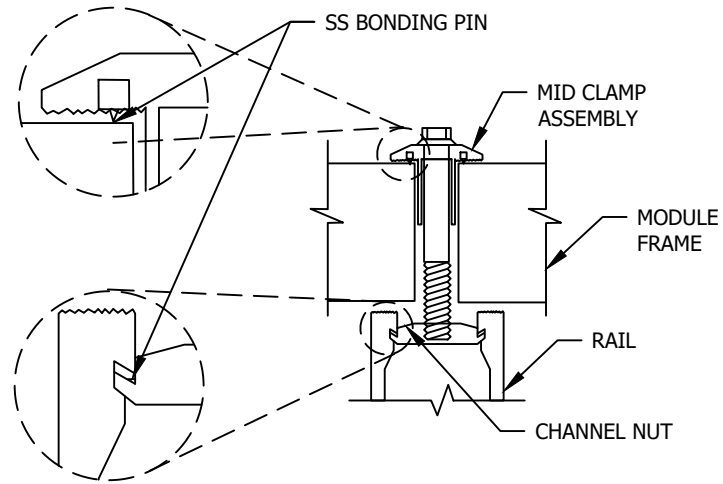
ARRAY LOCATION

B | MOUNTING DETAILS
 PV-3.1 | SCALE: 3/32" = 1'-0"



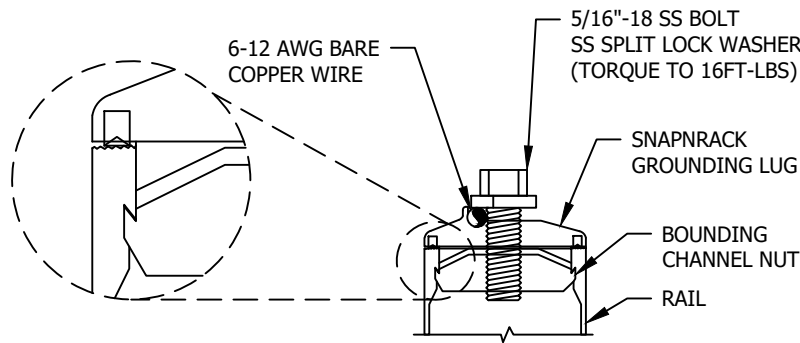
GROUNDING DETAILS

MODULE TO MODULE & MODULE TO RAIL



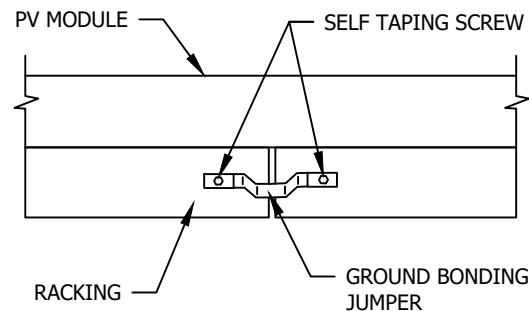
SNAPRACK GROUNDING MID-CLAMP
SCALE: NTS

SNAPRACK GROUNDING



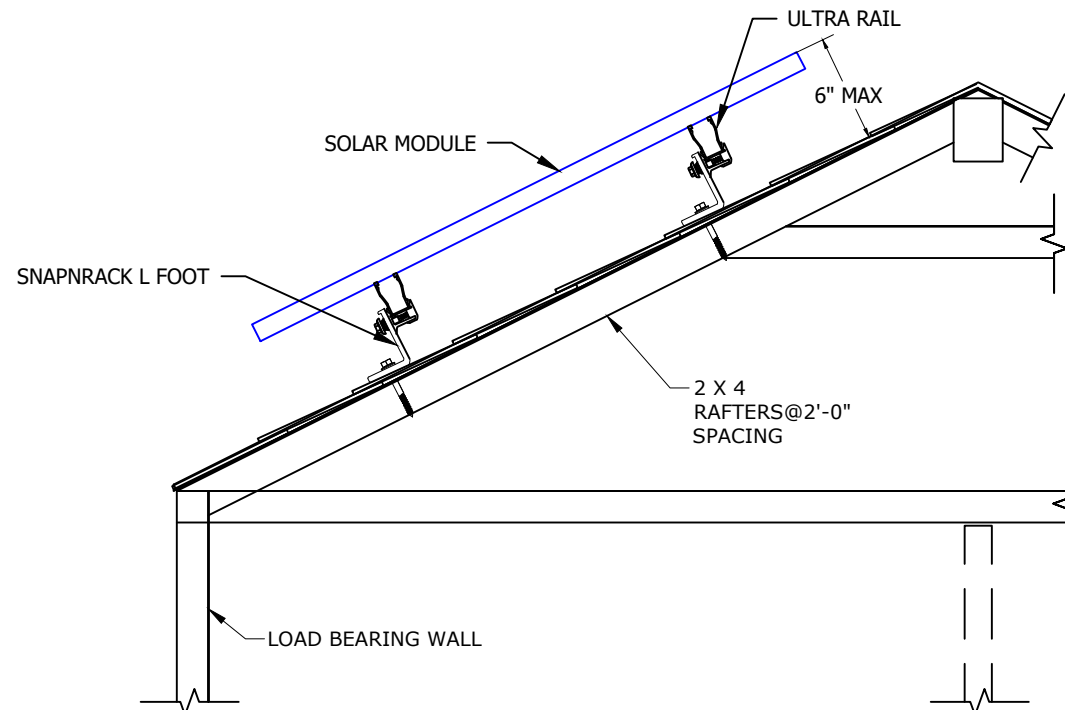
- NOTES:
- ALL HARDWARE IS INCLUDED FROM MANUFACTURER
 - A MINIMUM OF ONE GROUND LUG IS TO BE INSTALLED ON EVERY CONTINUOUS ROW OF MODULES
 - GROUNDING LUG MAY BE INSTALLED IN EITHER RAIL CHANNEL
 - GROUNDING LUG MAY BE INSTALLED SO GROUND WIRE IS PARALLEL OR PERPENDICULAR TO RAIL
 - ENSURE SPLIT LOCK WASHER IS INSTALLED ON TOP OF COPPER WIRE.
- SCALE:NTS

RAIL TO RAIL



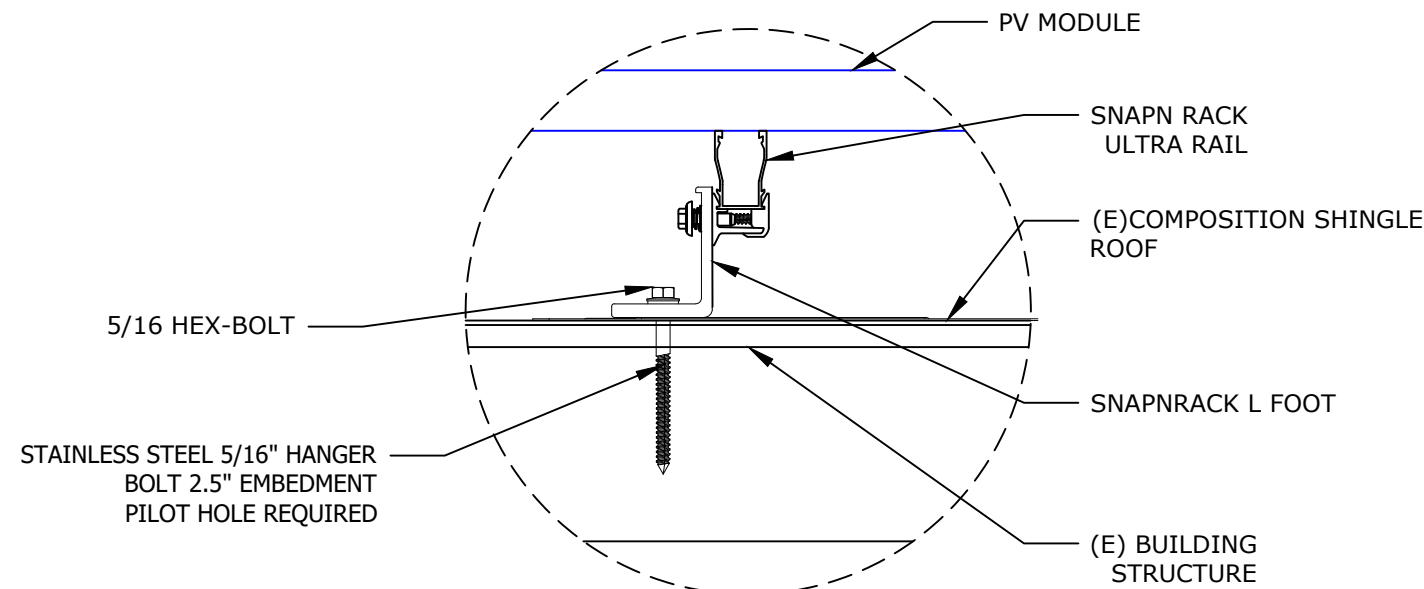
NTS REMOVAL OF ONE PIECE OF EQUIPMENT SHALL NOT DISCONNECT THE BONDING CONNECTION BETWEEN ANY OTHER PIECES.
SCALE:NTS

ROOF FRAMING DETAIL



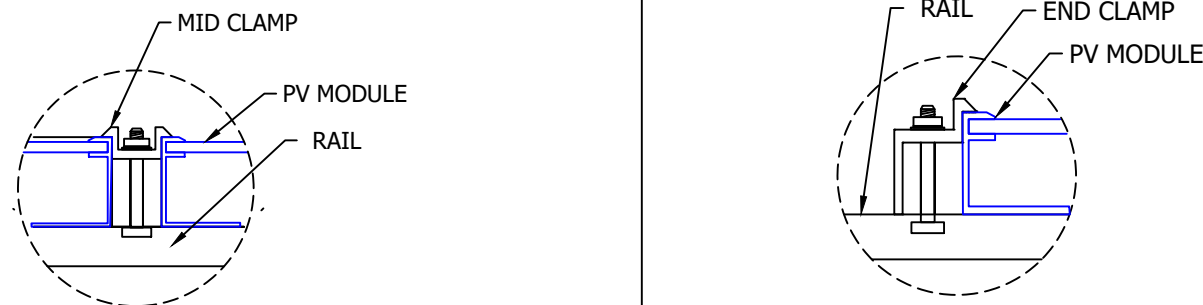
SCALE: NTS

ATTACHMENT DETAIL-SNAPRACK L FOOT



SCALE: NTS

MID-CLAMP & END CLAMP DETAIL



SCALE: NTS



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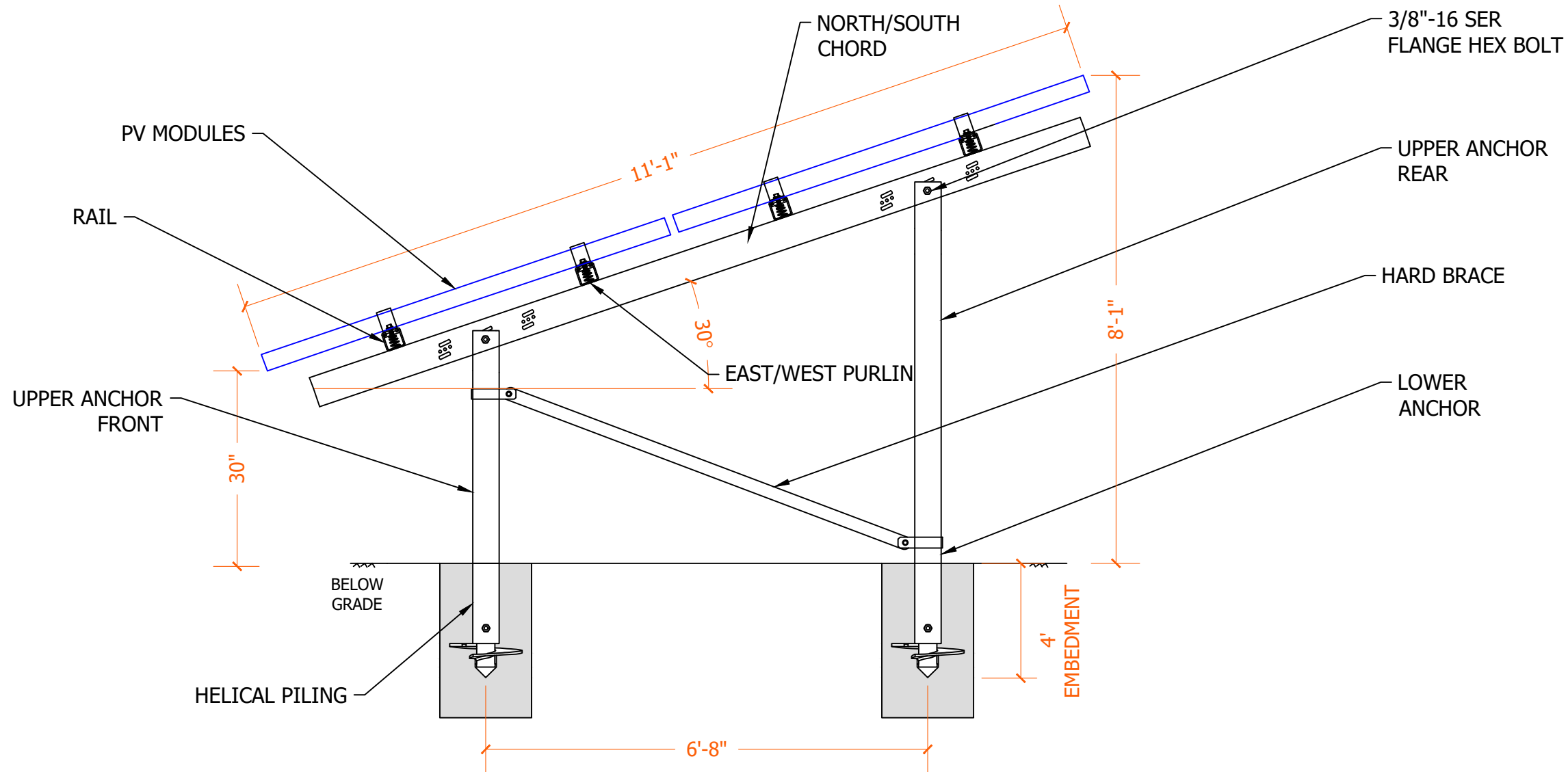
PAPER SIZE:17"x11"

DATE:09/01/20

REV:A

PV-3.2

GROUND MOUNT DETAIL



SCALE: NTS



SYSTEM INFORMATION

DC SYSTEM SIZE: 22110W
 AC SYSTEM SIZE: 15840W
 MODULES:
 (66) LG LG335N1K-V5
 INVERTER:
 (66) ENPHASE IQ7-60-2-US
 BRANCH DETAILS:
 (3) BRANCH OF 12 MICROINVERTER(12 MODULES)
 (1) BRANCH OF 13 MICROINVERTER(13 MODULES)
 (1) BRANCH OF 9 MICROINVERTER(9 MODULES)
 (1) BRANCH OF 8 MICROINVERTER(8 MODULES)

ENGINEER OF RECORD



10361 JAMESTOWN ST NE BLAINE, MN 55449
 763-450-9763
 LIC:ELEC#EA006457
 LIC:GEN#BC638279

CUSTOMER INFORMATION

NAME&ADDRESS:
 BRUCE STEINER
 144 EDGEWOOD AVE, WAYZATA, MN 55391.
 44°58'23.90"N 93°31'13.71"W
 APN: 061-172-223-0019

AHJ: MN-CITY OF WAYZATA

UTILITY: XCEL ENERGY

PROJECT NUMBER: CCEN-001138

STRUCTURAL DETAILS-2

DESIGNER/CHECKED BY:

GA/RR

SCALE: AS NOTED

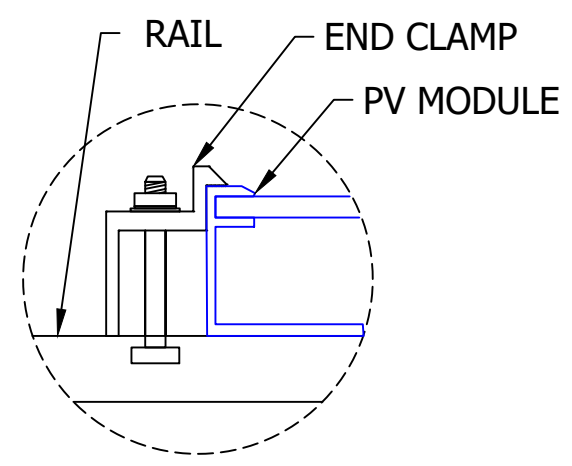
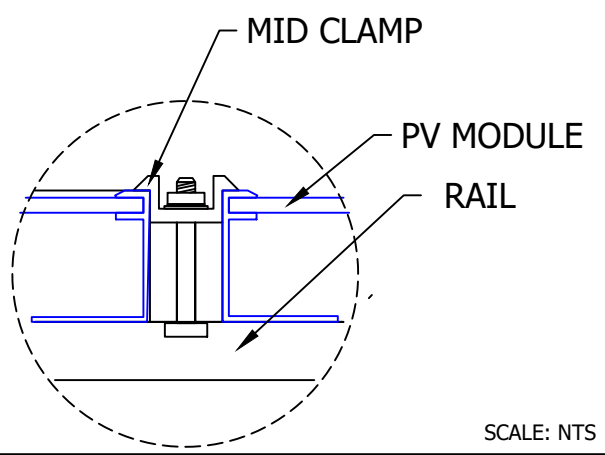
PAPER SIZE: 17"x11"

DATE: 09/01/20

REV: A

PV-3.3

MID-CLAMP & END CLAMP DETAIL



SCALE: NTS