PHOTOVOLTAIC GROUND MOUNT SYSTEM

40 MODULES-GROUND MOUNTED - 19.200 kW DC, 23.000 kW AC

2184 WIRE RD, BUNNLEVEL, NC 28323

PROJECT DATA

PROJECT ADDRESS	2184 WIRE RD, BUNNLEVEL, NC 28323
OWNER:	TRAVIS BASS
DESIGNER:	ESR

SCOPE: 19.200 KW DC GROUND MOUNT
SOLAR PV SYSTEM WITH
40 HANWHA SOLAR: Q CELLS Q.PEAK DUO XL-G10.3/BFG 480W
PV MODULES WITH
01 SOL-ARK 15K-LV INVERTER
01 SOL-ARK 8K-P INVERTER

AUTHORITIES HAVING JURISDICTION:
BUILDING: HARNETT COUNTY
ZONING: HARNETT COUNTY
UTILITY: DUKE ENERGY PROGRESS

SHEET INDEX

B

SIGNATURE

GENERAL NOTES

1. ALL COMPONENTS ARE UL LISTED AND CEC CERTIFIED, WHERE WARRANTED.
2. THE SOLAR PV SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH ARTICLE 690 OF THE NEC 2017.
3. THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION.
4. ALL CONDUCTORS OF A CIRCUIT, INCLUDING THE EGC, MUST BE INSTALLED IN THE SAME RACEWAY, OR CABLE, OR OTHERWISE RUN WITH THE PV ARRAY CIRCUIT CONDUCTORS WHEN THEY LEAVE THE VICINITY OF THE PV ARRAY.
5. WHERE METALLIC CONDUIT CONTAINING DC CONDUCTORS IS USED INSIDE THE BUILDING, IT SHALL BE IDENTIFIED AS "CAUTION: SOLAR CIRCUIT" EVERY 10FT.
6. HEIGHT OF THE AC DISCONNECT SHALL NOT EXCEED 6'-7" PER NEC CODE 240.24.
7. A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH CEC 690.47 AND 250.50 THROUGH 60 AND 250-166 SHALL BE PROVIDED. PER NEC GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE OR INADEQUATE A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT. GROUND ROD WITH ACORN CLAMP. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #8 AWG AND NO LARGER THAN #6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.
8. PHOTOVOLTAIC MODULES ARE TO BE CONSIDERED NON-COMBUSTIBLE.
9. PHOTOVOLTAIC INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING. MECHANICAL, OR BUILDING ROOF VENTS.
10. ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE. WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF THE ROOF SURFACE.
11. ALL SINAGE TO BE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SINAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.
12. INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE UL 1741 LISTED.
13. THE INSTALLATION OF EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE PERFORMED ONLY BY QUALIFIED PERSONS [NEC 690.4(C)]
14. ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED (OR BETTER), INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES.
15. ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250.
16. SYSTEM GROUNDING SHALL BE IN ACCORDANCE WITH NEC 690.41.
17. PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH NEC 690.12
18. DISCONNECTING MEANS SHALL BE LOCATED IN A VISIBLE, READILY ACCESSIBLE LOCATION WITHIN THE PV SYSTEM EQUIPMENT OR A MAXIMUM OF 10 FEET AWAY FROM THE SYSTEM [NEC 690.13(A)]
19. ALL WIRING METHODS SHALL BE IN ACCORDANCE WITH NEC 690.31
20. WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER NEC 110.26(A)(1), 110.26(A)(2) AND 110.26(A)(3).
21. ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED & IDENTIFIED IN ACCORDANCE WITH UL1703
22. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.

VICINITY MAP

HOUSE PHOTO

CODE REFERENCES

2018 NORTH CAROLINA BUILDING CODE
2018 NORTH CAROLINA RESIDENTIAL CODE
2018 NORTH CAROLINA FIRE CODE
2017 NATIONAL ELECTRICAL CODE

Andrew D. Leone
Digitally signed by Andrew D. Leone
Date: 2024.02.22 13:13:09 -05'00'

SOUTHEAST ENERGY SOLUTIONS

855 SUNSET DR #8, ATHENS, GA 30606, UNITED STATES

REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	10/27/2023	
FOUNDATION CHANGE	11/09/2023	A
RACKING SYSTEM AND ELECTRICAL CHANGE	11/21/2023	B
ARRAY LOCATION CHANGE	02/21/2024	C

NORTH CAROLINA PROFESSIONAL SEAL 44303 ENGINEER ANDREW D LEONE

PROJECT NAME & ADDRESS

TRAVIS BASS RESIDENCE
2184 WIRE RD, BUNNLEVEL, NC 28323

DRAWN BY: ESR

SHEET NAME: COVER SHEET

SHEET SIZE: ANSI B 11" X 17"

SHEET NUMBER: PV-1

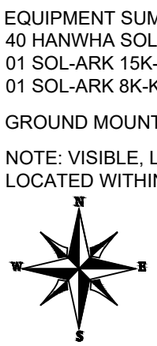
PROJECT DESCRIPTION:

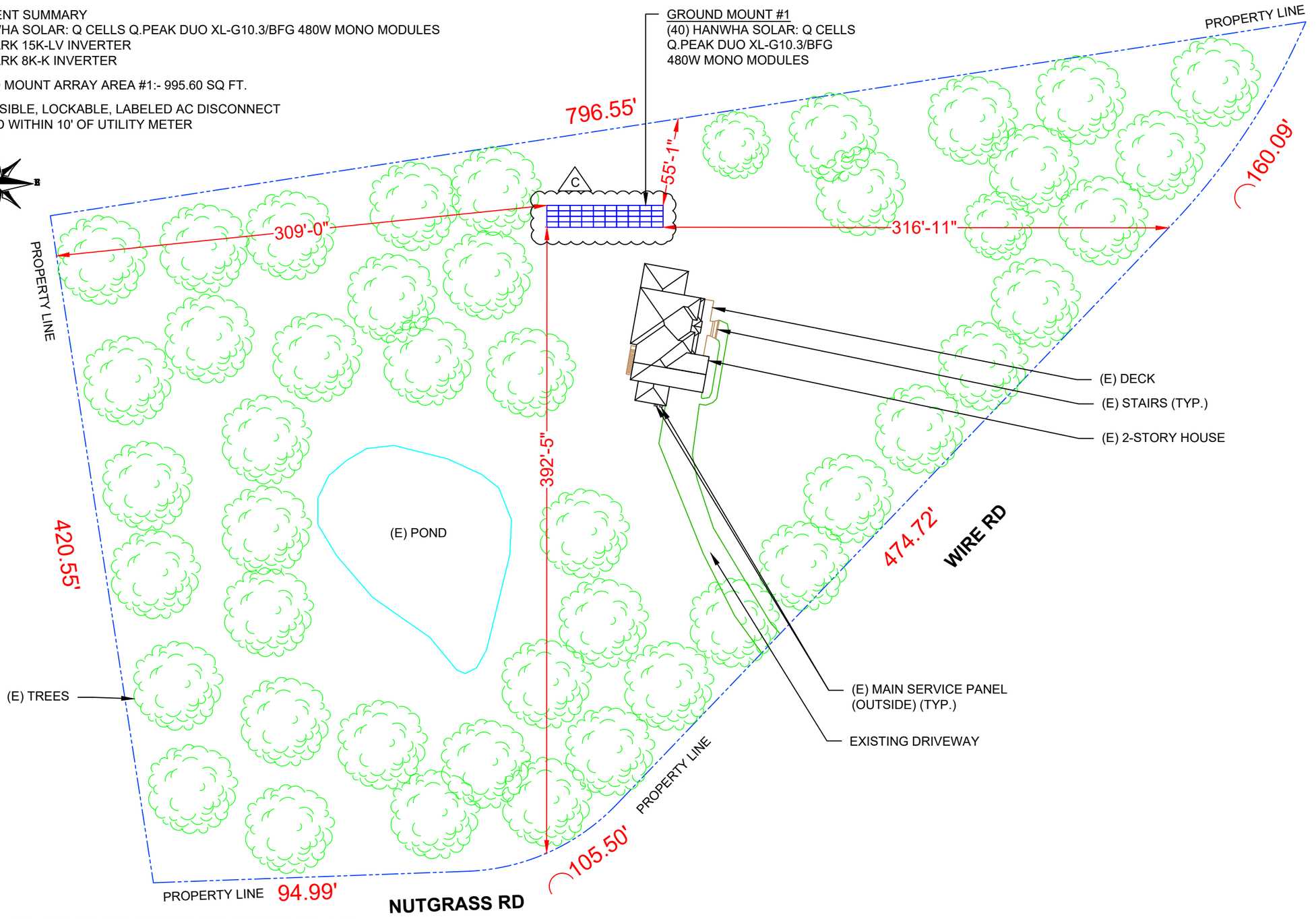
40 X HANWHA SOLAR: Q CELLS Q.PEAK DUO XL-G10.3/BFG 480W MONO MODULES
GROUND MOUNTED SOLAR PHOTOVOLTAIC MODULES
DC SYSTEM SIZE: 19.200 kW DC
AC SYSTEM SIZE: 23.000 kW AC

EQUIPMENT SUMMARY
40 HANWHA SOLAR: Q CELLS Q.PEAK DUO XL-G10.3/BFG 480W MONO MODULES
01 SOL-ARK 15K-LV INVERTER
01 SOL-ARK 8K-K INVERTER

GROUND MOUNT ARRAY AREA #1:- 995.60 SQ FT.

NOTE: VISIBLE, LOCKABLE, LABELED AC DISCONNECT
LOCATED WITHIN 10' OF UTILITY METER





1 PLOT PLAN WITH GROUND PLAN
PV-2 SCALE: 1/64" = 1'-0"

Southeast Energy Solutions

SOUTHEAST ENERGY SOLUTIONS

855 SUNSET DR #8, ATHENS,
GA 30606, UNITED STATES

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NORTH CAROLINA PROFESSIONAL SEAL 44303 ENGINEER ANDREW D LEONE

PROJECT NAME & ADDRESS

TRAVIS BASS RESIDENCE

2184 WIRE RD,
BUNNLEVEL, NC 28323

DRAWN BY
ESR

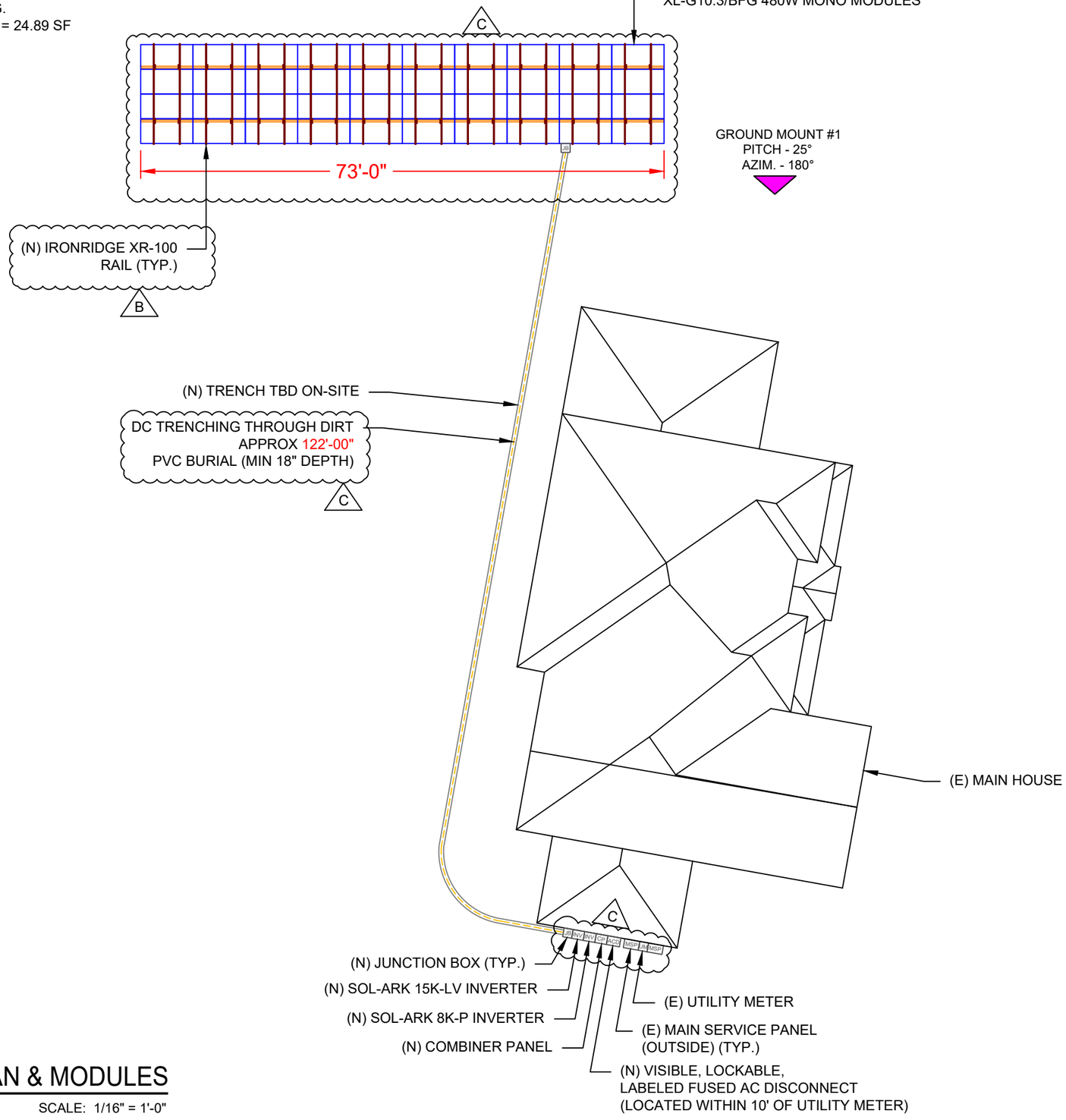
SHEET NAME
PLOT PLAN WITH GROUND PLAN

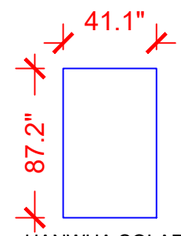
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-2

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 40 MODULES
MODULE TYPE = HANWHA SOLAR: Q CELLS Q.PEAK DUO XL-G10.3/BFG 480W MONO MODULES
MODULE WEIGHT = 64.2 LBS / 29.1KG.
MODULE DIMENSIONS = 87.2" x 41.1" = 24.89 SF





HANWHA SOLAR:
Q CELLS Q.PEAK
DUO XL-G10.3/BFG
480W MODULES

LEGEND

ACD	- AC DISCONNECT
INV	- INVERTER
UM	- UTILITY METER
SUB	- SUBPANEL
MSP	- MAIN SERVICE PANEL
JB	- JUNCTION BOX
	- CONDUIT
	- TRENCH

1 GROUND PLAN & MODULES
PV-3 SCALE: 1/16" = 1'-0"

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SOUTHEAST ENERGY SOLUTIONS

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NORTH CAROLINA PROFESSIONAL SEAL 44303 ENGINEER ANDREW D LEONE

PROJECT NAME & ADDRESS

TRAVIS BASS RESIDENCE

2184 WIRE RD,
BUNNLEVEL, NC 28323

DRAWN BY
ESR

SHEET NAME
GROUND PLAN & MODULES

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-3

STRING LEGENDS

- STRING #1/INV#1
- STRING #2/INV#1
- STRING #3/INV#1
- STRING #1/INV#2
- STRING #2/INV#2

B

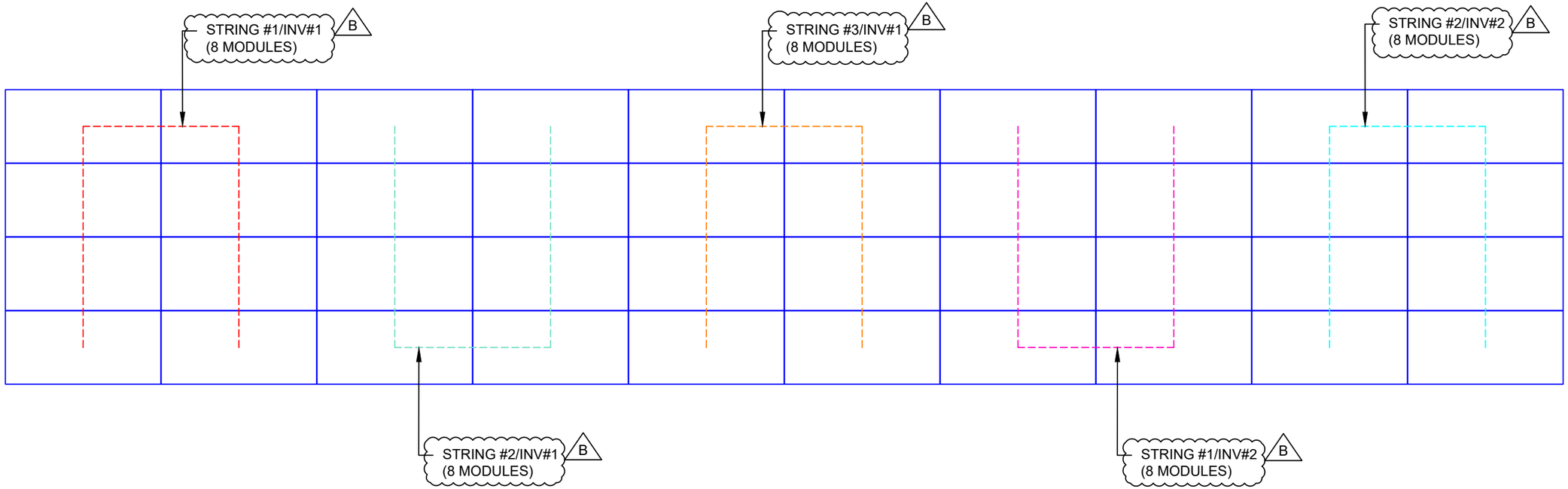
Bill of Materials

Part	Spares	Total Qty
Rails		
XR-100-168A XR100, Rail 168" Clear	0	20
Clamps & Grounding		
UFO-CL-01-A1 Universal Module Clamp, Clear	0	100
UFO-STP-35MM-M1 Stopper Sleeve, 35MM, Mill	0	40
XR-LUG-03-A1 Grounding Lug, Low Profile	0	1
Substructure		
70-0300-SGA SGA Top Cap at 3"	0	14
GM-BRC3-01-M1 Ground Mount Bonded Rail Connector - 3"	0	40

B

BILL OF MATERIALS

EQUIPMENT DESCRIPTION	QTY
SOLAR PV MODULES: HANWHA SOLAR: Q CELLS Q.PEAK DUO XL-G10.3/BFG 480W MODULE	40
INVERTER: SOL-ARK 15K-LV INVERTER	01
INVERTER: SOL-ARK 8K-P INVERTER	01
JUNCTION BOXES: 6"X6"X4" UL LISTED, STEEL WATER TIGHT NEMA TYPE 3R, UL LISTED	2
AC DISCONNECT: FUSED AC DISCONNECT, 200A FUSED, (2) 125A FUSES 240V NEMA 3R, UL LISTED	1



1 ELECTRICAL PLAN

PV-4 SCALE: 3/16" = 1'-0"

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PROJECT NAME & ADDRESS

TRAVIS BASS RESIDENCE

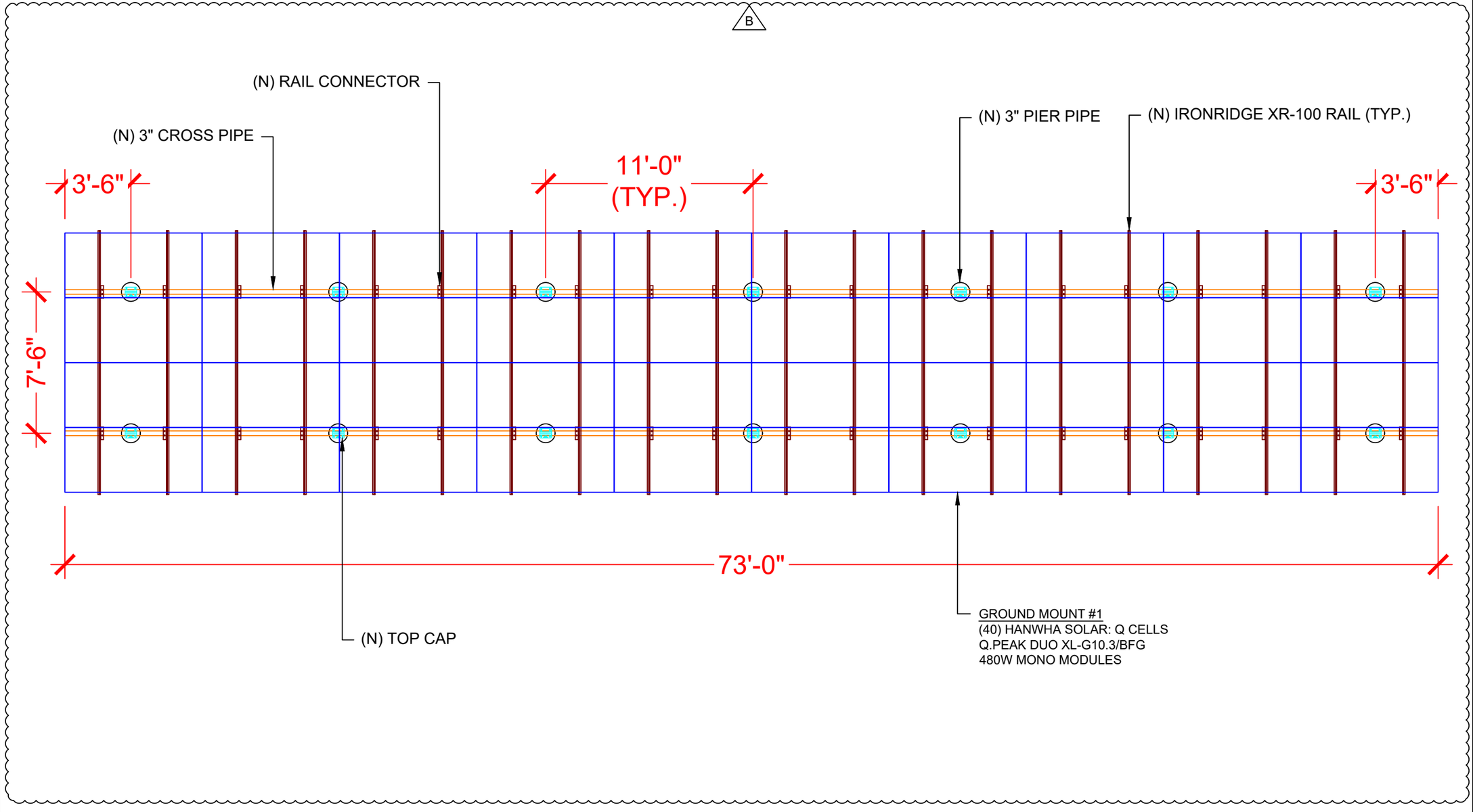
2184 WIRE RD, BUNNLEVEL, NC 28323

DRAWN BY
ESR

SHEET NAME
ELECTRICAL PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-4



1 ARRAY PLAN WITH MOUNTING DETAIL

PV-5

SCALE: NTS

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NORTH CAROLINA PROFESSIONAL SEAL 44303 ENGINEER ANDREW D LEONE

PROJECT NAME & ADDRESS

TRAVIS BASS RESIDENCE

2184 WIRE RD,
BUNNLEVEL, NC 28323

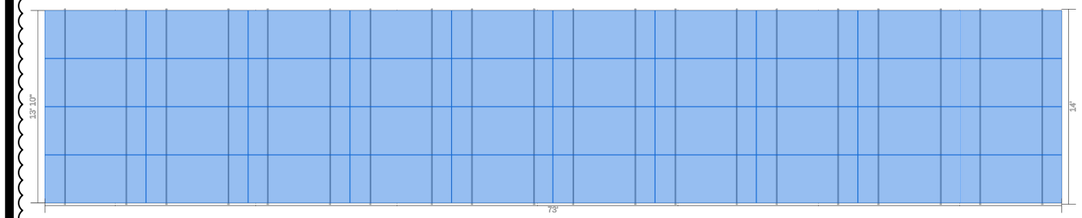
DRAWN BY
ESR

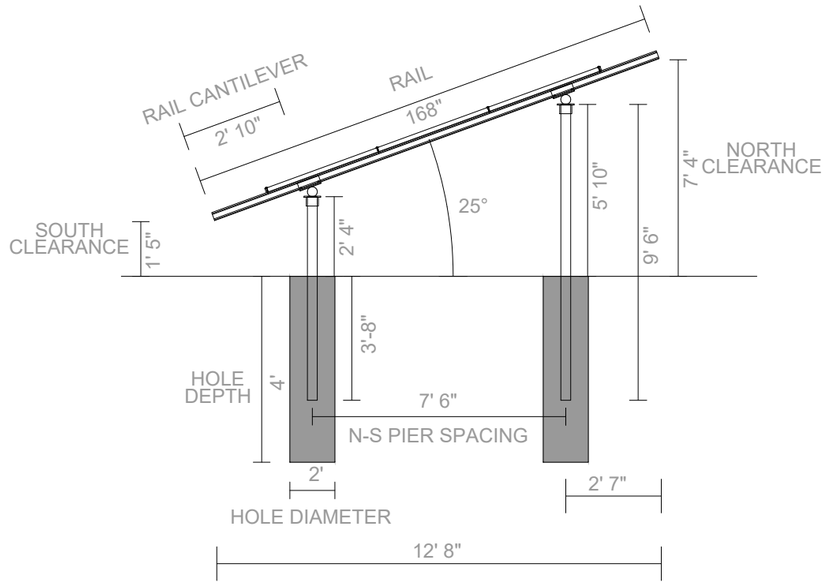
SHEET NAME
MOUNTING DETAIL-1

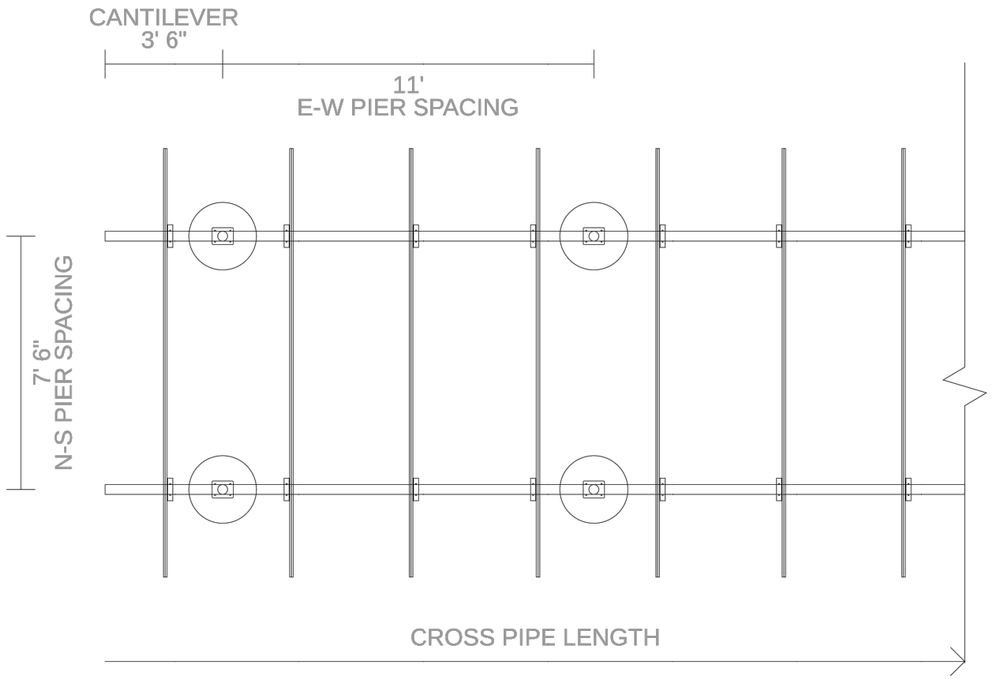
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-5

B

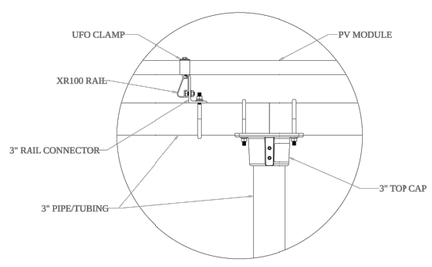




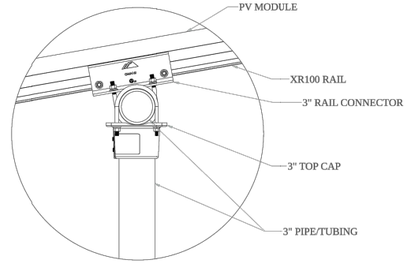


Pipe Fitting Detail

XR100 Rail

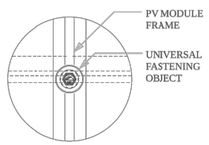


Front View

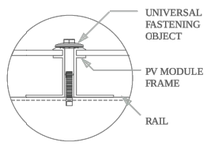


Side View

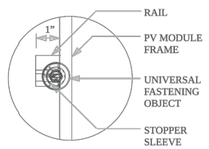
Clamp Detail



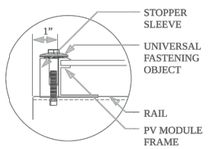
Mid Clamp, Plan



Mid Clamp, Front



End Clamp, Plan



End Clamp, Front

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SOUTHEAST ENERGY SOLUTIONS

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NORTH CAROLINA PROFESSIONAL SEAL 44303 ENGINEER ANDREW D LEONE

PROJECT NAME & ADDRESS

TRAVIS BASS RESIDENCE

2184 WIRE RD,
BUNNLEVEL, NC 28323

DRAWN BY
ESR

SHEET NAME
MOUNTING DETAIL-2

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-5A

DC SYSTEM SIZE: 19.200 kW DC
AC SYSTEM SIZE: 23.000 kW AC

(40) HANWHA SOLAR: Q CELLS Q.PEAK DUO XL-G10.3/BFG 480W MONO MODULES
(01) SOL-ARK 15K-LV INVERTER
(01) SOL-ARK 8K-P INVERTER
(05) STRINGS OF 08 MODULES ARE CONNECTED IN SERIES

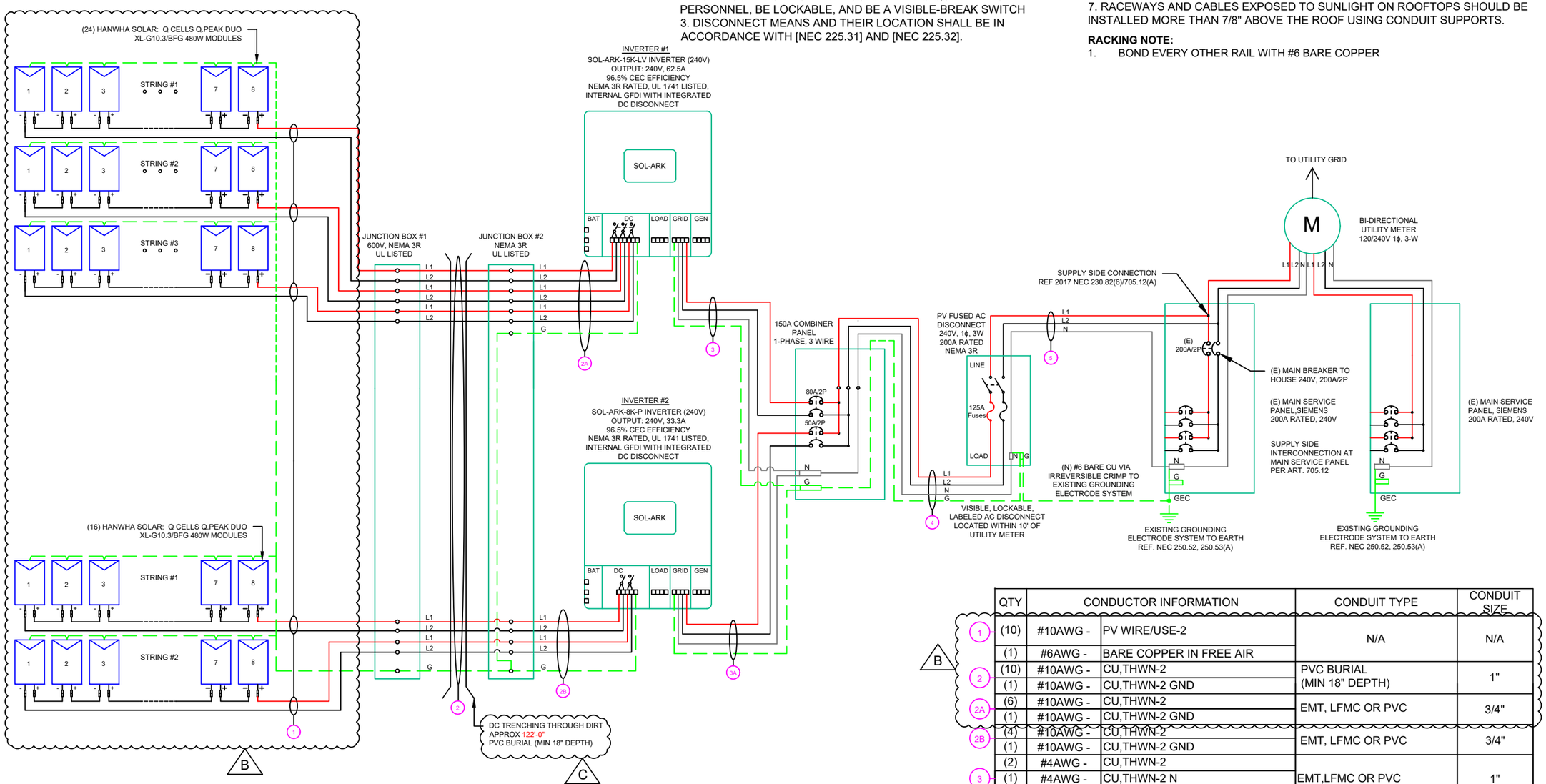
B

INTERCONNECTION NOTES:
1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12], AND [NEC 690.59].
2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95].
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

DISCONNECT NOTES:
1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED “LINE SIDE” (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
3. DISCONNECT MEANS AND THEIR LOCATION SHALL BE IN ACCORDANCE WITH [NEC 225.31] AND [NEC 225.32].

GROUNDING & GENERAL NOTES:
1. PV GROUNDING ELECTRODE SYSTEM NEEDS TO BE INSTALLED IN ACCORDANCE WITH [NEC 690.43]
2. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
3. DC GEC AND AC EGC TO REMAIN UNSPLICED, OR SPLICED TO EXISTING ELECTRODE
4. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
5. JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOX DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
6. AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.
7. RACEWAYS AND CABLES EXPOSED TO SUNLIGHT ON ROOFTOPS SHOULD BE INSTALLED MORE THAN 7/8" ABOVE THE ROOF USING CONDUIT SUPPORTS.

RACKING NOTE:
1. BOND EVERY OTHER RAIL WITH #6 BARE COPPER



	QTY	CONDUCTOR INFORMATION		CONDUIT TYPE	CONDUIT SIZE
1	(10)	#10AWG -	PV WIRE/USE-2	N/A	N/A
	(1)	#6AWG -	BARE COPPER IN FREE AIR		
2	(10)	#10AWG -	CU,THWN-2	PVC BURIAL (MIN 18" DEPTH)	1"
	(1)	#10AWG -	CU,THWN-2 GND		
2A	(6)	#10AWG -	CU,THWN-2	EMT, LFMC OR PVC	3/4"
	(1)	#10AWG -	CU,THWN-2 GND		
2B	(4)	#10AWG -	CU,THWN-2	EMT, LFMC OR PVC	3/4"
	(1)	#10AWG -	CU,THWN-2 GND		
3	(2)	#4AWG -	CU,THWN-2	EMT,LFMC OR PVC	1"
	(1)	#4AWG -	CU,THWN-2 N		
	(1)	#8AWG -	CU,THWN-2 GND		
3A	(2)	#8AWG -	CU,THWN-2	EMT, LFMC OR PVC	3/4"
	(1)	#8AWG -	CU,THWN-2 N		
	(1)	#10AWG -	CU,THWN-2 GND		
4	(2)	#1AWG -	CU,THWN-2	EMT,LFMC OR PVC	1-1/4"
	(1)	#1AWG -	CU,THWN-2 N		
	(1)	#6AWG -	CU,THWN-2 GND		
5	(2)	#1AWG -	CU,THWN-2	EMT, LFMC OR PVC	1-1/4"
	(1)	#1AWG -	CU,THWN-2 N		

NOTE: CONDUIT TO BE UL LISTED FOR WET LOCATIONS AND UV PROTECTED

1 ELECTRICAL LINE DIAGRAM
PV-6 SCALE: NTS

Southeast Energy Solutions

SOUTHEAST ENERGY SOLUTIONS

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PROJECT NAME & ADDRESS

TRAVIS BASS RESIDENCE

2184 WIRE RD, BUNNLEVEL, NC 28323

DRAWN BY
ESR

SHEET NAME
ELECTRICAL LINE DIAGRAM

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-6

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	HANWHA SOLAR: Q CELLS Q.PEAK DUO XL-G10.3/BFG 480W MODULE
VMP	45.33V
IMP	10.59A
VOC	53.39V
ISC	11.12A
TEMP. COEFF. VOC	-0.27%/°C
MODULE DIMENSION	87.2"L x 41.1"W x 1.38"D (In Inch)

INVERTER #1 SPECIFICATIONS	
MANUFACTURER / MODEL #	SOL-ARK 15K-LV INVERTER
NOMINAL AC POWER	15.000 kW
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	62.5A

INVERTER #2 SPECIFICATIONS	
MANUFACTURER / MODEL #	SOL-ARK 8K-P INVERTER
NOMINAL AC POWER	8.000 kW
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	33.3A

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-9°
AMBIENT TEMP (HIGH TEMP 2%)	38°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.27%/°C

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
.80	4-6
.70	7-9
.50	10-20

DC FEEDER CALCULATIONS

CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.56 (A)	OCPD SIZE (A)	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B)(2)(a)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(B)(3)(a)	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
STRING 1/INV#1	JUNCTION BOX 1	500	11.12	17.35	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.028	N/A	#N/A
STRING 2/INV#1	JUNCTION BOX 1	500	11.12	17.35	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.028	N/A	#N/A
STRING 3/INV#1	JUNCTION BOX 1	500	11.12	17.35	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.028	N/A	#N/A
STRING 1/INV#2	JUNCTION BOX 1	500	11.12	17.35	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.028	N/A	#N/A
STRING 2/INV#2	JUNCTION BOX 1	500	11.12	17.35	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.028	N/A	#N/A
JUNCTION BOX 1	JUNCTION BOX 2	500	11.12	17.35	20	CU #10 AWG	CU #10 AWG	35	PASS	38	10	40	0.91	0.5	18.2	PASS	122	1.24	0.673	1" PVC	27.89663
JUNCTION BOX 2	INVERTER 1	500	11.12	17.35	20	CU #10 AWG	CU #10 AWG	35	PASS	38	6	40	0.91	0.8	29.12	PASS	5	1.24	0.028	3/4" EMT	27.71107
JUNCTION BOX 2	INVERTER 2	500	11.12	17.35	20	CU #10 AWG	CU #10 AWG	35	PASS	38	4	40	0.91	0.8	29.12	PASS	5	1.24	0.028	3/4" EMT	19.79362

String 1/Inv#1 Voltage Drop	0.728
String 2/Inv#1 Voltage Drop	0.728
String 3/Inv#1 Voltage Drop	0.728
String 1/Inv#2 Voltage Drop	0.728
String 2/Inv#2 Voltage Drop	0.728

C

AC FEEDER CALCULATIONS

CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B)(2)(a)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(B)(3)(a)	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
INVERTER 1	COMBINER PANEL	240	62.5	78.125	80	CU #4 AWG	CU #8 AWG	CU #4 AWG	85	PASS	38	2	95	0.91	1	86.45	PASS	5	0.308	0.080	1" EMT	32.8472
INVERTER 2	COMBINER PANEL	240	33.3	41.625	50	CU #8 AWG	CU #10 AWG	CU #8 AWG	50	PASS	38	2	55	0.91	1	50.05	PASS	5	0.778	0.108	3/4" EMT	24.5591
COMBINER PANEL	AC DISCONNECT	240	95.8	119.75	125	CU #1 AWG	CU #6 AWG	CU #1 AWG	130	PASS	38	2	145	0.91	1	131.95	PASS	5	0.154	0.061	1 1/4" EMT	34.7126
AC DISCONNECT	POI	240	95.8	119.75	125	CU #1 AWG	N/A	CU #1 AWG	130	PASS	38	2	145	0.91	1	131.95	PASS	5	0.154	0.061	1 1/4" EMT	31.3235

CUMULATIVE VOLTAGE DROP INV #1	0.20
CUMULATIVE VOLTAGE DROP INV #2	0.23

ELECTRICAL NOTES

1. ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
2. ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
3. WIRING, CONDUIT, AND RACEWAYS MOUNTED ON GROUNDTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
4. WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
5. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
6. WHERE SIZES OF JUNCTION BOX, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
7. ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
8. MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
9. MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
10. TEMPERATURE RATINGS OF ALL CONDUCTORS, TERMINATIONS, BREAKERS, OR OTHER DEVICES ASSOCIATED WITH THE SOLAR PV SYSTEM SHALL BE RATED FOR AT LEAST 75 DEGREE C.

Southeast Energy Solutions

SOUTHEAST ENERGY SOLUTIONS

855 SUNSET DR #8, ATHENS, GA 30606, UNITED STATES

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	10/27/2023	
FOUNDATION CHANGE	11/09/2023	A
RACKING SYSTEM AND ELECTRICAL CHANGE	11/21/2023	B
ARRAY LOCATION CHANGE	02/21/2024	C

PROJECT NAME & ADDRESS

TRAVIS BASS RESIDENCE

2184 WIRE RD, BUNNLEVEL, NC 28323

DRAWN BY

ESR

SHEET NAME

WIRING CALCULATIONS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-7

PHOTOVOLTAIC POWER SOURCE

EVERY 10' ON CONDUIT & ENCLOSURES

LABEL- 1:
LABEL LOCATION:
EMT/CONDUIT RACEWAY
SOLADECK / JUNCTION BOX
CODE REF: NEC 690.31 (D)(2)

⚠ WARNING

ELECTRIC SHOCK HAZARD

TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL- 2:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.13(B)

⚠ WARNING

DUAL POWER SUPPLY

SOURCE: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

LABEL- 3:
LABEL LOCATION:
MAIN SERVICE PANEL
CODE REF: NEC 705.12(C) & NEC 690.59

SOLAR PV BREAKER:

BREAKER IS BACKFED
DO NOT RELOCATE

LABEL-4:
LABEL LOCATION:
MAIN SERVICE PANEL
CODE REF: NEC 705.12(C) & NEC 690.59

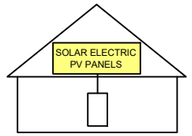
⚠ WARNING

POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL- 5:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 705.12(B)(3)(2)

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



LABEL- 6:
LABEL LOCATION:
AC DISCONNECT
CODE REF: [NEC 690.56(C)(1)(A)]

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL- 7:
LABEL LOCATION:
AC DISCONNECT
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 690.56(C)(2)

DC DISCONNECT

LABEL- 8:
LABEL LOCATION:
INVERTER
CODE REF: NEC 690.13(B)

AC DISCONNECT
PHOTOVOLTAIC SYSTEM POWER SOURCE

NOMINAL OPERATING AC VOLATGE	240 V
RATED AC OUTPUT CURRENT	95.8 A

LABEL- 9:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.54

FOR INV #1

INVERTER AC DISCONNECT

NOMINAL OPERATING AC VOLATGE	240 V
RATED AC OUTPUT CURRENT	62.50 A

LABEL- 10:
LABEL LOCATION:
INVERTER
CODE REF: NEC 690.54

FOR INV #2

INVERTER AC DISCONNECT

NOMINAL OPERATING AC VOLATGE	240 V
RATED AC OUTPUT CURRENT	33.3 A

LABEL- 11:
LABEL LOCATION:
INVERTER
CODE REF: NEC 690.54

FOR INV #1 & #2

MAXIMUM VOLTAGE	500 V
MAXIMUM CIRCUIT CURRENT	18 A
MAXIMUM RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER (IF INSTALLED)	

LABEL- 12:
LABEL LOCATION:
INVERTER
CODE REF: NEC 690.53

Southeast Energy Solutions

SOUTHEAST ENERGY SOLUTIONS

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PROJECT NAME & ADDRESS

TRAVIS BASS RESIDENCE

2184 WIRE RD, BUNNLEVEL, NC 28323

DRAWN BY
ESR

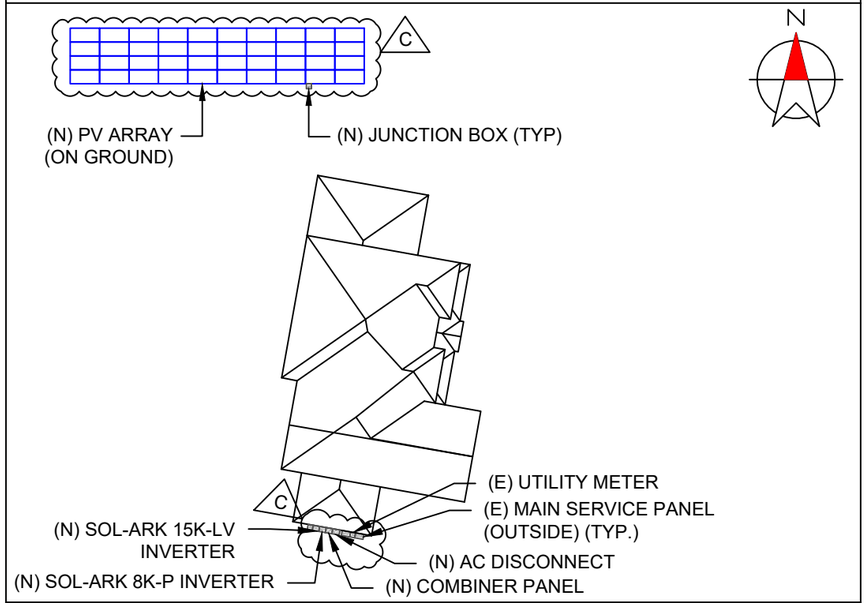
SHEET NAME
LABELS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-8

CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM MULTIPLE SOURCES OF POWER WITH SAFETY DISCONNECTS AS SHOWN:



2184 WIRE RD, BUNNLEVEL, NC 28323

DIRECTORY

PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM.

(ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN: NEC 690.56(B)&(C), [NEC 705.10])
[NEC 690.56(C)(1)(A)]

LABELING NOTES:

1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [NEC 690.56(C)(1)(A)].

Southeast Energy Solutions

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PROJECT NAME & ADDRESS

TRAVIS BASS RESIDENCE

2184 WIRE RD,
BUNNLEVEL, NC 28323

DRAWN BY
ESR

SHEET NAME
PLACARD

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-9

powered by Q.ANTUM DUO Z

Q.PEAK DUO XL-G10.3 / BFG

470-485

BIFACIAL DOUBLE GLASS MODULE
WITH EXCELLENT RELIABILITY
AND ADDITIONAL YIELD

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2020

Q CELLS Yield Security

BIFACIAL ENERGY YIELD GAIN OF UP TO 20 %

Bifacial Q.ANTUM solar cells with zero gap cell layout make efficient use of light shining on the module rear-side for radically improved LCOE.

LOW ELECTRICITY GENERATION COSTS

Q.ANTUM DUO Z combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology for higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 21.2 %.

INNOVATIVE ALL-WEATHER TECHNOLOGY

Optimal yields, whatever the weather with excellent low-light and temperature behavior.

ENDURING HIGH PERFORMANCE

Long-term yield security with Anti LID and Anti PID Technology[1], Hot-Spot Protect and Traceable Quality Tra.Q™.

FRAME FOR VERSATILE MOUNTING OPTIONS

High-tech aluminum alloy frame protects from damage, enables use of a wide range of mounting structures and is certified regarding IEC for high snow (5400 Pa) and wind loads (2400 Pa).

A RELIABLE INVESTMENT

Double glass module design enables extended lifetime with 12-year product warranty and improved 30-year performance warranty[2].

[1] APT test conditions according to IEC / TS 62804-1:2015 method B (−1500 V, 168 h) including post treatment according to IEC 61215-1-1 Ed. 2.0 (CD)
[2] See data sheet on rear for further information.

THE IDEAL SOLUTION FOR:

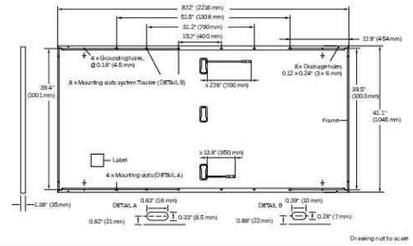
Ground-mounted solar power plants

Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	87.2 in × 41.1 in × 1.38 in (including frame) (2216 mm × 1045 mm × 35 mm)
Weight	64.2 lbs (29.1 kg)
Front Cover	0.08 in (2.0 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	0.08 in (2.0 mm) semi-tempered glass
Frame	Anodized aluminum
Cell	6 × 26 monocrystalline Q.ANTUM solar half cells
Junction Box	2.09–3.98 in × 1.26–2.36 in × 0.59–0.71 in (53–101 mm × 32–60 mm × 15–18 mm), IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥ 27.6 in (700 mm), (−) ≥ 13.8 in (350 mm)
Connector	Stäubli MC4-Evo2, Hanwha Q CELLS HQC4, IP68



Drawing not to scale

ELECTRICAL CHARACTERISTICS

POWER CLASS				470		475		480		485	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] AND BSTC[1] (POWER TOLERANCE +5 W / −0 W)					BSTC*		BSTC*		BSTC*		BSTC*
Minimum	Power at MPP[1]	P_{MPP}	[W]	470	514.1	475	519.6	480	525.0	485	530.5
	Short Circuit Current[1]	I_{SC}	[A]	11.04	12.08	11.08	12.12	11.12	12.17	11.16	12.21
	Open Circuit Voltage[1]	V_{OC}	[V]	52.91	53.10	53.15	53.34	53.39	53.58	53.63	53.82
	Current at MPP	I_{MPP}	[A]	10.51	11.50	10.55	11.54	10.59	11.58	10.63	11.63
	Voltage at MPP	V_{MPP}	[V]	44.73	44.72	45.03	45.02	45.33	45.32	45.63	45.62
	Efficiency[1]	η	[%]	≥ 20.3	≥ 22.2	≥ 20.5	≥ 22.4	≥ 20.7	≥ 22.7	≥ 20.9	≥ 22.9

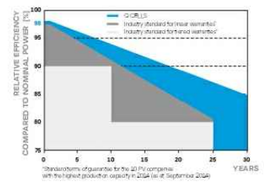
Bifaciality of P_{MPP} and I_{SC} 70 % ± 5 % • Bifaciality given for rear side irradiation on top of STC (front side) • According to IEC 60904-1-2

[1] Measurement tolerances P_{MPP} ±3 %; I_{SC}, V_{OC} ±5 % at STC: 1000 W/m²; *at BSTC: 1000 W/m² + φ × 135 W/m², φ = 70 % ± 5 %, 25 ± 2 °C, AM 1.5 according to IEC 60904-3

MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]							
Minimum	Power at MPP	P_{MPP}	[W]	353.8	357.6	361.4	365.1
	Short Circuit Current	I_{SC}	[A]	8.89	8.92	8.96	8.99
	Open Circuit Voltage	V_{OC}	[V]	50.04	50.27	50.49	50.72
	Current at MPP	I_{MPP}	[A]	8.27	8.30	8.34	8.37
	Voltage at MPP	V_{MPP}	[V]	42.77	43.06	43.35	43.63

[2] 800 W/m², NMOT, spectrum AM 1.5

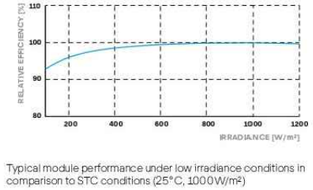
Q CELLS PERFORMANCE WARRANTY



At least 98 % of nominal power during first year. Thereafter max. 0.45 % degradation per year. At least 93.95 % of nominal power up to 10 years. At least 84.95 % of nominal power up to 30 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²)

TEMPERATURE COEFFICIENTS							
Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	−0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	−0.34	Nominal Module Operating Temperature	NMOT	[°F]	108 ± 5.4 (42 ± 3 °C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V_{SYS}	[V]	1500	PV module classification	Class II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating based on ANSI / UL 61730	TYPE 29[4]
Max. Design Load, Push / Pull[3]	[lbs/ft²]	75 (3600 Pa) / 33 (1600 Pa)	Permitted Module Temperature on Continuous Duty	−40 °F up to +185 °F (−40 °C up to +85 °C)
Max. Test Load, Push / Pull[3]	[lbs/ft²]	113 (5400 Pa) / 50 (2400 Pa)		

[3] See Installation Manual

[4] New Type is similar to Type 3 but with metallic frame

QUALIFICATIONS AND CERTIFICATES

UL 61730, CE-compliant;
IEC 61215:2016, IEC 61730:2016;
U.S. Patent No. 9,893,215 (solar cells);
Certification in process.

C SP US Certified UL 61730 · CE · TÜVRheinland CERTIFIED www.tuv.com ID 1111220277

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS America Inc.
400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | **TEL** +1 949 748 59 96 | **EMAIL** inquiry@us.q-cells.com | **WEB** www.q-cells.us

Southeast Energy Solutions

SOUTHEAST ENERGY SOLUTIONS

855 SUNSET DR #8, ATHENS,
GA 30606, UNITED STATES

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PROJECT NAME & ADDRESS

TRAVIS BASS RESIDENCE

2184 WIRE RD,
BUNNLEVEL, NC 28323

DRAWN BY
ESR

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-10

LIMITLESS 15K-LV Spec Sheet

Solar	Input Power 17000W
Max Allowed PV Power	17000W
Max PV Power Delivered to Battery & AC Outputs	15000W
Max DC Voltage (Voc)	500V @ 18A, 450V @ 20A
MPPT Voltage Range	150-425V
Starting Voltage	125V
Number of MPPT	3
Max Solar Strings Per MPPT	2
Max DC Current per MPPT (Self Limiting)	26A
Max AC Coupled Input (Micro/String Inverters)	19200W

Battery (optional)	Output Power 12000W
Type	Lead-Acid or Li-Ion
Nominal DC Input	48V
Capacity	50 — 9900Ah
Voltage Range	43.0 — 63.0V
Continuous Battery Charging Output	275A
Charging Curve	3-Stage w/ Equalization
Grid to Batt Charging Efficiency	96.0%
External Temperature Sensor	Included
Current Shunt for Accurate % SOC	Integrated
External Gen Start Based on Voltage or %SOC	Integrated
Communication to Lithium Battery	CanBus & RS485

General	
Dimensions (H x W x D)	31.8” x 18.3” x 10.9”
Weight	101 lbs
Enclosure	IP65 / NEMA 3R
Ambient Temperature	-40~60°C, >45°C Derating
Installation Style	Wall-Mounted
Wi-Fi & LAN Communication	Included
Standard Warranty (verified by HALT Testing)	10 Years

AC Output Power 15kW On-Grid & Off-Grid	
Connections	120/240/208V Split Phase
Continuous AC Power from PV	15000W 62.5A-L (240V)
Continuous AC Power from Batteries	12000W 50A-L (240V)
Surge AC Power 10sec Surge AC Power 100ms	24,000W L-L (240V) TBD
Parallel Stacking	Yes - 12 Max
Frequency	60/50Hz
Continuous AC Power with Grid or Generator	48000W 200A L-L (240V) 24000W 200A L-N (120V)
CEC Efficiency	96.5% (Peak 97.5%)
Idle Consumption Typical—No Load	90W
Sell Back Power Modes	Limited to Household/Fully Grid-Tied
Design (DC to AC)	Transformerless DC
Response Time (Grid-Tied to Off-Grid)	4ms
Power Factor	+/- 0.9 - 1.0

Protections & Certifications	
Electronics Certified Safety by SGS Labs to NEC & UL Specs - NEC 690.4B & NEC 705.4/6	Yes
Grid Sell Back — UL1741-2010/2018, IEE-E1547a-2003/2014, FCC 15 Class B, UL1741SA, CA Rule 21, HECO Rule 14H	Yes
PV DC Disconnect Switch — NEC 240.15	Integrated
Ground Fault Detection — NEC 690.5	Integrated
PV Rapid Shutdown Control — NEC 690.12	Integrated
PV Arc Fault Detection — NEC 690.11	Integrated
PV Input Lightning Protection	Integrated
PV String Input Reverse Polarity Protection	Integrated
AC Output Breakers - 63A	Integrated
250A Battery Breaker / Disconnect	Integrated
Surge Protection	DC Type II / AC Type II

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PROJECT NAME & ADDRESS

TRAVIS BASS RESIDENCE

2184 WIRE RD,
BUNNLEVEL, NC 28323

DRAWN BY
ESR

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-11

Sol-Ark

Sol-Ark 8K-P Spec Sheet

Solar	Input Power 9000W
Max Allowed PV Power	5500W + 5500W = 11000W
Max PV Power Delivered to Battery & AC Outputs	8000W
Max DC Voltage (Voc)	500V @ 18A, 450V @ 20A
MPPT Voltage Range	150-425V
Starting Voltage	125V
Number of MPPT	2
Max Solar Strings Per MPPT	2
Max DC Current per MPPT (Self Limiting)	20A
Max AC Coupled Input (Micro/String Inverters)	9600W

Battery (optional)	Output Power 8000W
Type	Lead-Acid or Li-Ion
Nominal DC Input	48V
Capacity	50 — 9900Ah
Voltage Range	43.0 — 63.0V
Continuous Battery Charging Output	185A
Charging Curve	3-Stage w/ Equalization
Grid to Batt Charging Efficiency	96.0%
External Temperature Sensor	Included
Current Shunt for Accurate % SOC	Integrated
External Gen Start Based on Voltage or %SOC	Integrated
Communication to Lithium Battery	CanBus & RS485

General	
Dimensions (H x W x D)	30.0" x 18.3" x
Weight	78 lbs
Enclosure	NEMA 3R
Ambient Temperature	-25-55°C, >45°C
Installation Style	Wall-Mounted
Wi-Fi & LAN Communication	Included
Standard Warranty (verified by HALT Testing)	5 Years

AC Output Power 8kW On-Grid & Off-Grid	
Connections	120/240/208V Split Phase
Continuous AC Power to Grid (On-Grid)	8000W 33.3A-L (240V)
Continuous AC Power to Load (Off-Grid)	8000W 33.3A-L (240V)
Surge AC Power 10sec (Load)	16,000VA L-L (240V)
Surge AC Power 100ms (Load)	25,000VA L-L(240V)
Parallel Stacking	No
Frequency	60/50Hz
Continuous AC Power with Grid or Generator (Pass-through Power)	15120W 63A L-L (240V) 7560W 63A L-N (120V)
CEC Efficiency	96.5% (Peak 97.5%)
Idle Consumption Typical—No Load	60W
Sell Back Power Modes	Limited to Household/Fully Grid-Tied
Design (DC to AC)	Transformerless DC
Response Time (Grid-Tied to Off-Grid)	4ms
Power Factor	+/- 0.9 - 1.0

Protections & Certifications	
Electronics Certified Safety by SGS Labs to NEC & UL Specs - NEC 690.4B & NEC 705.4/6	Yes
Grid Sell Back — UL1741-2010/2018, IEE-E1547a-2003/2014, FCC 15 Class B, UL1741SA,	Yes
PV DC Disconnect Switch — NEC 240.15	Integrated
Ground Fault Detection — NEC 690.5	Integrated
PV Rapid Shutdown Control — NEC 690.12	Integrated
PV Arc Fault Detection — NEC 690.11	Integrated
PV Input Lightning Protection	Integrated
PV String Input Reverse Polarity Protection	Integrated
AC Output Breakers - 63A	Integrated
250A Battery Breaker / Disconnect	Integrated
Surge Protection	DC Type II / AC Type II

Southeast Energy Solutions

SOUTHEAST ENERGY SOLUTIONS

855 SUNSET DR #8, ATHENS,
GA 30606, UNITED STATES

REVISIONS		
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INITIAL DESIGN	10/27/2023	
FOUNDATION CHANGE	11/09/2023	A
RACKING SYSTEM AND ELECTRICAL CHANGE	11/21/2023	B
ARRAY LOCATION CHANGE	02/21/2024	C

PROJECT NAME & ADDRESS

TRAVIS BASS RESIDENCE

2184 WIRE RD,
BUNNLEVEL, NC 28323

DRAWN BY
ESR

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-12

Tech Brief

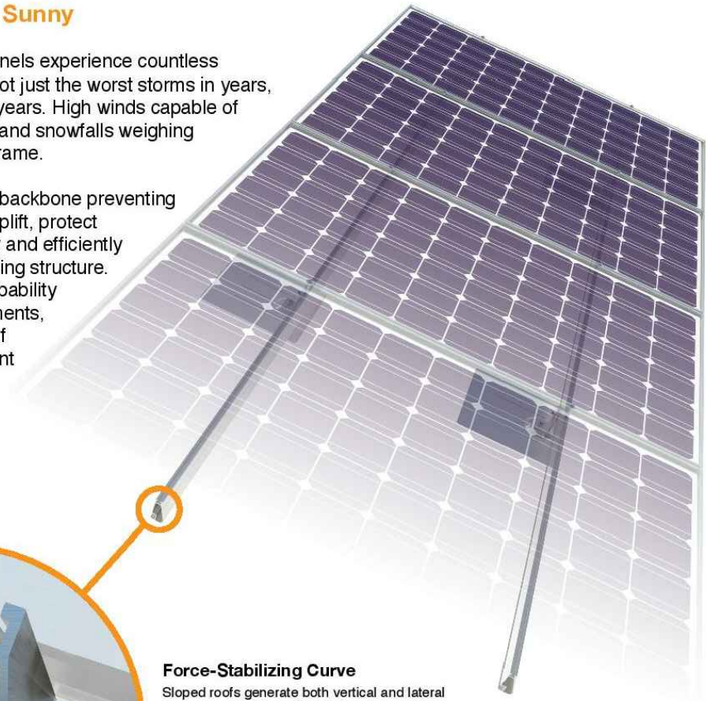
IRONRIDGE

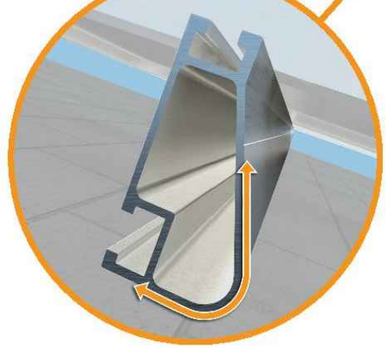
XR Rail Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.





Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs

XR Rails are compatible with FlashFoot and other pitched roof attachments.

IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.

Tech Brief

XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.

XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 6 feet, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear & black anodized finish
- Internal splices available

XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 10 feet.

- 10' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available

XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans up to 12 feet for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

The table below was prepared in compliance with applicable engineering codes and standards.* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	90	XR10		XR100		XR1000	
	120						
	140						
	160						
20	90						
	120						
	140						
	160						
30	90						
	160						
40	90						
	160						
80	160						
120	160						

*Table is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.

Southeast Energy Solutions

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DRAWN BY
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SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-13

B

Datasheet

IRONRIDGE

Ground Mount System

All-Terrain Mounting

The IronRidge® Ground Mount System combines our XR100® or XR1000® rails with locally-sourced steel pipes or mechanical tubing, to create a cost-effective structure capable of handling any site or terrain challenge.

Installation is simple with only a few structural components and no drilling, welding, or heavy machinery required. In addition, the system works with a variety of foundation options—including concrete piers, ground screws, helical or driven piles, and above-ground ballast blocks.

Rugged Construction
Engineered steel and aluminum components ensure durability.

PE Certified
Pre-stamped engineering letters available in most states.

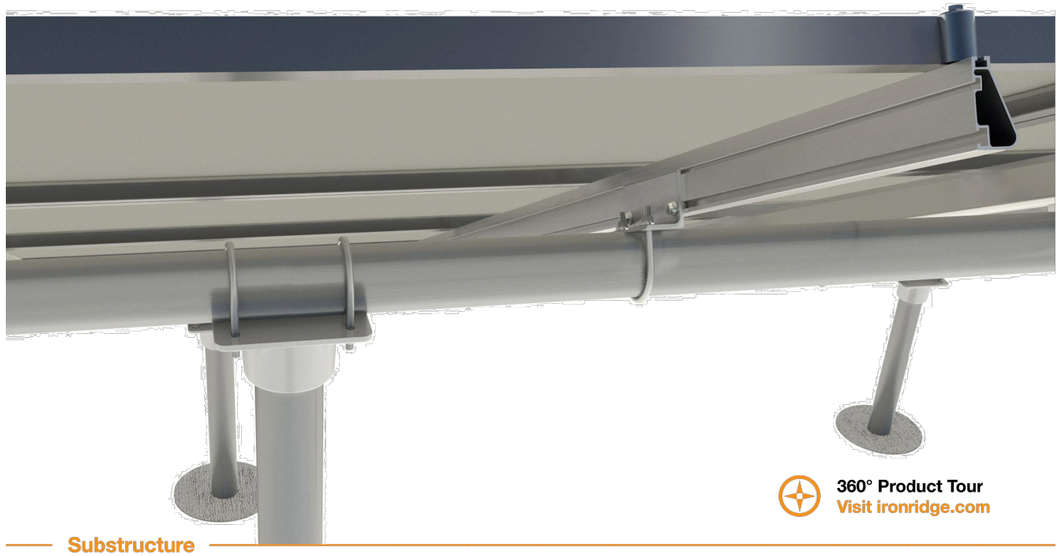
UL 2703 Listed System
Meets newest effective UL 2703 standard.

Design Software
Online tool generates engineering values and bill of materials.

Flexible Architecture
Multiple foundation and array configuration options.

25-Year Warranty
Products guaranteed to be free of impairing defects.

Datasheet



360° Product Tour
Visit ironridge.com

Substructure

Top Caps

Connect vertical piers with cross pipes or tubing.

Bonded Rail Connectors

Attach and bond XR Rails® to cross pipes or tubing.

Diagonal Braces

Optional brace provides additional support.

Cross Pipe & Piers

Steel pipes or mechanical tubing for substructure.

Rail Assembly

XR100® & XR1000® Rails

Curved XR Rails® increase spanning capabilities.

UFO®

Universal Fastening Objects bond modules to rails.

Stopper Sleeves

Snap onto the UFO® to turn into a bonded end clamp.

CAMO

Bond modules to rails while staying completely hidden.

Resources

Design Assistant
Go from rough layout to fully engineered system. For free.
Go to ironridge.com/design

NABCEP Certified Training
Earn free continuing education credits, while learning more about our systems.
Go to ironridge.com/training

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SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-14