

SCOPE OF WORK:
TO INSTALL A CARPORT SOLAR PHOTOVOLTAIC SYSTEM AT THE OWNER RESIDENCE
LOCATED AT ----, ---, ----.
THE POWER GENERATED BY THE PV SYSTEM WILL BE INTERCONNECTED WITH THE UTILITY
GRID THROUGH THE EXISTING ELECTRICAL SERVICE EQUIPMENT.
THE PV SYSTEM DOES NOT INCLUDE STORAGE BATTERIES

EQUIPMENT SUMMARY
120 JA SOLAR JAM54D41-440/MB 440W MODULES
8 TESLA POWERWALL 3 7.6KW (240V) INVERTERS
120 TIGO TS4-A-O OPTIMIZER

- GENERAL NOTES:**
- THESE CONSTRUCTION DOCUMENTS HAVE BEEN BASED ON FIELD INSPECTIONS AND OTHER INFORMATION AVAILABLE AT THE TIME. ACTUAL FIELD CONDITIONS MAY REQUIRE MODIFICATIONS IN CONSTRUCTION DETAILS.
 - ARCHITECT HAS NOT BEEN RETAINED TO SUPERVISE ANY CONSTRUCTION OR INSTALLATION OF ANY EQUIPMENT AT SITE.
 - CONTRACTOR SHALL FURNISH ALL LABOR, MATERIAL, EQUIPMENT, TOOLS, OBTAINS ALL PERMITS, LICENSES AND PAY ALL REQUIRED FEES AND COMPLETE INSTALLATION.
 - CONTRACTOR HAS THE FULL RESPONSIBILITY TO CHECK AND VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK. ANY WORK STARTED BEFORE CONSULTATION AND ACCEPTANCE BY THE ENGINEER SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE SUBJECT TO CORRECTION BY THEM WITHOUT ADDITIONAL COMPENSATION.
 - DAMAGE CAUSED TO THE EXISTING STRUCTURE, PIPES, DUCTS, WINDOWS, WALL, FLOORS, ETC. SHALL BE REPAIRED TO THE ORIGINAL CONDITION OR REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST.
 - THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR THE PROPER INSTALLATION AND COMPLETION OF THE WORK WITH APPROVED MATERIALS.
 - NO CHANGES ARE TO BE MADE WITHOUT THE CONSULTATION AND APPROVAL OF THE ARCHITECT.
 - CONTRACTOR SHALL OBTAIN BULDING PERMIT. NO WORK TO START UNLESS BUILDING PERMIT IS PROPERLY DISPLAYED.
 - ALL WORKMANSHIP AND MATERIALS SHALL BE OF FIRST QUALITY AND IN COMPLIANCE WITH THE REQUIREMENTS OF THE ---- BUILDING CODE, THE DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ALL PERTINENT AGENCIES.
 - IT IS ESSENTIAL THAT ALL WORK PROCEED WITH THE MAXIMUM COOPERATION OF ALL PARTIES AND WITH MINIMUM INTERFERENCE TO THE OCCUPANTS WITHIN THE BUILDING. THE OWNER'S DIRECTIONS IN THIS REGARD SHALL BE FULLY COMPLIED WITH.
 - ALL EXPOSED PLUMBING, HVAC, ELECTRICAL DUCTWORK, PIPING AND CONDUITS ARE TO BE PAINTED BY GENERAL CONTRACTOR.
 - THE CONTRACTOR SHALL PERFORM THE WORK IN STRICT CONFORMANCE WITH THE LOCAL LAWS, REGULATIONS AND THE NATIONAL ELECTRIC CODE.
 - THE CONTRACTOR SHALL OBTAIN ALL PERMITS, APPROVALS, AFFIDAVITS, CERTIFICATIONS, ETC. AND PAY ALL FEES AS REQUIRED BY THE LOCAL AUTHORITIES.
 - CONTRACTORS SHALL OBTAIN FIRE CERTIF. UPON COMPLETION OF WORK.

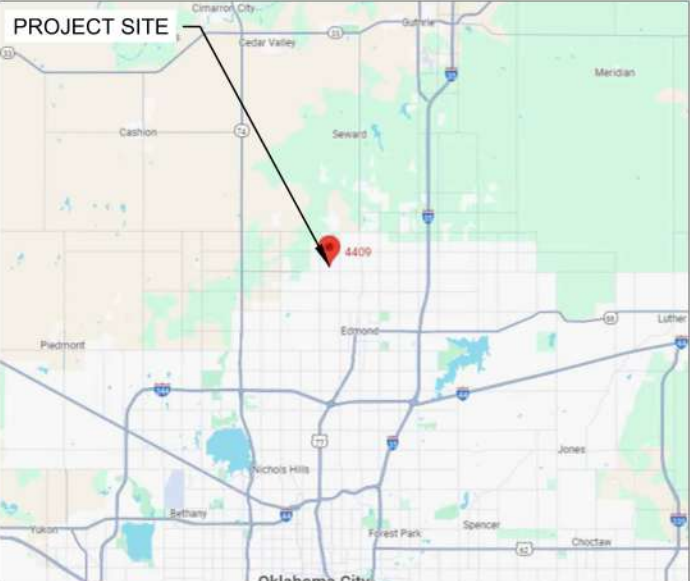
- ELECTRICAL NOTES:**
- THE EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE INSTALLED ONLY BY QUALIFIED PEOPLE. A QUALIFIED PERSON IS ONE WHO HAS SKILLS AND KNOWLEDGE RELATED TO THE CONSTRUCTION AND OPERATION OF THE ELECTRICAL EQUIPMENT AND INSTALLATIONS AND HAS RECIEVED SAFETY TRAINING TO RECOGNIZE AND AVOID THE HAZARDS INVOLVED. (NEC 690.4(E) AND 705.6)
 - LOCAL UTILITY PROVIDER SHALL BE NOTIFIED PRIOR TO USE AND ACTIVATION OF ANY SOLAR PHOTOVOLTAIC INSTALLATION. FOR A LINE SIDE TAP CONNECTION, UTILITY NEEDS TO BE NOTIFIED WELL IN ADVANCE TO COORDINATE BUILDING ELECTRICAL SHUT OFF.
 - NEW CONDUIT ROUTING SHOWN IS ESSENTIALLY SCHEMATIC. SUBCONTRACTOR SHALL LAY OUT RUNS TO SUIT FIELD CONDITIONS AND THE COORDINATION REQUIREMENTS OF OTHER TRADES.
 - ARRAY WIRING SHOULD NOT BE READILY ACCESSIBLE EXCEPT TO QUALIFIED PERSONNEL.
 - ALL EXTERIOR CONDUIT, FITTINGS, AND BOXES SHALL BE WATERTIGHT AND APPROVED FOR USE IN WET LOCATIONS. (NEC 314.15A).
 - WIRING METHODS FOR PV SYSTEM CONDUCTORS AREN'T PERMITTED WITHIN 10 IN. OF THE ROOF DECKING OR SHEATHING EXCEPT WHERE LOCATED DIRECTLY BELOW THE ROOF SURFACE THAT'S COVERED BY PV MODULES AND ASSOCIATED EQUIPMENT WIRING
 - BACK-FED BREAKER MUST BE AT THE OPPOSITE END OF BUS BAR FROM THE MAIN BREAKER OR MAIN LUG SUPPLYING CURRENT FROM THE UTILITIES.
 - ALL CONDUCTORS AND WIRE TIES EXPOSED TO SUNLIGHT ARE LISTED AS UV RESISTANT.
 - CONTRACTOR SHALL FOLLOW ALL ELECTRICAL EQUIPMENT LABELING REQUIREMENTS IN NEC 690 AND IFC 2018
 - MEASURE THE LINE-TO-LINE AND LINE-TO-NEUTRAL VOLTAGE OF ALL SERVICE ENTRANCE CONDUCTORS PROIR TO INSTALLING ANY SOLAR EQUIPMENT. THE VOLTAGES FOR THE 240VAC RATED.

GOVERNING CODES
2018 INTERNATIONAL RESIDENTIAL CODE
2018 INTERNATIONAL FIRE CODE
2020 NATIONAL ELECTRICAL CODE
2018 INTERNATIONAL BUILDING CODE

- WIRING AND CONDUIT NOTES:**
- ALL CONDUIT SIZES AND TYPES, SHALL BE LISTED FOR ITS PURPOSE AND APPROVED FOR THE SITE APPLICATIONS
 - ALL PV CABLES AND HOMERUN WIRES BE #10AWG *USE-2, PV WIRE, OR PROPRIETARY SOLAR CABLING SPECIFIED BY MFR, OR EQUIVALENT; ROUTED TO SOURCE CIRCUIT COMBINER BOXES AS REQUIRED
 - ALL CONDUCTORS AND OCPD SIZES AND TYPES SPECIFIED ACCORDING TO [NEC 690.8 (A)(1) & (B)(1)], [NEC 240] [NEC 690.7] FOR MULTIPLE CONDUCTORS
 - ALL PV DC CONDUCTORS IN CONDUIT EXPOSED TO SUNLIGHT SHALL BE DERATED ACCORDING TO [NEC TABLE 310.15 (B)(2)(C)] BLACK ONLY**
 - EXPOSED ROOF PV DC CONDUCTORS SHALL BE USE-2, 90°C RATED, WET AND UV RESISTANT, AND UL LISTED RATED FOR 600V, UV RATED SPIRAL WRAP SHALL BE USED TO PROTECT WIRE FROM SHARP EDGES
 - PHASE AND NEUTRAL CONDUCTORS SHALL BE DUAL RATED THHN/THWN-2 INSULATED, 90°C RATED, WET AND UV RESISTANT, RATED FOR 600V PER NEC 2008 OR 1000V PER NEC 2020
 - 4-WIRE DELTA CONNECTED SYSTEMS HAVE THE PHASE WITH THE HIGHER VOLTAGE TO GROUND MARKED ORANGE OR IDENTIFIED BY OTHER EFFECTIVE MEANS
 - ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION
 - VOLTAGE DROP LIMITED TO 2% FOR DC CIRCUITS AND 1% FOR AC CIRCUITS
 - AC CONDUCTORS >4AWG COLOR CODED OR MARKED: PHASE A OR L1- BLACK, PHASE B OR L2- RED, PHASE C OR L3- BLUE, NEUTRAL- WHITE/GRAY

SYSTEM RATING
52.80 KWDC
60.80 KWAC

SHEET INDEX	
PV-0	COVER PAGE
PV-1	SITE PLAN
PV-2	ARRAY PLAN & MODULES
PV-2A	STRING LAYOUT & BOM
PV-3	ATTACHMENT DETAIL
PV-4	ELECTRICAL LINE DIAGRAM
PV-4A	SPECIFICATIONS, CALC. & NOTES
PV-5	SIGNAGE
PV-6+	EQUIPMENT SPECIFICATIONS



2	PV-0	VICINITY MAP	SCALE: NTS
---	------	--------------	------------

REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

DATE: ----

DESIGNER DETAILS:

SHEET NAME
COVER PAGE

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-0

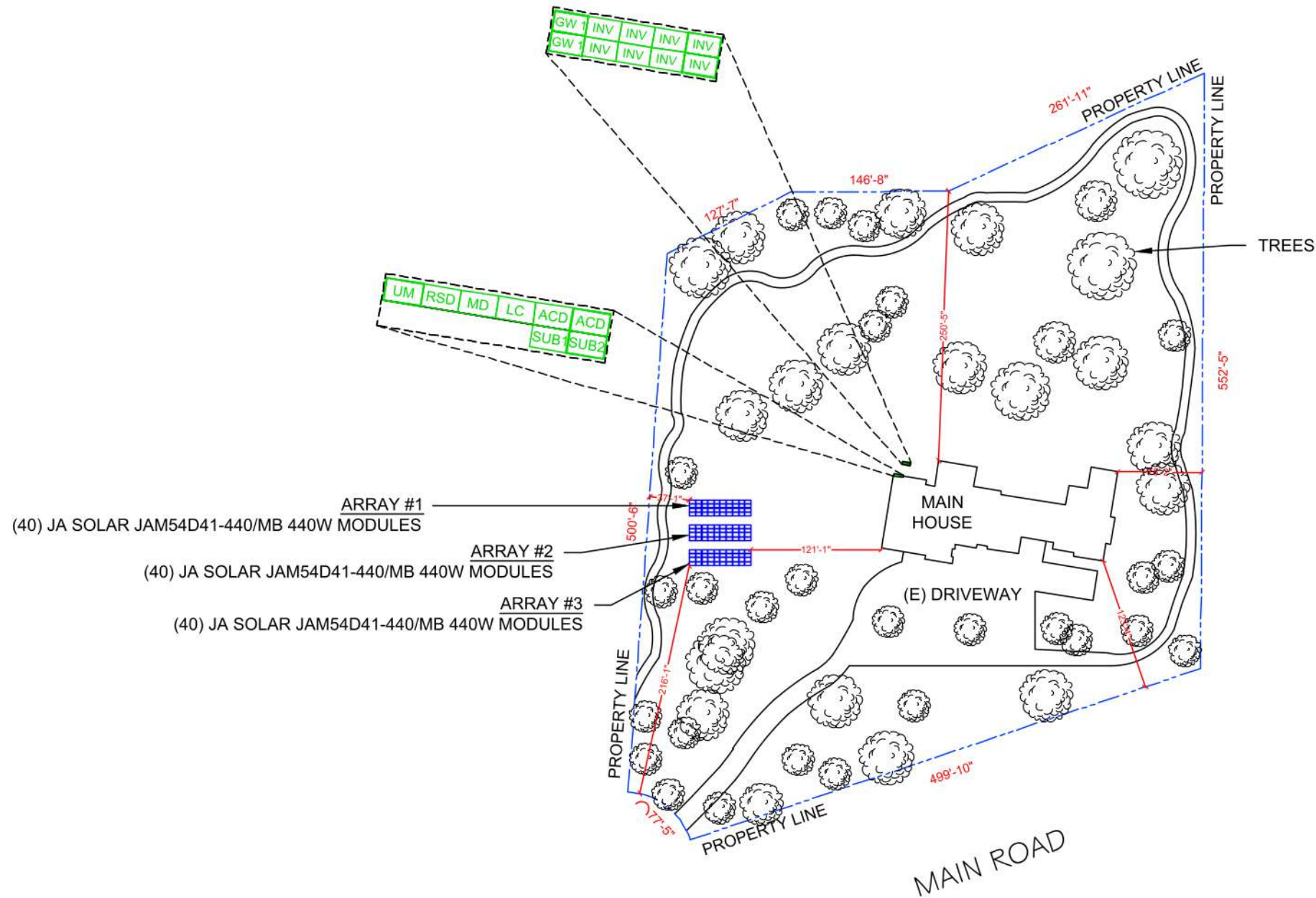


1

SITE PLAN

PV-1

SCALE: 1/128" = 1'-0"



LEGEND

- UM (E) UTILITY METER
- MD (E) MAIN DISCONNECT
- RSD (N) RAPID SHUTDOWN SWITCH
- SUB (E) 2 X 400A SUB PANEL
- ACD (N) 2 X 200A AC DISCONNECT
- INV (N) 8 X TESLA POWERWALL 3 7.6KW (240V)
- GW (N) 2 X TESLA GATEWAY 3
- LC (N) 1 X 400A LOAD CENTER
- - VENT, ATTIC FAN (ROOF OBSTRUCTION)
- CONDUIT
- (120) TIGO TS4-A-O OPTIMIZER
- (120) JA SOLAR JAM54D41-440/MB 440W (MODULES)

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

DATE: ----

DESIGNER DETAILS:

SHEET NAME

SITE PLAN

SHEET SIZE

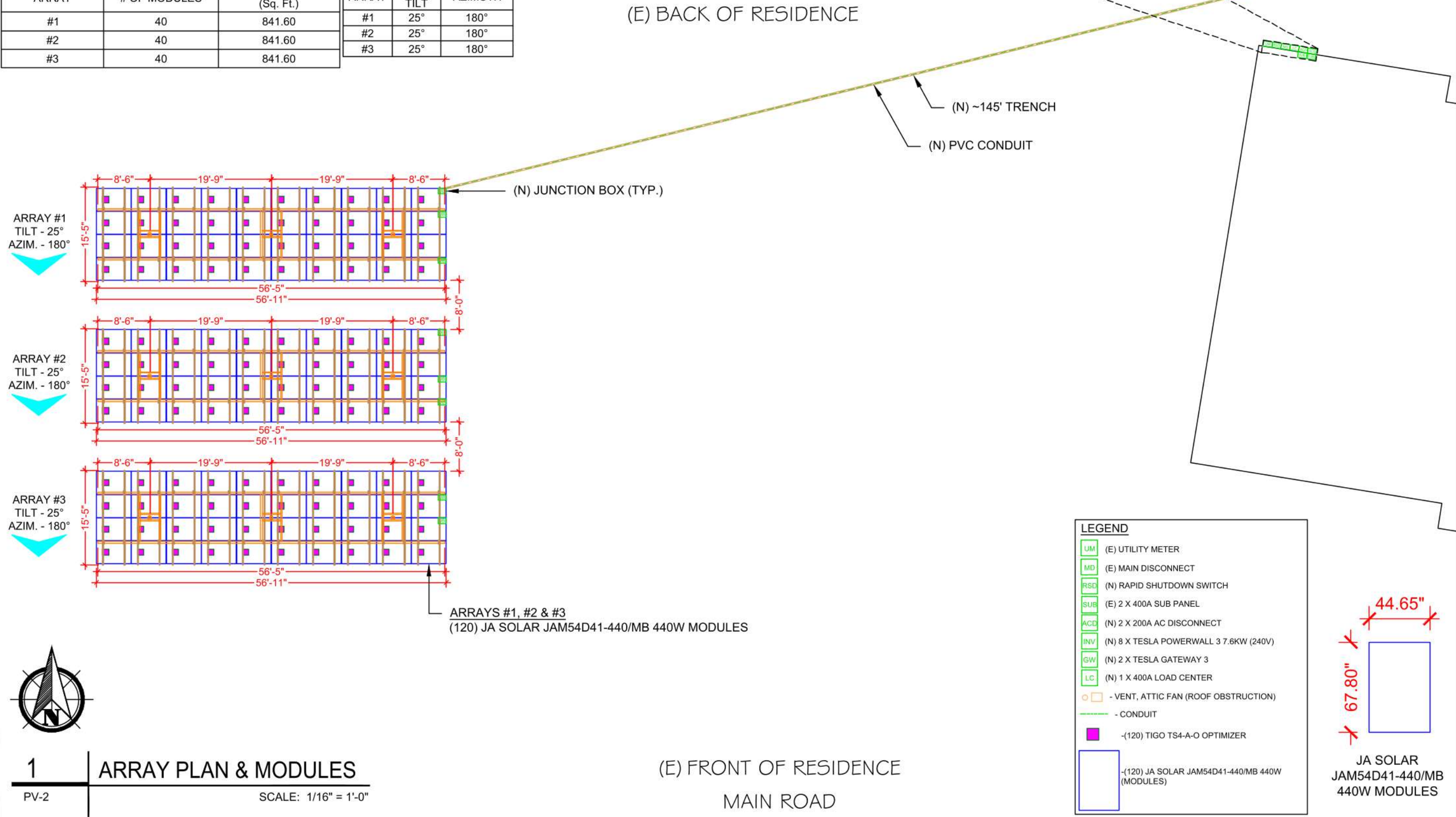
ANSI B
11" X 17"

SHEET NUMBER

PV-1

DESIGN SPECIFICATION		MODULE TYPE, DIMENSIONS & WEIGHT	
RISK CATEGORY:	II	NUMBER OF MODULES:	120 MODULES
CONSTRUCTION:	SFD	MODULE TYPE:	JA SOLAR JAM54D41-440/MB 440W MODULES
ZONING:	RESIDENTIAL	MODULE WEIGHT:	47.40 LBS
SNOW LOAD (ASCE 7-16):	10 PSF	MODULE DIMENSIONS:	67.80" X 44.65" = 21.02 SF
EXPOSURE CATEGORY:	C	UNIT WEIGHT OF AREA:	2.25 PSF
WIND SPEED (ASCE 7-16):	109 MPH		

ARRAY AREA & ROOF AREA CALC'S			ARRAY DESCRIPTION		
ARRAY	# OF MODULES	ARRAY AREA (Sq. Ft.)	ARRAY	ARRAY TILT	AZIMUTH
#1	40	841.60	#1	25°	180°
#2	40	841.60	#2	25°	180°
#3	40	841.60	#3	25°	180°



REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

DATE: ----

DESIGNER DETAILS:

SHEET NAME
ARRAY PLAN & MODULES

SHEET SIZE
ANSI B
11" X 17"

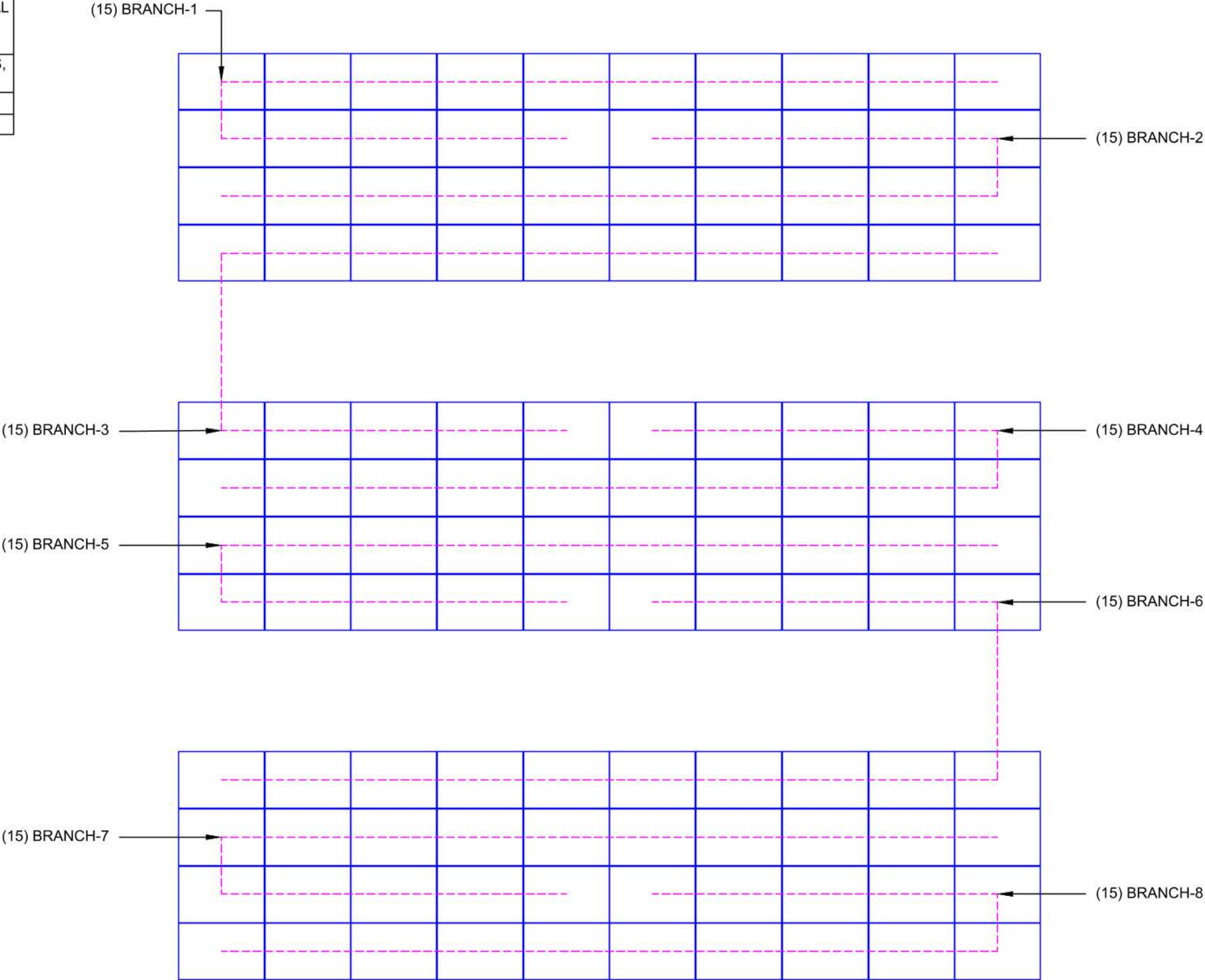
SHEET NUMBER

PV-2



BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	120	JA SOLAR JAM54D41-440/MB 440W MODULES
OPTIMIZER	120	TIGO TS4-A-O OPTIMIZER
INVERTER	8	TESLA POWERWALL 3 7.6KW (240V) INVERTERS
GATEWAY	2	BACKUP ENERGY GATEWAY 3 WITH INTERNAL PANELBOARD, 240 VAC, 200A RATED,NEMA 3R, UL LISTED
AC DISCONNECT	2	200A FUSED AC DISCONNECT (2) 200A FUSES, 240V, NEMA 3R, UL LISTED
LOAD CENTER	1	400A LOAD CENTER, MLO, NEMA 3R, 240V
JUNCTION BOX	8	JUNCTION BOX, NEMA 3R, UL LISTED

(E) BACK OF RESIDENCE



(E) FRONT OF RESIDENCE
MAIN ROAD



REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

DATE: ----

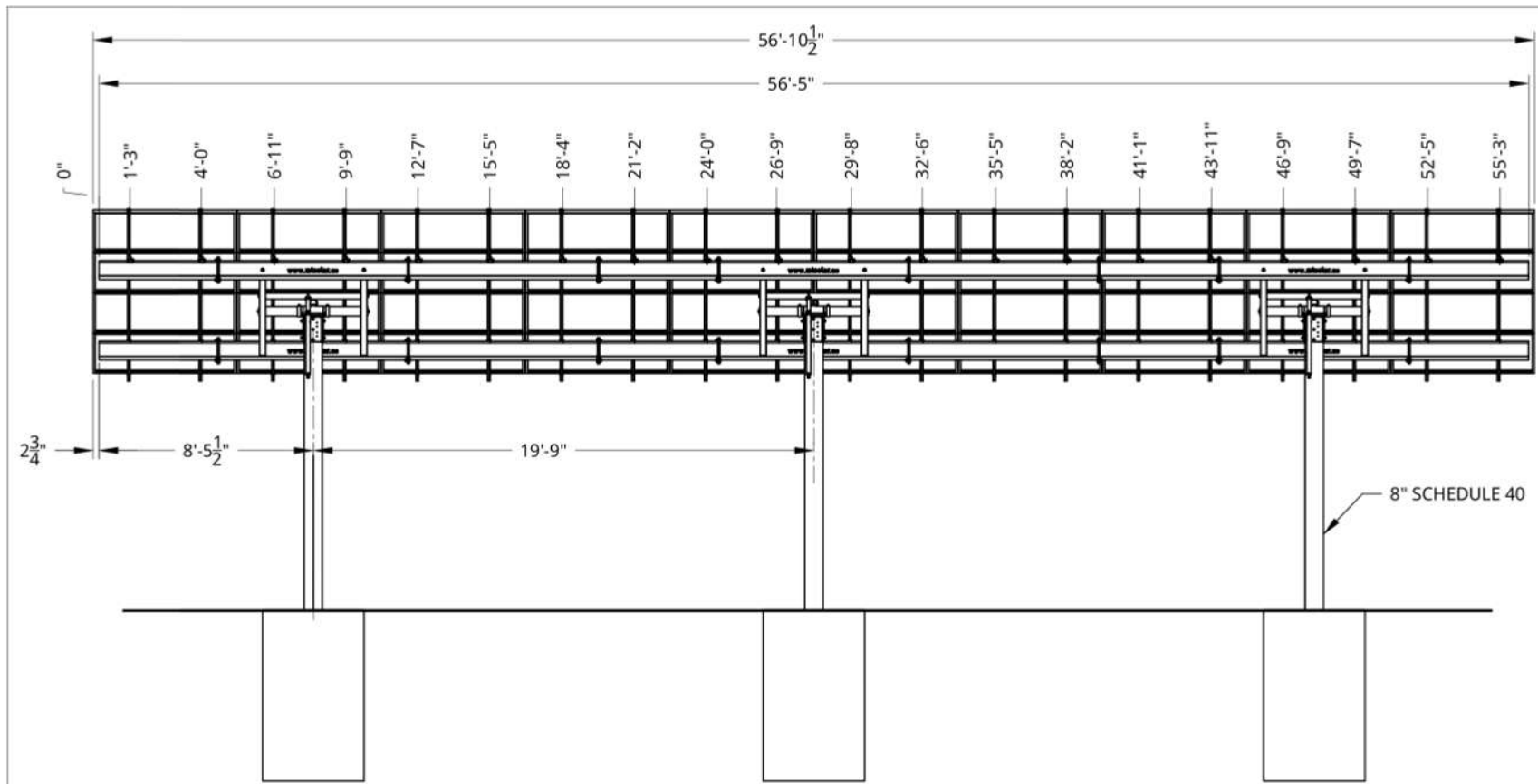
DESIGNER DETAILS:

SHEET NAME
STRING
LAYOUT & BOM

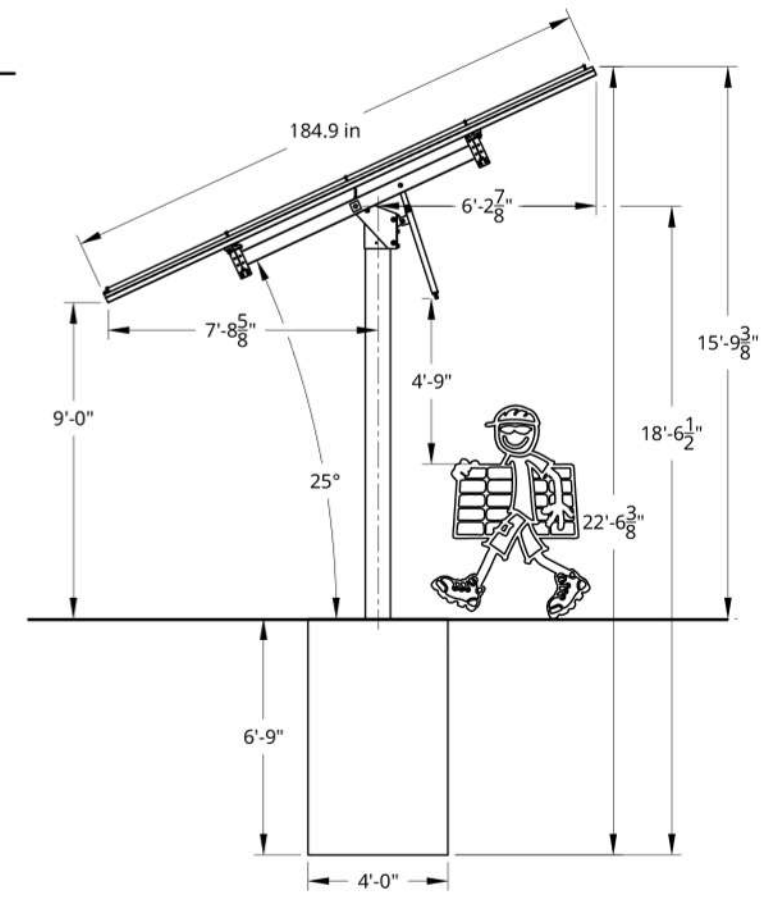
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER

PV-2A

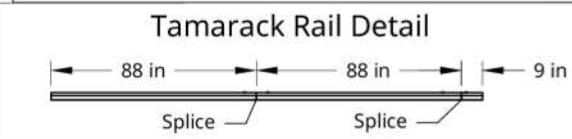


Seal applies exclusively to structural items and excludes all else, including civil and survey information.



ITEM	QUANTITY	NAME	MASS
1	4	BEAM-HD-WING-57-INCHES	53.5 LB
2	4	BEAM-HD-SPLICE-57-INCHES	59.9 LB
3	4	BEAM-HD-SPLICE-90-INCHES	87.7 LB
4	6	BEAM-HD-CENTER-90-INCHES	86.3 LB
5	6	TUBE-5X3-HD-90IN	72.3 LB
6	3	PIPE-2.5IN-HD-45IN	11.9 LB
7	3	PIPE-4IN-HD-45IN	57.5 LB
8	6	LOCK-COLLAR-4	1.2 LB
9	3	POLECAP	42.5 LB
10	3	BACKPLATE-8	15.4 LB
11	3	LIFT-INSERT-8	8.5 LB
12	3	SCREW ADJUSTER	
13	8	BEAM-SPLICE-BOLT-KIT-HD	1.7 LB
14	10	TAMARACK-GROUND-LUG	0.1 LB
15	100	TAMARACK-50/50-CLAMP	0.1 LB
16	40	TAMARACK-RAIL-ADAPTER-WITH-BOLT	0.1 LB
17	20	TAMARACK-3.1-RAIL-CUT-184.9-INCHES	14.3 LB
18	40	BEAM-CLAMP-WITH-BOLTS	1.2 LB
19	3	BOLT-KIT-8-TOP-BEAM	N/A
20	3	PALLET-PACKAGING-MATERIALS	N/A

THIS CONFIGURATION SATISFIES THE REQUIREMENTS SET FORTH IN THE:
• 15TH ED. AISC STEEL DESIGN MANUAL
MATERIALS:
GR 5 BOLTS USED AT ALL CONNECTION LOCATIONS U.N.O
STEEL MATERIALS CONFORM TO THE FOLLOWING
• STEEL PIPE: Fy=50 KSI MIN.
• WIDE FLANGE SECTIONS: ASTM A992, Fy=50 KSI
• RECTANGULAR HSS SECTIONS: ASTM A500, GR C, Fy=50 KSI
• PLATES: ASTM A36 Fy=36 KSI
CONCRETE WORK:
TO BE IN ACCORDANCE WITH ACI 318-14
• CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF (F'c) OF 2500 PSI



ITEM	QUANTITY	NAME
1	40	TAMARACK-3.1-RAIL-CUT-88-INCHES
2	20	TAMARACK-3.1-RAIL-CUT-9-INCHES
3	40	TAMARACK 3.1 SPLICE
4	80	TAMARACK RAIL NUT
5	80	HEX BOLT 5/16-18 X 1

DESIGN CRITERIA	Beall Power Solutions W-13191
Module Qty: 40	3P-19.75-8TOP-HD-57-L-4Hx10W-BHIL
Module Dimensions: 44.65" x 67.8"	 4409 Rock Canyon Rd Edmond, OK 73025 NOT TO SCALE DATE 09/24/2025
Wind Speed: 103 mph, Wind Exp: C	
Ground Snow: 10 psf	
Soil: 4 - Non-Cohesive	

REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

DATE: ----

DESIGNER DETAILS:

SHEET NAME
ATTACHMENT
DETAILS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER

PV-3

ID	TYPICAL	INITIAL CONDUCTOR LOCATION	FINAL CONDUCTOR LOCATION	CONDUCTOR			CONDUIT	# OF PARALLEL CIRCUITS	CURRENT-CARRYING CONDUCTORS IN CONDUIT	CONDUIT FILL PERCENT	OCPD	EGC/NEUTRAL		TEMP. CORR. FACTOR		CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	LENGTH	VOLTAGE DROP
1	1	ARRAY	JUNCTION BOX	10 AWG	PV WIRE	-	-	1	2	N/A	N/A	6 AWG	BARE, COPPER	0.71	(59°C)	N/A	12.0A	15.0A	40A	28.40A	90°C	86FT	0.23%
2	4	JUNCTION BOX	POWERWALL 3	10 AWG	THWN-2	COPPER	MIN 0.75" PVC SCH 80	4	8	26.63%	N/A	8 AWG	THWN-2, COPPER	0.91	(37°C)	1	12.0A	15.0A	40A	36.40A	90°C	145FT	0.38%
3	1	POWERWALL 3	GATEWAY 3	8 AWG	THWN-2	COPPER	MIN 0.75" Dia EMT	1	3	26.73%	40A	8 AWG	THWN-2, COPPER	0.91	(37°C)	1	32.0A	40.0A	55A	50.05A	90°C	5FT	0.13%
4	1	GATEWAY 3	SUB PANEL	3/0 AWG	THWN-2	COPPER	MIN 2.0" Dia EMT	1	3	30.20%	N/A	1 AWG	THWN-2, COPPER	0.91	(37°C)	1	160.0A	200.0A	225A	204.75A	90°C	15FT	0.20%
5	1	GATEWAY 3	AC DISCONNECT	3/0 AWG	THWN-2	COPPER	MIN 2.0" Dia EMT	1	3	30.20%	200A	1 AWG	THWN-2, COPPER	0.91	(37°C)	1	160.0A	200.0A	225A	204.75A	90°C	5FT	0.07%
6	1	AC DISCONNECT	LOAD CENTER	3/0 AWG	THWN-2	COPPER	MIN 2.0" Dia EMT	1	3	30.20%	200A	1 AWG	THWN-2, COPPER	0.91	(37°C)	1	160.0A	200.0A	225A	204.75A	90°C	5FT	0.07%
7	1	LOAD CENTER	MAIN DISCONNECT	3/0 AWG	THWN-2	COPPER	MIN 2.0" Dia EMT	3	3	30.20%	600A	1 AWG	THWN-2, COPPER	0.91	(37°C)	1	480.0A	600.0A	3 X 225A	3 X 204.75A	90°C	5FT	0.07%

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL	JA SOLAR JAM54D41-440/MB 440W
VMP	33.37 V
IMP	13.18 A
VOC	39.38 V
ISC	13.85 A
TEMP. COEFF. VOC	-0.250%/°C
MODULE DIMENSION	67.80"(L) x 44.65"(W)
PANEL WATTAGE	440W

INVERTER SPECIFICATION	
MANUFACTURER / MODEL	TESLA POWERWALL 3 7.6KW (240V)
NOMINAL AC POWER	7600 W
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	32.00 A

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
1	1-3
0.80	4-6
0.70	7-9
0.50	10-20

TIGO TS4-A-0 OPTIMIZER	
MAXIMUM INPUT POWER	500 W
MAXIMUM INPUT VOLTAGE	90 VDC
MAXIMUM OUTPUT CURRENT	12.0 ADC

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-14°C
AMBIENT TEMP (HIGH TEMP 2%)	37°C
CONDUIT HEIGHT	0.5"
ROOF TOP TEMP	75°C
CONDUCTOR TEMPERATURE RATE	59°C
MODULE TEMPERATURE COEFFICIENT OF VOC	-0.250%/°C

REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

DATE: ----

DESIGNER DETAILS:

SHEET NAME
SPECIFICATIONS
CALC. & NOTES

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER

PV-4A

1

**WARNING**

ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION

LABEL LOCATION:
POINT OF INTERCONNECTION,
(PER CODE: NEC 690.17(E))

2

WARNING - Electric Shock Hazard
No user serviceable parts inside
Contact authorized service provider for assistance

LABEL LOCATION:
INVERTER, JUNCTION BOXES (ROOF),
(PER CODE: NEC690.13.G.3 & NEC 690.13.G.4)

3

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

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(D)(4))

4

**WARNING: PHOTOVOLTAIC
POWER SOURCE**

LABEL LOCATION:
CONDUIT, COMBINER BOX
(PER CODE: NEC690.31(G)(3)(4) & NEC 690.13(G)(4)

- ADHESIVE FASTENED SIGNS:
- THE LABEL SHALL BE SUITABLE FOR THE ENVIRONMENT WHERE IT IS INSTALLED.
 - WHERE REQUIRED ELSEWHERE IN THIS CODE, ALL FIELD APPLIED LABELS, WARNINGS, AND MARKINGS SHOULD COMPLY WITH ANSI Z535.4 [NEC 110.21(B) FIELD MARKING].
 - ADHESIVE FASTENED SIGNS MAY BE ACCEPTABLE IF PROPERLY ADHERED. VINYL SIGNS SHALL BE WEATHER RESISTANT [IFC 605.11.1.3]

5

PHOTOVOLTAIC SYSTEM AC DISCONNECT
RATED AC OUTPUT CURRENT 320.0 AMPS
NOMINAL OPERATING AC VOLTAGE 240 VOLTS

LABEL LOCATION:
POINT OF INTERCONNECTION,
(PER CODE: NEC 690.54)

6

WARNING
INVERTER OUTPUT CONNECTION DO NOT
RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(D)(7))
[Not required if panelboard is rated not less than sum of ampere ratings
of all overcurrent devices supplying it]

7

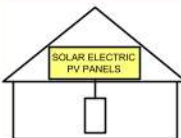
**CAUTION: SOLAR ELECTRIC
SYSTEM CONNECTED**

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC690.15, 690.13(B))
INVERTER

8

**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 PER NEC 690.56(C)- PROVIDE AT
AC DISCONNECT FOR RAPID
SHUTDOWN COMPLIANT SYSTEM

9

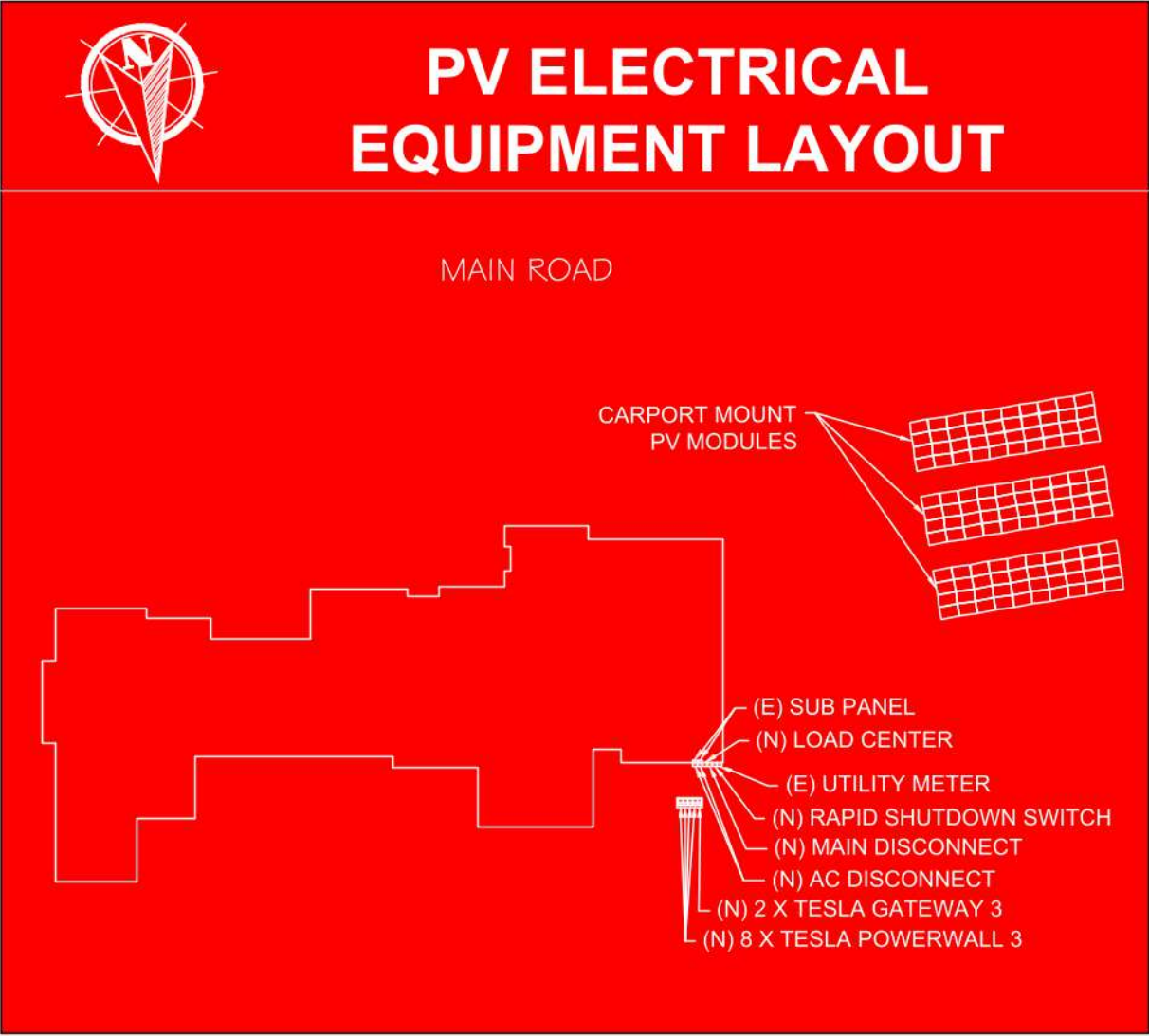
CAUTION: SOLAR CIRCUIT

LABEL LOCATION:
MARKINGS PLACED ON ALL INTERIOR AND EXTERIOR DC CONDUIT, RACEWAYS,
ENCLOSURES, AND CABLE ASSEMBLIES AT LEAST EVERY 10 FT, AT TURNS AND
ABOVE/BELOW PENETRATIONS AND ALL COMBINER/JUNCTION BOXES. (PER CODE:
IFC 605.11.1.4)

10

! WARNING !
INVERTER OUTPUT CONNECTION. DO NOT
RELOCATE THIS OVERCURRENT DEVICE.

LABEL LOCATION: POINT-OF-INTERCONNECTION
OR AT MAIN SERVICE DISCONNECT (MSP) PER
CODE: NEC 705.12(B)(2)(3)(b)



REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

DATE: ----
DESIGNER DETAILS:

SHEET NAME
SIGNAGE

SHEET SIZE
**ANSI B
11" X 17"**

SHEET NUMBER
PV-5

Harvest the Sunshine

445W

JA SOLAR

JAM54D41 MB Black Module

n-type Double Glass Bifacial Modules

Premium Cells

n-
Bycium+
16BB

26%
Up To

MBB Half-Cell
Technology

Cell Conversion
Efficiency

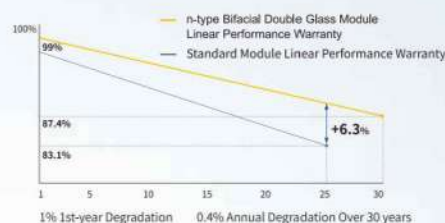
Premium Modules

Higher power
generation better LCOE

LID n-type with very
Lower LID

Better Temperature
Coefficient

Better low irradiance
response



12-year product
warranty

30-year linear power
output warranty

Comprehensive Certificates

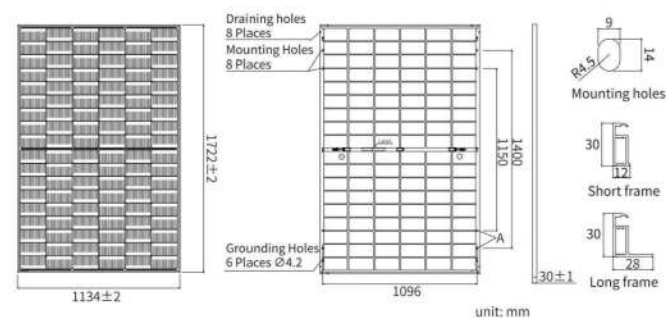
- IEC 61215, IEC 61730, UL 61215, UL 61730
- ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- ISO 45001: 2018 Occupational health and safety management systems
- IEC 62941: 2019 Terrestrial photovoltaic (PV) modules - Quality system for PV module manufacturing



DEEP BLUE 4.0 Pro

JAM54D41 MB n-type Double Glass Bifacial Modules

DEEP BLUE 4.0 Pro



MECHANICAL PARAMETERS

Cell	Mono
Weight	21.5kg
Dimensions	1722±2mm×1134±2mm×30±1mm
Cable Cross Section Size	4mm²(IEC), 12 AWG(UL)
No. of cells	108(6×18)
Junction Box	IP68, 3diodes
Connector	QC 4.10-351/ MC4-EVO2A
Cable Length (Including Connector)	Portrait: 300mm(+)/400mm(-) Landscape: 1100mm(+)/1100mm(-)
Front Glass/Back Glass	1.6mm/1.6mm
Packaging Configuration	36pcs/Pallet, 936pcs/40HQ Container

Remark: customized frame color and cable length available upon request

ELECTRICAL PARAMETERS AT STC

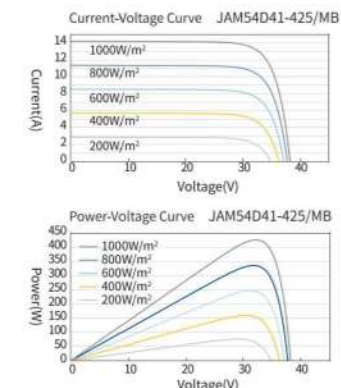
TYPE	JAM54D41 -420/MB	JAM54D41 -425/MB	JAM54D41 -430/MB	JAM54D41 -435/MB	JAM54D41 -440/MB	JAM54D41 -445/MB
Rated Maximum Power(Pmax) [W]	420	425	430	435	440	445
Open Circuit Voltage(Voc) [V]	38.28	38.56	38.84	39.11	39.38	39.65
Maximum Power Voltage(Vmp) [V]	32.38	32.64	32.88	33.13	33.37	33.64
Short Circuit Current(Isc) [A]	13.65	13.70	13.75	13.80	13.85	13.90
Maximum Power Current(Imp) [A]	12.97	13.02	13.08	13.13	13.18	13.23
Module Efficiency [%]	21.5	21.8	22.0	22.3	22.5	22.8
Power Tolerance	0~+3%					
Temperature Coefficient of Isc(α _{Isc})	+0.045%/°C					
Temperature Coefficient of Voc(β _{Voc})	-0.250%/°C					
Temperature Coefficient of Pmax(γ _{Pmp})	-0.290%/°C					
STC	Irradiance 1000W/m², cell temperature 25°C, AM1.5G					

Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

ELECTRICAL CHARACTERISTICS WITH 10% SOLAR IRRADIATION RATIO

TYPE	JAM54D41 -420/MB	JAM54D41 -425/MB	JAM54D41 -430/MB	JAM54D41 -435/MB	JAM54D41 -440/MB	JAM54D41 -445/MB
Rated Max Power(Pmax) [W]	454	459	464	470	475	481
Open Circuit Voltage(Voc) [V]	38.28	38.56	38.84	39.11	39.38	39.65
Max Power Voltage(Vmp) [V]	32.38	32.64	32.88	33.13	33.37	33.64
Short Circuit Current(Isc) [A]	14.74	14.80	14.85	14.90	14.96	15.01
Max Power Current(Imp) [A]	14.01	14.06	14.12	14.18	14.24	14.29
Irradiation Ratio (rear/front)	10%					

CHARACTERISTICS



OPERATING CONDITIONS

Maximum System Voltage	1500V DC
Operating Temperature	-40°C~+85°C
Maximum Series Fuse Rating	30A
Maximum Static Load, Front	5400Pa(112 lb/ft²)
Maximum Static Load, Back	2400Pa(50 lb/ft²)
NOCT	45±2°C
Bifaciality	80%±10%
Safety Class	Class II
Fire Performance	UL Type 38/Class C

Specifications subject to technical changes and tests.
JA Solar reserves the right of final interpretation.

Version No.: Global-EN-20241105A

JA SOLAR

Headquarters

No. 8 Building, Nuode Center, No.1 Courtyard, East Auto Museum Road,
Fengtai District, Beijing
Tel: +86 10 6361 1888 Fax: +86 10 6361 1999
E-mail: sales@jasolar.com marketing@jasolar.com www.jasolar.com

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

DATE: ----

DESIGNER DETAILS:

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER

PV-6

Powerwall 3

Power Everything

Powerwall 3 is a fully integrated solar and battery system, designed to accelerate the transition to sustainable energy. Customers can receive whole home backup, cost savings, and energy independence by producing and consuming their own energy while participating in grid services. Once installed, customers can manage their system using the Tesla App to customize system behavior to meet their energy goals.

Powerwall 3 achieves this by supporting up to 20 kW DC of solar and providing up to 11.5 kW AC of continuous power per unit. It has the ability to start heavy loads rated up to 185 LRA, meaning a single unit can support the power needs of most homes. Powerwall 3 Expansions make it easier and more affordable to scale up customers' systems to meet their current or future needs. Powerwall 3 is designed for fast and efficient installations, modular system expansion, and simple connection to any electrical service.



Powerwall 3 Technical Specifications

System Technical Specifications

Model Number	1707000-xx-y			
Nominal Grid Voltage (Input & Output)	120/240 VAC			
Grid Type	Split phase			
Frequency	60 Hz			
Nominal Battery Energy	13.5 kWh AC ¹			
Nominal Output Power (AC)	5.8 kW	7.6 kW	10 kW	11.5 kW
Maximum Apparent Power	5,800 VA	7,600 VA	10,000 VA	11,500 VA
Maximum Continuous Current	24 A	31.7 A	41.7 A	48 A
Overcurrent Protection Device ²	30 A	40 A	60 A	60 A
Configurable Maximum Continuous Discharge Power Off-Grid (PV Only, -20°C to 25°C)	15.4 kW ³			
Maximum Continuous Charge Current / Power (Powerwall 3 only)	20.8 A AC / 5 kW			
Maximum Continuous Charge Current / Power (Powerwall 3 with up to (3) Expansion units)	33.3 A AC / 8 kW			
Output Power Factor Rating	0 - 1 (Grid Code configurable)			
Maximum Output Fault Current (1 s)	160 A			
Maximum Short-Circuit Current Rating	10 kA			
Load Start Capability	185 LRA			
Solar to Battery to Home/Grid Efficiency	89% ¹⁴			
Solar to Home/Grid Efficiency	97.5% ⁵			
Power Scalability	Up to 4 Powerwall 3 units supported			
Energy Scalability	Up to 3 Expansion units (for a maximum total of 7 units)			
Supported Islanding Devices	Gateway 3, Backup Switch, Backup Gateway 2			
Connectivity	Wi-Fi (2.4 and 5 GHz), Ethernet, Cellular (LTE/4G ⁶)			
Hardware Interface	Dry contact relay, Rapid Shutdown (RSD) certified switch and 2-pin connector, RS-485 for meters			
AC Metering	Revenue Grade (+/- 0.5%, ANSI C12.20)			
Protections	Integrated arc fault circuit interrupter (AFCI), Isolation Monitor Interrupter (IMI), PV Rapid Shutdown (RSD) using Tesla Mid-Circuit Interrupters			
Customer Interface	Tesla Mobile App			
Warranty	10 years			

¹Values provided for 25°C (77°F), at beginning of life. 3.3 kW charge/discharge power.

²See [Powerwall 3 Installation Manual](#) for fuse requirements if using fuse for overcurrent protection.

³15.4kW off-grid maximum continuous discharge power is only available if on-grid rating is 11.5 kW. If enabled, Powerwall 3 must be installed with an 80 A breaker and appropriately sized conductors.

⁴Typical solar shifting use case.

⁵Tested using CEC weighted efficiency methodology.

⁶The customer is expected to provide internet connectivity for Powerwall 3; cellular should not be used as the primary mode of connectivity. Cellular connectivity subject to network operator service coverage and signal strength.

REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

DATE: ----

DESIGNER DETAILS:

SHEET NAME
EQUIPMENT SPECIFICATION
SHEET SIZE
ANSI B 11" X 17"
SHEET NUMBER
PV-7

Powerwall 3 Technical Specifications

Solar Technical Specifications	Maximum Solar STC Input	20 kW
	Withstand Voltage	600 V DC
	PV DC Input Voltage Range	60 – 550 V DC
	PV DC MPPT Voltage Range	60 – 480 V DC
	MPPTs	6
	Maximum Current per MPPT (I _{mp})	15 A ^{7,8}
	Maximum Short Circuit Current per MPPT (I _{sc})	19 A ⁸

⁷ Only applicable to Powerwall 3 units with 15 A I_{mp} on the product label. Otherwise, Powerwall 3 has an I_{mp} of 13 A.
⁸ When PV strings are combined on the roof and the DC input current exceeds the MPPT rating, a jumper can be used to combine two MPPTs into a single input to intake DC current up to 30 A I_{mp} / 38 A I_{sc} (or 26 A I_{mp} / 30 A I_{sc} if Powerwall 3 is labeled with 13 A I_{mp} / 15 A I_{sc}).

Environmental Specifications	Operating Temperature	–20°C to 50°C (–4°F to 122°F) ⁹
	Operating Humidity (RH)	Up to 100%, condensing
	Storage Temperature	–20°C to 30°C (–4°F to 86°F), up to 95% RH, non-condensing, State of Energy (SOE): 25% initial
	Maximum Elevation	3000 m (9843 ft)
	Environment	Indoor and outdoor rated
	Enclosure Rating	NEMA 3R
	Ingress Rating	IP67 (Battery & Power Electronics) IP55 (Wiring Compartment)
	Pollution Rating	PD3
	Operating Noise @ 1 m	< 50 db(A) typical < 62 db(A) maximum

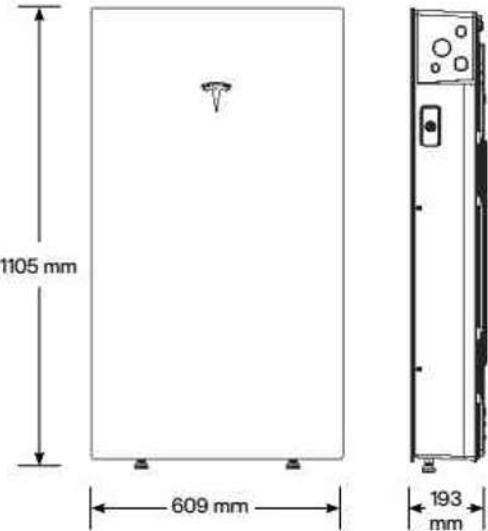
⁹ Performance may be de-rated at operating temperatures above 40°C (104°F).

Compliance Information	Certifications	UL 1741, UL 9540, UL 9540A, UL 3741, UL 1741 PCS, UL 1741 SA, UL 1741 SB, UL 1741 Multimode, UL 1973, UL 1699B, UL 1998, CSA C22.2 No. 0.8, CSA C22.2 No. 107.1, CSA C22.2 No. 330, CSA 22.3 No. 9, IEEE 1547, IEEE 1547A, IEEE 1547.1, CA Rule No.21
	Grid Connection	United States and Canada
	Emissions	FCC Part 15 Class B, ICES 003
	Environmental	RoHS Directive 2011/65/EU
	Seismic	AC156, IEEE 693-2005 (high)
	Fire Testing	Meets the unit level performance criteria of UL 9540A

Powerwall 3 Technical Specifications

Mechanical Specifications	Dimensions	1105 x 609 x 193 mm (43.5 x 24 x 7.6 in) ¹⁰
	Total Weight of Installed Unit	132 kg (291.2 lb)
	Weight of Powerwall 3	124 kg (272.5 lb)
	Weight of Glass Front Cover	6.5 kg (14.5 lb)
	Weight of Wall Bracket	1.9 kg (4.2 lb)
	Mounting Options	Floor or wall mount

¹⁰ These dimensions include the glass front cover being installed on Powerwall 3.



REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

DATE: ----
DESIGNER DETAILS:

SHEET NAME
EQUIPMENT SPECIFICATION
SHEET SIZE
ANSI B
11" X 17"
SHEET NUMBER
PV-8

Gateway 3

Tesla Gateway 3 controls connection to the grid in a Powerwall system, automatically detecting outages and providing seamless transition to backup power. It provides energy monitoring that is used by Powerwall for solar self-consumption, time-based control, and backup operation.

Performance Specifications

Model Number	1841000-x1-y	AC Meter	+/- 0.5%
Nominal Grid Voltage	120/240 V AC	Communication	CAN
Grid Configuration	Split phase	User Interface	Tesla App
Grid Frequency	60 Hz	Backup Transition	Automatic disconnect for seamless backup
Continuous Current Rating	200 A	Overcurrent Protection Device	100–200 A Service entrance rated Eaton CSR, BWH, or BW, or Square D QOM breakers
Maximum Supply Short Circuit Current	22 kA with Square D or Eaton main breaker 25 kA with Eaton main breaker ¹⁷	Internal Panelboard	200 A 8-space/16 circuit breakers Eaton BR, Siemens QP, or Square D HOM breakers rated to 10–125A
IEC Protective Class	Class I	Warranty	10 years
Overvoltage Category	Category IV		

¹⁷Only Eaton CSR or BWH main breakers are 25 kA rated.

Environmental Specifications

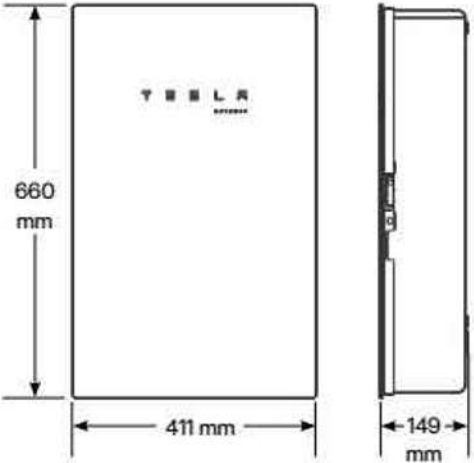
Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R

Compliance Information

Certifications	UL 67, UL 869A, UL 916, UL 1741 PCS, CSA 22.2 107.1, CSA 22.2 29
Emissions	FCC Part 15, Class B, ICES 003

Mechanical Specifications

Dimensions	660 x 411 x 149 mm (26 x 16 x 6 in)
Weight	16.3 kg (36 lb)
Mounting options	Wall mount



REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

DATE: ----
DESIGNER DETAILS:

SHEET NAME
EQUIPMENT SPECIFICATION
SHEET SIZE
ANSI B
11" X 17"
SHEET NUMBER
PV-9



TS4-A-O

PV Module Advanced Add-On

The TS4-A-O (Optimization) is the advanced add-on optimization solution that brings smart module functionality to standard PV modules for higher reliability. Improve energy efficiency by upgrading underperforming PV systems or adding smart features to new installations.

The TS4-A-O with UHD-Core technology and expanded specifications supports PV modules up to 500W.

Included Features



Module-level **optimization** for increased energy yield and greater design flexibility



Manual or automatic module-level **shutdown**



Module-level **monitoring** for energy production tracking and system management



Easy Installation

Snap to standard module frame or remove brackets for rack mounting

Smart Commissioning

Configure and commission with your Android or iOS mobile device

TS4-A-O SPECIFICATIONS

Environmental

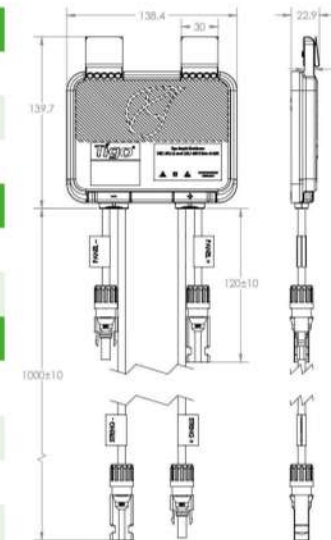
Operating Temperature Range	-40°C to +85°C (-40°F to +185°F)
Outdoor Rating	IP68
Maximum Elevation	2000m

Mechanical

Dimensions	138.4mm x 139.7mm x 22.9mm
Weight	520g

Electrical

Total Max Input Voltage (V _{oc} @ Lowest Temperature)	90V
Voltage Range	16 - 90V
Maximum Current	12A
Maximum Power	500W
Output Cable Length	1.2m (standard)
Connectors	MC4 (standard)
Communication Type	Wireless
Recommended Fuse Rating	15A



TAP required for module-level shutdown and CCA required for monitoring with TS4-A-O.

ORDERING INFORMATION

Standard

451-00252-32 1500V UL / 1000V TÜV, 1.2m cable, MC4

Options

451-00257-12 1000V UL / TÜV, 1.2m cable, MC4 comparable

451-00252-32 1500V UL / 1000V TÜV, 1.2m cable, MC4

451-00261-32 1500V UL / TÜV, 1.2m cable, EVO2



For sales info:

sales@tigoenergy.com

For product info:

Visit tigoenergy.com/products

For technical info:

Visit support.tigoenergy.com

For additional info and product selection assistance, use Tigo's online design tool at tigoenergy.com/design



Tigo Energy, Inc. | www.tigoenergy.com | sales@tigoenergy.com

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

DATE: ----

DESIGNER DETAILS:

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER

PV-10

SOLAR CARPORT

MAKE PARKING PRODUCTIVE AND SUSTAINABLE



CONFIGURATION OPTIONS

Covered Parking	up to 10 vehicles per array
Module Sizes	any. design based on module size
Front Edge Clearance	7 ft. - 20 ft.
Tilt	5° - 30°
Pole Sizes	NPS 6 in., 8 in., 10 in.
Pole Spacing	15 ft., 17 ft., 19.75 ft., 22.5 ft.



VERSATILE DESIGNS

Design mounts that fit residential driveways or commercial and community parking lots.

RELIABILITY IN MORE LOCATIONS

A rugged design and tough materials handle high winds and heavy snow loads. PE stamped drawings available.

EASY CONFIGURATIONS

Get help from our team in creating a design that adapts to your space and project goals.

TILT OPTIONS

Set the tilt of the array between 5 and 30 degrees to optimize output.

QUICK & SAFE INSTALLATION

Our patented system lets you assemble racking and arrays at ground level and hoist them into place.



EXPAND YOUR CAPABILITIES

Remove the complexity from solar parking jobs. Scale mounts for all weather requirements and locations, create designs that are ready for an engineer's stamp, and install with confidence.

USA MADE QUALITY, HIGH INTEGRITY SUPPORT

With solar mounts designed, manufactured, and shipped from Charlo, MT, we help solar professionals bring sustainable, resilient carports and canopies to more places. Our team is here to offer guidance and serve as a partner in impactful projects.

RaiseYourArrays

1-844-MT-SOLAR • SALES@MTSOLAR.US • WWW.MTSOLAR.US

RaiseYourArrays

Contact our team to get started with your carport project:

1-844-MT-SOLAR • SALES@MTSOLAR.US • WWW.MTSOLAR.US

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

DATE: ----

DESIGNER DETAILS:

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER

PV-11