

PHOTOVOLTAIC SYSTEM

SYSTEM SIZE:

NAMEPLATE: 12 KW DC / 10 KW AC

EQUIPMENT:

PV MODULES: (30) HANWHA QPEAK DUO BLK ML-G10+ (400W) SOLAR MODULE
PV OPTIMIZER(S): (30) S440 SOLAREEDGE POWER OPTIMIZER
INVERTER(S): (1) SOLAREEDGE SE10000H-US INVERTER
AC COMPONENT(S): (1) 60A FUSED AC DISCONNECT
(2) 60A UNFUSED AC DISCONNECT

TYPE OF INTERCONNECTION: LINE SIDE TAP IN THE MSP

SCOPE OF WORK:

INSTALLATION OF A CODE COMPLIANT, UTILITY INTERACTIVE PHOTOVOLTAIC ELECTRIC SYSTEM.

2017 NATIONAL ELECTRICAL CODE

2020 FIRE CODE OF NYS

2020 RESIDENTIAL CODE OF NYS

2020 BUILDING CODE OF NYS

APPLICABLE CODE PER LOCAL AUTHORITY HAVING JURISDICTION

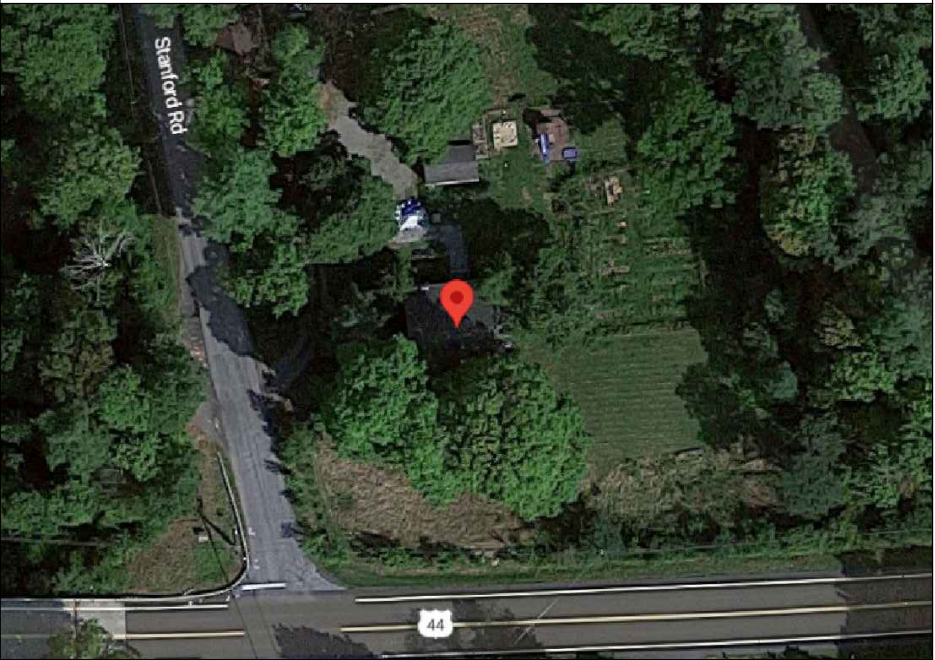
APPLICABLE CODES

PV1	COVER PAGE
PV2- 2.1	SITE PLAN
PV3 - 3.1	ELECTRICAL DIAGRAMS
PV4	MARKING & LABELS

*ATTACHMENTS

MANUFACTURER'S SPECIFICATIONS

INDEX



AERIAL VIEW 41.794369, -73.704009



VICINITY MAP

HEATHER BLAIKIE: 134 STANFORD RD, MILLBROOK, NY 12545, USA

GENERAL NOTES:

- DRAWINGS ARE DIAGRAMMATIC ONLY. THE LOCATION AND ROUTING OF RACEWAYS SHALL BE DETERMINED BY THE CONTRACTOR UNLESS OTHERWISE NOTED OR STANDARDIZED.
- ALL EQUATIONS ACCOUNT FOR WORST CASE CONDITIONS.
- IF A DISCREPANCY IN QUANTITY OR SIZE OF CONDUIT, WIRE, EQUIPMENT DEVICES, OVER-CURRENT PROTECTION, GROUNDING SYSTEMS, ETC. (ALL EQUIPMENT AND MATERIALS) THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL MATERIALS AND SERVICES REQUIRED BY THE STRICTEST CONDITIONS IN THE SPECIFICATIONS OR NOTED ON THE PLANS TO ENSURE COMPLETE COMPLIANCE WITH ALL CODES AND TO ENSURE THE LONGEVITY AND SAFETY OF THE OPERABLE SYSTEM.
- ALL OUTDOOR EQUIPMENT SHALL BE MIN. NEMA 3R RATED.
- METAL CONDUIT AND ENCLOSURES SHALL BE USED WHERE PV SOURCE OR OUTPUT CIRCUITS ARE RUN INSIDE A BUILDING.
- MODULES SHALL NOT BE PLACED OVER ANY PLUMBING VENTS AND AT LEAST 6" ABOVE FLUSH VENTS.
- THE ELECTRICAL CONTRACTOR SHALL COMPLY WITH ANY AND ALL REQUIREMENTS GIVEN BY UTILITY COMPANIES.
- FOR ADDITIONAL EQUIPMENT SPECIFICATIONS, SEE PROVIDED CUT SHEETS.
- ALL LABELS AND MARKINGS SHALL BE ATTACHED ACCORDING TO REQUIREMENTS BY NEC AND THE LOCAL AHJ. THE AHJ MAY HAVE SPECIAL LABEL REQUIREMENTS BEYOND THE SCOPE OF THIS DOCUMENT. THIS MAY ENCOMPASS LANGUAGE INCLUDING, BUT NOT LIMITED TO, THAT FOUND IN NEC ARTICLES 690.5 (C), 690.14 (C)(2), 690.17, 690.53,690.35(F), 690.54, 690.64(B)(7) and 705.10.
- ALL NEC REFERENCES SHALL BE DIRECTLY INTERCHANGEABLE WITH CEC REFERENCES.

STRUCTURAL NOTES:

- MOUNTS ARE DIAGRAMMATIC AND EXACT LOCATION MAY CHANGE, BUT SHALL BE ACCURATELY SPACED.
- MOUNTS SHALL BE STAGGERED WHEN NECESSARY TO EVENLY DISTRIBUTE LOAD AMONGST RAFTERS.
- DO NOT SPLICE RAILS IN MIDDLE 50% OF SPAN BETWEEN TWO MOUNTS.

ELECTRICAL NOTES:

- ALL EQUIPMENT IS LISTED FOR USE.
- MAXIMUM VOLTAGE DOES NOT EXCEED 600VDC.
- ANY EQUIPMENT OR ELECTRICAL MATERIALS USED FOR THIS INSTALLATION SHALL BE NEW AND LISTED BY A RECOGNIZED ELECTRICAL TESTING LABORATORY.
- AN INVERTER IN AN INTERACTIVE SOLAR PV SYSTEM SHALL AUTOMATICALLY DE-ENERGIZE ITS OUTPUT TO THE CONNECTED ELECTRICAL PRODUCTION AND DISTRIBUTION NETWORK UPON LOSS OF VOLTAGE IN THAT SYSTEM AND SHALL REMAIN IN THAT STATE UNTIL THE ELECTRICAL PRODUCTION AND DISTRIBUTION NETWORK VOLTAGE HAS BEEN RESTORED.
- ALL PV ARRAYS SHALL BE EQUIPPED WITH DC GROUND FAULT PROTECTION.
- ANY AC COMPONENT SHALL MEET OR EXCEED THE AVAILABLE FAULT CURRENT CALCULATED AT THAT COMPONENT.
- ALL MODULES AND ANY RELATED ROOF MOUNTED METALLIC EQUIPMENT SHALL BE PROPERLY GROUNDED.
- DC EQUIPMENT SHALL BE 600VDC RATED MINIMUM.
- MARKINGS SHALL BE PROVIDED TO INDICATE THAT ALL CONTACTS OF THE DISCONNECT EQUIPMENT MIGHT BE ENERGIZED.
- CONDUIT RUNS SHALL BE PROVIDED WITH SUFFICIENT WEATHERPROOF PULL BOXES OR JUNCTION BOXES/COMBINER BOXES PER APPROPRIATE JURISDICTIONAL REQUIREMENTS.
- FOR ANY UNGROUNDED PV SYSTEM, A LABEL READING: "WARNING - ELECTRICAL SHOCK HAZARD. THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED." SHALL BE PLACED AT EACH JUNCTION BOX, COMBINER BOX, DISCONNECT AND DEVICE WHERE ENERGIZED, UNGROUNDED CIRCUITS MAY BE EXPOSED DURING SERVICE.
- INVERTER(S) SHALL CONTAIN A GROUND FAULT DETECTION AND INTERRUPTION DEVICE.
- ALL METALLIC RACEWAYS AND EQUIPMENT SHALL BE BONDED AND ELECTRICALLY CONTINUOUS.
- THE POINT OF CONNECTION COMPLIES WITH APPLICABLE CEC/NEC.
- BACKFED SOLAR BREAKER(S) SHALL BE INSTALLED AT THE OPPOSITE END OF THE CIRCUIT OR FURTHEST AWAY FROM THE MAIN BREAKER.
- ALL WIRE, VOLTAGES, AMPERAGES AND EQUIPMENT IS SIZED ACCORDING TO TEMPERATURE DERATING AND LOCATION.
- ONLY COPPER (CU) CONDUCTORS SHALL BE USED. CONDUCTORS SHALL BE STRANDED OR SOLID WITH PROPERLY RATED CONNECTORS.
- DISCONNECT SHALL BE WIRED SO NO BLADES ARE ENERGIZED.
- ALL MODULES SHALL BE GROUNDED AS PER MANUFACTURER SPECIFICATIONS.
- ALL EQUIPMENT SHALL BE GROUNDED, INCLUDING BONDING JUMPERS WHERE NECESSARY ACROSS RAIL SPLICE PLATES TO BOND INDIVIDUAL PIECES OF RAIL.



CONTRACTORS LICENSE: 82-0674758

COVER PAGE

HEATHER BLAIKIE

134 STANFORD RD, MILLBROOK,
NY 12545, USA

SYSTEM

DC KW: 12

AC KW: 10

MODULES:30

CONTRACTOR

PLUGPV LLC

875 BROADWAY


ALBANY, NY 12207

DATA

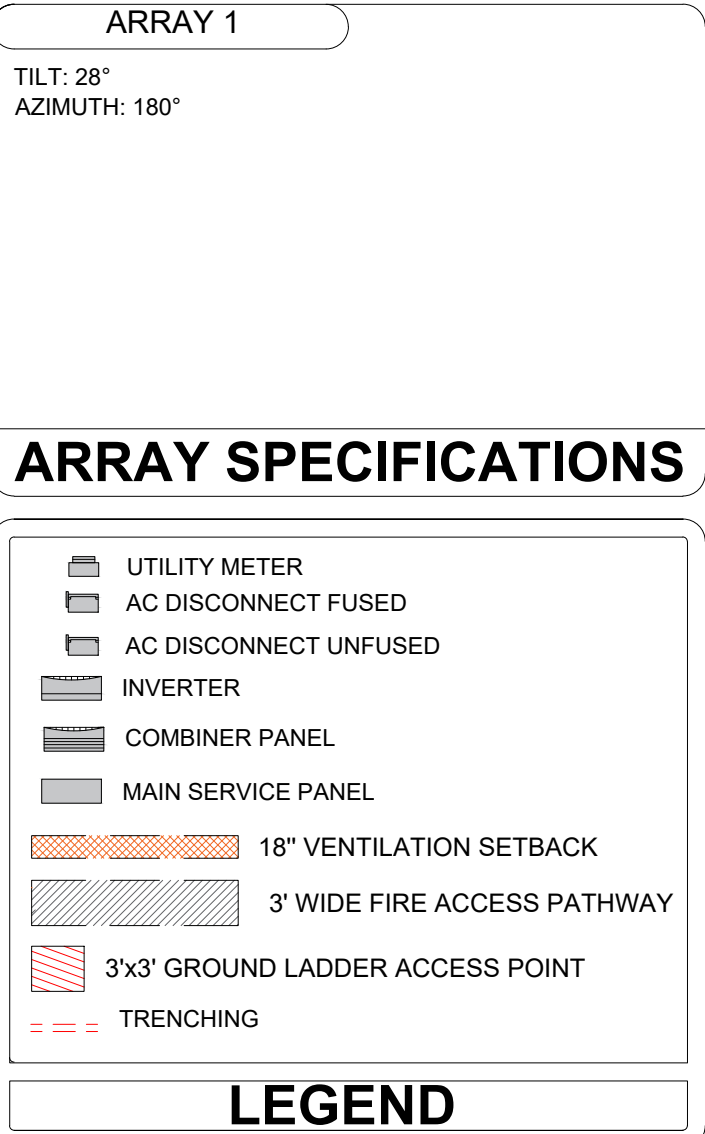
04/19/2023

DESIGNED BY:

OSB













PV1



TILT: 28°
AZIMUTH: 180°

ARRAY SPECIFICATIONS

-  UTILITY METER
-  AC DISCONNECT FUSED
-  AC DISCONNECT UNFUSED
-  INVERTER
-  COMBINER PANEL
-  MAIN SERVICE PANEL
-  18" VENTILATION SETBACK
-  3' WIDE FIRE ACCESS PATHWAY
-  3'x3' GROUND LADDER ACCESS POINT
-  TRENCHING

LEGEND

SITE PLAN

HEATHER BLAIKIE

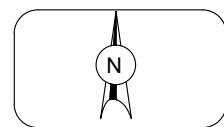
134 STANFORD RD, MILLBROOK,
NY 12545, USA

SYSTEM
DC KW: 12
AC KW: 10
MODULES:30

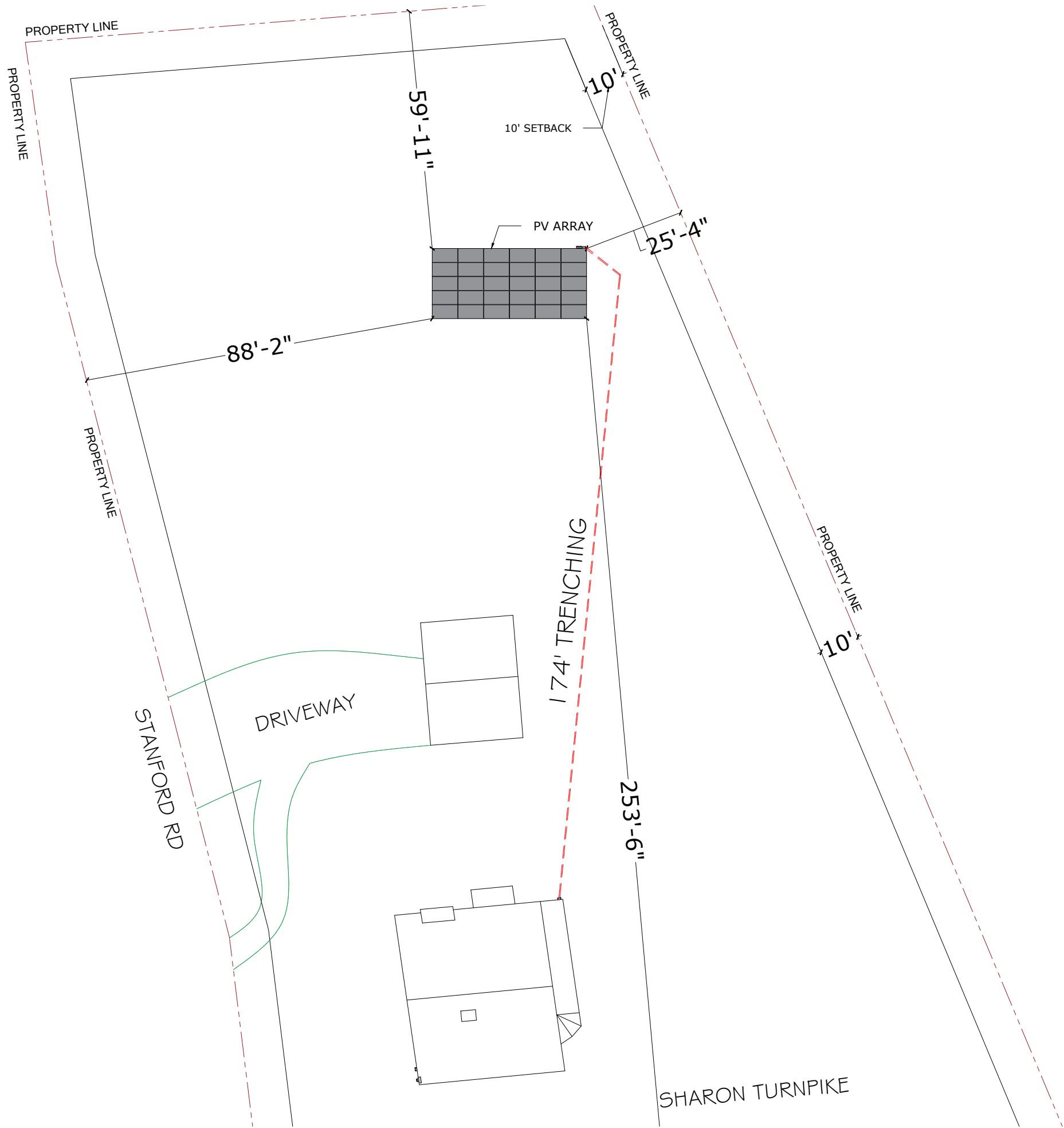
CONTRACTOR
PLUGPV LLC
875 BROADWAY
ALBANY, NY 12207

DATA
04/19/2023

DESIGNED BY:
OSB



PV2



ARRAY 1

TILT: 28°
AZIMUTH: 180°

ARRAY SPECIFICATIONS

- UTILITY METER
- AC DISCONNECT FUSED
- AC DISCONNECT UNFUSED
- INVERTER
- COMBINER PANEL
- MAIN SERVICE PANEL
- 18" VENTILATION SETBACK
- 3' WIDE FIRE ACCESS PATHWAY
- 3'x3' GROUND LADDER ACCESS POINT
- TRENCHING

LEGEND


CONTRACTORS LICENSE: 82-0674758

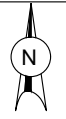
SITE PLAN
HEATHER BLAIKIE
134 STANFORD RD, MILLBROOK,
NY 12545, USA

SYSTEM
DC KW: 12
AC KW: 10
MODULES:30

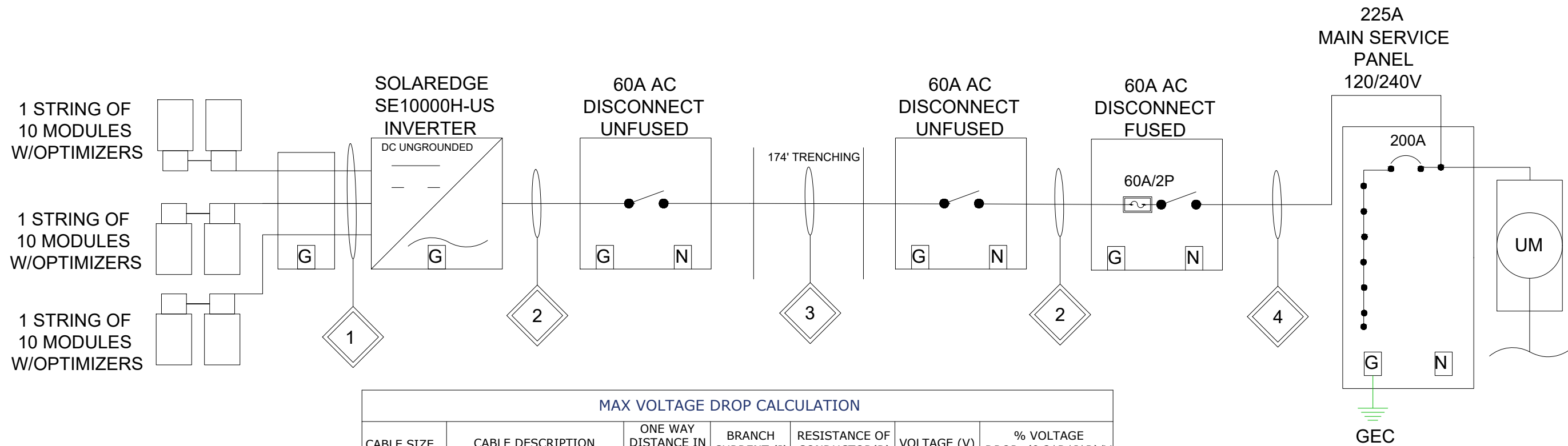
CONTRACTOR
PLUGPV LLC
875 BROADWAY
ALBANY, NY 12207

DATA
04/19/2023

DESIGNED BY:
OSB



PV2.1



MAX VOLTAGE DROP CALCULATION						
CABLE SIZE	CABLE DESCRIPTION	ONE WAY DISTANCE IN FEET (D)	BRANCH CURRENT (I)	RESISTANCE OF CONDUCTOR(R)	VOLTAGE (V)	% VOLTAGE DROP=(0.2*D*I*R)/V
#2 THHN	UNFUSED AC DISCONNECT TO UNFUSED AC DISCONNECT	174	42	0.194	240	0.320

CONDUCTORS AND CONDUIT

- 1

(6) #10 PV WIRE
(1) #6 THHN GND
3/4" EMT
- 2

(3) #6 THHN
(1) #6 THHN GND
3/4"EMT
- 3

(3) #2 THHN
(1) #6 THHN GND
1-1/4" PVC SCH 40

- 4

(3) #6 THHN
3/4" EMT

MODULES

(30)HANWHA QPEAK DUO BLK ML-G10+
(400W)

WATTS STC: 400W

ISC: 11.14A

IMP: 10.77A

VOC: 45.30V

VMP: 37.13V

INVERTER(S)

SOLAREGE SE10000H-US

MAX AC OUTPUT: 42 A

INVERTER OCPD CALC : (42) X 1.25 = 52.5A

MIN OCPD: 60A

WIRE AMPACITY: 65A @75° C TERMINAL

TEMPERATURE CORRECTION FACTOR:
31°-35°C = 0.96

CORRECTED WIRE AMPACITY: 62.40A

OTHER EQUIPMENT

60A FUSED AC DISCONNECT

60A UNFUSED AC DISCONNECT



ELECTRICAL DIAGRAMS

HEATHER BLAIE

134 STANFORD RD, MILLBROOK,
NY 12545, USA

SYSTEM

DC KW: 12

AC KW: 10

MODULES:30

CONTRACTOR

PLUGPV LLC

875 BROADWAY

ALBANY, NY 12207

DATA

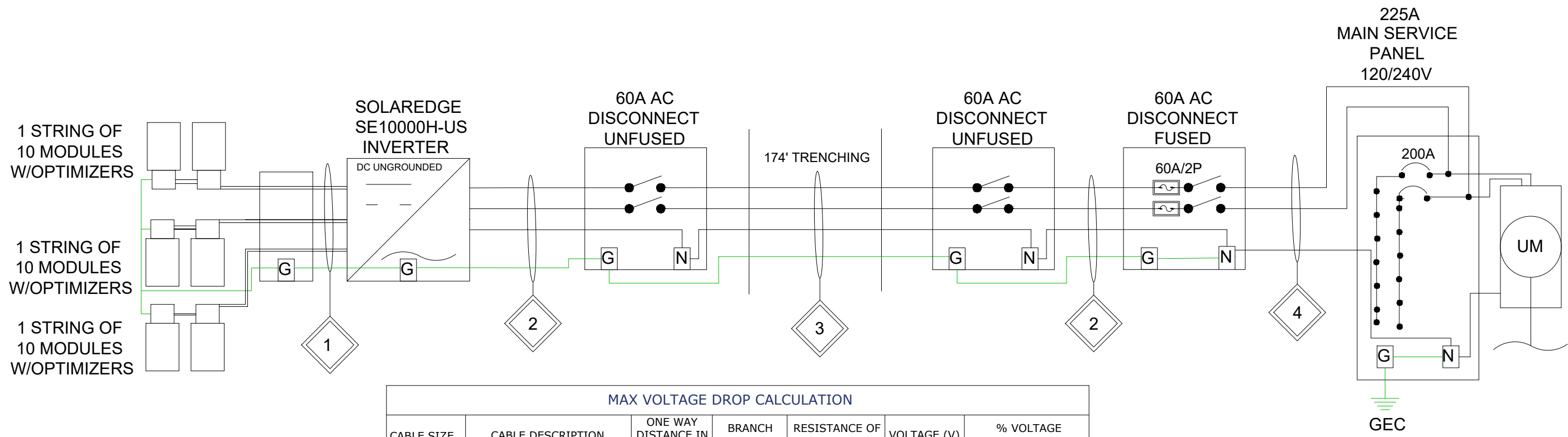
04/19/2023

DESIGNED BY:

OSB



PV3



MAX VOLTAGE DROP CALCULATION						
CABLE SIZE	CABLE DESCRIPTION	ONE WAY DISTANCE IN FEET (D)	BRANCH CURRENT (I)	RESISTANCE OF CONDUCTOR(R)	VOLTAGE (V)	% VOLTAGE DROP=(0.2*D*I*R)/V
#2 THHN	UNFUSED AC DISCONNECT TO UNFUSED AC DISCONNECT	174	42	0.194	240	0.320

CONDUCTORS AND CONDUIT

- 1

(6) #10 PV WIRE
(1) #6 THHN GND
3/4" EMT
- 2

(3) #6 THHN
(1) #6 THHN GND
3/4"EMT
- 3

(3) #2 THHN
(1) #6 THHN GND
1-1/4" PVC SCH 40
- 4

(3) #6 THHN
3/4" EMT

MODULES

(30)HANWHA QPEAK DUO BLK ML-G10+ (400W)

WATTS STC: 400W

ISC: 11.14A

IMP: 10.77A

VOC: 45.30V

VMP: 37.13V

INVERTER(S)

SOLAREEDGE SE10000H-US

MAX AC OUTPUT: 42 A

INVERTER OCPD CALC :(42) X 1.25 = 52.5A

MIN OCPD: 60A

WIRE AMPACITY: 65A @75° C TERMINAL

TEMPERATURE CORRECTION FACTOR: 31°-35°C = 0.96

CORRECTED WIRE AMPACITY: 62.40A

OTHER EQUIPMENT

60A FUSED AC DISCONNECT

60A UNFUSED AC DISCONNECT



CONTRACTORS LICENSE: 82-0674758

ELECTRICAL DIAGRAMS

HEATHER BLAIE

134 STANFORD RD, MILLBROOK, NY 12545, USA

SYSTEM

DC KW: 12

AC KW: 10

MODULES:30

CONTRACTOR

PLUGPV LLC

875 BROADWAY

ALBANY, NY 12207

DATA

04/19/2023

DESIGNED BY:

OSB

PV3.1

INVERTER

NEC 690.17(4) GROUNDED SYSTEMS

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

NEC 690.14(C)(2)

PHOTOVOLTAIC DC DISCONNECT

PHOTOVOLTAIC
SYSTEM EQUIPPED WITH
RAPID SHUTDOWN

NEC 690.53 # INVERTER 1

PHOTOVOLTAIC ARRAY
DC DISCONNECT
OPERATING CURRENT: 27 A
OPERATING VOLTAGE: 400 V
MAX. SYSTEM VOLTAGE: 480.0 V
SHORT-CIRCUIT CURRENT: 45.0 A

AC DISCONNECT

NEC 690.14(C)(2)

PHOTOVOLTAIC DISCONNECT
FOR UTILITY OPERATIONS

NEC 690.54

RATED AC OUTPUT CURRENT: 42 A
NOMINAL AC VOLTAGE: 240 V

NEC 690.56

EMERGENCY RESPONDER
THIS SOLAR PV SYSTEM
EQUIPPED
WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN
SWITCH TO THE
"OFF" POSITION ONLY
CONDUCTORS INSIDE
BUILDING OR OFF THE
ROOF WILL SHUT DOWN

Sections of the PV system that
are shut down when the rapid
shutdown switch is operated.

Sections of the PV system that
are not shut down when the rapid
shutdown switch is operated.

CONDUIT, RACEWAYS,
ENCLOSURES, CABLE
ASSEMBLIES
& JUNCTION BOXES

NEC 690.31(E)(3) CONDUIT

Warning: Photovoltaic Power Source

NEC 690.35(F) UNGROUNDED SYSTEMS JUNCTION BOX

WARNING
ELECTRIC SHOCK HAZARD.
THE DC CONDUCTORS OF THIS
PHOTOVOLTAIC SYSTEM ARE
UNGROUND AND MAY BE
ENERGIZED.

MAIN SERVICE PANEL

NEC 705.12(D)(4)), 690.56(B)

WARNING
POWER IS BEING SUPPLIED TO THIS
PANEL FROM THE UTILITY AND A
SOLAR PV SYSTEM.

NEC 705.12(D)(7)

WARNING
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS
OVERCURRENT DEVICE

LABEL TO BE INSTALLED DIRECTLY NEXT TO PV BACKFEED
BREAKER. IF INSTALLED ANYWHERE ELSE ON DEADFRONT
THEN A PERMANENT ARROW FROM LABEL POINTING TO
PV BACKFEED BREAKER REQUIRED.

NEC 690.54

RATED AC OUTPUT CURRENT: 42 A
NOMINAL AC VOLTAGE: 240 V

NEC 690.14(C)(2)

PHOTOVOLTAIC AC DISCONNECT

CONTRACTORS LICENSE: 82-0674758

MARKING & LABELS

HEATHER BLAIE
134 STANFORD RD, MILLBROOK,
NY 12545, USA

SYSTEM

DC KW: 12
AC KW: 10
MODULES:30

CONTRACTOR

PLUGPV LLC
875 BROADWAY
ALBANY, NY 12207

DATA

04/19/2023

DESIGNED BY:

OSB

PV4

powered by

Q.ANTUM DUO Z

Q.PEAK DUO BLK ML-G10+ 385-405

ENDURING HIGH
PERFORMANCE



BREAKING THE 20% EFFICIENCY BARRIER

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.9%.



THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY

Q CELLS is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.



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 Technology, Anti PID Technology¹, Hot-Spot Protect and Traceable Quality Tra.Q™.



EXTREME WEATHER RATING

High-tech aluminum alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).



A RELIABLE INVESTMENT

Inclusive 25-year product warranty and 25-year linear performance warranty².

¹ APT test conditions according to IEC / TS 62804-1:2015, method A (-1500V, 96h)

² See data sheet on rear for further information.



THE IDEAL SOLUTION FOR:



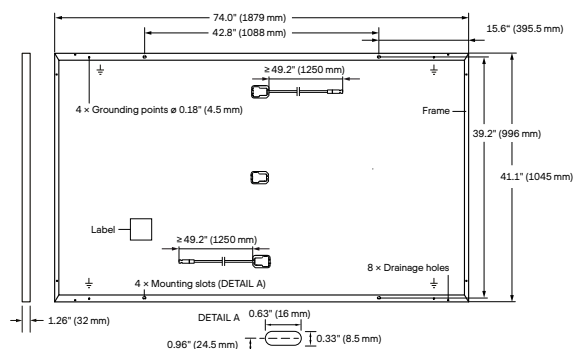
Rooftop arrays on
residential buildings

Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	74.0in × 41.1in × 1.26in (including frame) (1879mm × 1045mm × 32mm)
Weight	48.5lbs (22.0kg)
Front Cover	0.13in (3.2mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 × 22 monocrystalline Q.ANTUM solar half cells
Junction Box	2.09-3.98in × 1.26-2.36in × 0.59-0.71in (53-101mm × 32-60mm × 15-18mm), IP67, with bypass diodes
Cable	4mm ² Solar cable; (+) ≥ 49.2in (1250mm), (-) ≥ 49.2in (1250mm)
Connector	Stäubli MC4; IP68



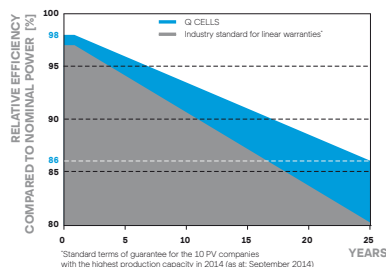
ELECTRICAL CHARACTERISTICS

POWER CLASS			385	390	395	400	405
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC ¹ (POWER TOLERANCE +5W / -0W)							
Minimum	Power at MPP ¹	P _{MPP} [W]	385	390	395	400	405
	Short Circuit Current ¹	I _{SC} [A]	11.04	11.07	11.10	11.14	11.17
	Open Circuit Voltage ¹	V _{OC} [V]	45.19	45.23	45.27	45.30	45.34
	Current at MPP	I _{MPP} [A]	10.59	10.65	10.71	10.77	10.83
	Voltage at MPP	V _{MPP} [V]	36.36	36.62	36.88	37.13	37.39
	Efficiency ¹	η [%]	≥ 19.6	≥ 19.9	≥ 20.1	≥ 20.4	≥ 20.6
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT ²							
Minimum	Power at MPP	P _{MPP} [W]	288.8	292.6	296.3	300.1	303.8
	Short Circuit Current	I _{SC} [A]	8.90	8.92	8.95	8.97	9.00
	Open Circuit Voltage	V _{OC} [V]	42.62	42.65	42.69	42.72	42.76
	Current at MPP	I _{MPP} [A]	8.35	8.41	8.46	8.51	8.57
	Voltage at MPP	V _{MPP} [V]	34.59	34.81	35.03	35.25	35.46

¹Measurement tolerances P_{MPP} ± 3%; I_{SC}; V_{OC} ± 5% at STC: 1000 W/m², 25 ± 2°C, AM 1.5 according to IEC 60904-3 • 800 W/m², NMOT, spectrum AM 1.5

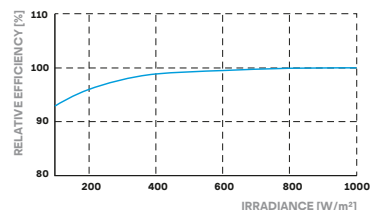
Q CELLS PERFORMANCE WARRANTY

PERFORMANCE AT LOW IRRADIANCE



At least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 86% of nominal power up to 25 years.

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



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]	109 ± 5.4 (43 ± 3°C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V _{sys}	[V]	1000 (IEC)/1000 (UL)	PV module classification	Class II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating based on ANSI / UL 61730	TYPE 2
Max. Design Load, Push / Pull ³	[lbs/ft ²]	75 (3600 Pa)/55 (2660 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/ft ²]	113 (5400 Pa)/84 (4000 Pa)		

³ See Installation Manual

QUALIFICATIONS AND CERTIFICATES

UL 61730, CE-compliant,
Quality Controlled PV - TÜV Rheinland,
IEC 61215:2016, IEC 61730:2016,
U.S. Patent No. 9,893,215 (solar cells),
QCPV Certification ongoing.



PACKAGING INFORMATION

Horizontal packaging	76.4in 1940mm	43.3in 1100mm	48.0in 1220mm	1656lbs 751kg	24 pallets	24 pallets	32 modules

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

TRANSITIONING TO UL 61730-1 AND UL 61730-2 FROM UL 1703

BACKGROUND

Solar panel certification for the U.S. market has transitioned from UL 1703 to UL 61730-1 and UL 61730-2. UL 61730-1 encompasses the construction evaluation of the solar module, such as the individual component evaluation utilized in construction/assembly, and design assessment, such as clearance and creepage distances. UL 61730-2 entails testing requirements for solar panels such as humidity freeze tests and how to conduct such tests. The new UL standards (UL 61730-1 and -2) harmonize with existing international standards (IEC 61730-1 and -2). The harmonization helps solar panel manufacturing companies operate in a global en-

vironment under a single certification program. Since IEC 61730 standards have been developed for the international market, this may not necessarily address specific local requirements such as for the U.S. market. However, modifications made to address the U.S. market’s safety requirements have been incorporated and are called national deviations. When comparing the UL 61730 certification program against the UL 1703 certification program, UL 61730 involves more testing requirements such as more fire types alongside other key differences as tabulated below:

KEY DIFFERENCES BETWEEN UL 1703 AND UL 61730-1 AND UL 61730-2

STANDARD REQUIREMENTS	UL 1703	UL 61730-1 & UL 61730-2
Construction and Testing	One document, UL 1703, refers to construction evaluation of the product and its testing	Two documents -UL 61730-1 refers to construction evaluation of the product and UL 61730-2 refers to its testing
Number of Test Sequences	4	8
Design Load	30 psf or 1436 Pa	50.12 psf or 2400 Pa
Fire Type	Up to Type 15	Up to Type 33
California Energy Commission	Will not accept UL 1703 certification for new products starting January 1, 2020	Accepted starting January 1, 2020
NEC 2020	Referenced	Referenced

QUESTION AND ANSWER

Do I need UL 1703 or UL 61730 certification? Will both or one of the two suffice?

Certification to only one standard is required (UL 1703 or UL 61730) but will depend on the timeframe. Products with UL1703 obtained before January 2020 can continue to be used in the U.S., but new products certified after January 2020 need to have UL 61730 for CEC listing. QCELLS solar panels are UL 1703 and UL 61730 certified since the standard was adopted by the CEC.

Which standard is better?

Overall, UL 61730 is a better standard for modules since the requirements and test cycles are more stringent in UL 61730 compared to UL 1703. It is more beneficial for the market and addresses challenges such as new construction types for fire ratings that were not addressed before in UL 1703.

Are these new standards adopted or referenced in the 2020 National Electric Code?

UL 61730-1/-2 is referenced in Appendix A of the latest NEC 2020 edition. This is also helpful to point out to building inspectors if they have questions about UL 61730 certification.

Whom should we reach out to in case building officials have any questions?

Please reach out to Q CELLS at pti@us.q-cells.com; an engineer from Q CELLS will assist you with your needs.



Power Optimizer

For Residential Installations

S440 / S500 / S500B



POWER OPTIMIZER

Enabling PV power optimization at the module level

- / Specifically designed to work with SolarEdge residential inverters
- / Detects abnormal PV connector behavior, preventing potential safety issues*
- / Module-level voltage shutdown for installer and firefighter safety
- / Superior efficiency (99.5%)
- / Mitigates all types of module mismatch loss, from manufacturing tolerance to partial shading
- / Faster installations with simplified cable management and easy assembly using a single bolt
- / Flexible system design for maximum space utilization
- / Compatible with bifacial PV modules

* Functionality subject to inverter model and firmware version

/ Power Optimizer

For Residential Installations

S440 / S500 / S500B

	S440	S500	S500B	UNIT
INPUT				
Rated Input DC Power ⁽¹⁾	440	500		W
Absolute Maximum Input Voltage (Voc)	60		125	Vdc
MPPT Operating Range	8 – 60		12.5 – 105	Vdc
Maximum Short Circuit Current (Isc) of Connected PV Module	14.5	15		Adc
Maximum Efficiency	99.5			%
Weighted Efficiency	98.6			%
Overvoltage Category	II			
OUTPUT DURING OPERATION				
Maximum Output Current	15			Adc
Maximum Output Voltage	60		80	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)				
Safety Output Voltage per Power Optimizer	1 ± 0.1			Vdc
STANDARD COMPLIANCE ⁽²⁾				
EMC	FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3, CISPR11, EN-55011			
Safety	IEC62109-1 (class II safety), UL1741			
Material	UL94 V-0, UV Resistant			
RoHS	Yes			
Fire Safety	VDE-AR-E 2100-712:2013-05			
INSTALLATION SPECIFICATIONS				
Maximum Allowed System Voltage	1000			Vdc
Dimensions (W x L x H)	129 x 155 x 30		129 x 155 x 45	mm
Weight (including cables)	655			gr
Input Connector	MC4 ⁽³⁾			
Input Wire Length	0.1			m
Output Connector	MC4			
Output Wire Length	(+) 2.3, (-) 0.10			m
Operating Temperature Range ⁽⁴⁾	-40 to +85			°C
Protection Rating	IP68			
Relative Humidity	0 – 100			%

(1) Rated power of the module at STC will not exceed the Power Optimizer Rated Input DC Power. Modules with up to +5% power tolerance are allowed.

(2) For details about CE compliance, see [Declaration of Conformity – CE](#).

(3) For other connector types please contact SolarEdge.

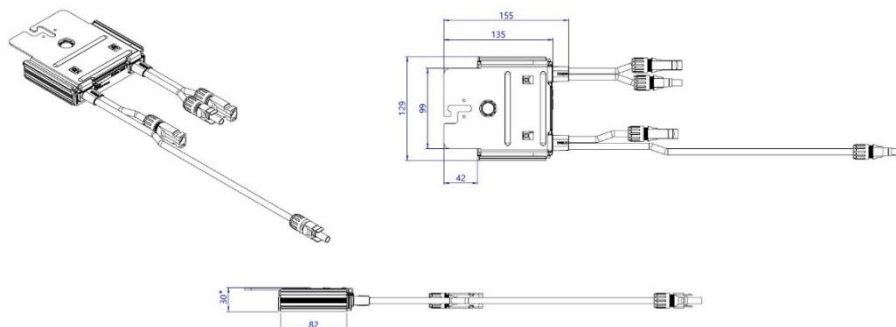
(4) For ambient temperature above +70°C power de-rating is applied. Refer to [Power Optimizers Temperature De-Rating Technical Note](#) for details.

PV System Design Using a SolarEdge Inverter ⁽⁵⁾	SolarEdge Home Wave Single Phase	Three Phase SExxK-RWB	Three Phase for 230/400V Grid	Three Phase for 277/480V Grid	
Minimum String Length (Power Optimizers)	S440, S500 S500B	8 6	9 8	16 14	18
Maximum String Length (Power Optimizers)		25	20	50	
Maximum Continuous Power per String		5700	5625	11250	12750
Maximum Allowed Connected Power per String (Permitted only when the power difference between strings is less than 2,000W)		See ⁽⁶⁾	See ⁽⁶⁾	13500	15000
Parallel Strings of Different Lengths or Orientations		Yes			

(5) It is not allowed to mix S-series and P-series Power Optimizers in new installations.

(6) If the inverter's rated AC power ≤ maximum nominal power per string, then the maximum power per string will be able to reach up to the inverter's maximum input DC power.

Refer to [Application Note: Single String Design Guidelines](#).



* 45mm for S500B

Single Phase Inverter with HD-Wave Technology

for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US /
SE7600H-US / SE10000H-US / SE11400H-US



Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking 99% weighted efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014, NEC 2017 and NEC 2020 per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install both outdoors or indoors
- Built-in module-level monitoring
- Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)

/ Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/
SE7600H-US / SE10000H-US / SE11400H-US

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXXH-XXXXBXX4							
OUTPUT								
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5 ⁽¹⁾							Hz
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A
Power Factor	1, Adjustable - 0.85 to 0.85							
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
INPUT								
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							Vdc
Nominal DC Input Voltage	380				400			Vdc
Maximum Input Current @240V ⁽²⁾	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V ⁽²⁾	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600k Ω Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W

(1) For other regional settings please contact SolarEdge support

(2) A higher current source may be used; the inverter will limit its input current to the values stated

/ Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/
SE7600H-US / SE10000H-US / SE11400H-US

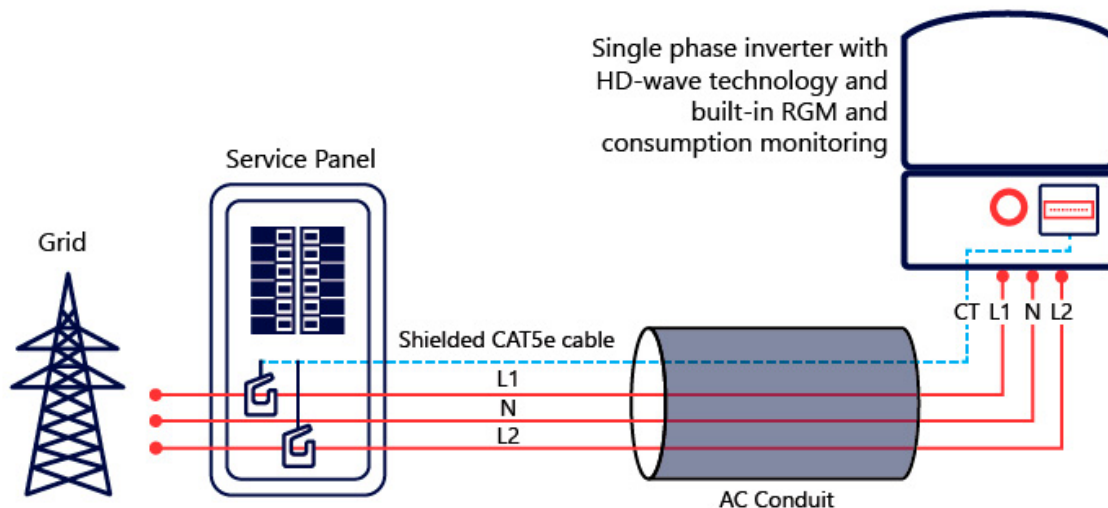
MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US
ADDITIONAL FEATURES							
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)						
Revenue Grade Metering, ANSI C12.20	Optional ⁽³⁾						
Consumption metering							
Inverter Commissioning	With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection						
Rapid Shutdown - NEC 2014, NEC 2017 and NEC 2020, 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect						
STANDARD COMPLIANCE							
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCEI according to T.I.L. M-07						
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)						
Emissions	FCC Part 15 Class B						
INSTALLATION SPECIFICATIONS							
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG				1" Maximum /14-4 AWG		
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG				1" Maximum / 1-3 strings / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174				21.3 x 14.6 x 7.3 / 540 x 370 x 185		in / mm
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9		38.8 / 17.6		lb / kg
Noise	< 25				<50		dBA
Cooling	Natural Convection						
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁴⁾						°F / °C
Protection Rating	NEMA 4X (Inverter with Safety Switch)						

(3) Inverter with Revenue Grade Meter P/N: SExxxxH-US000BNC4; Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxxH-US000BNI4. For consumption metering, current transformers should be ordered separately: SEACT0750-200NA-20 or SEACT0750-400NA-20. 20 units per box

(4) Full power up to at least 50°C / 122°F; for power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

How to Enable Consumption Monitoring

By simply wiring current transformers through the inverter's existing AC conduits and connecting them to the service panel, homeowners will gain full insight into their household energy usage helping them to avoid high electricity bills





Solar Foundations[®] USA

Innovative. Adaptable. Grounded.



SFUSA[®]

Ground Mount

Adaptable Ground Screw Fixed Tilt System

The SFUSA® Ground Mount system is the optimal solution for residential and light commercial solar projects. By custom designing and manufacturing components in-house, Solar Foundations' structure fits and functions together seamlessly, installs in far less time and with greater strength. The highest quality materials such as high-grade steel fully galvanized in accordance with ASTM standards and high-strength aluminum alloys for our panel support rails are utilized for long-term durability. Designed to withstand high snow and wind areas, the UL 2703 classified system has an expected lifespan that exceeds multiple panel lifecycles. Thus, Solar Foundations' product maximizes the residual investment of your ground mount structure.

Features

Solar Foundations' patented rail design offers a simple connection detail between the panel support rail and the horizontal support beams.

The patented telescopic design of the SFUSA Wind Brace allows quick and easily adaptable length changes to match installation conditions where significant adjustability is required.

A two-man crew can typically install up to about a 25kW residential structure in a single day.

SFUSA has developed processes and equipment that permits the installation of our patent pending ground screws in any soil conditions including solid rock.

Our foundations feature wider spans between support columns and stronger members. We engineered our system to obtain a better balance between all of the system components, resulting in less ground penetrations, a lower installed cost and has allowed us to offer further cost optimizations and array configurations that are not typically available in the industry.



- ✓ Allows for mounting panels in four-, five- or six-high in landscape orientation and can be adapted to custom configurations
- ✓ Durable design enables any wind speed and snow load
- ✓ 0° to 40° tilt with multiple inter-row spacing options
- ✓ Compatible with a wide range of modules
- ✓ Pile verification report available after the installation has been completed
- ✓ 25-year guarantee against failure



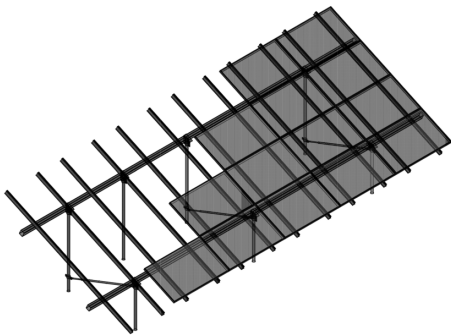
SFUSA®

Ground Mount

Let us simplify your **ground mount** structure process.

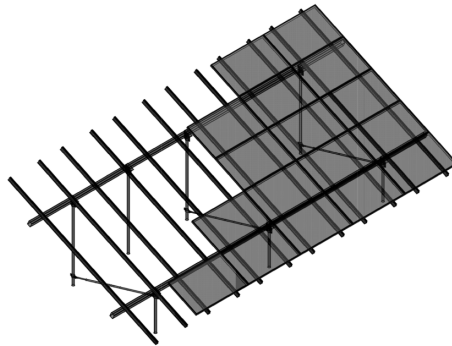
FT4L

Fixed Tilt 4 Landscape



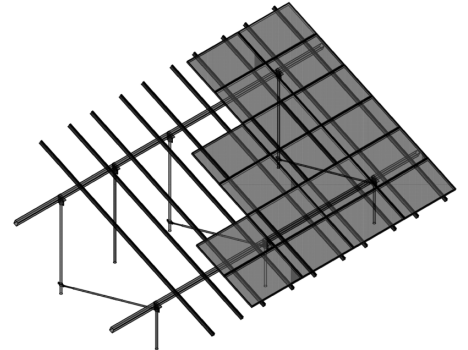
FT5L

Fixed Tilt 5 Landscape



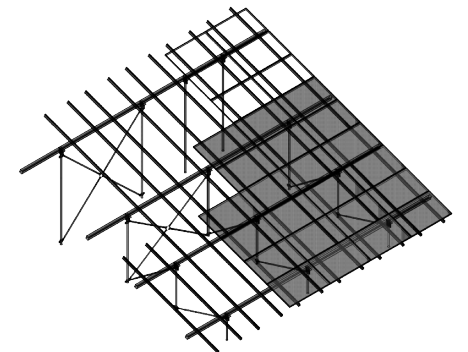
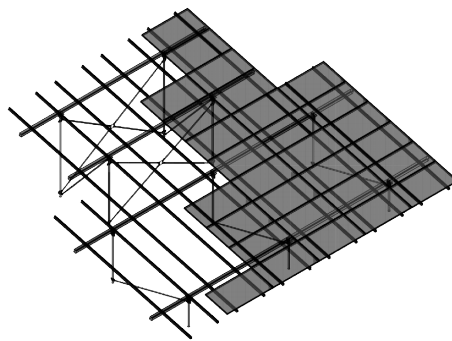
FT6L

Fixed Tilt 6 Landscape



Custom

SFUSA® has the ability to come up with creative structures and products outside of our standard systems for unique situations.



Materials	Hot-dipped galvanized steel, aluminum, stainless-steel mounting hardware
Tilt Angle	0° - 40°
Module Orientation	Landscape
Finishes	Galvanized
Foundation Options	Ground Screw - All soils including rock drilling
Grounding	Integrated or WEEB Bonding
Maximum Grade of Terrain	15°
Design Services	Signed & sealed structural drawings
Certifications	UL 2703
Warranty	25 years
Installation Services	Material, foundations, racking

LESS PILES
LARGER SPANS

UP TO 15°
TERRAIN SLOPES

We're more than just a **racking company**.

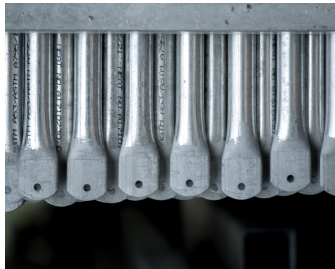
Substructure Assembly

Horizontal Support Beam



We provide maximum support for our structure by utilizing high yield strength hollow structural steel sections on our racking systems.

Diagonal Wind Brace and Insert



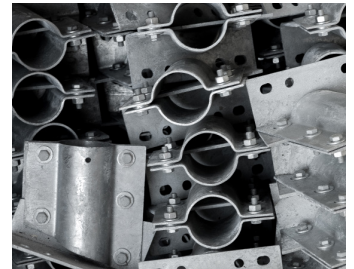
Our patented telescopic design allows quick and easily adaptable length changes to match installation conditions.

Diagonal Wind Brace Column Connector



SolarFoundations' hot-dipped galvanized custom Wind Brace Column Connectors fasten the Diagonal Wind Brace to a vertical column.

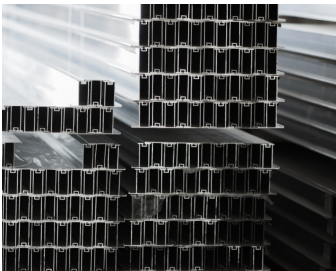
Column Caps



Our unique design allows a straightforward connection to the horizontal steel support beam.

Racking Assembly

Ground Mount Rail



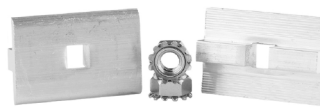
Solar Foundations' patented rail design offers a simple connection detail between the panel support rail and the horizontal support beams, allowing 6 modules per column in landscape orientation.

Module End Clamp



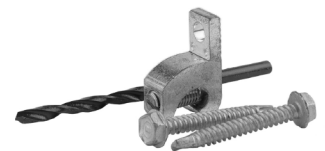
Our end clamp design securely fastens the top and bottom edges of a column of solar panels to the SF Rail.

Module Mid Clamp



The mid clamp fastens two adjoining solar panels in a column of solar panels to the SF Rail. Our sleek design with multiple serrations increases the holding power of the modules to our SF Rails.

Grounding



Our UL 2703 Certification encompasses the rail to beam and beam to pile connections, permitting the use of a single grounding lug for the entire racking system.

Contact us at info@solarfoundationsusa.com or (855) 738-7200.