PROJECT DESCRIPTION

THIS 7.92 KWSTC, GROUND-MOUNTED PHOTOVOLTAIC (PV) SYSTEM IS TO BE INSTALLED AT THE SINGLE-FAMILY DWELLING IN KANSAS CITY, MO. THE ENERGY PRODUCED BY THE PV SYSTEM SHALL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ON-SITE ELECTRICAL EQUIPMENT VIA A BACK-FED BREAKER IN THE MAIN SERVICE PANEL. THIS PROJECT DOES NOT INCLUDE STORAGE BATTERIES.

SHEET INDEX

SCOPE OF WORK

(24) PV MODULES (TOTAL: 433 SQ. FT.)
(1) 7.6 kW INVERTER
(24) SOLAREDGE POWER OPTIMIZERS

SITE SPECIFICATIONS

RISK CATEGORY: I
EXPOSURE CATEGORY: C
ASCE 7-10 WIND SPEED: 115 MPH
ASCE 7-10 GROUND SNOW LOAD: 20 PSF

GOVERNING CODES

2009 INTERNATIONAL ENERGY CONSERVATION CODE
2012 INTERNATIONAL MECHANICAL CODE
UNDERWRITERS LABORATORIES (UL) STANDARDS
OSHA 29 CFR 1910.269

CONSTRUCTION NOTES

1.) CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO INITIATING CONSTRUCTION.
2.) CONTRACTOR SHALL REVIEW ALL MANUFACTURER INSTALLATION DOCUMENTS PRIOR TO INITIATING CONSTRUCTION.
3.) ALL EQUIPMENT SHALL BE LISTED BY A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) FOR ITS SPECIFIC APPLICATION.
4.) ALL EQUIPMENT SHALL BE RATED FOR THE ENVIRONMENT IN WHICH IT IS INSTALLED.
5.) ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
6.) ACCESS TO ELECTRICAL COMPONENTS OVER 150 VOLTS TO GROUND SHALL BE RESTRICTED TO QUALIFIED PERSONNEL.
7.) ALL CONDUCTORS SHALL BE COPPER AND RATED FOR 600 VOLTS AND 90°C WET ENVIRONMENT, UNLESS OTHERWISE NOTED.
8.) WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, CONTRACTOR SHALL SIZE THEM ACCORDING TO APPLICABLE CODES.
9.) GROUNDING ELECTRODE CONDUCTOR (G.E.C.) SHALL BE CONTINUOUS AND/OR IRREVERSIBLY SPLICED/WELDED.
10.) PV MODULE FRAMES SHALL BE BONDED TO RACKING RAIL OR BARE COPPER G.E.C. PER THE MODULE MANUFACTURER'S LISTED INSTRUCTION SHEET.
11.) PV MODULE RACKING RAIL SHALL BE BONDED TO THE BARE COPPER G.E.C. VIA AN APPROPRIATELY LISTED GROUNDING LUG.
12.) ALL JUNCTION BOXES, COMBINER BOXES, AND DISCONNECTS SHALL BE INSTALLED IN AN ACCESSIBLE LOCATION.
13.) ROOF ACCESS POINTS SHALL BE LOCATED AT A STRUCTURALLY SOUND POINT ON THE BUILDING AND NOT REQUIRE THE PLACEMENT OF LADDERS OVER EXTERIOR WALL OPENINGS SUCH AS WINDOWS OR DOORS.
14.) WORKING SPACE AROUND ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.

PARTS LIST

QUANTITY	DESCRIPTION
1	SolarEdge 7.6 kW Inverter
1	40 A, 2-P Breaker
24	Panasonic 330 W PV Module
24	SolarEdge P400 Power Optimizer

Project:
KANSAS CITY, MO 64134

Project Details:
7.92 kWstc, 7.60 kW AC
AHJ: KANSAS CITY, CITY OF

REVISIONS

DESCRIPTION	DATE	REV
ORIGINAL	9/18/2018	A

Sheet Title:
COVER

Sheet Number:
T1.0

Sheet Size:
ANSI B - 17" x 11"

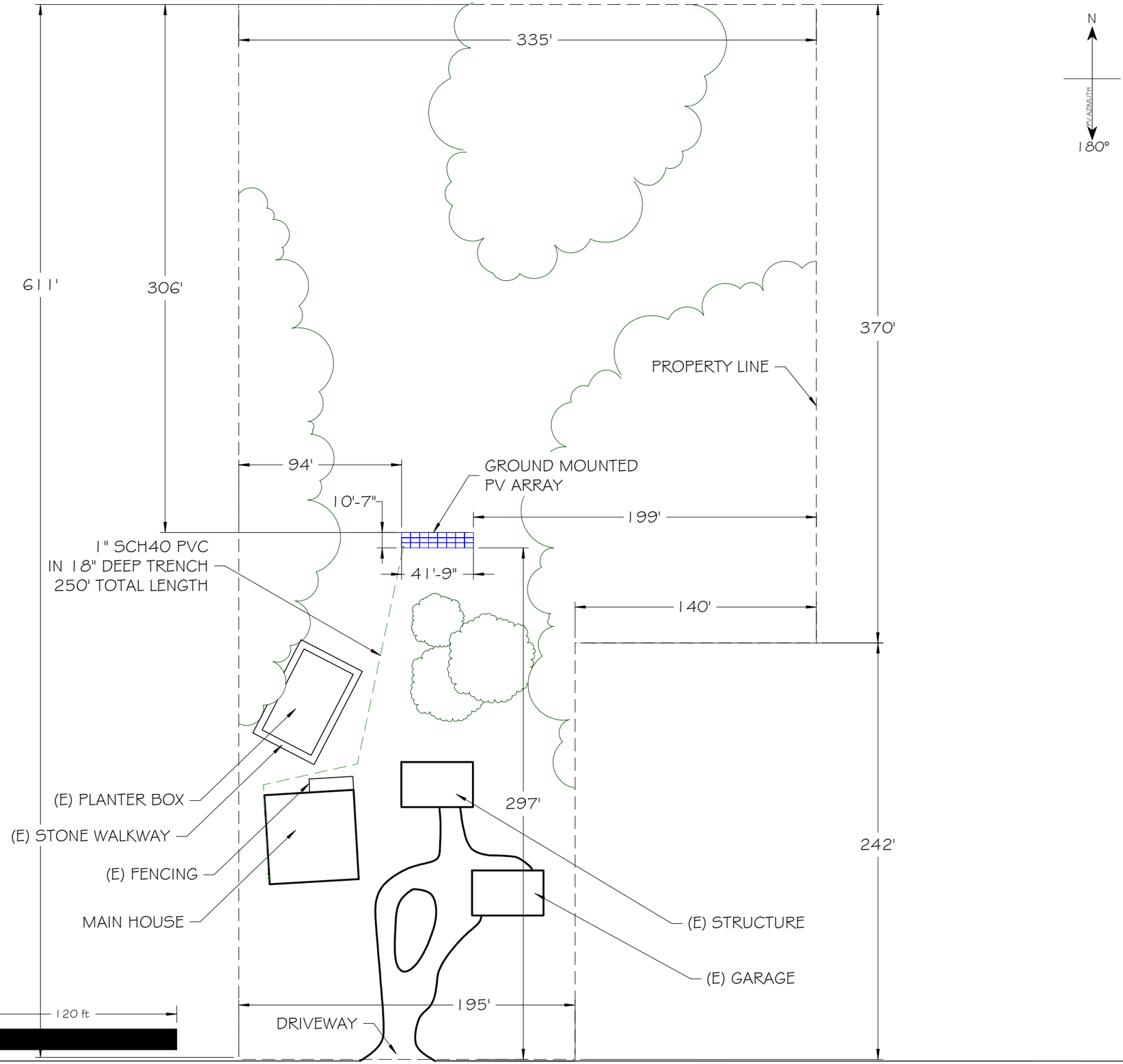
DESIGN & DRAFTING BY:
CLARK FLEMING

"Do not pray for an easy life, pray for the strength to endure a difficult one."
- Bruce Lee

SepiSolar
POWER BY DESIGN

Reviewed & Approved by:
AD

NABCEP CERTIFIED PV Installation Professional



Project:

KANSAS CITY, MO 64134

Project Details:

7.92 kWstc, 7.60 kW AC
AHJ: KANSAS CITY, CITY OF

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DESCRIPTION	DATE	REV
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PLOT PLAN

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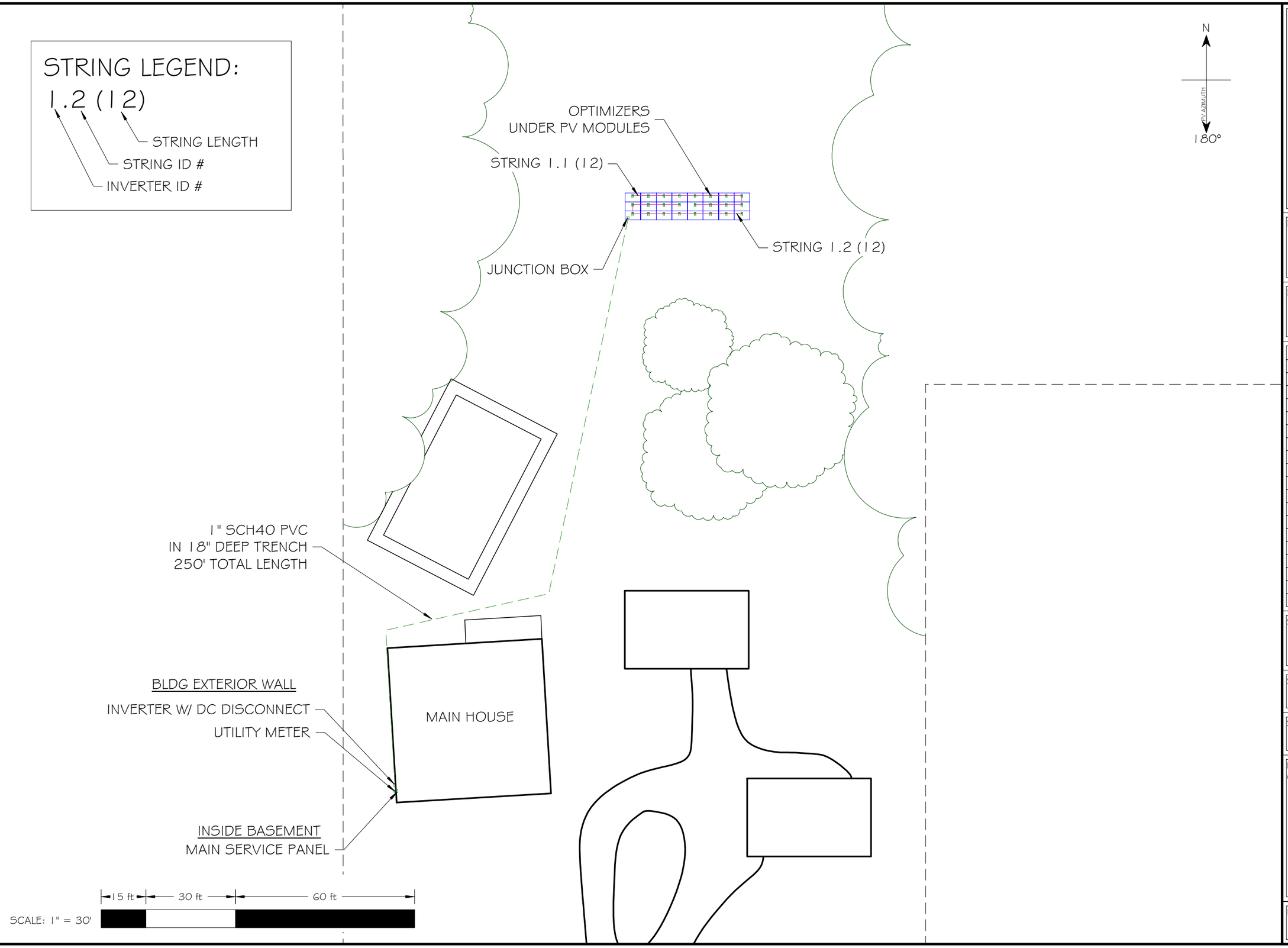
STRING LEGEND:

1.2 (12)

- STRING LENGTH
- STRING ID #
- INVERTER ID #



Project:

KANSAS CITY, MO 64134

Project Details:

7.92 kWstc, 7.60 kW AC
AHJ: KANSAS CITY, CITY OF

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SITE PLAN

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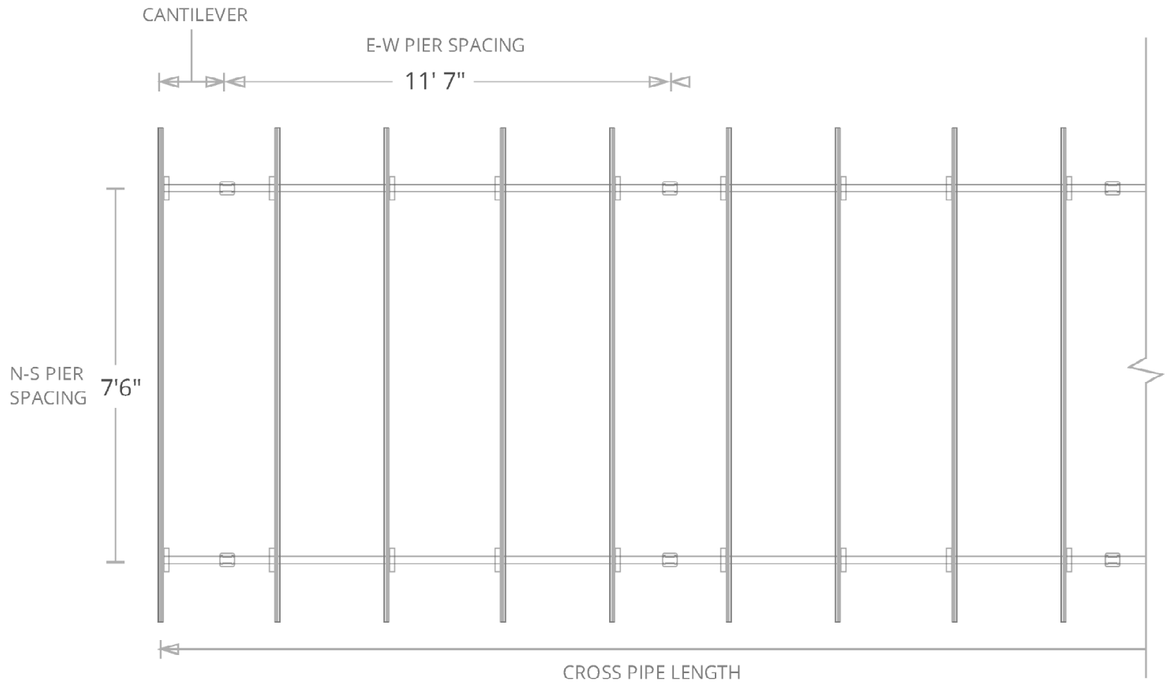
ENGINEERING AND DRAWINGS PROVIDED BY IRONRIDGE DESIGN ASSISTANT

Foundation Requirements

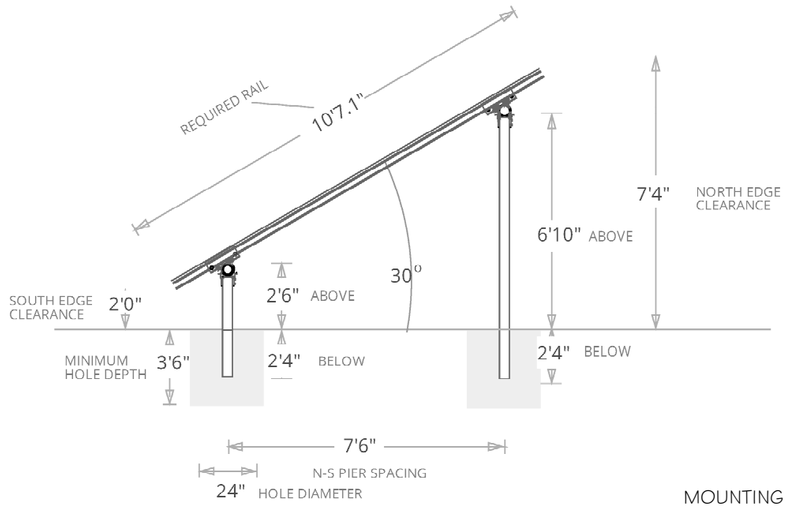
TYPE	Concrete
HOLE DIAMETER	24 in.
MIN HOLE DEPTH	42 in.

Foundation Loads

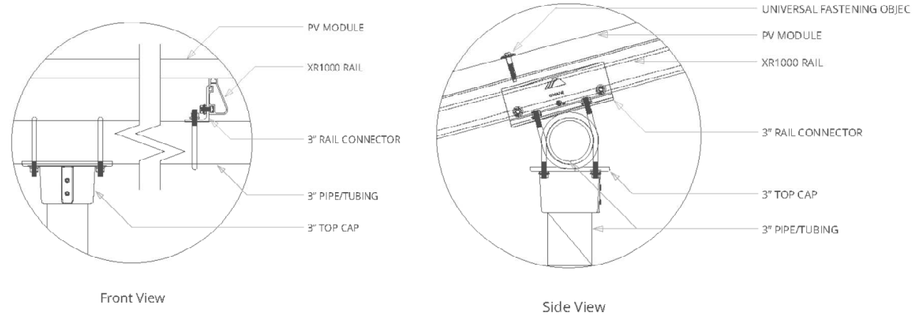
SHEAR	1,532 lbs.
MOMENT	3,830 ft-lbs.
UPLIFT	-1,383 lbs.



MOUNTING PLAN VIEW
SCALE: N.T.S.
1



MOUNTING METHOD
SCALE: N.T.S.
2



Front View

Side View

MOUNTING DETAIL
SCALE: N.T.S.
3

2
-

Project:
KANSAS CITY, MO 64134

Project Details:
7.92 kWstc, 7.60 kW AC
AHJ: KANSAS CITY, CITY OF

REVISIONS

DESCRIPTION	DATE	REV
ORIGINAL	9/18/2018	A

Sheet Title:
MOUNTING & RACKING METHOD

Sheet Number:
A2.0

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— — = EQUIP. GROUNDING CONDUCTOR | —— = CIRCUIT CONDUCTOR | = FUSE | = CIRCUIT BREAKER | (N) = NEW EQUIP. | (E) = EXISTING EQUIP. | L1 = LINE 1 (BLACK) | L2 = LINE 2 (RED) | N = NEUTRAL (WHITE) | G = GROUND (GREEN) | = POSITIVE (RED) | = NEGATIVE (BLACK)

Array Configuration	
System: 7.92 kWstc, 7.6 kW AC	
Total PV Module Qty: 24	
Inverter I.D. #	Inv. #1
Inverter AC Power (kW):	7.60
PV Power (kWstc):	7.92
Inverter DC:AC Ratio	1.04
Module Total Qty:	24
INPUT "A" String Qty:	1
String Length:	12
Max Open Circuit Voltage:	480
Operating Voltage:	400
Max Short Circuit Current:	15
Operating Current:	9.9
INPUT "B" String Qty:	1
String Length:	12
Max Open Circuit Voltage:	480
Operating Voltage:	400
Max Short Circuit Current:	15
Operating Current:	9.9

PV Module Specifications			
Model Number:	PANASONIC VBHN330SA17		
Weight (lbs):	40.8		
Dimensions (in):	62.6 x 41.5 x 1.4		
Power @ STC (W):	330		
Voc (VDC):	69.7	Voc Temp. Coeff. (%/°C):	-0.25
Vmp (VDC):	58.0	Max Voltage (VDC):	600
Isc (A):	6.07	Module Qty:	24
Imp (A):	5.70		

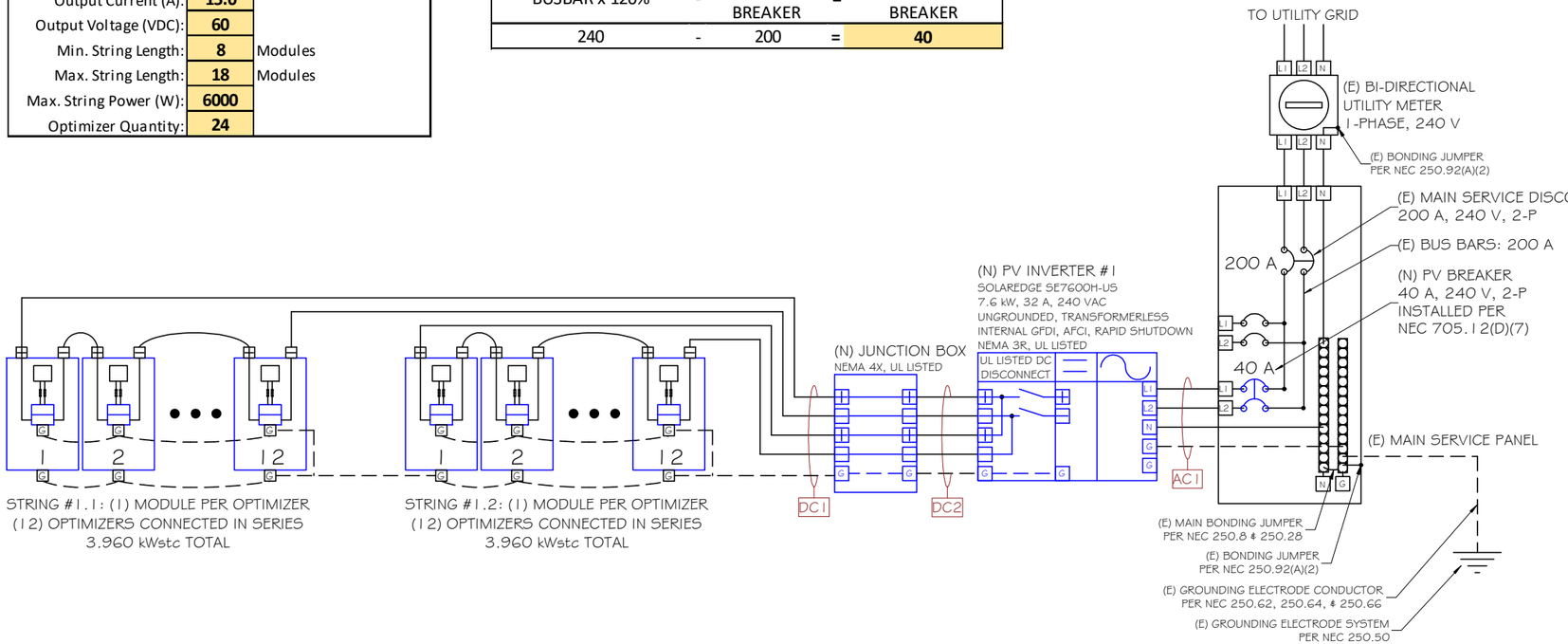
Power Optimizer Specifications		
Model Number:	SolarEdge P400	
Max Input Power (W):	400	
Max Input Voc (VDC):	80	
Max Input Isc (A):	10.1	
Output Current (A):	15.0	
Output Voltage (VDC):	60	
Min. String Length:	8	Modules
Max. String Length:	18	Modules
Max. String Power (W):	6000	
Optimizer Quantity:	24	

Inverter #1 Specifications			
Model Number:	SolarEdge SE7600H-US		
Power Rating (kW AC):	7.60		
Nominal AC Voltage (V):	240		
Max Output Current (A):	32.0		
CEC Weighted Efficiency:	99.0%		
Max DC Voltage (V):	480		
Operating DC Voltage (V):	400	Inverter Qty:	1

120% Rule Calculation per NEC 705.12(D)(2)				
Main Busbar Rating:	200	Amps		
Main Service Disconnect Rating:	200	Amps		
PV Breaker Rating:	40	Amps		
BUSBAR x 120%	-	MAIN BREAKER	=	MAX PV BREAKER
240	-	200	=	40

PV System Maximum Voltage Calculation per NEC 690.7(A)															
Local Record Low Temp:	-19 °C					Data Source:	KANSAS CITY DOWNTOWN AP								
Voc Temp Coefficient	x	25°C - Record Low Temp.	+ 1 =	Voc Correction Factor		Voc Correction Factor	x	Voc	x	Max # of Modules in Series	=	Temperature Corrected Open Circuit Voltage	
0.25 %/°C	x	44 °C	+ 1 =	1.110		1.110	x	69.7	x	1	=	77.4	VDC

AC System Summary		
NOMINAL SYSTEM VOLTAGE:	240	Volts AC
MAX CURRENT PER 690.8(A):	32	Amps
MAX CURRENT PER 690.8(B):	40	Amps



TAG	CIRCUIT ORIGIN	CIRCUIT DESTINATION	CONDUCTOR SPECIFICATIONS: MATERIAL	COND. TEMP. RATING	TRADE SIZE	AMPACITY PER 310.15(B)(16) & 310.5(B)(17)	REQUIRED CONDUCTOR AMPACITY: OPTIMIZER OUTPUT CURRENT	x	# OF PARALLEL STRINGS	=	MAX CURRENT PER 690.8(A)(1)	x	125% PER 690.8(B)(1)	=	MAX CURRENT PER 690.8(B)(1)	AMPACITY CHECK #1: MAX CURRENT PER 690.8(B)(1)	<	CONDUCTOR AMPACITY
DC1	PV STRING	JUNCTION BOX	COPPER	90°C	AWG #10	40 Amps	15.0	x	1	=	15.0 Amps	x	1.25	=	18.75 Amps	18.75 Amps	<	40 Amps
DC2	JUNCTION BOX	INVERTER	COPPER	75°C	AWG #10	35 Amps	15.0	x	1	=	15.0 Amps	x	1.25	=	18.75 Amps	18.75 Amps	<	35 Amps

TAG	CONDUCTOR TEMPERATURE DERATING: CIRCUIT ENVIRONMENT	LOCAL 2% AVG. HIGH TEMP (°C)	HEIGHT ABOVE ROOF (in)	TEMP. ADDER PER 310.15(B)(3)(c)	OPERATING TEMP (°C)	AMPACITY CORRECTION 310.15(B)(2)(a)	CONDUIT FILL DERATING: # OF UNGROUNDED CONDUCTORS	AMPACITY CORRECTION	CORRECTED AMPACITY CALCULATION: 90 °C CONDUCTOR AMPACITY	x	TEMP. DERATE	x	CONDUIT FILL DERATE	=	DERATED CONDUCTOR AMPACITY	AMPACITY CHECK #2: MAX CURRENT PER 690.8(A)(1)	<	DERATED CONDUCTOR AMPACITY	VOLTAGE DROP: EST. ONE-WAY DISTANCE	VOLTAGE DROP
DC1	OUTDOORS, SHADED (+10°C)	35	-	N/A	45	0.87	N/A	1.00	40	x	0.87	x	1.00	=	34.8 Amps	15 Amps	<	34.8 Amps	20 ft	0.04%
DC2	UNDERGROUND (+0°C)	35	-	N/A	35	0.96	4	0.80	40	x	0.96	x	0.80	=	30.8 Amps	15 Amps	<	30.8 Amps	250 ft	0.49%

TAG	CIRCUIT ORIGIN	CIRCUIT DESTINATION	CONDUCTOR SPECIFICATIONS: MATERIAL	COND. TEMP. RATING	TRADE SIZE	AMPACITY PER 310.15(B)(16) & 310.5(B)(17)	REQUIRED CONDUCTOR AMPACITY: INVERTER OUTPUT CURRENT	x	# OF INVERTERS	=	MAX CURRENT PER 690.8(A)(3)	x	125% PER 690.8(B)(1)	=	MAX CURRENT PER 690.8(B)(1)	AMPACITY CHECK #1: MAX CURRENT PER 690.8(B)(1)	<	CONDUCTOR AMPACITY
AC1	INVERTER	PV BREAKER	COPPER	75°C	AWG #8	50 Amps	32.0	x	1	=	32.0 Amps	x	1.25	=	40 Amps	40 Amps	<	50 Amps

TAG	CONDUCTOR TEMPERATURE DERATING: CIRCUIT ENVIRONMENT	LOCAL 2% AVG. HIGH TEMP (°C)	EXPECTED OPERATING TEMP (°C)	AMPACITY CORRECTION 310.15(B)(2)(a)	CONDUIT FILL DERATING: # OF UNGROUNDED CONDUCTORS	AMPACITY CORRECTION	CORRECTED AMPACITY CALCULATION: 90 °C CONDUCTOR AMPACITY	x	TEMP. DERATE	x	CONDUIT FILL DERATE	=	DERATED CONDUCTOR AMPACITY	AMPACITY CHECK #2: MAX CURRENT PER 690.8(B)(2)	<	DERATED CONDUCTOR AMPACITY	VOLTAGE DROP: EST. ONE-WAY DISTANCE	VOLTAGE DROP
AC1	EXT. BLDG. WALL (+15°C)	35	50	0.82	2	1.00	55	x	0.82	x	1.00	=	45.1 Amps	32.0 Amps	<	45.1 Amps	20 ft	0.65%

WIRE & CONDUIT SCHEDULE									
TAG	CONDUIT SIZE	CONDUIT TYPE	PHASE CONDUCTOR QTY, SIZE AND TYPE PER CONDUIT			GROUND CONDUCTOR QTY, SIZE AND TYPE PER CONDUIT			EST. DIST.
DC1	N/A	N/A	2/STRING	AWG #10	PV-WIRE	1	AWG #6	BARE CU	20
DC2	1"	SCH40 PVC	4	AWG #10	THWN-2	1	AWG #10	THWN-2	250
AC1	1"	EMT	3	AWG #8	THWN-2	1	AWG #10	THWN-2	20

Project:
KANSAS CITY, MO 64134

Project Details:
7.92 kWstc, 7.60 kW AC
AHJ: KANSAS CITY, CITY OF

REVISIONS		
DESCRIPTION	DATE	REV
ORIGINAL	9/18/2018	A

Sheet Title:
ELECTRICAL DIAGRAM

Sheet Number:
E1.0

Sheet Size:
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- Bruce Lee

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POWER BY DESIGN

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NABCEP CERTIFIED PV Installation Professional

WARNING
ELECTRIC SHOCK HAZARD
IF A GROUND FAULT IS INDICATED NORMALLY GROUNDED CONDUCTORS MAY BE ENERGIZED AND UNGROUNDED

REQ'D BY: NEC 690.5(C) — 1
APPLY TO:
INVERTER(S), IF NOT APPLIED BY MFR

SOLAR DC DISCONNECT

REQ'D BY: NEC 690.14(C)(2) — 2
APPLY TO:
DC DISCONNECT SWITCHES

SOLAR AC DISCONNECT

REQ'D BY: NEC 690.14(C)(2) — 3
APPLY TO:
AC DISCONNECT SWITCHES

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

REQ'D BY: NEC 690.17 — 4
APPLY TO:
DISCONNECTS, FUSES, CIRCUIT BREAKERS

WARNING: PHOTOVOLTAIC POWER SOURCE

REQ'D BY: NEC 690.31(E)(3) — 5
APPLY TO:
JUNCTION BOXES, RACEWAYS, CABLE TRAYS, CONDUIT BODIES WITH AVAILABLE OPENINGS, EVERY 10', WITHIN 1' OF TURNS/PENETRATIONS

THIS ELECTRIC SYSTEM IS ALSO SERVED BY A PHOTOVOLTAIC SYSTEM

REQ'D BY: NEC 705.12(D)(4) — 6
APPLY TO:
ANY/ALL ELECTRICAL PANELS CONNECTED TO MULTIPLE POWER SOURCES

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

REQ'D BY: NEC 690.35(F) — 7
APPLY TO:
JUNCTION & COMBINERS BOXES, DC DISCONNECTS, OTHER SERVICEABLE DEVICES

PHOTOVOLTAIC SYSTEM
AC DISCONNECT
OPERATING CURRENT: 40 AMPS
OPERATING VOLTAGE: 240 VOLTS

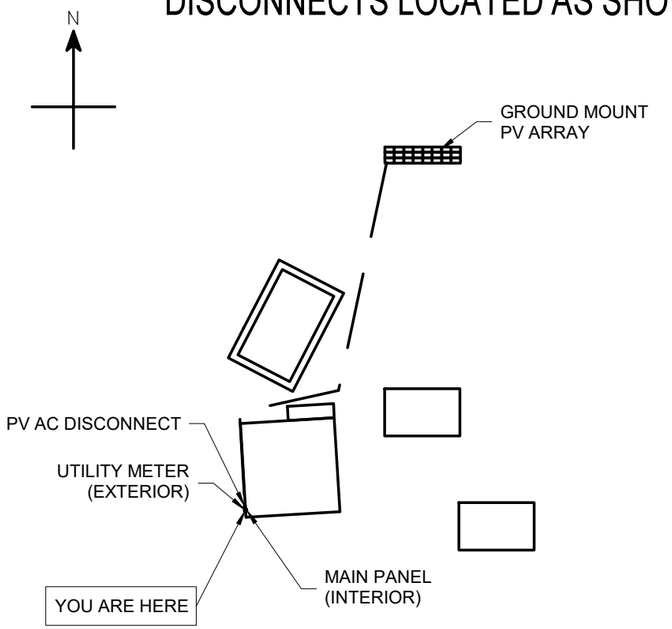
REQ'D BY: NEC 690.54 — 8
APPLY TO:
POINT OF INTERCONNECTION

PHOTOVOLTAIC POWER SOURCE
OPERATING CURRENT: 19.8 AMPS
OPERATING VOLTAGE: 400 VOLTS
MAX SYSTEM VOLTAGE: 480 VOLTS
MAX SYSTEM CURRENT: 30 AMPS

REQ'D BY: NEC 690.53 — 9
APPLY TO:
INVERTER #1

CAUTION

POWER FROM THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING POWER SOURCES WITH DISCONNECTS LOCATED AS SHOWN



SERVICE BY QUALIFIED PERSONNEL ONLY

SIGNAGE REQUIREMENTS

1.) RED BACKGROUND
2.) WHITE LETTERING
3.) MIN. 3/8" LETTER HEIGHT
4.) ALL CAPITAL LETTERS
5.) ARIAL OR SIMILAR FONT
6.) WEATHER RESISTANT MATERIAL, PER UL 969

REQ'D BY: NEC 690.56 — 10
APPLY TO:
UTILITY METER

SCALE: 1" = 4"

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KANSAS CITY, MO 64134

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AHJ: KANSAS CITY, CITY OF

REVISIONS

DESCRIPTION	DATE	REV
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Sheet Title:
SAFETY PLACARDS

Sheet Number:
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