

To: SUNDA Project Cooperatives

Dated: November 29, 2016

Re: Reference Block Design for Utility Scale PV Solar System

<u>Purpose</u>: Provide a reference PV system block design with simple, convenient features, which is intended to reduce field time and provide for monitoring features. This is a reference design and will need to be adjusted for the particulars of a field site, including electrical string length (based on minimum site temperatures), climatic conditions (such as wind and snow loads), row spacing (based on latitude), land contours, shading, and others. Typical engineering time for such adjustment is intended to be, and historically has been, about 100 hrs for site specific modifications.

<u>What's included</u>: a cover sheet that provides a drawing sheet list, site plans (layouts, trenching and grounding), single line diagrams, schedules, labels, partial plans for inverter pad/mounting, conduit details and stringing plans for arrays.

Design Criteria and Attributes used in creating this design:

- Maximize ground coverage ratio, expandable symmetric block
- Efficient design, allowing for most of the array construction to be duplicated
- Combiner box locations optimized to reduce DC conductors, avoiding jumpers or other pull boxes in unusual locations
- Equipment pad centrally located, driving reduced feeder cost
- Access roads can be on either side
- Grounding and Surge Protection: metallic array parts, pad halo grounding, fence grounding, surge arrestors in gear
- MV switch is used as site AC disconnect, reduces pad footprint
- Racking system is ETL listed for grounding, reducing significant bonding requirements and on-site labor
- Racking has integrated wire management
- Racking design is very modular, fast to install and accessible height good for install
- AC Switchgear contains the AC bus, the step down transformer for local 120V power and the revenue meter for DAS
- Electrical equipment pad is conveniently accessible. Designed to provide easy service access, minimize concrete, optimize feeder stub ups
- Expandability and flexible re-design options to meet site specific issues
- Monitoring tool needs to be able to:
 - o Provide system overview, historical output and on-site weather data
 - Public view website to view performance and track environmental offsets online or on any internet device
 - Assist remote troubleshooting
 - Optional features: cell-modem, online storage of data, historical data exports, monthly reporting, alarms, curtailment, fault codes and sensors (horizontal/plane of array pyranometers, wind speed/direction, humidity, ambient temp, cell temp, revenue grade meters, load or bus kw meters)

DISCLAIMER

While significant effort has been made to incorporate all applicable standards and ensure good engineering and correct practice in the development of this design, and this design has been used to develop actual field deployed, utility-scale, solar PV systems, no warranty or guaranty is made on this design for its fitness, suitability, safety or applicability for any purpose. Utilities must employ a trained engineer to interpret and adjust this reference design for the specific requirements of their application.

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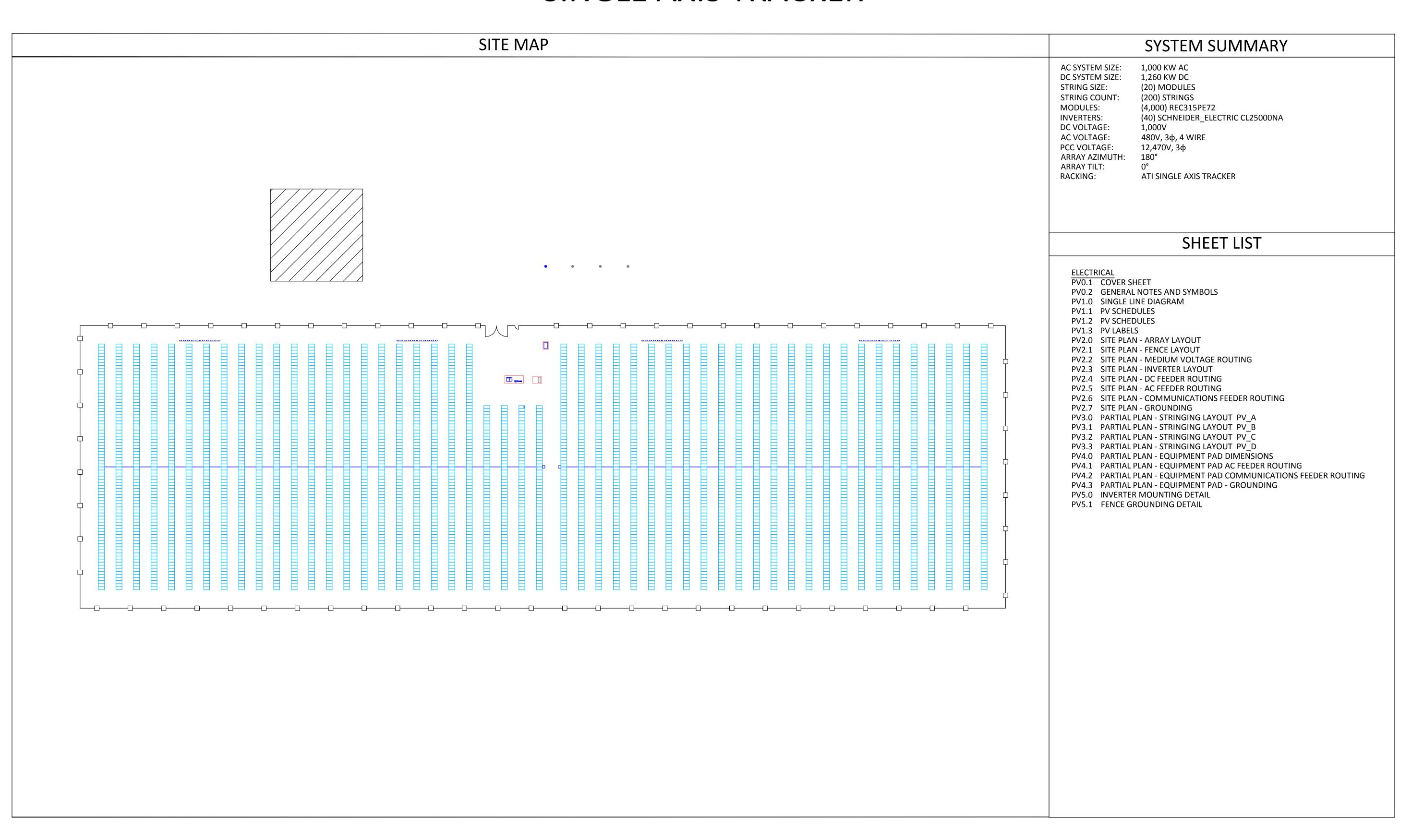
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SUNDA REFERENCE DESIGN

1,000KWac, 1,000Vdc SINGLE AXIS TRACKER





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PROJECT:

10.21.2016 SHEET:

PV0.2

ABBREVIATIONS	GENERAL NOTES		SYMBOLS
A AMPS	THE CONTRACTOR IS RESPONSIBLE FOR MEETING ALL OSHA REGULATIONS AND SAFETY PRECAUTIONS ON SITE. THE ENGINEER IS NOT RESPONSIBLE FOR		
AC ALTERNATING CURRENT	SPECIFIC WORKING HAZARDS.	X XX-X	DETAIL TAG
AL ALUMINUM ASHRAE AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING	2. THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR READING AND UNDERSTANDING ALL EQUIPMENT MANUALS AND DRAWINGS PRIOR TO INSTALLING AND ENERGIZING EQUIPMENT.	XX-X	DETAIL TAG
ENGINEERS	3. ALL SYSTEM COMPONENTS SHALL BE LISTED BY A THIRD PARTY TESTING AGENCY (UL, NRTL, ETL, ETC.). ALL EQUIPMENT SHALL HAVE A MINIMUM RATING OF NEMA 3R UNLESS LOCATED INDOORS.	/#	EQUIPMENT TAG
C CELSIUS CT CURRENT TRANSFORMER	4. ALL ELECTRICAL WORK SHALL BE PERFORMED BY A CERTIFIED ELECTRICIAN AND APPRENTICES UNDER THE SUPERVISION OF A LICENSED ELECTRICAL	<u> </u>	
CU COPPER	CONTRACTOR.	\overline{A}	FEEDER TAG
DB DRY BULB DC DIRECT CURRENT	5. PV STRINGS SHALL BE CONNECTED AND LABELED AS DETAILED IN THE DRAWING SET.	A	FLEDER TAG
DIA DIAMETER	6. THE SYSTEM SHALL BE INSTALLED PER NEC 2014 AND SHALL ADHERE TO ALL LOCAL CODES AND STANDARDS.		
DISC DISCONNECT DWG DRAWING	7. THE PV SYSTEM SHALL BE GROUNDED AND BONDED PER NEC ARTICLE 690 SECTION V AND ARTICLE 250. ANY DEVIATIONS FROM THE DRAWINGS SET WILL NEED TO BE APPROVED BY THE ENGINEER.	(#)	KEYED NOTE TAG
EGC EQUIPMENT GROUNDING CONDUCTOR	8. SYSTEM SIGNAGE SHALL BE INSTALLED AND LABELED PER NEC ARTICLE 690 SECTION VI.		
EMT ELECTRICAL METALLIC TUBING	9. WORKING CLEARANCES AROUND ALL EQUIPMENT SHALL CONFORM TO NEC 110.26.	R#	REVISION TAG
ETL ELECTRICAL TESTING LABS GALV GALVANIZED	10. ALL WIRING SHALL BE INSTALLED IN ACCORDANCE WITH CHAPTER 3 OF THE NEC.		
GEC GROUNDING ELECTRODE CONDUCTOR	11. CONTRACTOR INITIATED CHANGES SHALL BE SUBMITTED IN WRITING TO THE ENGINEER PRIOR TO MAKING ANY CHANGES. APPROVED CHANGES SHALL REQUIRE A DRAWING REVISION TO MAINTAIN VERSION CONTROL.		MODULE
GFI GROUND FAULT INTERRUPTER GND GROUND	12. ACTUAL LOCATION OF OVERHEAD AND UNDERGROUND UTILITIES SHALL BE FIELD VERIFIED AND DOCUMENTED PRIOR TO THE EXECUTION OF ANY WORK. THE ENGINEER OF RECORD SHALL BE NOTIFIED OF ANY DISCREPANCIES TO EXISTING CONDITIONS.		
IMC INTERMEDIATE METALLIC CONDUIT IMP MAXIMUM POWER CURRENT	13. ALL CONDUCTORS AND EQUIPMENT SHALL BE CONSIDERED "ENERGIZED" UNLESS CHECKED, AND CHECKED AGAIN. LOCKOUT - TAGOUT PROCEDURES SHALL	X# 200	COMBINER
INV INVERTER	BE EMPLOYED BEFORE ANY WORK IS DONE ON ELECTRICAL EQUIPMENT.		
ISC SHORT CIRCUIT CURRENT KW KILOWATT	14. THE CONTRACTOR SHALL MAKE AN EFFORT TO CAUSE AS LITTLE DISTURBANCE AS POSSIBLE AND PROTECT THE NATURAL ENVIRONMENT AND RESOURCES OF THE FACILITY DURING THE COURSE OF THE WORK. ALL DISTURBED AREAS SHALL BE RETURNED TO THEIR PRE-CONSTRUCTION STATE OR BETTER. AREAS WHICH ARE SEEDED OR SODDED WITH ESTABLISHED GRASS SHALL BE SEEDED AS SOON AS POSSIBLE AFTER COMPLETION OF THE WORK IN THAT AREA.	X# YZY	CONTACTOR RECOMBINER
KV KILOVOLT KA KILOVOLT AMPS	15. THE CONDUIT LAYOUT DEPICTED IN THE DRAWING SET IS FOR DIAGRAMMATIC PURPOSES ONLY UNLESS OTHERWISE NOTED. CONTRACTOR SHALL ROUTE CONDUIT TO BEST SUIT SITE CONDITIONS AND PROVIDE ACCURATE AS-BUILTS.		
KVM KEYBOARD, VIDEO, MOUSE	16. CONNECTORS, TERMINATIONS AND EQUIPMENT HARDWARE SHALL BE TORQUED PER DEVICE LISTING OR INSTALLATION DOCUMENTATION.	<u>~</u>	INVERTER
LFMC LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT	17. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS ON THE DRAWINGS INCLUDING EXISTING STRUCTURES. THE ENGINEER SHALL BE NOTIFIED OF		
LFNC LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT MAX MAXIMUM	ANY DISCREPANCIES IN THE DRAWINGS AND/OR EXISTING SITE CONDITIONS.	M	METER
MCB MAIN CIRCUIT BREAKER	18. DC VOLTAGE IS ALWAYS PRESENT FROM THE ARRAY DURING DAYLIGHT HOURS. THERE IS A POTENTIAL FOR VOLTAGE TO BE PRESENT AT THE TERMINALS OF THE DC DISCONNECT, COMBINER BOX AND AT THE DC TERMINALS ON THE INVERTER. ALL PERSONNEL SHOULD BE NOTIFIED OF THIS POTENTIAL HAZARD		
MIN MINIMUM	AND SHOULD TAKE PRECAUTIONS TO PREVENT ACCIDENTAL SHOCK OR INJURY.	XXXA	
MLO MAIN LUG ONLY MPP MAXIMUM POWER POINT	19. ALL EQUIPMENT SHALL BE MOUNTED PER MANUFACTURER'S SPECIFICATIONS.		FUSE
MV MEDIUM VOLTAGE	20. THE CONTRACTOR SHALL SUPPLY EQUIPMENT/MATERIAL SUBMITTALS PRIOR TO ORDERING. APPROVAL BY POWERSECURE SOLAR FOR ALL EQUIPMENT IS MANDATORY.		
NEC NATIONAL ELECTRIC CODE NEG NEGATIVE		XXXA	CIRCUIT BREAKER
NEU NEUTRAL			
NEMA NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION		₽ T	THREE-WINDING TRANSFORMER
NFPA NATIONAL FIRE PROTECTION ASSOCIATION NRTL NATIONALLY RECOGNIZED TESTING LABORATORY		m m	
OCPD OVER CURRENT PROTECTION DEVICE		[11.11]	
PC PERSONAL COMPUTER		m	TWO-WINDING TRANSFORMER
PCC POINT OF COMMON COUPLING PLC PROGRAMMABLE LOGIC CONTROLLER			
POS POSITIVE		<u>-</u>	FUSED DISCONNECT
PT POTENTIAL TRANSFORMER			
PV PHOTOVOLTAIC PVC POLYVINYL CHLORIDE			SWITCH
RMC RIGID METALLIC CONDUIT			SVVIICII
RTU REMOTE TERMINAL UNIT			
SCADA SUPERVISORY CONTROL AND DATA ACQUISITION SCH SCHEDULE		- **D-	FUSED SWITCH
STC STANDARD TEST CONDITIONS			
TEMP TEMPERATURE		\bigcap	CURRENT TRANSFORMER
TYP TYPICAL UL UNDERWRITERS LABORATORIES		<u>†</u> 1	
UPS UNINTERRUPTIBLE POWER SUPPLY		RATIO	DOTENTIAL TRANSCORAGE
V VOLT/VOLTS			POTENTIAL TRANSFORMER
VAC VOLTS AC VDC VOLTS DC			
VMP MAXIMUM POWER VOLTAGE			
VOC OPEN CIRCUIT VOLTAGE			
XFMR TRANSFORMER			



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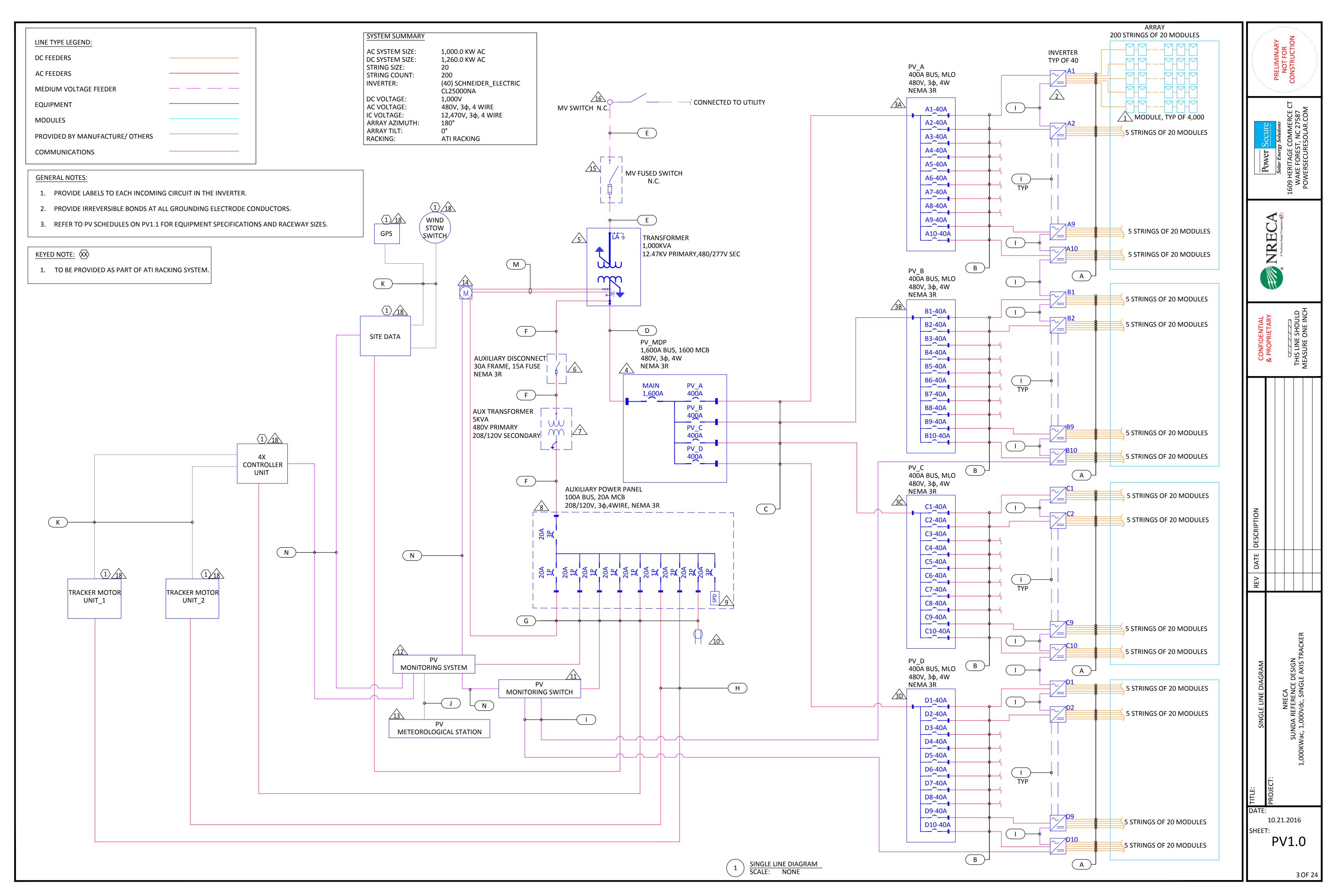


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THIS LINE SHOULD
MEASURE ONE INCH

NRECA
REFERENCE DESIGN
OVDC, SINGLE AXIS TRACKER

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10.21.2016 SHEET: PV0.2



			EQUIPMENT SCHE **EQUIPMENT IS NO	
TAG	DESCRIPTION	QUANTITY	MANUFACTURER	NOTES
1	SOLAR PV MODULE	4,000	REC	315 WATT MODULE REFER TO MODULE SCHEDULE FOR SPECIFICATION. MODULES SHALL BE LABELED PER NEC 690 VI
2	INVERTER	40	SCHNEIDER_ELECTRIC	25 KWATT, 3PHASE 480 VOLT (REFER TO INVERTER RATING SCHEDULE FOR SPECIFICATION)
3A-3D	PV DISTRIBUTION PANEL	1	SQUARE-D	PV DISTRIBUTION PANEL, 400 AMP BUS MAIN LUG ONLY. REFER TO PANEL SCHEDULE FOR ADDITIONAL SPECIFICATIONS.
4	PV_MDP	1	SQUARE-D	PV DISTRIBUTION PANEL, 1,600 AMP BUS WITH 1,600A MAIN CIRCUIT BREAKER. REFER TO PANEL SCHEDULE FOR ADDITIONAL SPECIFICATIONS.
5	MEDIUM VOLTAGE TRANSFORMER	1	ABB	1000 KVA, THREE PHASE, 12.47/7.2 KV YGRND PRIMARY, 480/277V YGRND SECONDARY. LIQUID COOLED, BAYONET FUSES ON PRIMARY SIDE.
6	DISCONNECT FOR AUXILIARY POWER PANEL	1	SQUARE-D	30 AMP 3 POLE FUSED DISCONNECT WITH (3) 15 AMP FUSES, NEMA 3R. PROVIDE STICKER LABEL TO BE VISIBLE WHEN FUSE IS REMOVED TO READ "MAX 15A".
7	5 KVA DISTRIBUTION TRANSFORMER	1	DONGAN	THREE PHASE GENERAL PURPOSE DRY TYPE TRANSFORMER, PRIMARY VOLTS 480 VAC, SECONDARY VOLTS 208/120 VAC, NEMA 3R ENCAPSULATED ENCLOSURE
8	AUXILIARY POWER PANEL	1	SQUARE-D	AUXILARY PANEL BOARD, 100 AMP BUS WITH 20 AMP MAIN CIRCUIT BREAKER. REFER TO PANEL SCHEDULE FOR ADDITIONAL SPECIFICATIONS.
9	SURGE PROTECTION DEVICE	1	SQUARE-D	NEMA 4X RATING, INTEGRATED OVER CURRENT PROTECTION, MOUNTED DIRECTLY TO ENCLOSURE OF EQUIPMENT, MANUFACTURER PROVIDED INSTALLATION MANUAL SHALL BE FOLLOWED EXACTLY
10	RECEPTACLE	1	PASS & SEYMOUR	120V, 20 AMP, WEATHER PROOF GFI DUPLEX RECEPTACLE.
11	PV MONITORING SWITCH	1	NETGEAR	SERIAL TO ETHERNET NETWORK SWITCH, PROVIDE IN NEMA 3R ENCLOSURE.
12	PV MONITORING SYSTEM	1	DRAKER	CENTRAL DATA ACQUISITION UNIT, NEMA 3R ENCLOSURE, LOCAL DATA STORAGE, INTEGRAL ETHERNET COMMUNICATIONS, WEB BASED DISPLAY AND LOCAL KEYPAD DISPLAY, PROVIDE 120V 1¢ POWER SUPPLY
13	PV METEOROLOGICAL STATION	1	DRAKER	STATION INCLUDES: PLANE OF ARRAY PYRANOMETER, GLOBAL HORIZONTAL IRRADIANCE PYRANOMETER, BACK OF MODULE TEMPERATURE SENSOR, AMBIENT TEMPERATURE, AND WIND SENSORS
14	MONITORING METER	1	SHARK 100	REVENUE GRADE METER IN NEMA 3R ENCLOSURE
15	MEDIUM VOLTAGE SWITCH	1	S&C	15KV PAD MOUNTED SWITCH WITH INTEGRATED 60A STANDARD SPEED FUSES.
16	COORDINATED POLE MOUNTED SWITCH	1	ABB	SWITCH TO MEET THE REQUIREMENT OF THE UTILITY
17	GROUND ROD	6	HARGER OR EQUAL	3/4" DIAMETER, 10'-0" LONG COPPER CLAD GROUND ROD
18	ATI RACKING ACCESSORIES	1	ATI	TO BE PROVIDED WITH ATI RACKING. INCLUDES (1) 4X CONTROLLER UNIT, (2) TRACKER MOTOR, (1) SITE DATA, (1) GPS AND (1) WIND STOW SWITCH

EQUIPMENT SCHEDULE NOTES:

					>	FEEDER SC **FEEDER IS			A			
TAG		PHA	SE			NEUTR	AL		GROU	ND	INSULATION	RACEWAY SIZE
Α	(1) SET OF #NOTE1	(2) - (10)	#10	COPPER				(1)	#10	COPPER	PV	1-1/2"
В	(1) SET OF	(3)	#8	COPPER	(1)	#8	COPPER	(1)	#8	COPPER	THWN-2	1"
С	(2) SET OF	(3)	250 KCMIL	ALUMINUM	(1)	250 KCMIL	ALUMINUM	(1)	#1	ALUMINUM	THWN-2	2-1/2"
D	(6) SET OF	(3)	500 KCMIL	ALUMINUM	(1)	500 KCMIL	ALUMINUM	(1)	350 KCMIL	ALUMINUM	THWN-2	3-1/2"
E ^{NOTE#6}	(1) SET OF	(3)	#1/0	ALUMINUM							MV TR-XLPE WITH CONCENTRIC NEUTRAL	4"
F	(1) SET OF	(3)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
G	(1) SET OF	(1)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
Н	(1) SET OF	(2)	#12	COPPER				(1)	#12	COPPER	THWN-2	3/4"
I					RS	S-485: BELDE	N 3107A					3/4"
J					Р	ROVIDED BY	DRAKER					3/4"
K				CC	NTRO	OL WIRES PR	OVIDED BY AT	Π				3/4"
L								(1)	#6	COPPER	BARE	
M	(1) SET OF	(7)	#12	COPPER							THWN-2	3/4"
N			CAT	SE OR CAT6 ET	THER	NET CABLE: B	ELDEN 7937A	OR E	QUIVALENT			3/4"
0								(1)	#3/0	COPPER	BARE	

- 1. (#) DENOTES QUANTITY OF DC PHASE WIRES TO BE PROVIDED.
- 2. WHERE MULITPLE CONDUITS ARE NOTED, THE RACEWAYS SHALL BE PROVIDED IN PARALLEL.
- 3. REFER TO RACEWAY APPLICATION SCHEDULE FOR RACEWAY TYPE.
- 4. ALL RACEWAY SIZES ARE NEC MINIMUM REQUIREMENTS, LARGER CONDUITS ARE PERMITED FOR EASE OF INSTALLATION.
- 5. PV SOURCE CIRCUITS SHALL NOT BE REQUIRED TO BE IN RACEWAY IF CONDUCTORS ARE NOT READILY ACCESSIBLE AND
- NOT EXPOSED TO PHYSICAL DAMAGE. BELOW GRADE PV SOURCE CIRCUITS SHALL BE IN RACEWAY.

 6. PROVIDE 15KV RATED MEDUIM VOLTAGE FEEDERS WITH 100% INSULATION.

INVERTER SPECIFICATIONS

	-
	INVERTER DESIGNATION
SCHNEIDER_ELECTRIC	INVERTER MANUFACTURER
CL25000NA	INVERTER MODEL
40	INVERTER QUANTITY
1,000 V	MAXIMUM DC VOLTAGE
25.0 KW	AC POWER OUTPUT
100	MODULE QUANTITY PER INVERTER
31.5 KW	DC POWER INPUT
126.00%	DC/AC RATIO
480V, 3ф	OUTPUT VOLTAGE
31 A	MAXIMUM OUTPUT CURRENT
40 A	MIN OCPD REQUIRED
500 V	MIN Vmp
800 V	MAX Vmp
250 V	START UP VOLTAGE
NEMA 3R	ENCLOSURE
2	MPPT QUANTITY
UNGROUNDED	GROUNDING CONFIGURATION

MODULE SPECIFICATIONS

MODULE MANUFACTURER	REC
MODULE MODEL	REC315PE72
MODULE QUANTITY	4000
MAX POWER (PMAX)	315 W
MAX POWER-POINT CURRENT (IMP)	8.62 A
MAX POWER-POINT VOLTAGE (VMP)	36.80 V
OPEN CIRCUIT VOLTAGE (VOC)	45.50 V
SHORT CIRCUIT CURRENT (ISC)	9.09 A
MAX SERIES FUSE	20 A
MAXIMUM DC VOLTAGE	1,000 V
VOC TEMP COEFF (%/°C)	-0.27
ISC TEMP COEFF (%/°C)	0.013
PMP TEMP COEFF (%/°C)	-0.4

1	
APPLICATION	CONDUIT TYPE
ROOF MOUNTED	RMC
(EXPOSED)	NIVIC
BUILDING INTERIOR	
(EXPOSED TO PHYSICAL	RMC
DAMAGE)	
BUILDING INTERIOR	
(PROTECTED FROM PHYSICAL	EMT
DAMAGE)	
BUILDING EXTERIOR	
(EXPOSED TO PHYSICAL	RMC
DAMAGE)	
BUILDING EXTERIOR	
(PROTECTED FROM PHYSICAL	RMC
DAMAGE)	
BELOW GRADE	
(IN DIRECT CONTACT WITH	PVC SCHED 40
EARTH)	
TRANSITION FROM BELOW	
GRADE TO ABOVE GRADE	RMC
(EXPOSED TO PHYSICAL	NIVIC
DAMAGE	
TRANSITION FROM BELOW	
GRADE TO ABOVE GRADE	DVC CCLIED OO
(PROTECTED FROM PHYSICAL	PVC SCHED 80
DAMAGE	

PRELIMINARY NOT FOR CONSTRUCTION

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NRECA
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1,000KWac, 1,000Vdc, SINGLE AXIS TRACKER

DATE: 10.21.2016

PV1.1

^{1.} SPECIFICED MANUFACTURE OR EQUIVALENT SHALL BE PROVIDED.

											PV_A									
ГҮРЕ	:																			
SERV	ICE S	UPPL	L 480V, 3ф, 4 WIRE																	
BUS:			400 AMP																	
ΊΑΝ	۷:		MLO																	
EED	ER:		REFER TO SINGLE LI	NE DIAG	RAM															
IC F	ATIN	G:	65,000																	
	KVA									Ø	Ø								KVA	
Α	В	С		COND	GND	NEU	PH						PH	NI	EU GND	COND		Α	В	С
3.3			-						-	-+	A 2							8.33		<u> </u>
	8.3		INVERTER A1	RE	FER T	O SLD)	40/3	—	\rightarrow	B 4	40/3	F	REF	ER TO SL	D	INVERTER A6		8.33	
		8.3								\rightarrow	C 6									8.3
3.3									-	-	A 8		_					8.33		
	8.3		INVERTER A2	RE	FER T	O SLD)	40/3		-	B 10	40/3	F	REF	ER TO SL	D	INVERTER A7		8.33	
		8.3							11	\rightarrow	C 12									8.3
8.3				5.5	-			40 /2	-	-+	A 14	40/0	_		50 TO 61		INIVERTED AC	8.33		
	8.3		INVERTER A3	KE	FEK I	O SLD)	40/3	-	-	B 16	40/3	F	KEFI	ER TO SL	ן ט	INVERTER A8		8.33	
2 2		8.3							17	-	C 18							0.22		8.3
8.3	0.2			DE	ггр т	O SLD		40/2			A 20	40/2	_	סררו		_	INIVEDTED AO	8.33	0.22	
	8.3	0.2	INVERTER A4	KE	FEKI	O SLL	,	40/3			B 22	40/3	r	KEFI	ER TO SL	ן ט	INVERTER A9		8.33	0.2
8.3		8.3							 		C 24							8.33		8.3
0.3	8.3		INVERTER A5	 RF	FFR T	O SLD)	40/3		-	A 26	40/3	-	RFF!	ER TO SL	D	INVERTER A10	0.55	8.33	
	6.5	8.3	-		ILIVI	O JLD		40/3		-	C 30	40/3		\LI			INVERTER ATO		0.33	8.3
		0.5							23	<u> </u>	C 30									0.3
42	42	42																41.7	41.7	41
			1													ΤΩΤΛΙ	. CONNECTED LOAD (KV			

										PV_	В										
TYPE	:																				
SERV	ICE S	UPPI	. 480V, 3ф, 4 WIRE																		
BUS:			400 AMP																		
MAII	N:		MLO																		
EEC	ER:		REFER TO SINGLE L	INE DIAGRA	M																
AIC F	RATIN	G:	65,000	,		,	1		, ,												
	KVA								Ø	Ø										KVA	
Α	В	С		COND GN	D NEU	PH							PH	N	EU G	ND	OND		A	В	С
8.3								1	+	A 2									8.33		
	8.3		INVERTER B1	REFEI	R TO SLI	D	40/3	3	+		1 40)/3	R	REF	ER TO	SLE)	INVERTER B6		8.33	
		8.3						5	С	C (5										8.3
8.3								7	+ + +		3								8.33		
	8.3		INVERTER B2	REFEI	R TO SLI	D	40/3		1 1		0 40)/3	R	REF	ER TO	SLE)	INVERTER B7		8.33	
		8.3						11	1 1	C 1											8.3
8.3						_		-	-	A 1	_	,_	_						8.33		
	8.3		INVERTER B3	REFEI	R TO SLI	D	40/3		+ - +		6 40)/3	R	REF	ER TO	SLL)	INVERTER B8		8.33	
		8.3						17	+	C 1	_										8.3
8.3				5555		_	40.40	19	+ +	A 2		,,	_	. – –	- -	٥		14W (FR T FR R0	8.33		
	8.3	0.0	INVERTER B4	KEFEI	R TO SLI	ט	40/3		+-+		2 40	1/3	R	KEF	ER TO	SLL	ا ر	INVERTER B9		8.33	0.0
0.3		8.3						23		C 2		\dashv							0.22		8.3
8.3	0.3		INIVEDTED DE	ם הרבי	TO 511	_	40/3	25	A	A 2	b 44	12	D) C C	ED TO	CIT		INIVEDTED D10	8.33	0.22	
	8.3	0.2	INVERTER B5	KEFE	R TO SLI	J	40/3		1 1			1/3	K	LF	ER TO	SLL	,	INVERTER B10		8.33	0.7
		8.3						29	С	C 3	υ										8.3
42	42	42																	41.7	11 7	11
42	42	42															TOT 4 !	CONNECTED LOAD (1/2	41.7		
																		CONNECTED LOAD (K) CONNECTED LOAD (A)		83.3	83 30

						AUX	XILI/	ARY	/ PC	OWE	R PAN	IEL							
TYPE:																			
SERVI	CE SUF	PPLY:	208V, 3φ, 4 WIRE																
BUS:			100 AMP																
MAIN:	:		20 AMP MAIN CIRCU	JIT BREAKER															
FEEDE	R:		REFER TO SINGLE LIN	NE DIAGRAM	1														
AIC RA	ATING	:	25,000																
	VA				T			Ø	Ø									VA	
Α	В	С		COND GND	NEU _F	PH						РН	NEU	GND	ONE)	Α	В	С
750			TRACKER MOTOR_1	REFER TO	SID	20/2	1	Α	Α	2	20/1	RE	FER	TO SLE)	RECEPTACLE	180		
	750		TRACKER WOTOR_I	KEI EK TO	JLD	20/2		В	В	4	20/1	RE	FER	O SLE)	SHARK METER		500	
																PV MONITORING			
		750	TRACKER MOTOR_2	REFER TO	CLD	20/2	5	С	С	6	20/1	RE	FER	O SLE)	SYSTEM			500
			TRACKER WIG TOR_2	NEFEN 10	SLD	20/2										4X			
750							7	Α	Α	8	20/1	RE	FER	O SLE)	CONTROLLER UNIT		60	
			PV MONITORING																
		50	SWITCH	REFER TO	SLD	20/1	9	В	В	10	20/1	RE	FER	O SLE)	SITE DATA			60
			SPACE			- 20/1					20/1	-	-	-	-	SPACE			
			MAIN CIRCUIT			1-	13			14						SURGE PROTECTION			
			BREAKER	REFER TO	SLD	20/3	15 17			16 18	20/3	FACT	URY F	ROVI	DED	DEVICE			
1500	750	800															180	560	560
			I											ΤΩΤΔ	ו ככ	NNECTED LOAD (VA)		1310	

											PV_C	<u>. </u>								
TYPE	:																			
SERV	/ICE S	UPPl	. 480V, 3ф, 4 WIRE																	
BUS:			400 AMP																	
MAII	N:		MLO																	
FEED	ER:		REFER TO SINGLE L	INE DIAG	GRAM															
AIC F	RATIN	IG:	65,000					1					1	,				T		
	KVA									Ø	Ø				<u> </u>				KVA	
Α	В	С		COND	GND	NEU	PH						PH	NEU	GNI	POND		A	В	C
8.3				_					1	Α						_		8.33		
	8.3		INVERTER C1	RE	FER T	O SLE)	40/3	3		B 4	40/3	F	REFER	TO S	LD	INVERTER C6		8.33	
		8.3							5		C 6									8.3
8.3								10/0	7		A 8	10/0	_					8.33		
	8.3		INVERTER C2	RE	:FER I	O SLE)	40/3	9		B 10		F	REFER	10 \$	LD	INVERTER C7		8.33	1
		8.3							11	 	C 12	1								8.3
8.3	0.0		INIVEDTED 63			-O CI F		40/2	13	-	A 14	-			TO 6		INIVERTED CO	8.33		
	8.3	0.0	INVERTER C3	KE	:FEK I	O SLE)	40/3				40/3		REFER	10.5	רט	INVERTER C8		8.33	
0.0		8.3							17	-	C 18							0.22		8.3
8.3	0.2		INVERTER C4		CED T	O SLE	,	40/2			A 20			REFER	TO 0		INIVEDTED CO	8.33	0.22	
	8.3	8.3	INVERTER C4	NE	IFER I	O SLL	,	40/3			B 22		「	NEFER	103	ן ט	INVERTER C9		8.33	8.3
8.3		6.5							23	+	C 24 A 26							8.33		0.5
0.5	8.3		INVERTER C5	RE	FFR T	O SLE)	40/3			_	40/3		REFER	TO S	וח	INVERTER C10	0.33	8.33	
	0.3	8.3	INVERTER CS			O JLL	,	140/3			C 30		'	\LI LI\	103		HVERTER CIO		0.33	8.3
		0.5							23	<u> </u>	C 30	<u>' </u>								0.0
42	42	42																41.7	41.7	41
+4	 4 2	+2]													ΤΩΤΛΙ	CONNECTED LOAD (KV			
																	L CONNECTED LOAD (AV			†

											$PV_{\underline{}}$	D									
TYPE	: :																				
SER\	/ICE S	UPPL	.480V, 3φ, 4 WIRE																		
BUS:			400 AMP																		
MAI	N:		MLO																		
EEC	DER:		REFER TO SINGLE LI	NE DIAC	GRAM	l															
AIC	RATIN	IG:	65,000																		
	KVA									Ø	Ø									KVA	
Α	В	С		COND	GND	NEU	PH							PH	NEU	GND	COND		Α	В	С
8.3									1	Α	Α	2							8.33		
	8.3		INVERTER D1	RE	EFER 1	TO SLE)	40/3	3	В	В	4	40/3	R	REFER	TO SL	D	INVERTER D6		8.33	
		8.3							5	С	С	6									8.33
8.3									7	Α	Α	8							8.33		
	8.3		INVERTER D2	RE	EFER 1	TO SLD		40/3	9	В	B 1	LO	40/3	R	REFER	TO SL	D	INVERTER D7		8.33	
		8.3					J JLD		11	С	C 1	L2									8.33
8.3									13	Α	A 1	L4							8.33		
	8.3		INVERTER D3	RE	EFER 1	TO SLE)	40/3	15	В	B 1	L6	40/3	R	REFER	TO SL	D	INVERTER D8		8.33	
		8.3							17	С	C 2	L8									8.33
8.3										$\overline{}$	A 2								8.33		
	8.3		INVERTER D4	RE	EFER 1	ro sle)	40/3	\vdash	В	B 2		- I	R	REFER	TO SL	D	INVERTER D9		8.33	
		8.3							23	С		24									8.33
8.3									$\overline{}$	-	A 2								8.33		
	8.3		INVERTER D5	RE	EFER 1	TO SLE)	40/3	-	-			40/3	R	REFER	TO SL	D	INVERTER D10		8.33	1
		8.3							29	С	C 3	30									8.33
	<u> </u>		Γ																 		
42	42	42																	41.7		
																		CONNECTED LOAD (KVA			+
																	TOTAI	CONNECTED LOAD (A)	301	301	301

										PV	_M[)P								
TYPE	•																			
SERV	ICE S	UPP	L 480V, 3φ, 4 WIRE																	
BUS:			1,600 AMP																	
MAII	N:		1,600A																	
FEED	ER:		REFER TO SINGLE LI	NE DIAG	SRAM															
AIC F	RATIN	G:	65,000				_					_								
	KVA									ØØ	5								KVA	
Α	В	С		COND	GND	NEU	PH						PH	N	IEU GND	ķο	ID	Α	В	С
83									1	ΑΑ	2							83.3		
	83		PV_A	RE	FER T	O SLE)	400/3	3	ВВ	4	400/3	R	REF	ER TO SI	LD	PV_0		83.3	
		83							5	CC	6									83.3
83									7	AA	ا 8							83.3		
05	83		PV_B	RE	FERT	O SLE)	400/3	9	-		400/3	R	REF	ER TO SI	LD	PV_C		83.3	
03		83							11	cc	12									83.3
			_																	



Solar Energy Solutions

1609 HERITAGE COMMERCE
WAKE FOREST, NC 27587
POWERSECURESOLAR.CON



THIS LINE SHOULD
MEASURE ONE INCH 10.21.2016 PV1.2

50F 24

RATED MPP CURRENT 43.10 A RATED MPP VOLTAGE 736.0 V **MAX SYSTEM VOLTAGE** 988.38 V MAX CIRCUIT CURRENT 56.81 A

WARNING

APPROPRIATE PPE REQUIRED. FAILURE TO COMPLY MAY RESULT IN DEATH OR INJURY. REFER TO NFPA 70E.

WARNING: ELECTRIC SHOCK HAZARD

DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDE MAY BE ENERGIZED IN THE OPEN POSITION.

WARNING: ELECTRIC SHOCK HAZARD

THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED.

WHITE LETTERING ON RED BACKGROUND TYPICAL OF 40:A1-A10, B1-B10, C1-C10, D1-D10

INVERTER AC OUTPUT

AC OUTPUT CURRENT NOMINAL AC VOLTAGE

WARNING

APPROPRIATE PPE REQUIRED. FAILURE TO COMPLY MAY RESULT IN DEATH OR INJURY. REFER TO NFPA 70E.

WARNING: ELECTRIC SHOCK HAZARD

DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDE MAY BE ENERGIZED IN THE OPEN POSITION.

WARNING

THIS EQUIPMENT IS FED BY MULTIPLE SOURCES (UTILITY AND PHOTOVOLTAIC)

WHITE LETTERING ON RED BACKGROUND TYPICAL OF 40 INVERTERS (A1-A10, B1-B10, C1-C10, D1-D10) REFER TO DISTRIBUTION PANEL SCHEDULES PV A TO PV D FOR LABEL VALUES.

PHOTOVOLTAIC AC DISCONNECT

AC OUTPUT CURRENT

NOMINAL AC VOLTAGE

31 A 480 V

WARNING

APPROPRIATE PPE REQUIRED. FAILURE TO COMPLY MAY RESULT IN DEATH OR INJURY. REFER TO NFPA 70E.

WARNING: ELECTRIC SHOCK HAZARD

DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDE MAY BE ENERGIZED IN THE OPEN POSITION.

WARNING

THIS EQUIPMENT IS FED BY MULTIPLE SOURCES (UTILITY AND PHOTOVOLTAIC)

WHITE LETTERING ON RED BACKGROUND TYPICAL OF 40 BREAKERS (A1-A10, B1-B10, C1-C10, D1-D10) REFER TO DISTRIBUTION PANEL SCHEDULES PV A TO PV D FOR LABEL VALUES.

WARNING:

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

WHITE LETTERING ON RED BACKGROUND THIS LABEL IS REQUIRED ON EXPOSED RACEWAY, CABLE TRAY, ENCLOSURES AND CONDUIT BODIES CONTAINING PHOTOVOLTAIC SOURCE CIRCUITS. SPACING AND LOCATION OF LABEL AS SPECIFIED PER NEC 690.35(F).

PHOTOVOLTAIC SYSTEM AC DISCONNECT

PV-X

AC OUTPUT CURRENT NOMINAL AC VOLTAGE 310 A 480 V

1,240 A

480 V

WARNING

APPROPRIATE PPE REQUIRED. FAILURE TO COMPLY MAY RESULT IN DEATH OR INJURY. REFER TO NFPA 70E.

WARNING: ELECTRIC SHOCK HAZARD

DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDE MAY BE ENERGIZED IN THE OPEN POSITION.

WARNING

THIS EQUIPMENT IS FED BY MULTIPLE SOURCES (UTILITY AND PHOTOVOLTAIC)

WHITE LETTERING ON RED BACKGROUND

TYPICAL OF 4:PV A, PV B, PV C AND PV D BREAKERS OF PV MDP.

PHOTOVOLTAIC SYSTEM AC DISCONNECT

PV-MDP

AC OUTPUT CURRENT NOMINAL AC VOLTAGE

WARNING

APPROPRIATE PPE REQUIRED. FAILURE TO COMPLY MAY RESULT IN DEATH OR INJURY. REFER TO NFPA 70E.

WARNING: ELECTRIC SHOCK HAZARD

DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDE MAY BE ENERGIZED IN THE OPEN POSITION

WARNING

THIS EQUIPMENT IS FED BY MULTIPLE SOURCES (UTILITY AND PHOTOVOLTAIC)

WHITE LETTERING ON RED BACKGROUND

PV X DISTRIBUTION PANEL 480V, 3φ, 4W 400A BUS, MLO

WHITE LETTERING ON BLACK BACKGROUND TYPICAL OF 4 PANEL BOARDS: PV A, PV B, PV C AND PV D

> PV MDP 480V, 3φ, 4W 1,600A BUS, 1,600 MCB

WHITE LETTERING ON BLACK BACKGROUND

AUXILIARY POWER DISCONNECT

WHITE LETTERING ON BLACK BACKGROUND.

5.0KVA AUXILIARY POWER TRANSFORMER 480:208/120V, 3φ

WHITE LETTERING ON BLACK BACKGROUND

AUXILIARY POWER PANEL 208/120V, 3ф 100A BUS, 20A MCB

WHITE LETTERING ON BLACK BACKGROUND

PHOTOVOLTAIC POWER SOURCE MAX 1,000V

WHITE LETTERING ON BLACK BACKGROUND THIS LABEL IS REQUIRED ON EXPOSED RACEWAY, CABLE TRAY, ENCLOSURES AND CONDUIT BODIES CONTAINING PHOTOVOLTAIC CIRCUITS. SPACING AND LOCATION OF LABEL AS SPECIFIED PER NEC 690.31(E)(4).

1000VDC WIRE

POSITIVE **RED OR YELLOW** NEGATIVE **BLACK GREEN OR BARE** GROUND

WHITE LETTERING ON BLACK BACKGROUND PROVIDE WARNING SIGNAGE AT EACH JUNCTION BOX, COMBINER BOX, DISCONNECT, AND ANY OTHER DEVICE WHERE ENERGIZE THAT CONTAINS 1000VDC WIRE.

480VAC WIRE A PHASE **BROWN ORANGE B PHASE YELLOW C PHASE** GREEN OR BARE GROUND

WHITE LETTERING ON BLACK BACKGROUND PROVIDE WARNING SIGNAGE AT EACH JUNCTION BOX OR ANY OTHER DEVICE WHERE ENERGIZE THAT CONTAINS 360VAC WIRE

120/208VAC WIRE **BLACK** L1

RED

WHITE OR GRAY **NEUTRAL** GREEN OR BARE GROUND

WHITE LETTERING ON BLACK BACKGROUND PROVIDE WARNING SIGNAGE AT EACH JUNCTION BOX OR ANY OTHER DEVICE WHERE ENERGIZE THAT CONTAINS 120/240VAC WIRE.

12,470VAC WIRE

A PHASE BROWN **B PHASE ORANGE** YELLOW C PHASE

GREEN OR BARE GROUND WHITE LETTERING ON BLACK BACKGROUND PROVIDE WARNING SIGNAGE AT EACH JUNCTION BOX OR ANY OTHER DEVICE WHERE ENERGIZE THAT CONTAINS 12470VAC WIRE.

INVERTER XX

WHITE LETTERING ON BLACK BACKGROUND. TYPICAL OF 40

TRANSFORMER

WHITE LETTERING ON BLACK BACKGROUND. TYPICAL OF 1

MV FUSED **SWITCH**

WHITE LETTERING ON BLACK BACKGROUND. TYPICAL OF 1

PV PRODUCTION MONITORING SYSTEM

WHITE LETTERING ON BLACK BACKGROUND

PV PRODUCTION MONITORING SWITCH

WHITE LETTERING ON BLACK BACKGROUND. TYPICAL OF 1

PV PRODUCTION METEOROLOGICAL STATION

WHITE LETTERING ON BLACK BACKGROUND. TYPICAL OF 2

PV PRODUCTION METER

WHITE LETTERING ON BLACK BACKGROUND. TYPICAL OF 1

TRACKER MOTOR UNIT

WHITE LETTERING ON BLACK BACKGROUND. TYPICAL OF 2

4X CONTROL UNIT

WHITE LETTERING ON BLACK BACKGROUND. TYPICAL OF 1

SITE DATA

WHITE LETTERING ON BLACK BACKGROUND. TYPICAL OF 1

GPS

WHITE LETTERING ON BLACK BACKGROUND. TYPICAL OF 1

WIND STOW SWITCH

WHITE LETTERING ON BLACK BACKGROUND. TYPICAL OF 1

PV SERVICE

VOLTAGE: AVAILABLE FAULT CURRENT

CALCULATED: XX/XX/XXXX XXX,XXX A OCPD AIC RATING

XXXV

XXX A

WHITE LETTERING ON RED BACKGROUND

WARNING

ARC FLASH AND SHOCK HAZARD APPROPRIATE PPE REQUIRED XXX

VOLTAGE WORKING DISTANCE (INCHES) INCIDENT ENERGY (CAL/CM2) FLASH BOUNDARY (INCHES) LIMITED APPROACH (INCHES) RESTRICTED APPROACH (INCHES) **GLOVE CLASS**

STUDY PERFORMED BY POWER SECURE SOLAR ON XX/XX/XXXX

BLACK LETTERING ON WHITE BACKGROUND WITH ORANGE HEADER. ARC FLASH VALUES TO BE DETERMINED BY ENGINEER OF RECORD BEFORE SYSTEM COMMISSIONING.

DANGER

ARC FLASH AND SHOCK HAZARD NO SAFE PPE EXISTS XXX

VOLTAGE WORKING DISTANCE (INCHES) INCIDENT ENERGY (CAL/CM2) FLASH BOUNDARY (INCHES) XX LIMITED APPROACH (INCHES) RESTRICTED APPROACH (INCHES) **GLOVE CLASS**

STUDY PERFORMED BY POWER SECURE SOLAR ON XX/XX/XXXX

BLACK LETTERING ON WHITE BACKGROUND WITH RED HEADER. ARC FLASH VALUES TO BE DETERMINED BY ENGINEER OF RECORD BEFORE SYSTEM COMMISSIONING.

PRELIMINARY NOT FOR CONSTRUCTION

1609 HERITAGE COMMERCE C WAKE FOREST, NC 27587 POWERSECURESOLAR.COM





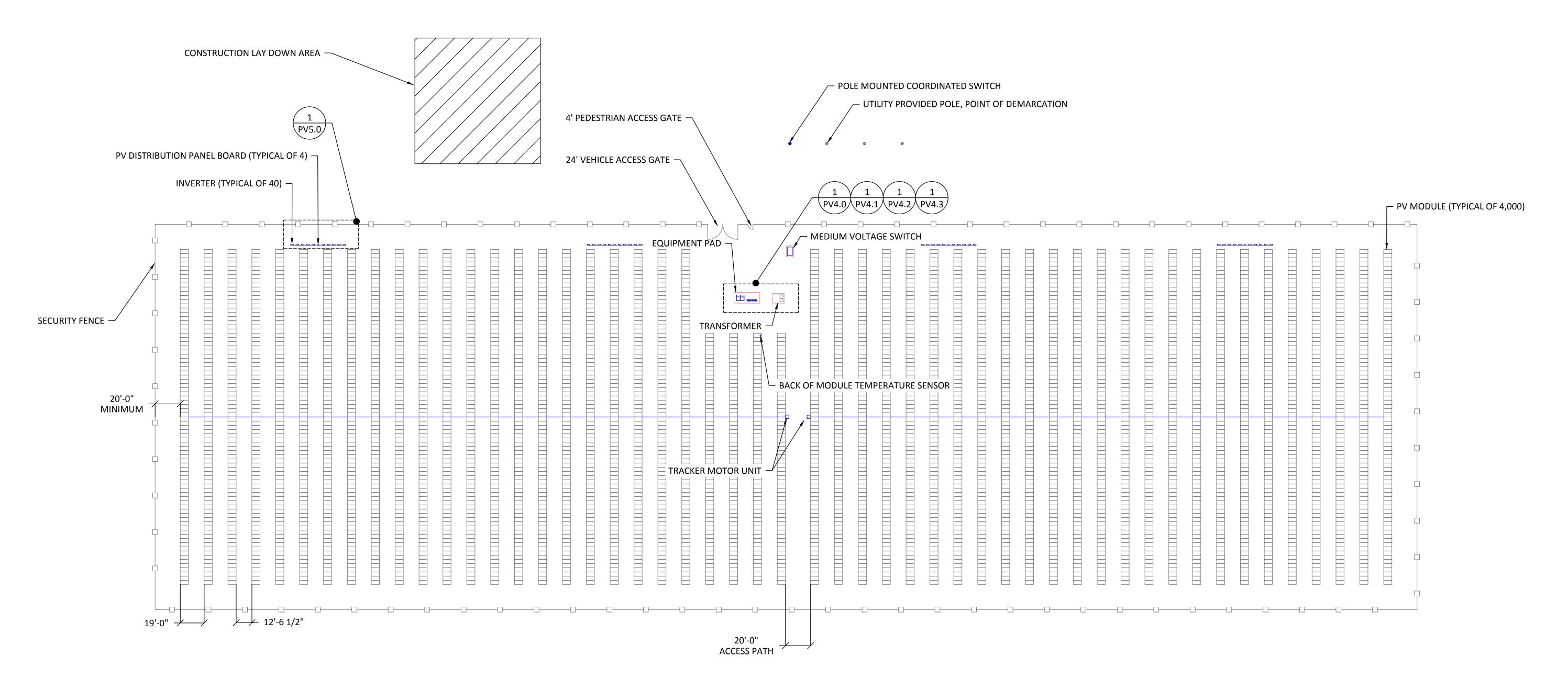
THIS LINE

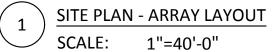
NRECA SUNDA REFERENCE DESIGN ac, 1,000Vdc, SINGLE AXIS TR

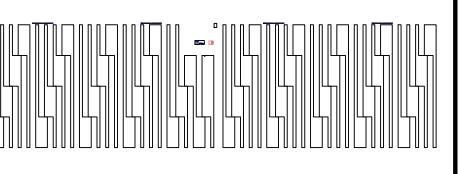
10.21.2016

PV1.3

- 1. REFER TO SINGLE LINE DIAGRAM ON PV1.0 FOR SPECIFICATIONS.
- 2. REFER TO EQUIPMENT AND FEEDER SCHEDULES ON PV1.1 FOR SPECIFICATIONS
- 3. PROVIDE ATI SINGLE AXIS TRACKER. RACKING SYSTEM SHALL BE A PIER DRIVEN SYSTEM. EACH ROW SECTION SHALL CONTAIN 80 MODULES HIGH IN PORTRAIT. HORIZONTAL DISTANCE BETWEEN RACK SECTION SHALL BE SPECIFIED BY MANUFACTURER. THE RACKING SYSTEM SHALL BE UL LISTED FOR GROUNDING CONTINUITY. COMPONENTS WITHIN THE RACKING SYSTEM SHALL FORM AN ELECTRICALLY BONDED UNIT AND WILL REQUIRE ADDITIONAL BONDING FROM ONE INDIVIDUAL RACK SECTION TO ADJACENT SECTIONS. REFER TO MANUFACTURER PROVIDED DOCUMENTATION AND SEALED STRUCTURAL DOCUMENTATION.
- 4. STRINGING FEEDERS SHALL BE ROUTED ALONG RACKING SYSTEM IN RACKING MANUFACTURERS PROVIDED INTEGRATED WIRE MANAGEMENT TRAY OR BELOW GRADE.







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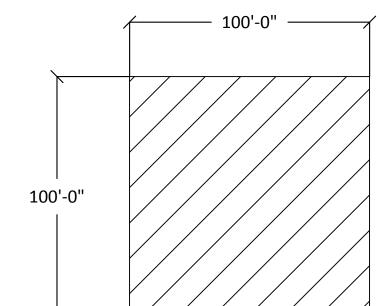
KEY PLAN - OVERALL ARRAY

7 OF 24

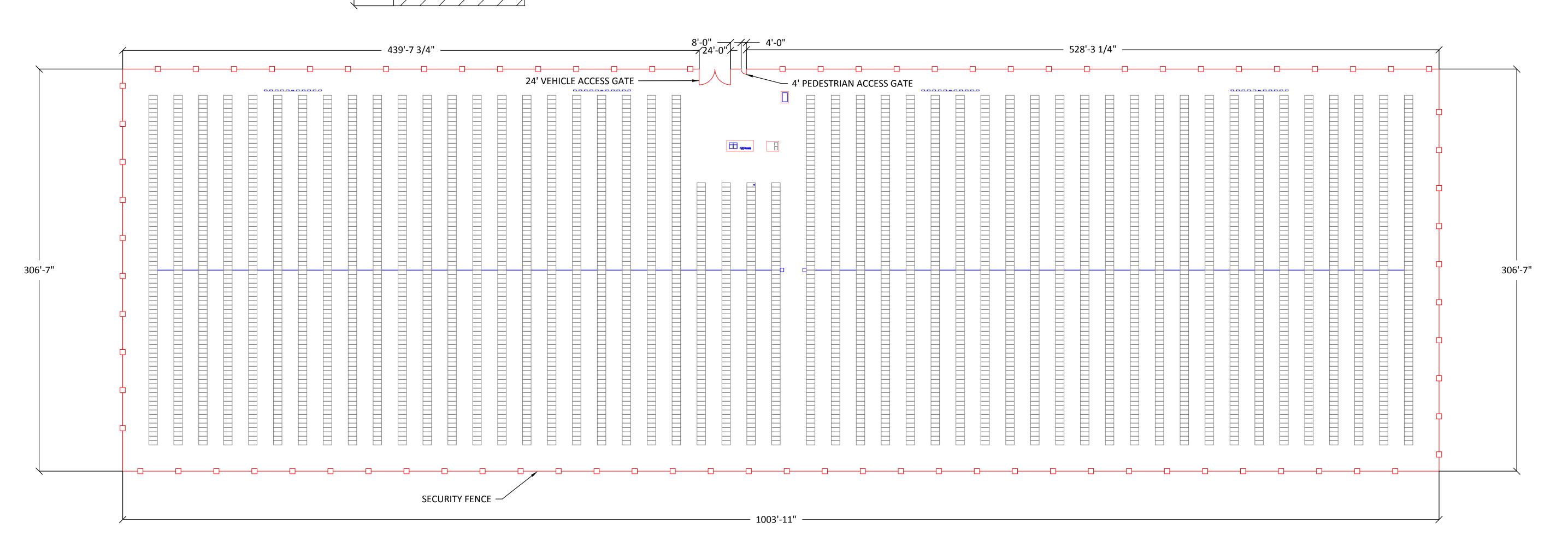
10.21.2016

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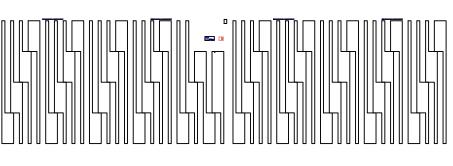
- 1. TOTAL FENCE LENGTH IS APPROXIMATELY 2,620 FEET.
- 2. FENCE SHALL BE 6'-0" TALL TOPPED WITH 3 STRING BARBED WIRE NO LESS THAN 12" IN HEIGHT. OVERALL HEIGHT OF 7'-0" MINIMUM PER NEC110.31.
- 4. ONE PERMANENT PEDESTRIAN ENTRANCE GATE,4' MINIMUM IN WIDTH, LOCATED AS SHOWN.
- 5. REFER TO FENCE GROUNDING DETAIL ON PV5.1.



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SITE PLAN - FENCE LAYOUT

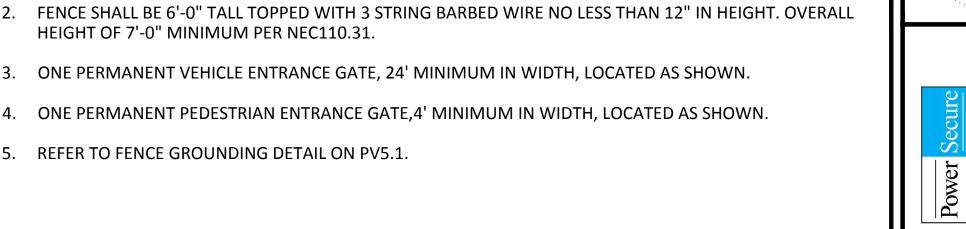


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PV2.1

8 OF 24

KEY PLAN - OVERALL ARRAY

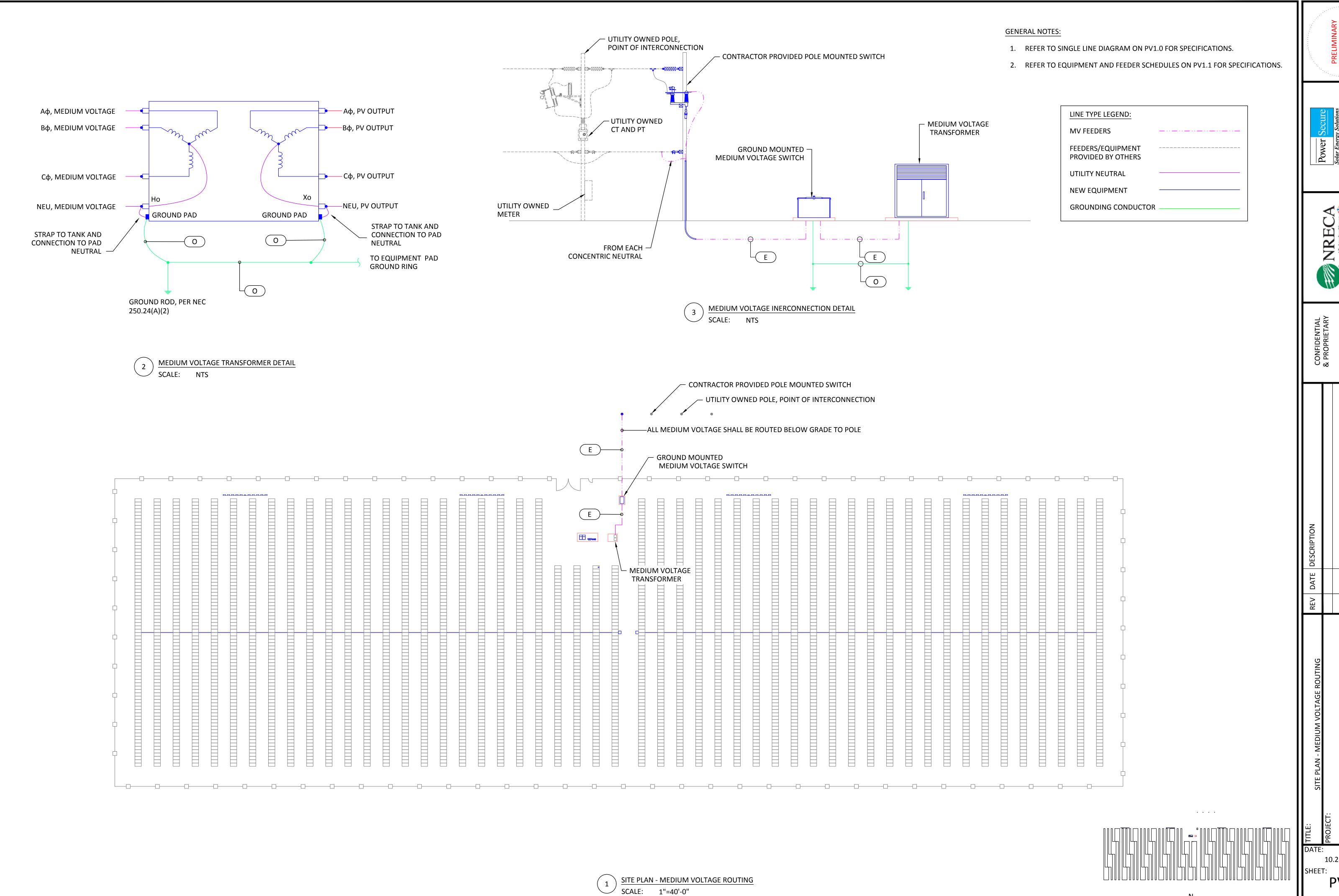


2

HIS LINE EASURE (

NRECA SUNDA REFERENCE DESIGN 000KWac, 1,000Vdc, SINGLE AXIS TR.

10.21.2016



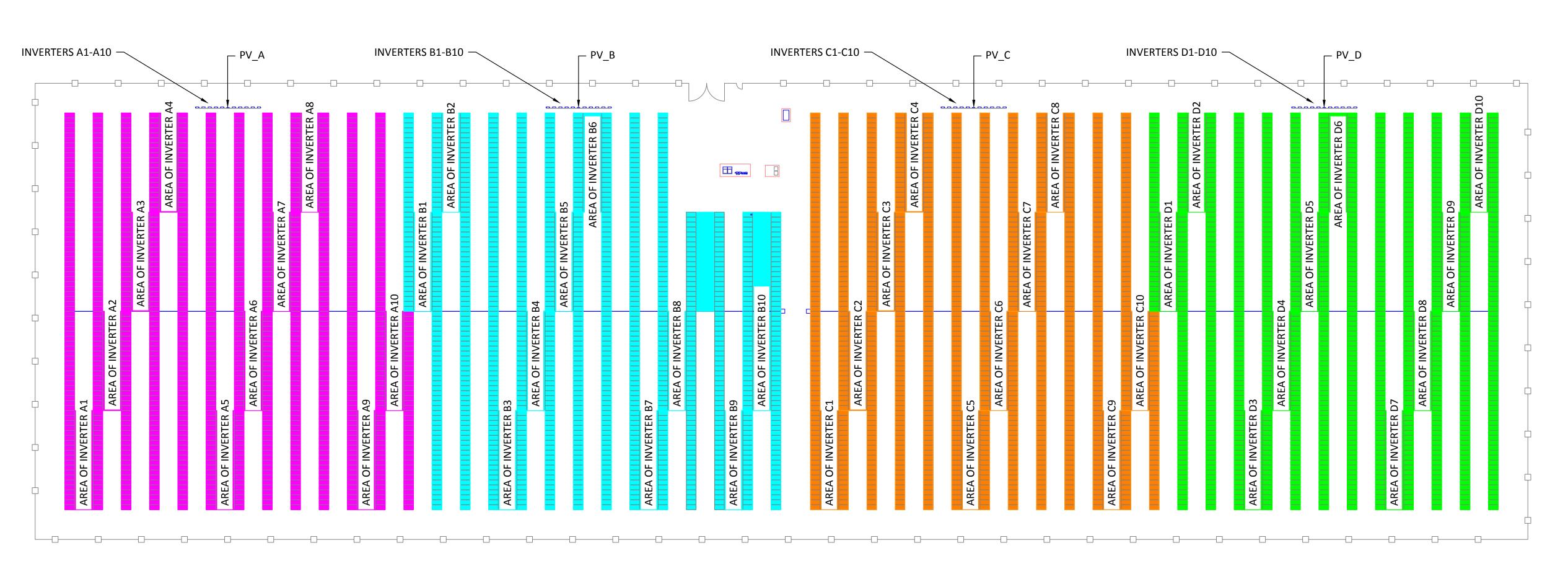
NRECA SUNDA REFERENCE DESIGN 000KWac, 1,000Vdc, SINGLE AXIS TR. 10.21.2016 KEY PLAN - OVERALL ARRAY

LEGEND: AREA OF INVERTERS FEEDING DISTRIBUTION PANEL A (PV_A) AREA OF INVERTERS FEEDING DISTRIBUTION PANEL B (PV_B) AREA OF INVERTERS FEEDING DISTRIBUTION PANEL C (PV_C) AREA OF INVERTERS FEEDING
DISTRIBUTION PANEL D (PV_D)

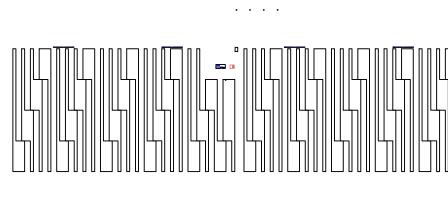
GENERAL NOTES:

1. REFER TO EQUIPMENT SCHEDULE AND SINGLE LINE DIAGRAM FOR SPECIFICATIONS.

• • •



SCALE: 1"=40'-0"



10 OF 24

10.21.2016

PV2.3

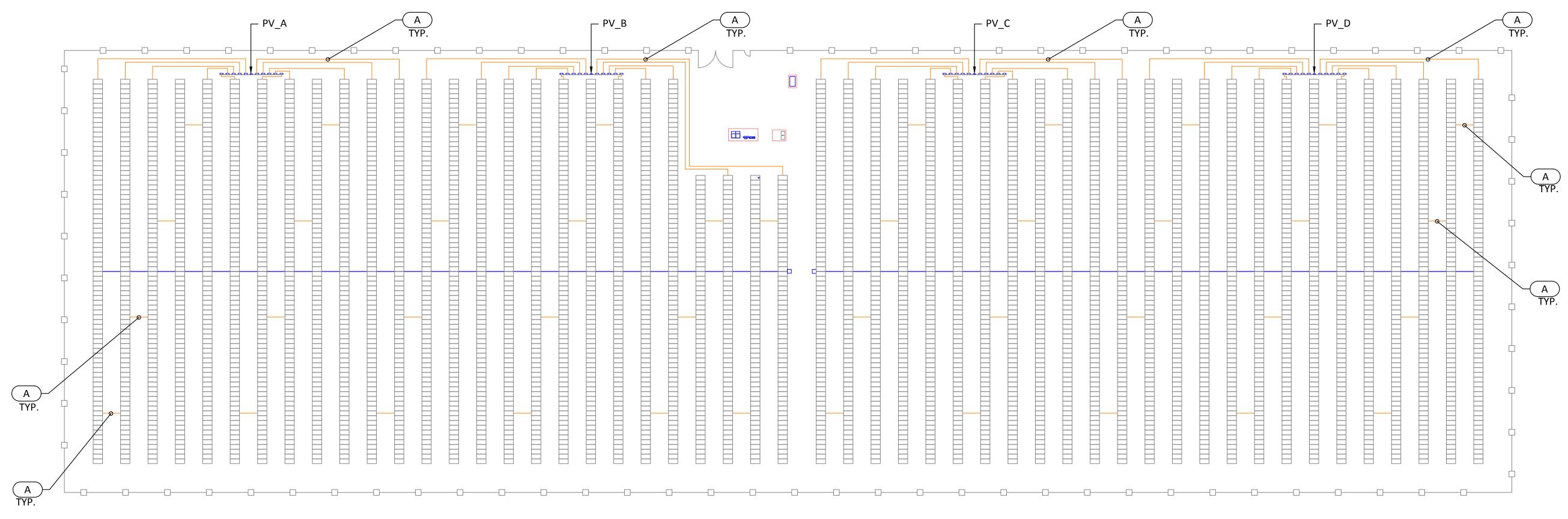
NRECA SUNDA REFERENCE DESIGN 1,000KWac, 1,000Vdc, SINGLE AXIS TRACKER

NREC.

THIS LINE SHOULD
MEASURE ONE INCH

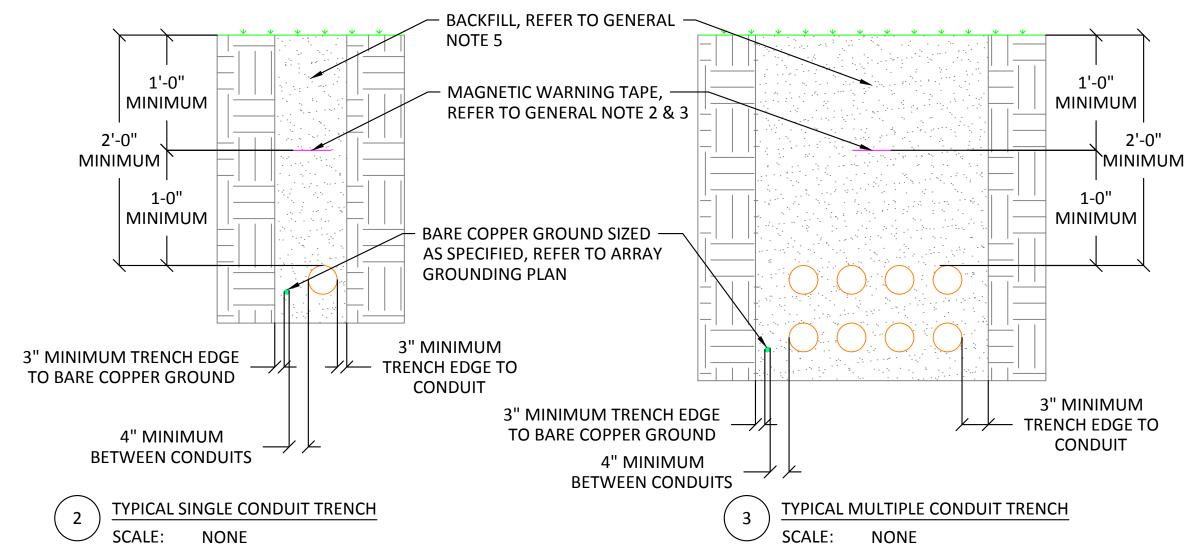
KEY PLAN - OVERALL ARRAY

• • • •



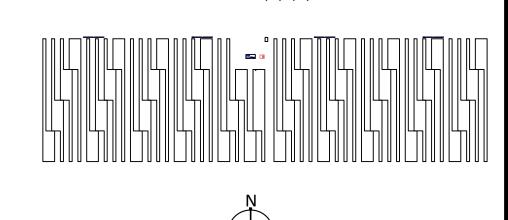
						FEEDER SCI	HEDULE					
					;	**FEEDER IS I	NOTED BY		(<u>A</u>)			
TAG		РНА	SE			NEUTRAL GROUND				ND	INSULATION	RACEWA' SIZE
Α	(1) SET OF #NOTE1	(2) - (10)	#10	COPPER				(1)	#10	COPPER	PV	1-1/2"
В	(1) SET OF	(3)	#8	COPPER	(1)	#8	COPPER	(1)	#8	COPPER	THWN-2	1"
С	(2) SET OF	(3)	250 KCMIL	ALUMINUM	(1)	250 KCMIL	ALUMINUM	(1)	#1	ALUMINUM	THWN-2	2-1/2"
D	(6) SET OF	(3)	500 KCMIL	ALUMINUM	(1)	500 KCMIL	ALUMINUM	(1)	350 KCMIL	ALUMINUM	THWN-2	3-1/2"
E ^{NOTE#6}	(1) SET OF	(3)	#1/0	ALUMINUM							MV TR-XLPE WITH CONCENTRIC NEUTRAL	4"
F	(1) SET OF	(3)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
G	(1) SET OF	(1)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
Н	(1) SET OF	(2)	#12	COPPER				(1)	#12	COPPER	THWN-2	3/4"
I					RS	S-485: BELDE	N 3107A					3/4"
J					P	ROVIDED BY	DRAKER					3/4"
K	CONTROL WIRES PROVIDED BY ATI											3/4"
L								(1)	#6	COPPER	BARE	
М	(1) SET OF	(7)	#12	COPPER							THWN-2	3/4"
N			CAT	5E OR CAT6 E	THERI	NET CABLE: B	ELDEN 7937A	OR E	QUIVALENT			3/4"
0								(1)	#3/0	COPPER	BARE	

- FEEDER SCHEUDLE NOTES:
 - 1. (#) DENOTES QUANTITY OF DC PHASE WIRES TO BE PROVIDED.
 - 2. WHERE MULITPLE CONDUITS ARE NOTED, THE RACEWAYS SHALL BE PROVIDED IN PARALLEL.
 - 3. REFER TO RACEWAY APPLICATION SCHEDULE FOR RACEWAY TYPE.
 - 4. ALL RACEWAY SIZES ARE NEC MINIMUM REQUIREMENTS, LARGER CONDUITS ARE PERMITED FOR EASE OF INSTALLATION.
 - 5. PV SOURCE CIRCUITS SHALL NOT BE REQUIRED TO BE IN RACEWAY IF CONDUCTORS ARE NOT READILY ACCESSIBLE AND
 - NOT EXPOSED TO PHYSICAL DAMAGE. BELOW GRADE PV SOURCE CIRCUITS SHALL BE IN RACEWAY.
 - 6. PROVIDE 15KV RATED MEDUIM VOLTAGE FEEDERS WITH 100% INSULATION.



GENERAL NOTES:

- 1. REFER TO EQUIPMENT SCHEDULE AND SINGLE LINE DIAGRAM FOR SPECIFICATIONS
- 2. ALL UNDERGROUND RACEWAY SHALL BE SCHEDULE 40 PVC. TRANSITIONS BELOW TO ABOVE GRADE SHALL BE PER CONDUIT STUB UP DETAIL.
- 3. FOR TRENCHES 24" WIDE AND LESS, ONLY ONE RUN OF MAGNETIC ELECTRICAL WARNING TAPE SHALL BE REQUIRED PER DETAIL 3.
- 4. FOR TRENCHES WIDER THAN 24" ONE PIECE OF TAPE SHALL BE LOCATED AT EACH SIDE OF THE TRENCH WITH ADDITIONAL RUNS PROVIDED AS NECESSARY. THE MAXIMUM DISTANCE BETWEEN TAPE RUNS SHALL BE 24" ON CENTER.
- 5. TRENCH BOTTOMS: EXCAVATE TRENCHES 3" DEEPER THAN BOTTOM OF PIPE ELEVATION TO ALLOW FOR BEDDING COURSE. HAND EXCAVATE FOR BELL OF PIPE. EXCAVATE TRENCHES 3" DEEPER THAN ELEVATION REQUIRED IN ROCK OR OTHER UNYIELDING BEARING MATERIAL TO ALLOW BEDDING COURSE.
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- 7. REFER TO ARRAY GROUNDING DETAIL FOR BARE COPPER GROUND TRENCH ROUTING.
- 8. FEEDER ROUTING SHOWN DIAGRAMMATICALLY, COORDINATION WITH SITE CONDITIONS REQUIRED.



🕂 🕂 KEY PLAN - OVERALL ARRAY

PRELIMINARY NOT FOR CONSTRUCTION

Power Secure

Solar Energy Solutions

609 HERITAGE COMMERC

WAKE FOREST, NC 2758



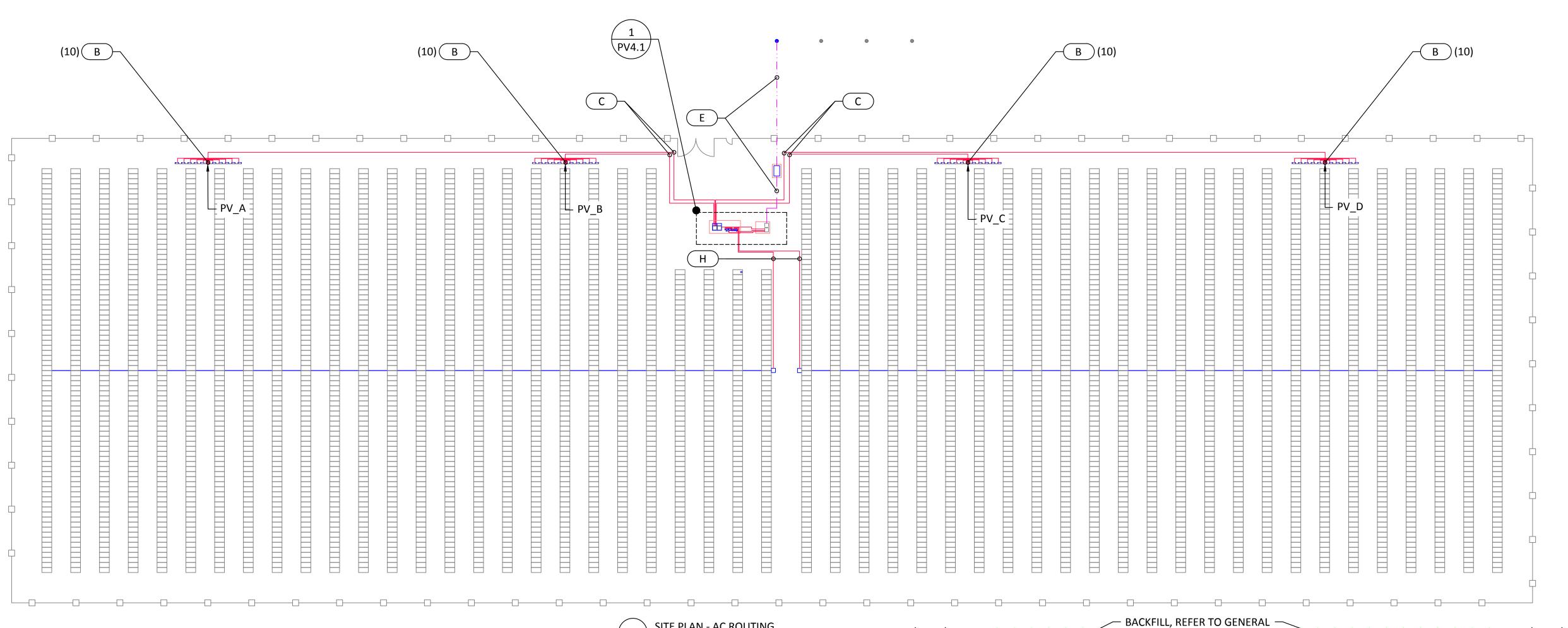
PROPRIETARY
IIS LINE SHOULD
ASURF ONF INCH

REV DATE DESCRIPTION

NRECA SUNDA REFERENCE DESIGN 00KWac, 1,000Vdc, SINGLE AXIS TRACKER

三 DATE: 10.21.2016

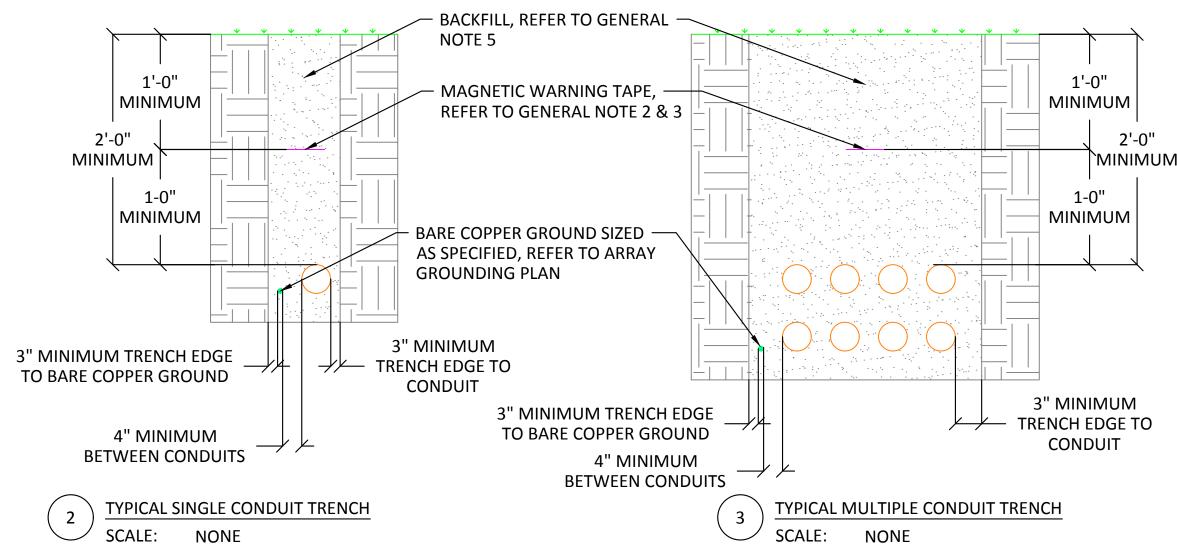
SHEET: **PV2.4**



					k	FEEDER SC **FEEDER IS			A			
TAG		PHA	ASE		NEUTRAL				GROUND		INSULATION	RACEWA SIZE
Α	(1) SET OF #NOTE1	(2) - (10)	#10	COPPER				(1)	#10	COPPER	PV	1-1/2"
В	(1) SET OF	(3)	#8	COPPER	(1)	#8	COPPER	(1)	#8	COPPER	THWN-2	1"
С	(2) SET OF	(3)	250 KCMIL	ALUMINUM	(1)	250 KCMIL	ALUMINUM	(1)	#1	ALUMINUM	THWN-2	2-1/2"
D	(6) SET OF	(3)	500 KCMIL	ALUMINUM	(1)	500 KCMIL	ALUMINUM	(1)	350 KCMIL	ALUMINUM	THWN-2	3-1/2"
E ^{NOTE#6}	(1) SET OF	(3)	#1/0	ALUMINUM							MV TR-XLPE WITH CONCENTRIC NEUTRAL	4"
F	(1) SET OF	(3)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
G	(1) SET OF	(1)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
Н	(1) SET OF	(2)	#12	COPPER				(1)	#12	COPPER	THWN-2	3/4"
I					RS	S-485: BELDE	N 3107A					3/4"
J					Р	ROVIDED BY	DRAKER					3/4"
K	CONTROL WIRES PROVIDED BY AT								TI			
L								(1)	#6	COPPER	BARE	
M	(1) SET OF	(7)	#12	COPPER							THWN-2	3/4"
N			CAT	SE OR CAT6 ET	THERN	NET CABLE: B	ELDEN 7937A	OR E	QUIVALENT			3/4"
0								(1)	#3/0	COPPER	BARE	

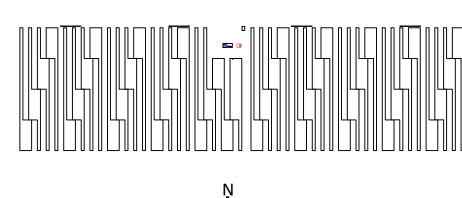
FEEDER SCHEUDLE NOTES:

- 1. (#) DENOTES QUANTITY OF DC PHASE WIRES TO BE PROVIDED.
- 2. WHERE MULITPLE CONDUITS ARE NOTED, THE RACEWAYS SHALL BE PROVIDED IN PARALLEL.
- 3. REFER TO RACEWAY APPLICATION SCHEDULE FOR RACEWAY TYPE.
- 4. ALL RACEWAY SIZES ARE NEC MINIMUM REQUIREMENTS, LARGER CONDUITS ARE PERMITED FOR EASE OF INSTALLATION.
- 5. PV SOURCE CIRCUITS SHALL NOT BE REQUIRED TO BE IN RACEWAY IF CONDUCTORS ARE NOT READILY ACCESSIBLE AND
- NOT EXPOSED TO PHYSICAL DAMAGE. BELOW GRADE PV SOURCE CIRCUITS SHALL BE IN RACEWAY.
- 6. PROVIDE 15KV RATED MEDUIM VOLTAGE FEEDERS WITH 100% INSULATION.



GENERAL NOTES:

- 1. REFER TO EQUIPMENT SCHEDULE AND SINGLE LINE DIAGRAM FOR SPECIFICATIONS.
- 2. ALL UNDERGROUND RACEWAY SHALL BE SCHEDULE 40 PVC. TRANSITIONS BELOW TO ABOVE GRADE SHALL BE PER CONDUIT STUB UP DETAIL.
- 3. FOR TRENCHES 24" WIDE AND LESS, ONLY ONE RUN OF MAGNETIC ELECTRICAL WARNING TAPE SHALL BE REQUIRED PER DETAIL 3.
- 4. FOR TRENCHES WIDER THAN 24" ONE PIECE OF TAPE SHALL BE LOCATED AT EACH SIDE OF THE TRENCH WITH ADDITIONAL RUNS PROVIDED AS NECESSARY. THE MAXIMUM DISTANCE BETWEEN TAPE RUNS SHALL BE 24" ON CENTER.
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- 8. FEEDER ROUTING SHOWN DIAGRAMMATICALLY, COORDINATION WITH SITE CONDITIONS REQUIRED.

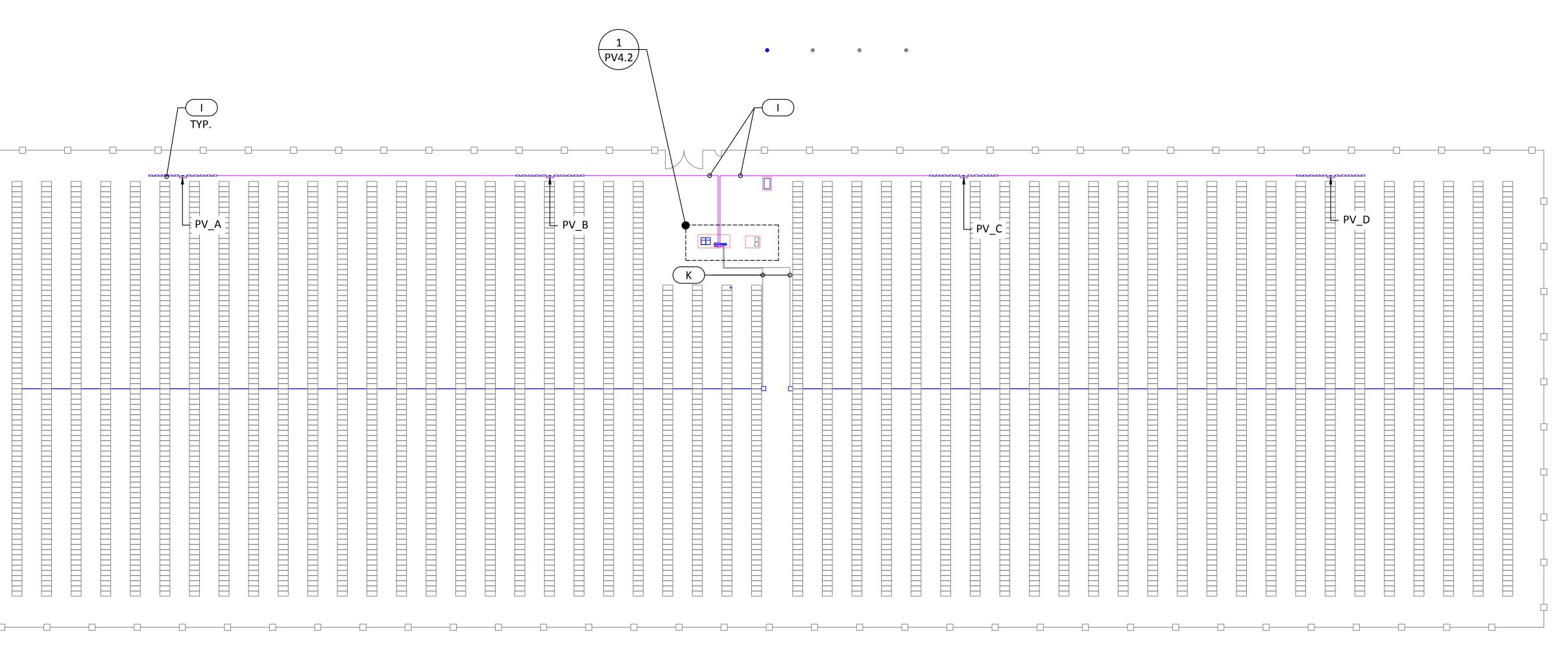


10.21.2016 **PV2.5**

12 OF 24

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🕽 KEY PLAN - OVERALL ARRAY



SITE PLAN - COMMUNICATONS ROUTING

					k	FEEDER SC **FEEDER IS			A			
TAG		PHA	\SE			NEUTR		GROUND			INSULATION	RACEWA' SIZE
Α	(1) SET OF #NOT	^{E1} (2) - (10)	#10	COPPER				(1)	#10	COPPER	PV	1-1/2"
В	(1) SET OF	(3)	#8	COPPER	(1)	#8	COPPER	(1)	#8	COPPER	THWN-2	1"
С	(2) SET OF	(3)	250 KCMIL	ALUMINUM	(1)	250 KCMIL	ALUMINUM	(1)	#1	ALUMINUM	THWN-2	2-1/2"
D	(6) SET OF	(3)	500 KCMIL	ALUMINUM	(1)	500 KCMIL	ALUMINUM	(1)	350 KCMIL	ALUMINUM	THWN-2	3-1/2"
E ^{NOTE#6}	(1) SET OF	(3)	#1/0	ALUMINUM							MV TR-XLPE WITH CONCENTRIC NEUTRAL	4"
F	(1) SET OF	(3)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
G	(1) SET OF	(1)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
Н	(1) SET OF	(2)	#12	COPPER				(1)	#12	COPPER	THWN-2	3/4"
l					RS	S-485: BELDE	N 3107A					3/4"
J					Р	ROVIDED BY	DRAKER					3/4"
K				CC	NTRO	OL WIRES PR	OVIDED BY A	ΓΙ				3/4"
L								(1)	#6	COPPER	BARE	
М	(1) SET OF	(7)	#12	COPPER							THWN-2	3/4"
N	CAT5E OR CAT6 ETHERNET CABLE: BELDEN 7937A OR EQUIVALENT									3/4"		
0								(1)	#3/0	COPPER	BARE	

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REFER TO RACEWAY APPLICATION SCHEDULE FOR RACEWAY TYPE.

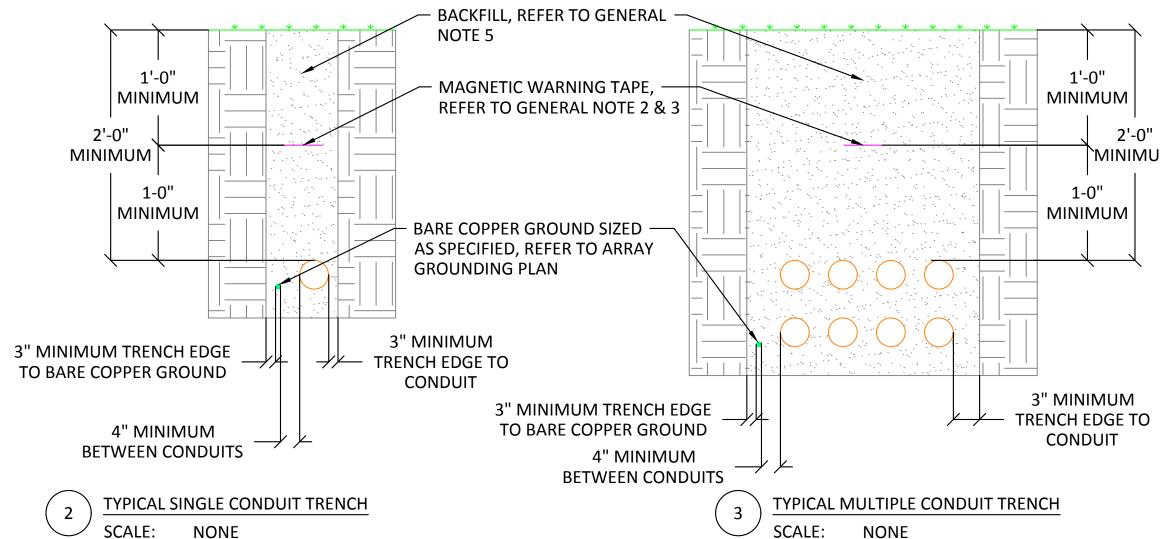
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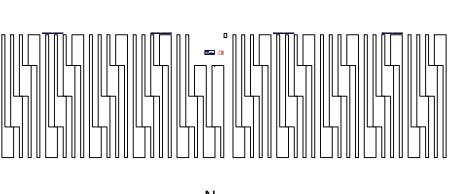
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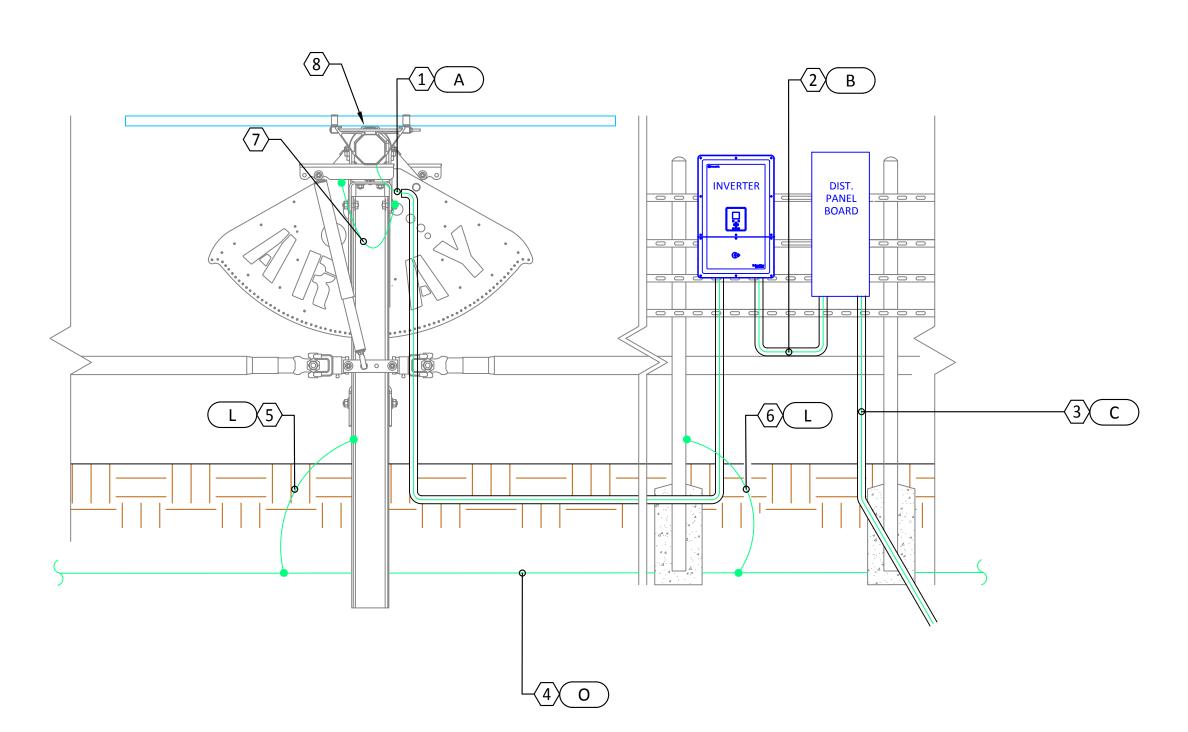
· KEY PLAN - OVERALL ARRAY

10.21.2016

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PV2.6

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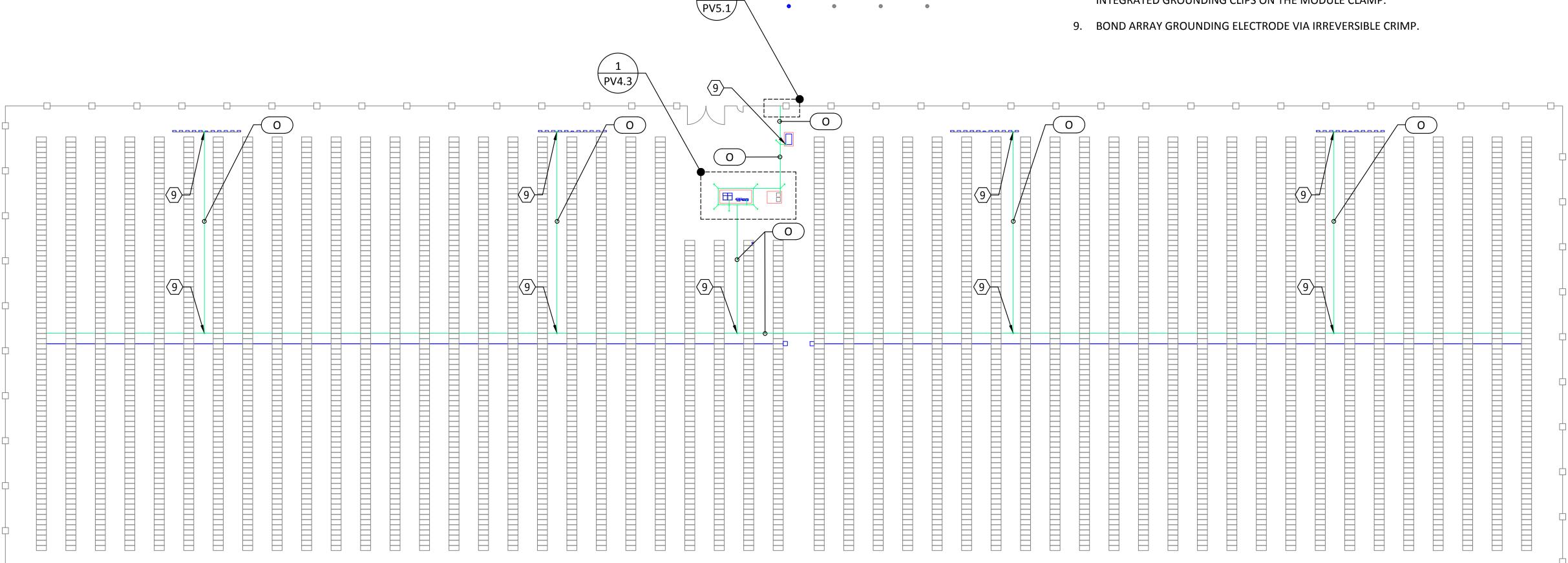
SIDE ELEVATION - RACK GROUNDING SCALE: NTS

GENERAL NOTES:

- 1. THE RACKING SYSTEM SHALL BE ULLISTED FOR GROUNDING CONTINUITY. COMPONENTS WITHIN THE RACKING SYSTEM SHALL FORM AN ELECTRICALLY BONDED UNIT AND REQUIRE ADDITIONAL BONDING FROM ONE INDIVIDUAL RACK SECTION TO ADJACENT SECTIONS.
- 2. REFER TO SINGLE LINE DIAGRAM AND SCHEDULES FOR SPECIFICATIONS.
- 3. ARRAY EQUIPMENT GROUND CONDUCTOR SHALL BE RUN IN TRENCH WITH INVERTERS FEEDERS WHERE POSSIBLE.
- 4. GROUND FEEDER ROUTING SHOWN DIAGRAMMATICALLY, COORDINATION WITH SITE CONDITIONS REQUIRED.
- 5. PROVIDE AT LEAST 6'-1/2" OF WORKING CLEARANCE FOR INVERTERS AS PER NEC 110.26(A)(3) OR TO THE HEIGHT OF THE EQUIPMENT, WHICHEVER IS GREATER.

KEYED NOTES: $\langle \# \rangle$

- 1. PROVIDE #10 COPPER (FEEDER A) EQUIPMENT GROUND CONDUCTOR (EGC) FROM THE INVERTER GROUND BAR TO RACK ON ADJOINING ROW, EGC SHALL BE RUN WITH ASSOCIATED STRING FEEDERS.
- 2. PROVIDE #8 COPPER (FEEDER B) EQUIPMENT GROUND CONDUCTOR (EGC) FROM INVERTER GROUND BUS BAR TO ASSOCIATED DISTRIBUTION PANEL BOARD. EGC SHALL BE RUN IN CONDUIT WITH ASSOCIATED AC OUTPUT CONDUCTORS.
- 3. PROVIDE #1 ALUMINIUM (FEEDER C) EQUIPMENT GROUND CONDUCTOR (EGC) FROM PV DISTRIBUTION PANEL INVERTER TO PV MAIN DISTRIBUTION PANEL BOARD. EGC SHALL BE RUN IN CONDUIT WITH ASSOCIATED AC **OUTPUT CONDUCTORS.**
- 4. PROVIDE ARRAY GROUNDING ELECTRODE THE LENGTH OF ARRAY.
- 5. PROVIDE #6 BARE COPPER (FEEDER L) BONDING JUMPER VIA IRREVERSIBLE CRIMP FROM ARRAY SUPPLEMENTAL GROUNDING CONDUCTOR IN TRENCH TO POST OF RACKING. IRREVERSIBLE CRIMP SHALL BE UL LISTED FOR GROUNDING AND BONDING. ENSURE ALL CONNECTIONS ARE TORQUED TO MANUFACTURER'S SPECIFICATIONS.
- 6. PROVIDE #6 BARE COPPER (FEEDER L) BONDING JUMPER VIA IRREVERSIBLE CRIMP FROM ARRAY SUPPLEMENTAL GROUNDING CONDUCTOR IN TRENCH TO THE INVERTER AND DISTRIBUTION PANEL BOARD MOUNTING STRUCTURE. IRREVERSIBLE CRIMP SHALL BE UL LISTED FOR GROUNDING AND BONDING.
- 7. GROUNDING STRAP FROM THE GEAR RACK TO THE POST PROVIDED BY RACKING MANUFACTURER.
- 8. THE GEAR BOX COUPLES TO THE TORQUE TUBE THROUGH MECHANICAL MEANS WHICH CREATES A PROPER GROUNDING CONNECTION. THE SOLAR MODULES AND THE TORQUE TUBE ARE GROUNDED BY MEANS OF INTEGRATED GROUNDING CLIPS ON THE MODULE CLAMP.



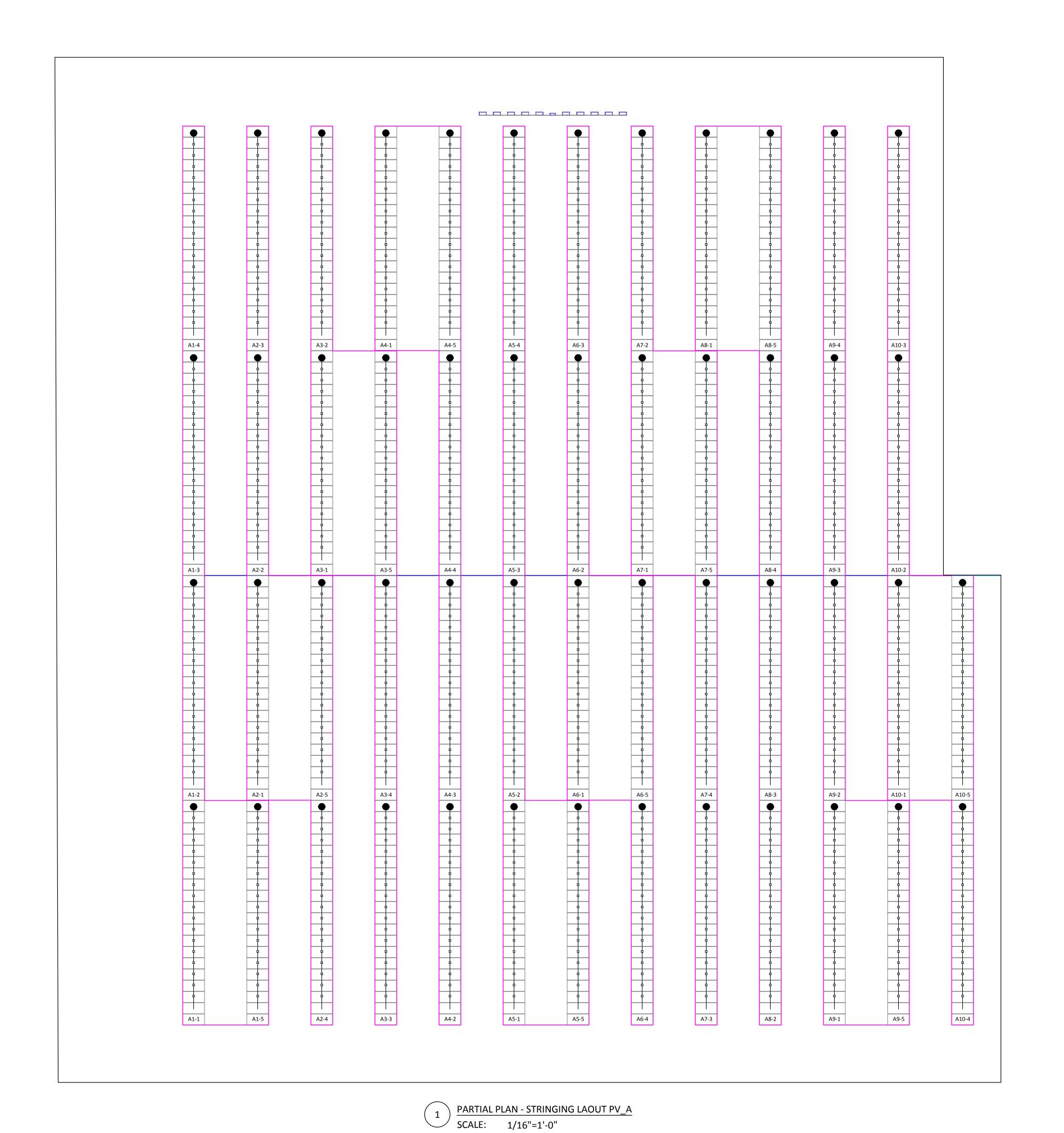
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KEY PLAN - OVERALL ARRAY

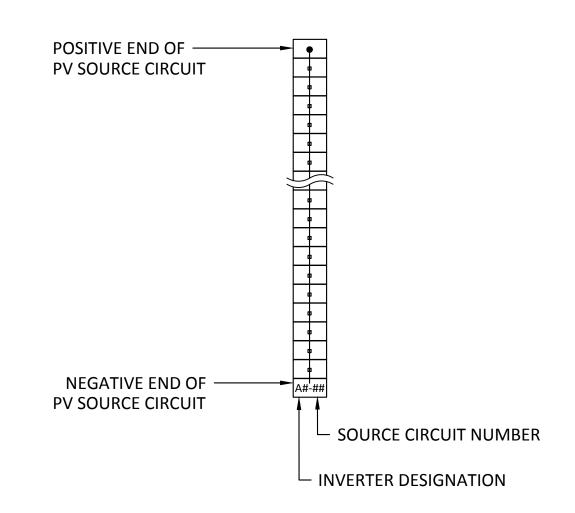
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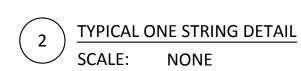
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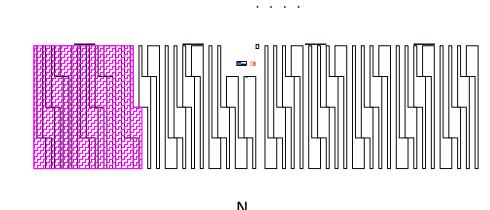
10.21.2016



- 1. EACH STRING SHALL BE LABELED AS DESIGNATED WITH SHRINK TUBE.
- 2. LABELS SHALL BE LOCATED AT CONNECTOR ON BOTH POSITIVE AND NEGATIVE SIDES, AND AT THE CONNECTOR BOX.







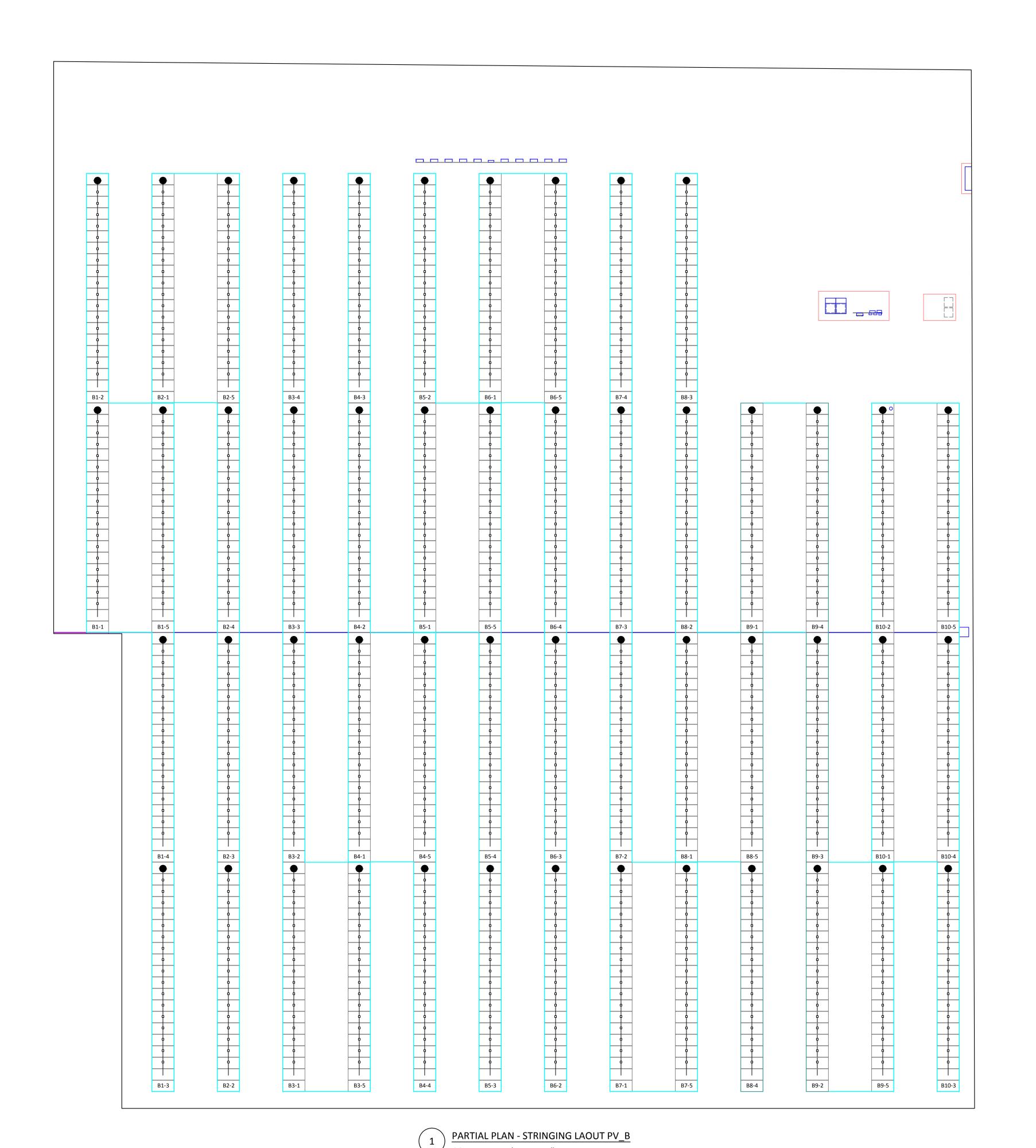
KEY PLAN - OVERALL ARRAY

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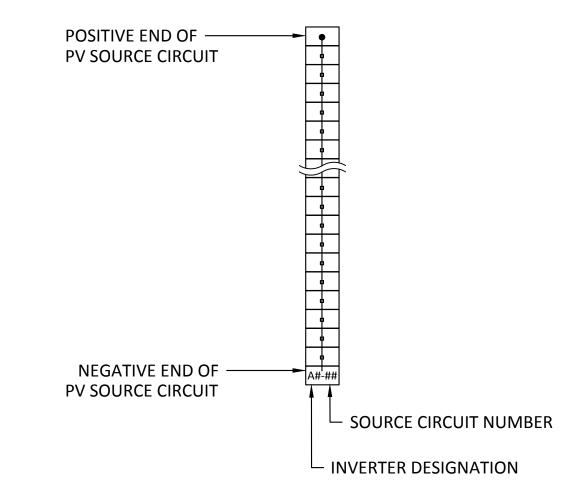
HIS LINE EASURE (

10.21.2016

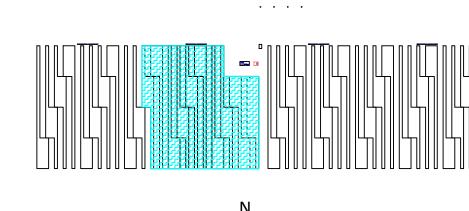
PV3.0



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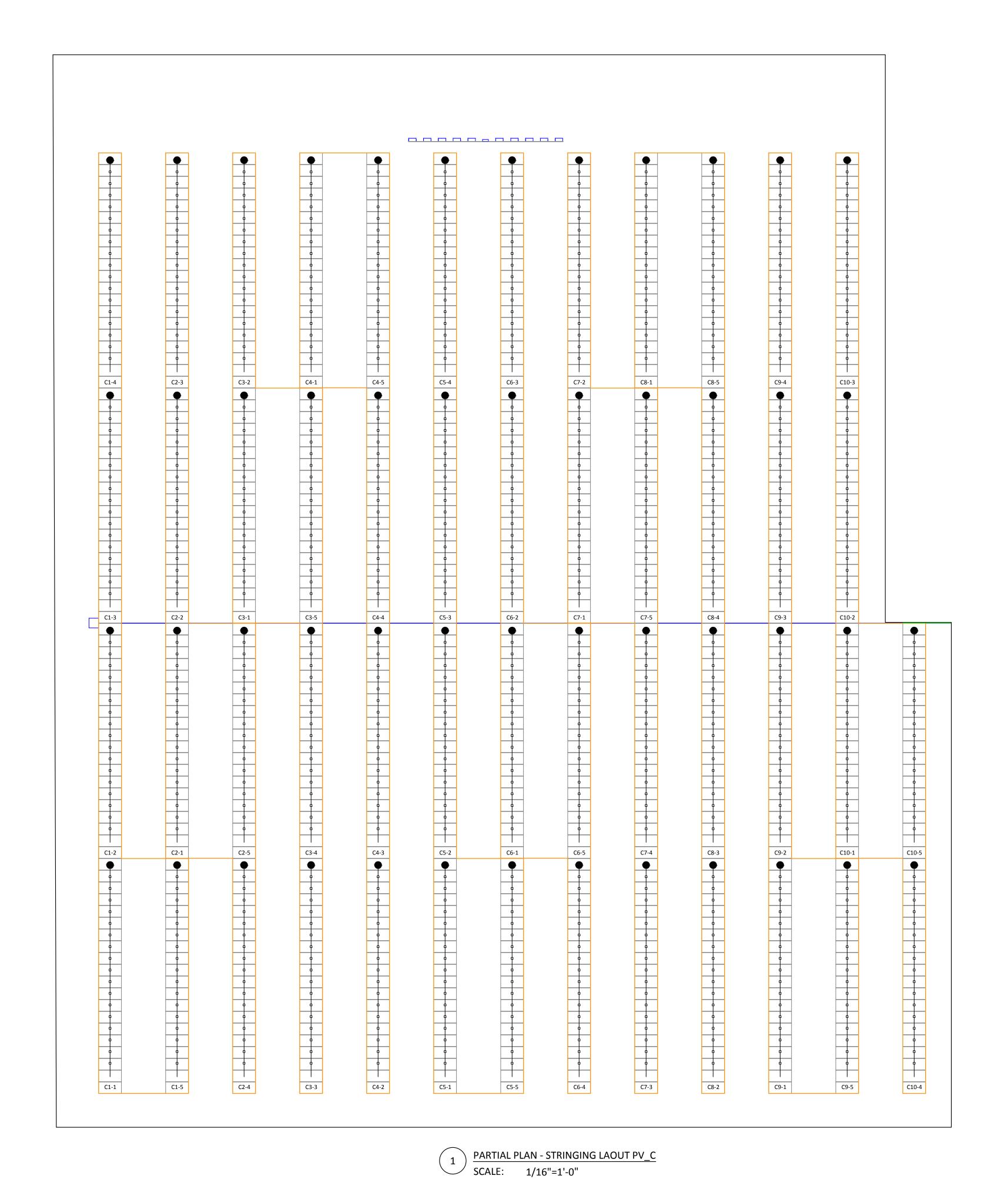
TYPICAL ONE STRING DETAIL



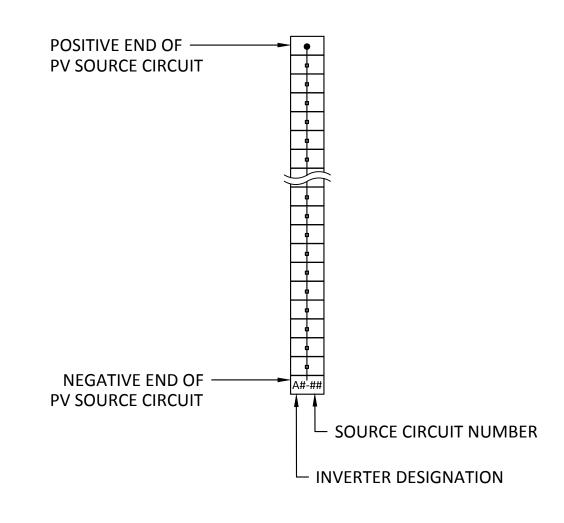
10.21.2016 PV3.1 KEY PLAN - OVERALL ARRAY 16 OF 24

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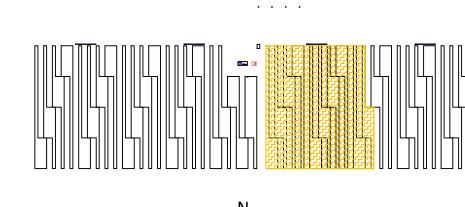
THIS LINE MEASURE (



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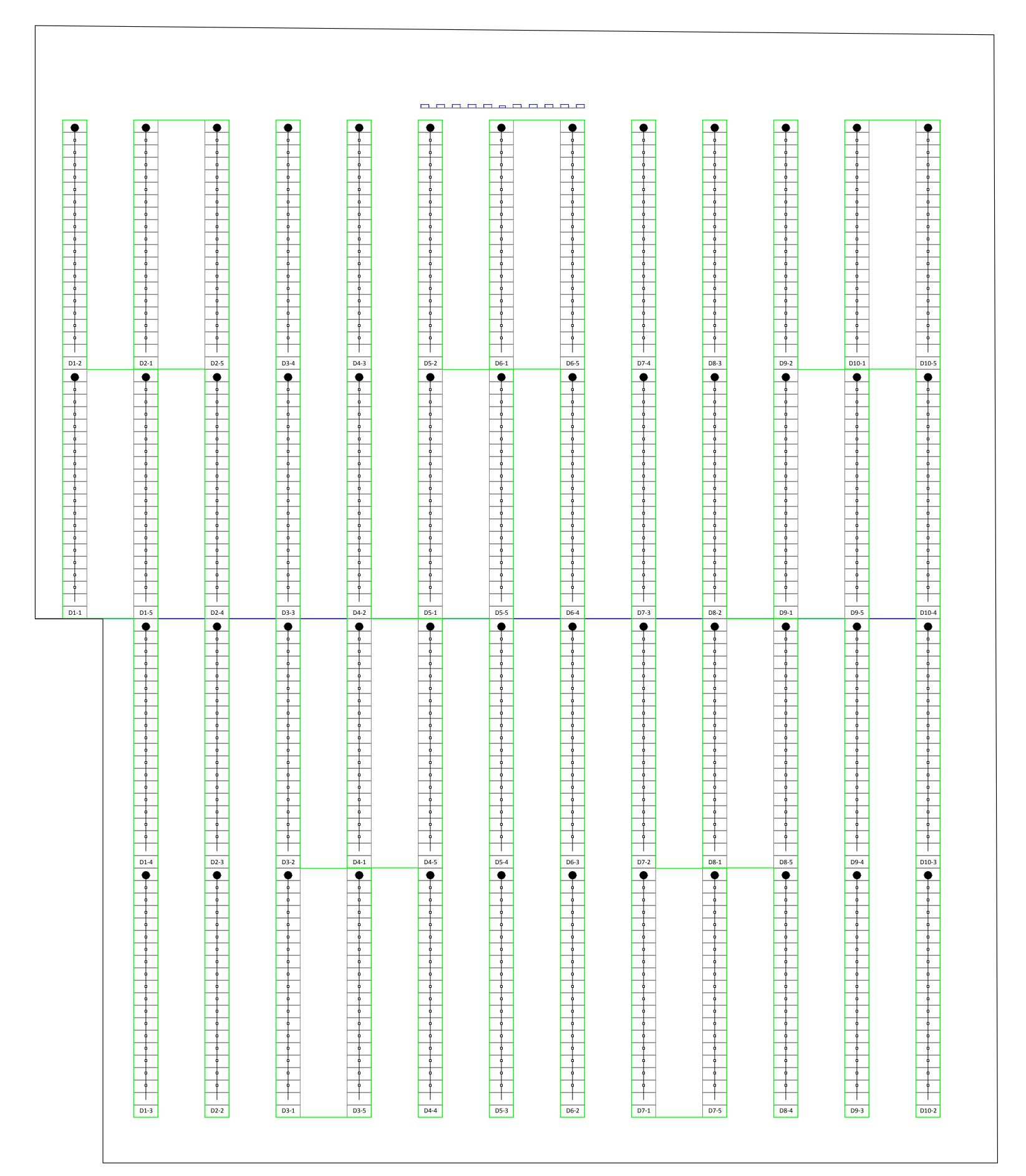
TYPICAL ONE STRING DETAIL SCALE:



10.21.2016 PV3.2 KEY PLAN - OVERALL ARRAY 17 OF 24

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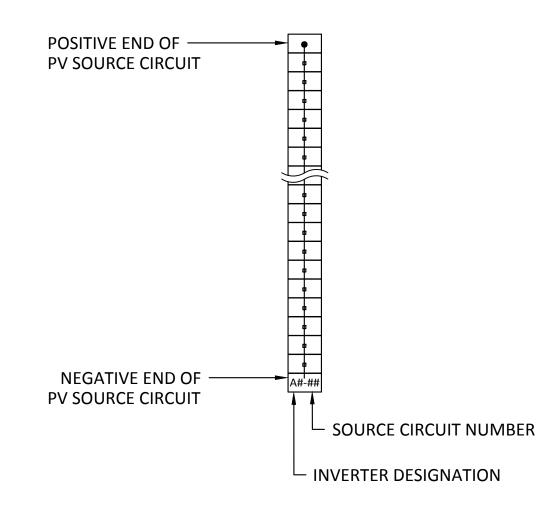
THIS LINE



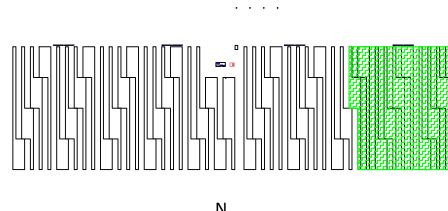
PARTIAL PLAN - STRINGING LAOUT PV_D SCALE: 1/16"=1'-0"

GENERAL NOTES:

- 1. EACH STRING SHALL BE LABELED AS DESIGNATED WITH SHRINK TUBE.
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TYPICAL ONE STRING DETAIL SCALE: NONE



KEY PLAN - OVERALL ARRAY

18OF 24



THIS LINE MEASURE (

10.21.2016 PV3.3

KEYED NOTES: 🗱

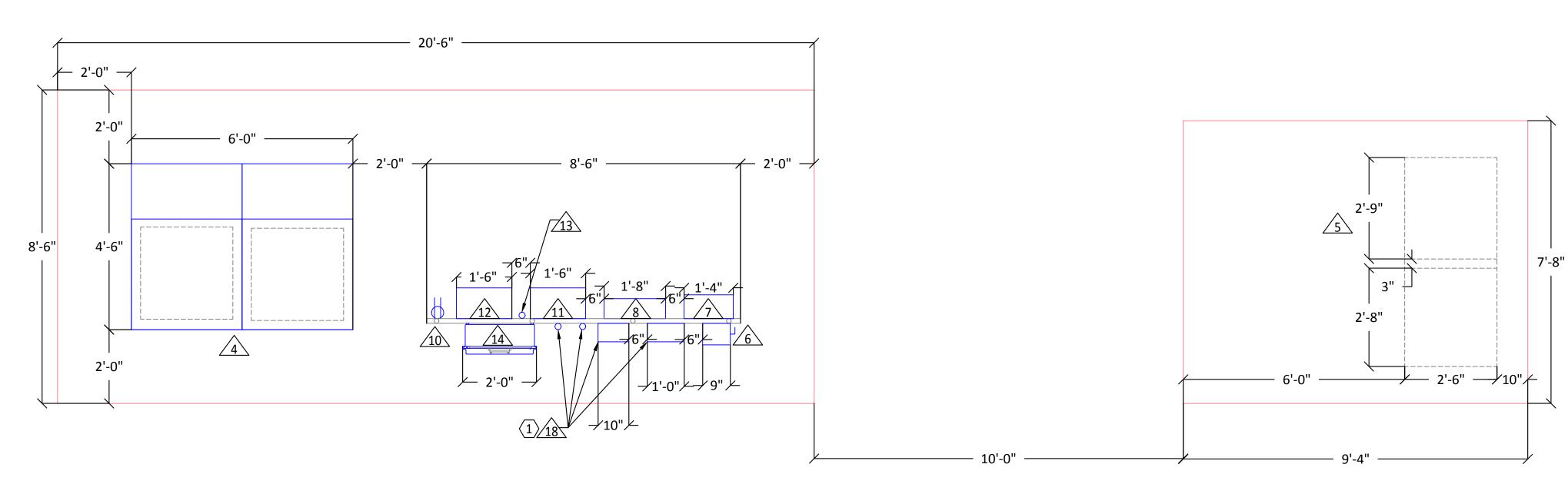
1. REPRESENTS GPS, WIND STOW SWITCH, SITE DATA AND 4X CONTROLLER LEFT TO RIGHT.

LINE TYPE LEGEND:	
CONCRETE PAD	
EQUIPMENT	
PROVIDED BY MANUFACTURER/ OTHERS	
CONDUIT WINDOW	

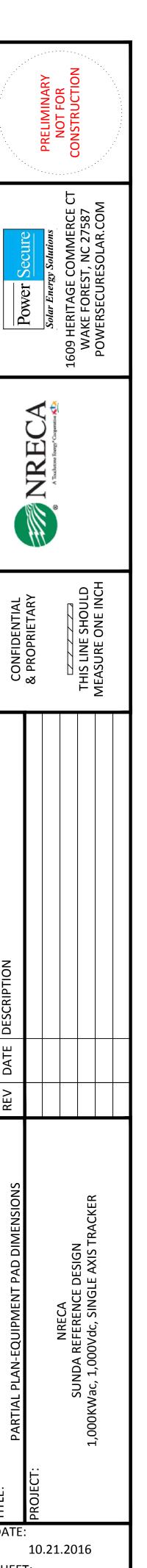
	1		EQUIPMENT SCHE **EQUIPMENT IS NO	
TAG 1	DESCRIPTION SOLAR PV MODULE	QUANTITY 4,000	MANUFACTURER	NOTES 315 WATT MODULE REFER TO MODULE SCHEDULE FOR SPECIFICATION. MODULES SHALL BE LABELED PER NEC 69
2	INVERTER	40	SCHNEIDER_ELECTRIC	25 KWATT, 3PHASE 480 VOLT (REFER TO INVERTER RATING SCHEDULE FOR SPECIFICATION)
3A-3D	PV DISTRIBUTION PANEL	1	SQUARE-D	PV DISTRIBUTION PANEL, 400 AMP BUS MAIN LUG ONLY. REFER TO PANEL SCHEDULE FOR ADDITIONAL SPECIFICATIONS.
4	PV_MDP	1	SQUARE-D	PV DISTRIBUTION PANEL, 1,600 AMP BUS WITH 1,600A MAIN CIRCUIT BREAKER. REFER TO PANEL SCHEDULE FOR ADDITIONAL SPECIFICATIONS.
5	MEDIUM VOLTAGE TRANSFORMER	1	ABB	1000 KVA, THREE PHASE, 12.47/7.2 KV YGRND PRIMARY, 480/277V YGRND SECONDARY. LIQUID COOLED, BAYONET FUSES ON PRIMARY SIDE.
6	DISCONNECT FOR AUXILIARY POWER PANEL	1	SQUARE-D	30 AMP 3 POLE FUSED DISCONNECT WITH (3) 15 AMP FUSES, NEMA 3R. PROVIDE STICKER LABEL TO BE VISIBLE WHEN FUSE IS REMOVED TO READ "MAX 15A".
7	5 KVA DISTRIBUTION TRANSFORMER	1	DONGAN	THREE PHASE GENERAL PURPOSE DRY TYPE TRANSFORMER PRIMARY VOLTS 480 VAC, SECONDARY VOLTS 208/120 VAC, NEMA 3R ENCAPSULATED ENCLOSURE
8	AUXILIARY POWER PANEL	1	SQUARE-D	AUXILARY PANEL BOARD, 100 AMP BUS WITH 20 AMP MAIN CIRCUIT BREAKER. REFER TO PANEL SCHEDULE FOR ADDITIONAL SPECIFICATIONS.
9	SURGE PROTECTION DEVICE	1	SQUARE-D	NEMA 4X RATING, INTEGRATED OVER CURRENT PROTECTION, MOUNTED DIRECTLY TO ENCLOSURE OF EQUIPMENT, MANUFACTURER PROVIDED INSTALLATION MANUAL SHALL BE FOLLOWED EXACTLY
10	RECEPTACLE	1	PASS & SEYMOUR	120V, 20 AMP, WEATHER PROOF GFI DUPLEX RECEPTACLE
11	PV MONITORING SWITCH	1	NETGEAR	SERIAL TO ETHERNET NETWORK SWITCH, PROVIDE IN NEMA 3R ENCLOSURE.
12	PV MONITORING SYSTEM	1	DRAKER	CENTRAL DATA ACQUISITION UNIT, NEMA 3R ENCLOSURE, LOCAL DATA STORAGE, INTEGRAL ETHERNET COMMUNICATIONS, WEB BASED DISPLAY AND LOCAL KEYPAD DISPLAY, PROVIDE 120V 1¢ POWER SUPPLY
13	PV METEOROLOGICAL STATION	1	DRAKER	STATION INCLUDES: PLANE OF ARRAY PYRANOMETER, GLOBAL HORIZONTAL IRRADIANCE PYRANOMETER, BACK OF MODULE TEMPERATURE SENSOR, AMBIENT TEMPERATURE, AND WIND SENSORS
14	MONITORING METER	1	SHARK 100	REVENUE GRADE METER IN NEMA 3R ENCLOSURE
15	MEDIUM VOLTAGE SWITCH	1	S&C	15KV PAD MOUNTED SWITCH WITH INTEGRATED 60A STANDARD SPEED FUSES.
16	COORDINATED POLE MOUNTED SWITCH	1	ABB	SWITCH TO MEET THE REQUIREMENT OF THE UTILITY
17	GROUND ROD	6	HARGER OR EQUAL	3/4" DIAMETER, 10'-0" LONG COPPER CLAD GROUND ROD
18	ATI RACKING ACCESSORIES	1	ATI	TO BE PROVIDED WITH ATI RACKING. INCLUDES (1) 4X CONTROLLER UNIT, (2) TRACKER MOTOR, (1) SITE DATA, (1) GPS AND (1) WIND STOW SWITCH

EQUIPMENT SCHEDULE NOTES:

1. SPECIFICED MANUFACTURE OR EQUIVALENT SHALL BE PROVIDED.



1 PARTIAL PLAN - EQUIPMENT PAD DIMENSIONS
SCALE: 1/2"=1'-0"



PV4.0

- 1		
	LINE TYPE LEGEND:	
	CONCRETE PAD	
	EQUIPMENT	
	PROVIDED BY MANUFACTURER/ OTHERS	
	CONDUIT WINDOW	
	AC FEEDERS	
	MEDIUM VOLTAGE FEEDERS	
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KEYED NOTES: XX

 REPRESENTS GPS, WIND STOW SWITCH, SITE DATA AND 4X CONTROLLER LEFT TO RIGHT.

			EQUIPMENT SCHE **EQUIPMENT IS NO	\wedge
TAG	DESCRIPTION	QUANTITY	MANUFACTURER	NOTES
1	SOLAR PV MODULE	4,000	REC	315 WATT MODULE REFER TO MODULE SCHEDULE FOR SPECIFICATION. MODULES SHALL BE LABELED PER NEC 690 VI
2	INVERTER	40	SCHNEIDER_ELECTRIC	25 KWATT, 3PHASE 480 VOLT (REFER TO INVERTER RATING SCHEDULE FOR SPECIFICATION)
3A-3D	PV DISTRIBUTION PANEL	1	SQUARE-D	PV DISTRIBUTION PANEL, 400 AMP BUS MAIN LUG ONLY. REFER TO PANEL SCHEDULE FOR ADDITIONAL SPECIFICATIONS.
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6	DISCONNECT FOR AUXILIARY POWER PANEL	1	SQUARE-D	30 AMP 3 POLE FUSED DISCONNECT WITH (3) 15 AMP FUSES, NEMA 3R. PROVIDE STICKER LABEL TO BE VISIBLE WHEN FUSE IS REMOVED TO READ "MAX 15A".
7	5 KVA DISTRIBUTION TRANSFORMER	1	DONGAN	THREE PHASE GENERAL PURPOSE DRY TYPE TRANSFORMER, PRIMARY VOLTS 480 VAC, SECONDARY VOLTS 208/120 VAC, NEMA 3R ENCAPSULATED ENCLOSURE
8	AUXILIARY POWER PANEL	1	SQUARE-D	AUXILARY PANEL BOARD, 100 AMP BUS WITH 20 AMP MAIN CIRCUIT BREAKER. REFER TO PANEL SCHEDULE FOR ADDITIONAL SPECIFICATIONS.
9	SURGE PROTECTION DEVICE	1	SQUARE-D	NEMA 4X RATING, INTEGRATED OVER CURRENT PROTECTION, MOUNTED DIRECTLY TO ENCLOSURE OF EQUIPMENT, MANUFACTURER PROVIDED INSTALLATION MANUAL SHALL BE FOLLOWED EXACTLY
10	RECEPTACLE	1	PASS & SEYMOUR	120V, 20 AMP, WEATHER PROOF GFI DUPLEX RECEPTACLE.
11	PV MONITORING SWITCH	1	NETGEAR	SERIAL TO ETHERNET NETWORK SWITCH, PROVIDE IN NEMA 3R ENCLOSURE.
12	PV MONITORING SYSTEM	1	DRAKER	CENTRAL DATA ACQUISITION UNIT, NEMA 3R ENCLOSURE, LOCAL DATA STORAGE, INTEGRAL ETHERNET COMMUNICATIONS, WEB BASED DISPLAY AND LOCAL KEYPAD DISPLAY, PROVIDE 120V 1¢ POWER SUPPLY
1 13	PV METEOROLOGICAL STATION	1	DRAKER	STATION INCLUDES: PLANE OF ARRAY PYRANOMETER, GLOBAL HORIZONTAL IRRADIANCE PYRANOMETER, BACK OF MODULE TEMPERATURE SENSOR, AMBIENT TEMPERATURE, AND WIND SENSORS
14	MONITORING METER	1	SHARK 100	REVENUE GRADE METER IN NEMA 3R ENCLOSURE
15	MEDIUM VOLTAGE SWITCH	1	S&C	15KV PAD MOUNTED SWITCH WITH INTEGRATED 60A STANDARD SPEED FUSES.
16	COORDINATED POLE MOUNTED SWITCH	1	ABB	SWITCH TO MEET THE REQUIREMENT OF THE UTILITY
17	GROUND ROD	6	HARGER OR EQUAL	3/4" DIAMETER, 10'-0" LONG COPPER CLAD GROUND ROD
18	ATI RACKING ACCESSORIES	1	ATI	TO BE PROVIDED WITH ATI RACKING. INCLUDES (1) 4X CONTROLLER UNIT, (2) TRACKER MOTOR, (1) SITE DATA, (1) GPS AND (1) WIND STOW SWITCH

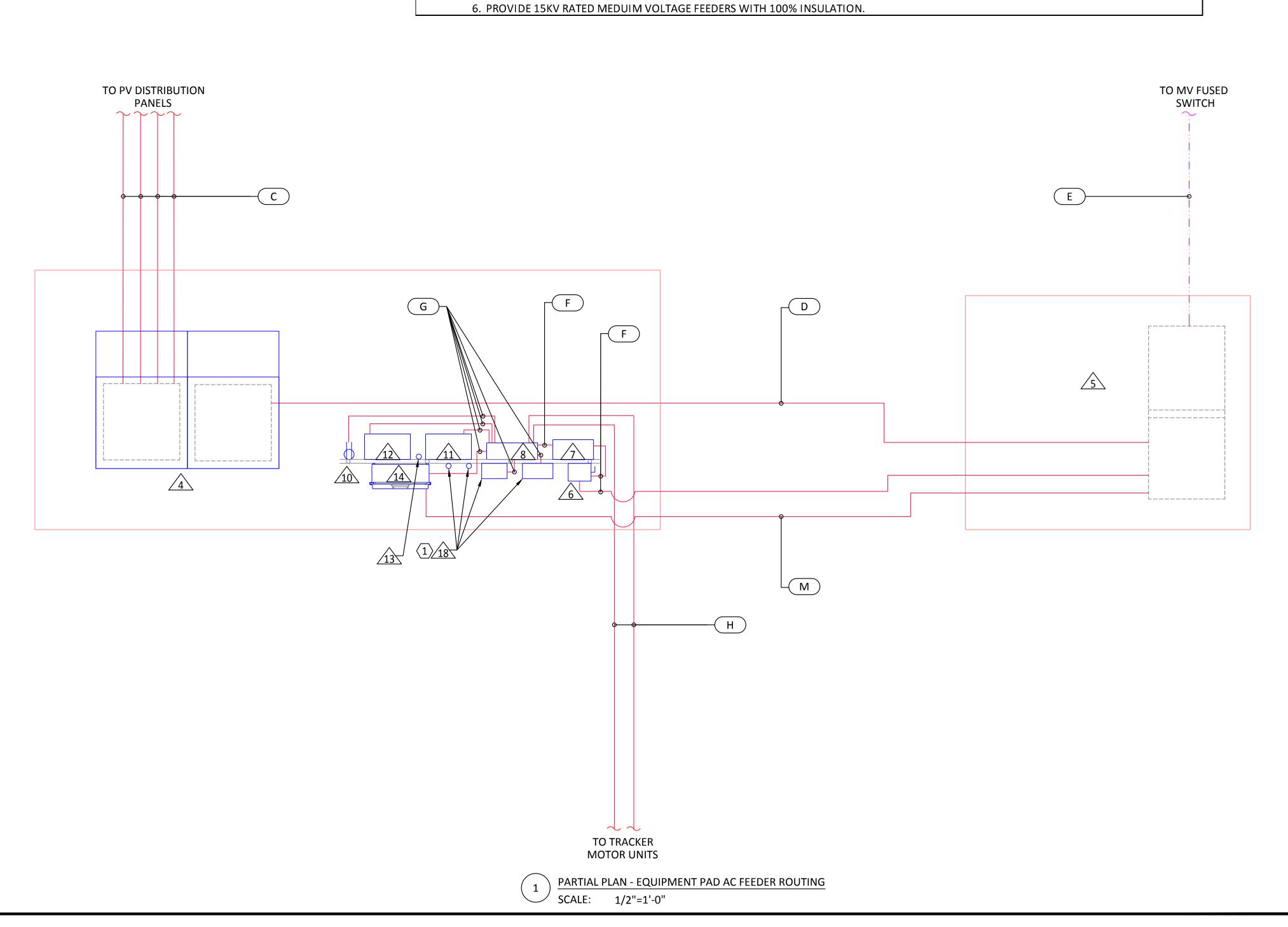
	QUIPN	ΛENT S	CHEDULE	NOTES:
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1. SPECIFICED MANUFACTURE OR EQUIVALENT SHALL BE PROVIDED.

					:	FEEDER SC **FEEDER IS			A			
TAG		PHA	ASE			NEUTR	AL	GROUND			INSULATION	RACEWAY SIZE
Α	(1) SET OF #NO	OTE1 (2) - (10)	#10	COPPER				(1)	#10	COPPER	PV	1-1/2"
В	(1) SET OF	(3)	#8	COPPER	(1)	#8	COPPER	(1)	#8	COPPER	THWN-2	1"
С	(2) SET OF	(3)	250 KCMIL	ALUMINUM	(1)	250 KCMIL	ALUMINUM	(1)	#1	ALUMINUM	THWN-2	2-1/2"
D	(6) SET OF	(3)	500 KCMIL	ALUMINUM	(1)	500 KCMIL	ALUMINUM	(1)	350 KCMIL	ALUMINUM	THWN-2	3-1/2"
E ^{NOTE#6}	(1) SET OF	(3)	#1/0	ALUMINUM							MV TR-XLPE WITH CONCENTRIC NEUTRAL	4"
F	(1) SET OF	(3)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
G	(1) SET OF	(1)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
Н	(1) SET OF	(2)	#12	COPPER				(1)	#12	COPPER	THWN-2	3/4"
I					RS	S-485: BELDE	N 3107A					3/4"
J					Р	ROVIDED BY	' DRAKER					3/4"
K	CONTROL WIRES PROVIDED BY ATI									3/4"		
L								(1)	#6	COPPER	BARE	
М	(1) SET OF	(7)	#12	COPPER							THWN-2	3/4"
N			CAT:	5E OR CAT6 ET	THERI	NET CABLE: B	ELDEN 7937A	OR E	QUIVALENT			3/4"
0					_			(1)	#3/0	COPPER	BARE	

FEEDER SCHEUDLE NOTES:

- 1. (#) DENOTES QUANTITY OF DC PHASE WIRES TO BE PROVIDED.
- 2. WHERE MULITPLE CONDUITS ARE NOTED, THE RACEWAYS SHALL BE PROVIDED IN PARALLEL.
- 3. REFER TO RACEWAY APPLICATION SCHEDULE FOR RACEWAY TYPE.
- 4. ALL RACEWAY SIZES ARE NEC MINIMUM REQUIREMENTS, LARGER CONDUITS ARE PERMITED FOR EASE OF INSTALLATION.
- 5. PV SOURCE CIRCUITS SHALL NOT BE REQUIRED TO BE IN RACEWAY IF CONDUCTORS ARE NOT READILY ACCESSIBLE AND NOT EXPOSED TO PHYSICAL DAMAGE. BELOW GRADE PV SOURCE CIRCUITS SHALL BE IN RACEWAY.





Power Secure

Solar Energy Solutions

1609 HERITAGE COMMERCE C

WAKE FOREST, NC 27587

POWERSECURESOLAR.COM



& PROPRIETARY

THIS LINE SHOULD

MEASURE ONE INCH

NRECA JNDA REFERENCE DESIGN c, 1,000Vdc, SINGLE AXIS TRACKER

PROJECT: 1,0

DATE: 10.21.2016

PV4.1

LINE TYPE LEGEND:	
CONCRETE PAD	
EQUIPMENT	
PROVIDED BY MANUFACTURER/ OTHERS	
CONDUIT WINDOW	
COMMUNICATIONS	

KEYED NOTES: (XX)

 REPRESENTS GPS, WIND STOW SWITCH, SITE DATA AND 4X CONTROLLER LEFT TO RIGHT.

			EQUIPMENT SCHE **EQUIPMENT IS NO	
TAG	DESCRIPTION	QUANTITY	MANUFACTURER	NOTES
1	SOLAR PV MODULE	4,000	REC	315 WATT MODULE REFER TO MODULE SCHEDULE FOR SPECIFICATION. MODULES SHALL BE LABELED PER NEC 690 VI
2	INVERTER	40	SCHNEIDER_ELECTRIC	25 KWATT, 3PHASE 480 VOLT (REFER TO INVERTER RATING SCHEDULE FOR SPECIFICATION)
3A-3D	PV DISTRIBUTION PANEL	1	SQUARE-D	PV DISTRIBUTION PANEL, 400 AMP BUS MAIN LUG ONLY. REFER TO PANEL SCHEDULE FOR ADDITIONAL SPECIFICATIONS.
4	PV_MDP	1	SQUARE-D	PV DISTRIBUTION PANEL, 1,600 AMP BUS WITH 1,600A MAIN CIRCUIT BREAKER. REFER TO PANEL SCHEDULE FOR ADDITIONAL SPECIFICATIONS.
5	MEDIUM VOLTAGE TRANSFORMER	1	ABB	1000 KVA, THREE PHASE, 12.47/7.2 KV YGRND PRIMARY, 480/277V YGRND SECONDARY. LIQUID COOLED, BAYONET FUSES ON PRIMARY SIDE.
6	DISCONNECT FOR AUXILIARY POWER PANEL	1	SQUARE-D	30 AMP 3 POLE FUSED DISCONNECT WITH (3) 15 AMP FUSES, NEMA 3R. PROVIDE STICKER LABEL TO BE VISIBLE WHEN FUSE IS REMOVED TO READ "MAX 15A".
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12	PV MONITORING SYSTEM	1	DRAKER	CENTRAL DATA ACQUISITION UNIT, NEMA 3R ENCLOSURE, LOCAL DATA STORAGE, INTEGRAL ETHERNET COMMUNICATIONS, WEB BASED DISPLAY AND LOCAL KEYPAD DISPLAY, PROVIDE 120V 1¢ POWER SUPPLY
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14	MONITORING METER	1	SHARK 100	REVENUE GRADE METER IN NEMA 3R ENCLOSURE
15	MEDIUM VOLTAGE SWITCH	1	S&C	15KV PAD MOUNTED SWITCH WITH INTEGRATED 60A STANDARD SPEED FUSES.
16	COORDINATED POLE MOUNTED SWITCH	1	ABB	SWITCH TO MEET THE REQUIREMENT OF THE UTILITY
17	GROUND ROD	6	HARGER OR EQUAL	3/4" DIAMETER, 10'-0" LONG COPPER CLAD GROUND ROD
18	ATI RACKING ACCESSORIES	1	ATI	TO BE PROVIDED WITH ATI RACKING. INCLUDES (1) 4X CONTROLLER UNIT, (2) TRACKER MOTOR, (1) SITE DATA, (1) GPS AND (1) WIND STOW SWITCH

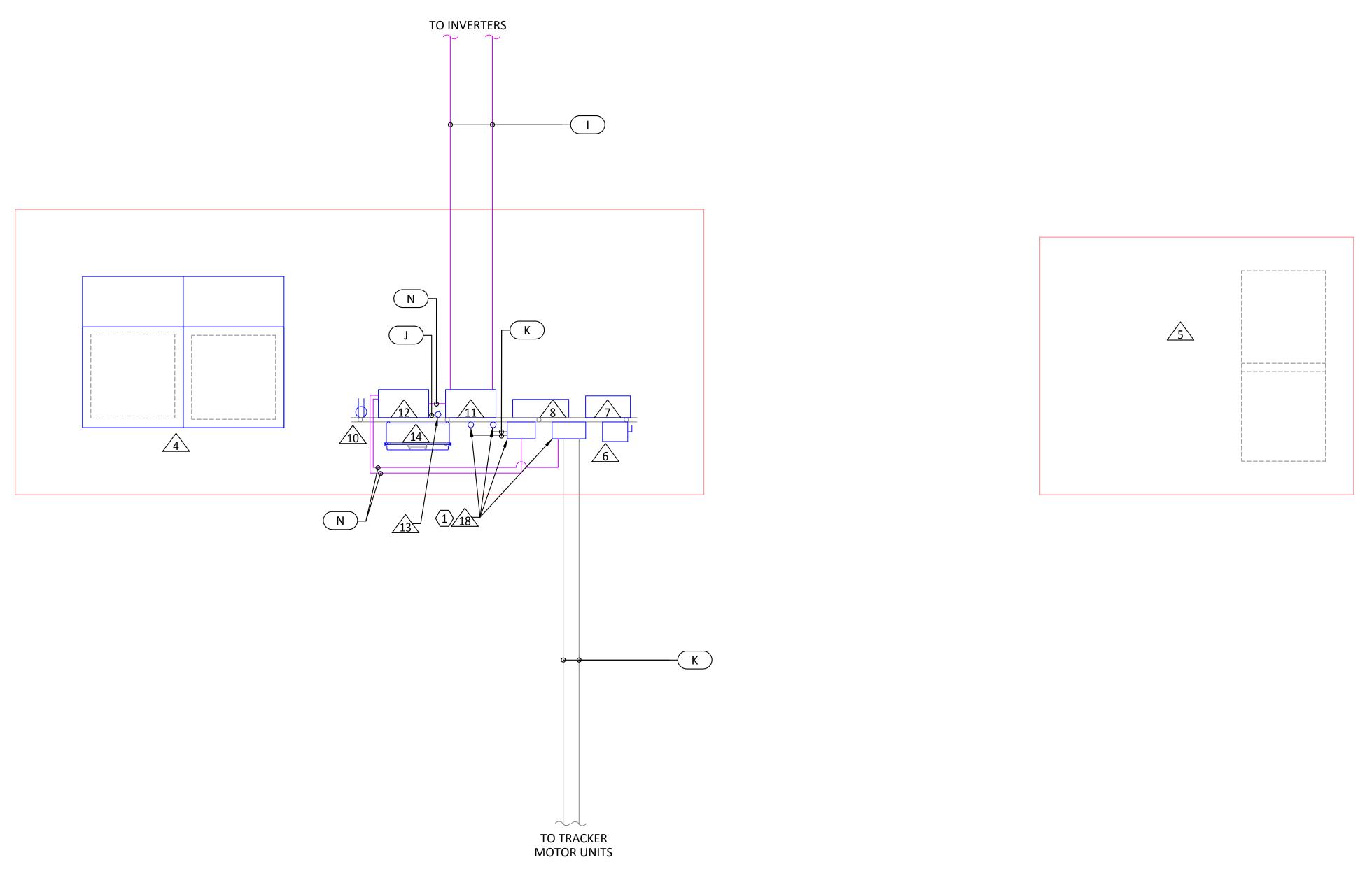
EQUIPMENT SCHEDULE NOTES:

1. SPECIFICED MANUFACTURE OR EQUIVALENT SHALL BE PROVIDED.

					3	FEEDER SC **FEEDER IS			A			
TAG		PHA	ASE			NEUTR	AL		GROU	ND	INSULATION	RACEWAY SIZE
Α	(1) SET OF #NOTE1	(2) - (10)	#10	COPPER				(1)	#10	COPPER	PV	1-1/2"
В	(1) SET OF	(3)	#8	COPPER	(1)	#8	COPPER	(1)	#8	COPPER	THWN-2	1"
С	(2) SET OF	(3)	250 KCMIL	ALUMINUM	(1)	250 KCMIL	ALUMINUM	(1)	#1	ALUMINUM	THWN-2	2-1/2"
D	(6) SET OF	(3)	500 KCMIL	ALUMINUM	(1)	500 KCMIL	ALUMINUM	(1)	350 KCMIL	ALUMINUM	THWN-2	3-1/2"
E ^{NOTE#6}	(1) SET OF	(3)	#1/0	ALUMINUM							MV TR-XLPE WITH CONCENTRIC NEUTRAL	4"
F	(1) SET OF	(3)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
G	(1) SET OF	(1)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
Н	(1) SET OF	(2)	#12	COPPER				(1)	#12	COPPER	THWN-2	3/4"
I					RS	S-485: BELDE	N 3107A					3/4"
J					Р	ROVIDED BY	DRAKER					3/4"
K				CC	ONTRO	OL WIRES PR	OVIDED BY A	ΓΙ				3/4"
L								(1)	#6	COPPER	BARE	
M	(1) SET OF	(7)	#12	COPPER							THWN-2	3/4"
N			CAT:	SE OR CAT6 ET	THERI	NET CABLE: B	ELDEN 7937A	OR E	QUIVALENT			3/4"
0								(1)	#3/0	COPPER	BARE	

FEEDER SCHEUDLE NOTES:

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- 6. PROVIDE 15KV RATED MEDUIM VOLTAGE FEEDERS WITH 100% INSULATION.



 $\frac{1}{S}$

PARTIAL PLAN - EQUIPMENT PAD COMMUNICATIONS FEEDER ROUTING

 $\frac{1}{\text{SCALE:}} \frac{\text{PARTIAL PLAN - EQUIPN}}{1/2"=1'-0"}$

PRELIMINARY NOT FOR CONSTRUCTION

Solar Energy Solutions
1609 HERITAGE COMMERCE C
WAKE FOREST, NC 27587
POWERSECURESOLAR.COM



CATIONS FEEDER ROUTING

REV DATE DESCRIPTION

& PR

& PR

SIGN

AXIS TRACKER

MEASU

10.21.2016 HEET:

PV4.2

210F 24

LINE TYPE LEGEND:	
CONCRETE PAD	
EQUIPMENT	
PROVIDED BY MANUFACTURER/ OTHERS	
CONDUIT WINDOW	
GROUND FEEDERS	

KEYED NOTES: (XX)

- 1. PROVIDE IRREVERSIBLE BOND TO GROUND RING.
- REPRESENTS GPS, WIND STOW SWITCH, SITE DATA AND 4X CONTROLLER LEFT TO RIGHT.

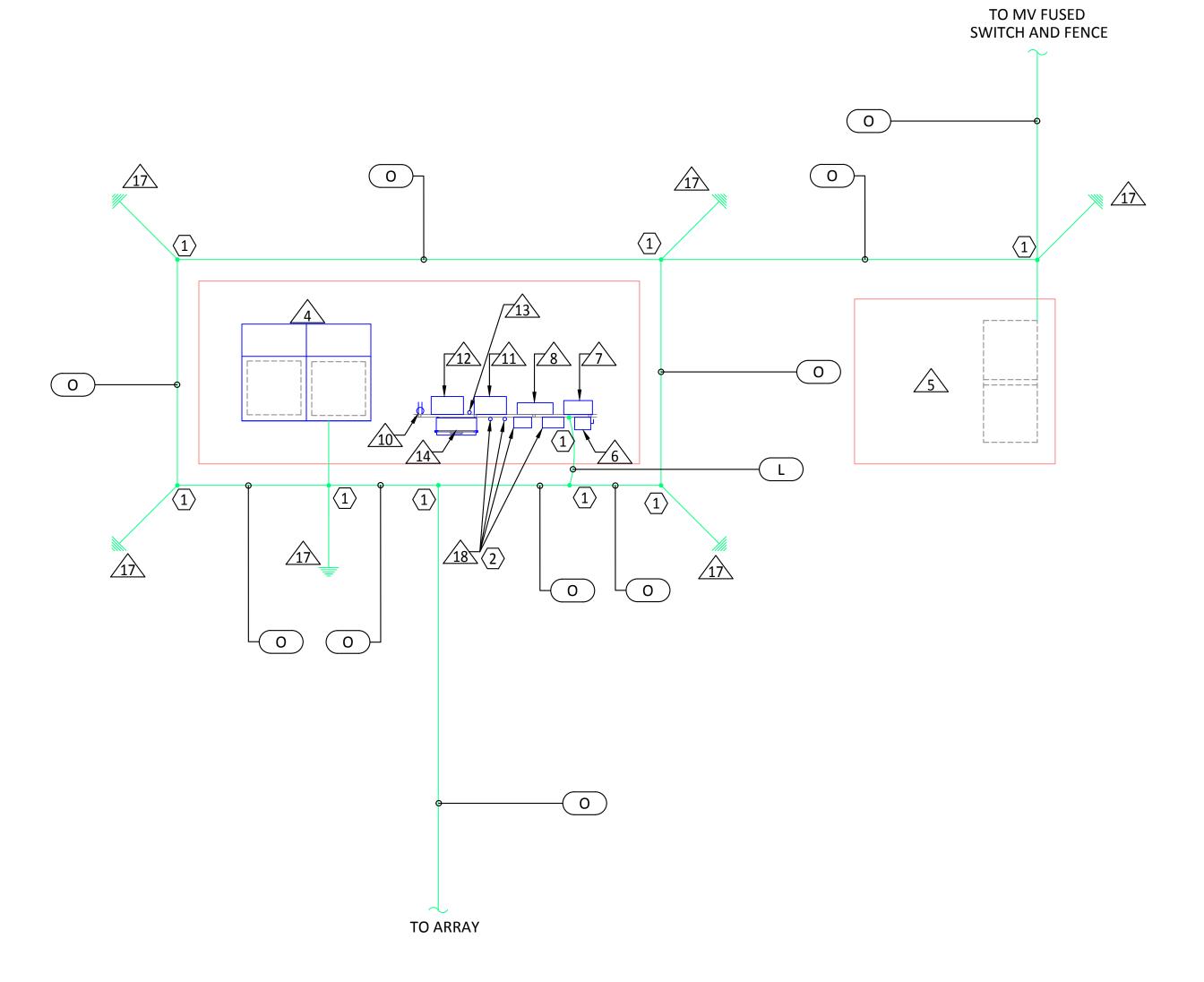
			EQUIPMENT SCHE **EQUIPMENT IS NO	
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EQUIPMENT SCHEDULE NOTES:

FEEDER SCHEDULE **FEEDER IS NOTED BY A												
TAG		РНА	SE			NEUTR	AL		GROU	ND	INSULATION	RACEWAY SIZE
Α	(1) SET OF #NOTE1	(2) - (10)	#10	COPPER				(1)	#10	COPPER	PV	1-1/2"
В	(1) SET OF	(3)	#8	COPPER	(1)	#8	COPPER	(1)	#8	COPPER	THWN-2	1"
С	(2) SET OF	(3)	250 KCMIL	ALUMINUM	(1)	250 KCMIL	ALUMINUM	(1)	#1	ALUMINUM	THWN-2	2-1/2"
D	(6) SET OF	(3)	500 KCMIL	ALUMINUM	(1)	500 KCMIL	ALUMINUM	(1)	350 KCMIL	ALUMINUM	THWN-2	3-1/2"
E ^{NOTE#6}	(1) SET OF	(3)	#1/0	ALUMINUM							MV TR-XLPE WITH CONCENTRIC NEUTRAL	4"
F	(1) SET OF	(3)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
G	(1) SET OF	(1)	#12	COPPER	(1)	#12	COPPER	(1)	#12	COPPER	THWN-2	3/4"
Н	(1) SET OF	(2)	#12	COPPER				(1)	#12	COPPER	THWN-2	3/4"
I					RS	S-485: BELDE	N 3107A					3/4"
J PROVIDED BY DRAKER							3/4"					
K	K CONTROL WIRES PROVIDED BY ATI							3/4"				
L								(1)	#6	COPPER	BARE	
М	(1) SET OF	(7)	#12	COPPER							THWN-2	3/4"
N								3/4"				
0								(1)	#3/0	COPPER	BARE	

FEEDER SCHEUDLE NOTES:

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- 6. PROVIDE 15KV RATED MEDUIM VOLTAGE FEEDERS WITH 100% INSULATION.



1 PARTIAL PLAN - EQUIPMENT PAD GROUNDING SCALE: 1/4"=1'-0"



Solar Energy Solutions
1609 HERITAGE COMMERCE C
WAKE FOREST, NC 27587
POWERSECURESOLAR COM

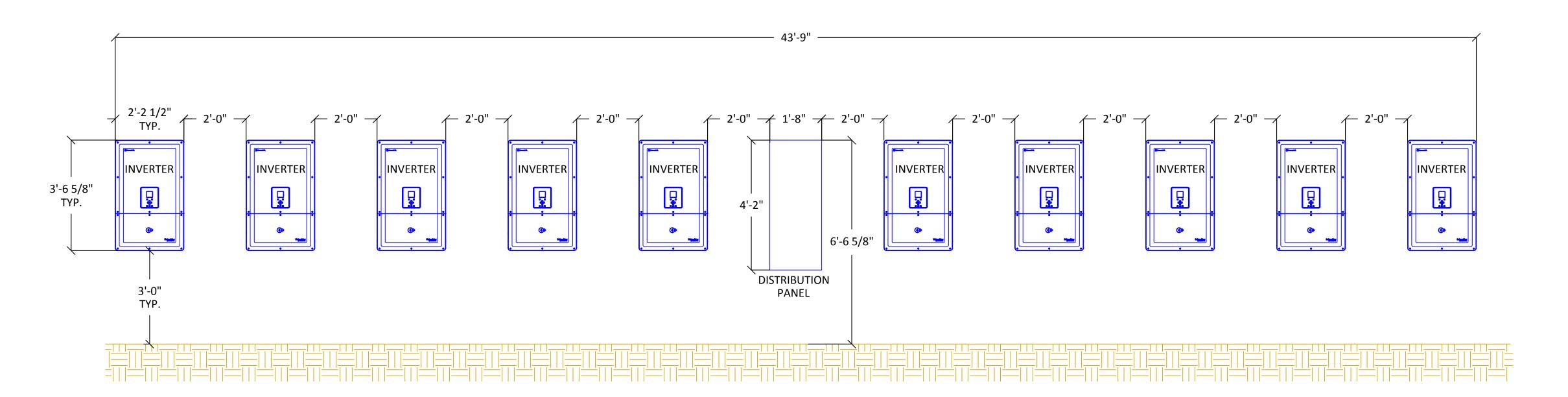


10.21.2016

PV4.3

^{1.} SPECIFICED MANUFACTURE OR EQUIVALENT SHALL BE PROVIDED.

1. TYPICAL (10) INVERTERS AND (1) PV DISTRIBUTION PANEL ELEVATION APPLIES IN 4 UNIQUE LOCATIONS: INVERTERS A1-A10 & PV_A INVERTERS B1-B10 & PV_B INVERTERS C1-C10 & PV_C AND INVERTERS D1-D10 & PV_D.



1 TYPICAL (10) INVERTERS AND (1) PV DISTRIBUTION PANEL ELEVATION SCALE: NTS

PRELIMINARY NOT FOR CONSTRUCTION

Power Secure
Solar Energy Solutions
1609 HERITAGE COMMERCE
WAKE FOREST, NC 27587



& PROPRIETARY

THIS LINE SHOULD

MEASURE ONE INCH

REV DATE DESCRIPTION

NRECA
SUNDA REFERENCE DESIGN
1,000KWac, 1,000Vdc, SINGLE AXIS TRACKER

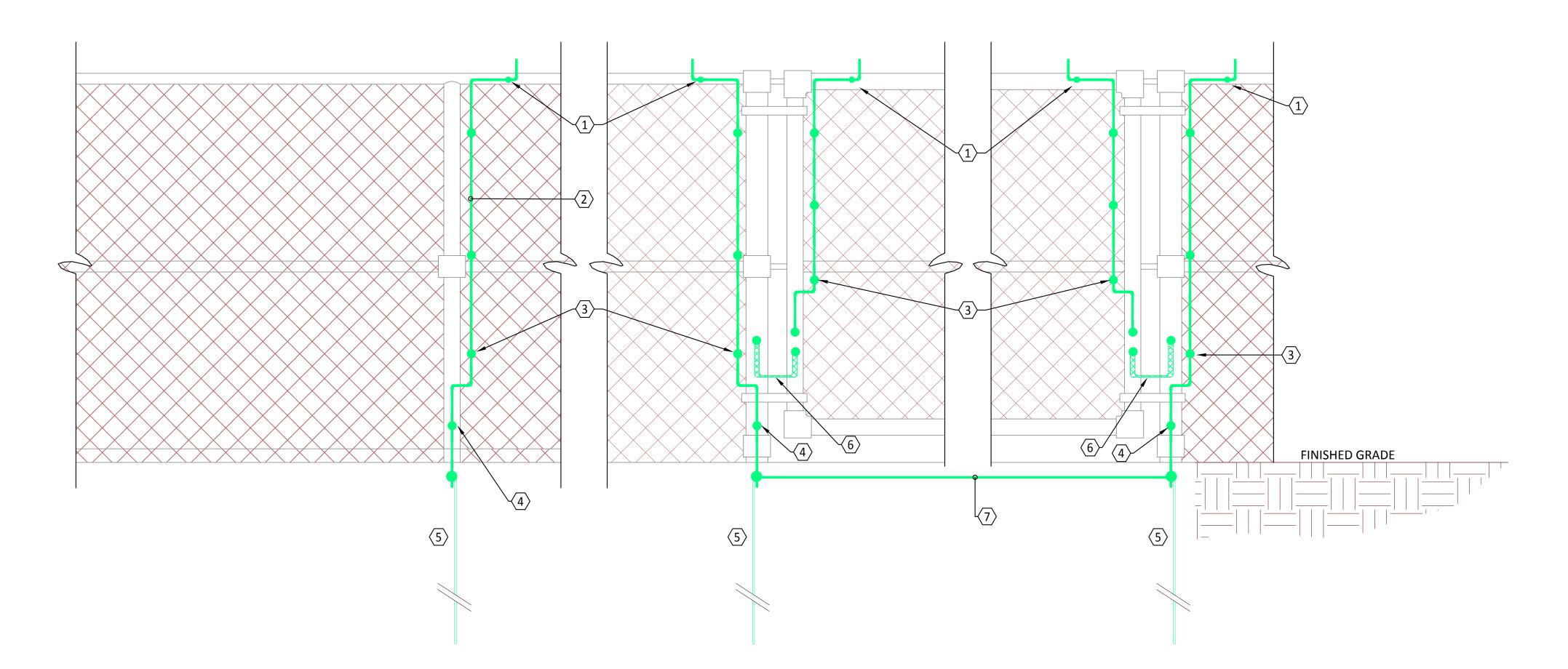
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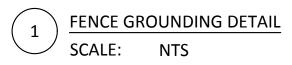
PV5.0

- 1. ALL FENCE GROUNDING POINTS SHALL BE LOCATED WITHIN FENCE PERIMETER.
- 2. GROUND CORNER POSTS AND ADDITIONAL POSTS AT 500' INTERVAL.
- 3. GROUND ALL GATE POSTS.

KEYED NOTES:

- 1. PROVIDE EXOTHERMIC WELD TO TOP RAIL.
- 2. #6 BARE COPPER WIRE, TYPICAL UNLESS NOTED OTHERWISE.
- 3. PROVIDE SPLIT BOLT TO CONNECT WIRE TO FENCE FABRIC.
- 4. PROVIDE EXOTHERMIC WELD TO FENCE POST.
- 5. 3/4" X 10' COPPER CLAD GROUND ROD BONDED TO BARE COPPER.
- 6. FLEXIBLE GROUND BRAID SECURED TO GATE.
- 7. GATES SHALL BE BONDED TOGETHER.







Power Secure

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1609 HERITAGE COMMERCE

WAKE FORFST NC 27587



THIS LINE SHOULD
MEASURE ONE INCH

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NRECA SUNDA REFERENCE DESIGN 1,000KWac, 1,000Vdc, SINGLE AXIS TRACKER

PROJECT:

10.21.2016

PV5.1