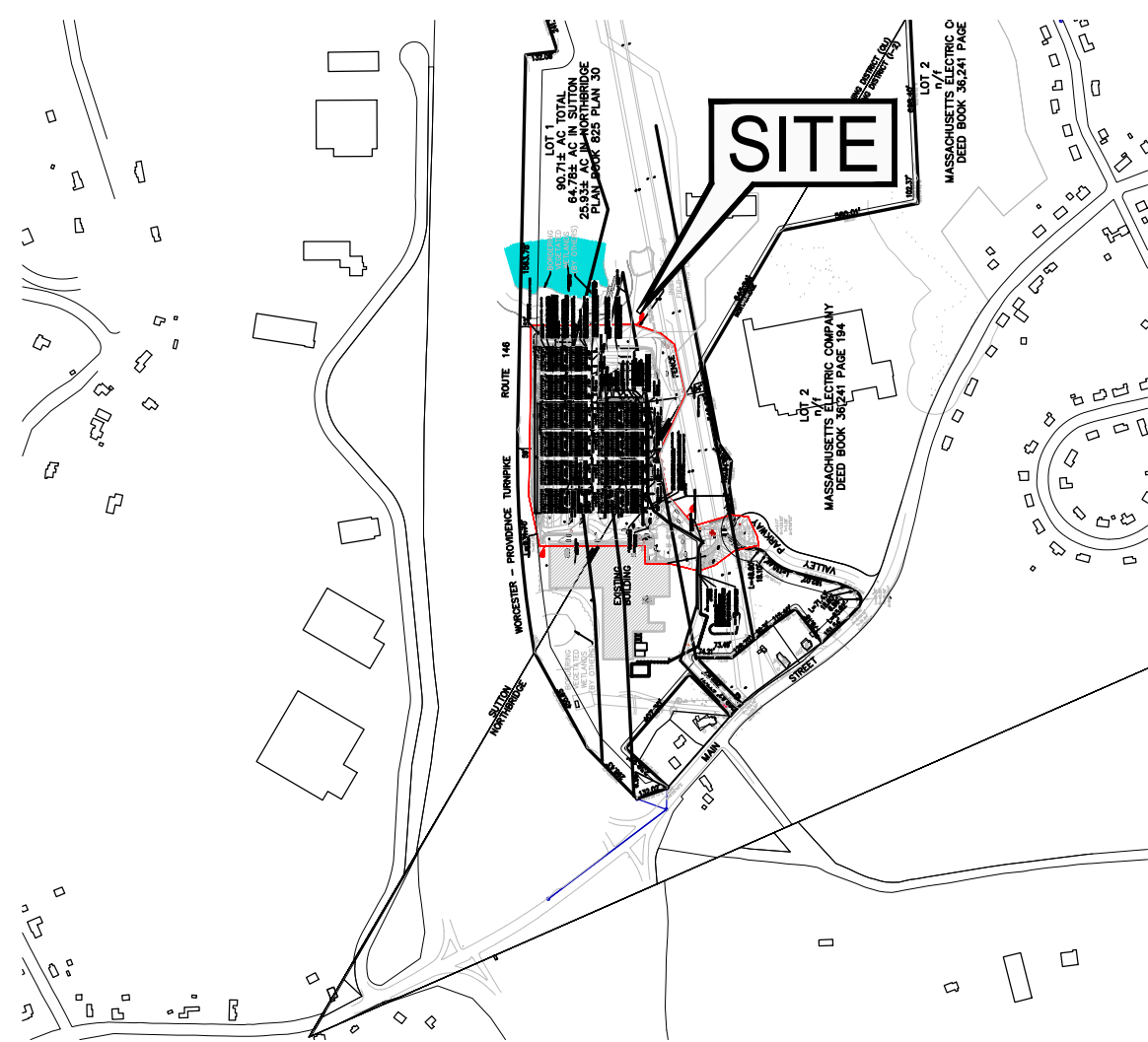


**NEDC GENERATION STATION**  
**AS-BUILT DRAWINGS**  
( 13.8-KV CLASS INTERCONNECTION / 4970 KW AC CAPACITY )

**1152 MAIN STREET**  
**NORTHBRIDGE, MA 01588**

**SITE LOCATION**



0 2000  
SCALE IN FEET  
USGS QUADRANGLE MAP

LIST OF DRAWINGS	
FIGURE NO.	DRAWING TITLE
E-1	ELECTRICAL OVERVIEW
E-2	ELECTRICAL SINGLE-LINE DIAGRAM
E-3	DATA ACQUISITION AND CONTROL SINGLE-LINE DIAGRAM
E-4A	PROTECTION LOGIC DIAGRAM
E-4B	RFL DTT RELAY DC SCHEMATIC & PROTECTION LOGIC DIAGRAM
E-5A	THREE-LINE DIAGRAM: PV STRINGS & COMBINER BOX
E-5B	THREE-LINE DIAGRAM: SOLAR INVERTERS
E-5C	THREE-LINE DIAGRAM: BATTERY & STORAGE INVERTERS
E-6	THREE-LINE DIAGRAM: MEDIUM VOLTAGE AND PROTECTION SYSTEMS
E-7A	ELECTRICAL EQUIPMENT SITE PLAN
E-7B	STRING PLAN
E-7C	CONDUIT PLAN
E-8A	INTERCONNECTION PAD DETAIL
E-8B	SOLAR INVERTER PAD DETAIL
E-8C	STATIONARY BATTERY EQUIPMENT DETAIL
E-8D	MOBILE BATTERY PAD DETAIL
E-9	GENERAL DETAILS
E-10	GROUNDNG AND BONDING DETAIL
E-11	ELECTRICAL NOTES & PLAQUES
E-12	ELECTRICAL DIRECTORIES
E-13	SITE PLAN VERIZON

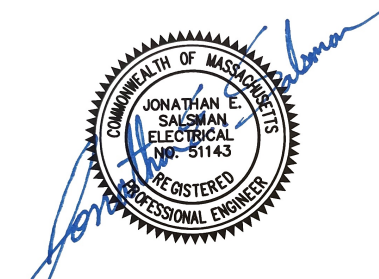

**SITE ACCESS:**  
**NATIONAL GRID**  
**100 VALLEY PARKWAY**  
**NORTHBRIDGE, MA 01588**

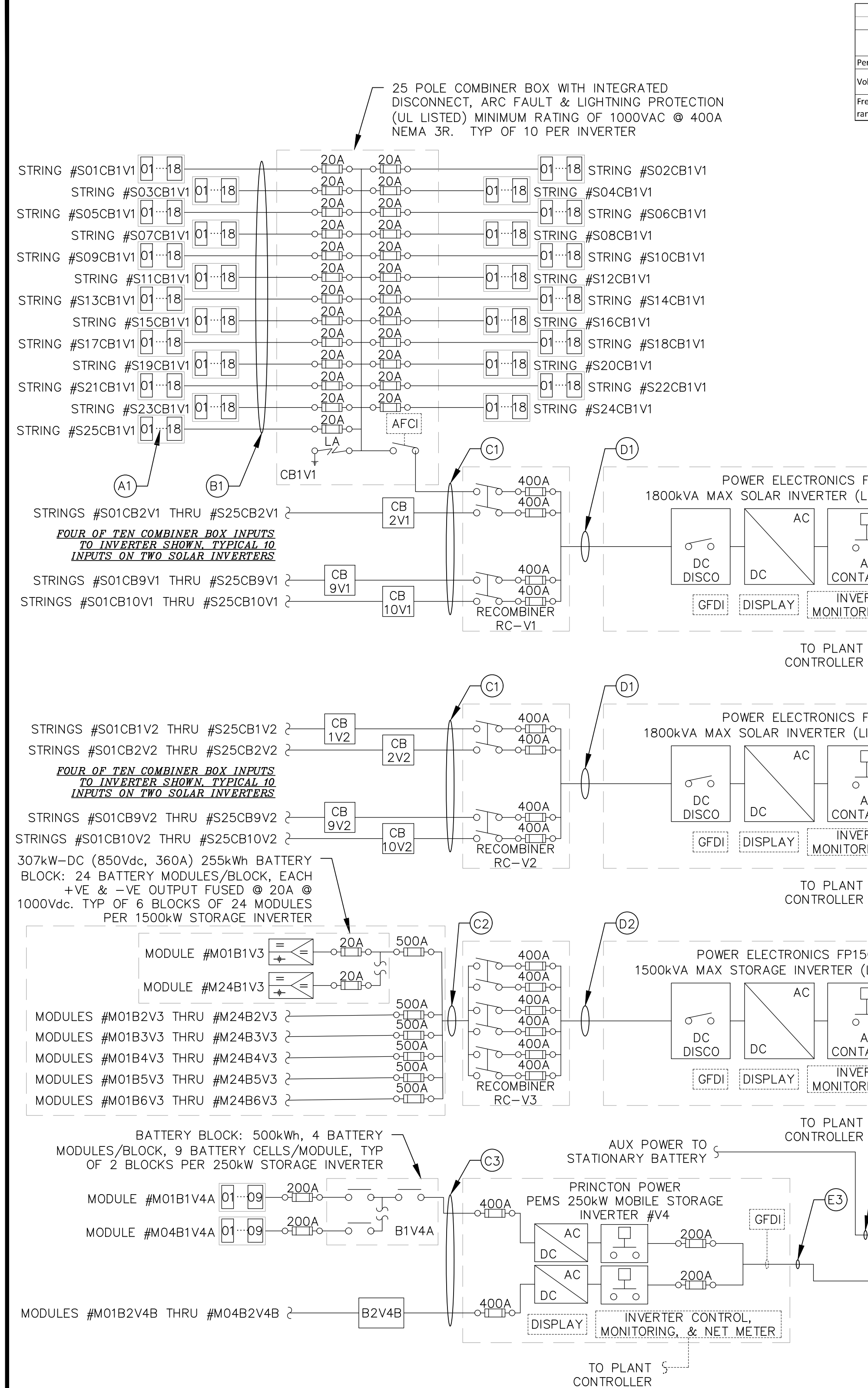
**AS-BUILT DRAWINGS**  
**JULY 28, 2022**

**PREPARED FOR:**  
**NATIONAL GRID**

**PREPARED BY:**



		Digital Signature on 7/28/2022 by Jonathan E. Salsman	
—	7/28/2022	AS-BUILT	
REV. #	DATE	DESCRIPTION OF REVISION	
<div>  <div>           INDUSTRIA ENGINEERING, INC.            91 CEDAR STREET            MILFORD, MA 01757         </div> </div>			
TITLE			
ELECTRICAL OVERVIEW			
PROJECT			
NEDC GENERATION STATION			
SITE			
1152 MAIN ST, NORTHBBRIDGE, MA			
CLIENT			
NATIONAL GRID SOLAR — NEDC			
DESIGNED GM	CHECKED JS	FILENAME NEDC_ASUBILT	DATE 07/28/2022
			FIGURE E-1



Utility Restoration				
Enter into Service Criteria				
Enter service criteria		SEL - 651R	Solar Inverters	Storage Inverters
Permit service (after 5min within ranges below)		Enabled	Enabled	Enabled
Voltage within range	Min Voltage (0.95 PU)	113.5	380.0	456.0
	Max Voltage (1.05 PU)	125.5	420.0	504.0
Frequency within range	Min Freq. (Hz)	59.5	59.5	59.5
	Max Freq. (Hz)	60.5	60.5	60.5

Proposed Relay Settings																
Component	Base Info**		Relay Element*													
	Freq (Hz)	Voltage (V)	81U (Fast)		81U (Slow)		81O (Fast)		81O (Slow)		27 (0.50 PU)		27 (0.88 PU)		59 (1.10 PU)	
			Freq	Pick Up & Clear(s)	Freq	Pick Up & Clear(s)	Freq	Pick Up & Clear(s)	Freq	Pick Up & Clear(s)	Volt	Pick Up & Clear(s)	Volt	Pick Up & Clear(s)	Volt	Pick Up & Clear(s)
Solar Inverters	60	400	56.5	0.09	58.5	299.93	62.0	0.09	61.2	299.93	200.0	1.03	352.0	1.93	440.0	0.09
				0.16		300.00		0.16		300.00		1.10		2.00	480.0	0.16
Storage Inverters	60	480	56.5	0.09	58.5	299.93	62.0	0.09	61.2	299.93	240.0	1.03	422.4	1.93	528.0	0.09
				0.16		300.00		0.16		300.00		1.10		2.00	576.0	0.16
SEL - 651R		119.51	56.5	0.11	58.5	299.95	62.0	0.11	61.2	299.95	59.75	1.05	105.17	1.95	131.46	0.11
				0.16		300.00		0.16		300.00		1.10		2.00	143.41	0.16

\*For each protective element the relay Pick Up time & Total Clear time are shown. Total Clear time includes relay pick up time and electrical device clearing time. Inverters have a electrical device clearing time of 70 milliseconds. Recloser (denoted by SEL-651R) has an electrical clearing time of 50 milliseconds. All settings comply with National Grid Solar Phase III requirements and have been previously approved by the interconnection department.

\*\*Base voltage is derived by the following:  $[(13800/1.7321)/2500]^{*}(300/8) = 119.51V$  & CTR is 200:1

\*\*\*51C & 51G are voltage controlled elements. Voltage controlled element use the 27(Slow) element to provide the voltage control pick up. All current elements subject to change based upon final coordination study. Min pickup for 51C = 0.1

DC SYSTEM SPECIFICATIONS																
Inverter #	ID	Qty	Voltage		Current		Fuse		Conductors*		Conduit**		Distance (ft)	VD (%)		
			Voc	Vmp	Isc	Imp	(A)	Size	Parallel	Type	Qty	Contents				
Solar Inverters	A1	9,000	55.1	40.6	10.47	9.86	20	12	1	PV (Cu)	1	Module leads, In Free Air				
	B1	500					20	10	1	PV (Cu)	1	(50) 10, (1) EGC	200	0.70		
	C1	20	991	731	262	247	400	400	2	PV	3	4" RMC / PVC	1	(4) 400, (1) EGC	725	1.29
	D1	2			2618	2465						DC BUS from recombiner to inverter				
Storage Inverters*	C2	6	850 / 790	-	360	-	400 / 500					DC BUS from battery to recombiner				
	C3											MANUFACTURER DESIGN, WIRED, & LISTED				
	D2	1	850 / 790	-	2278 / 2255	-						DC BUS from recombiner to inverter				

\*All current carrying conductors <1/0 to be Cu & >= 1/0 to be AL unless otherwise noted. All equipment grounding conductors (EGC) to be bare stranded copper, EGC exposed to be jacketed copper.

\*\*All exposed above grade conduit shall be type RMC minimum and is allowed to transition to SCH 40 PVC below grade after RMC sweep.

\*\*\*All Voc values are temperature adjusted based on project location per NEC 690.7.

++Storage inverter DC bus voltage & current is dependent on the operational state of the system. See operations manual for further details

AC SYSTEM SPECIFICATIONS																
Component	ID	Voltage (V)	Current (A)	Power (kW)	Protect (A)	Conductors <sup>(1)</sup>		EGC	Size	Type	Qty	Contents/Conduit	Distance (ft)	VD (%)		
						Parallel	Type									
Solar Inverters	E1	400	2324	1,610	Internal	Direct 3-phase throat connection (BUS) from inverter to transformer with 500kVCM (Cu) EGC in 3" conduit										
	E2		1804	1,500	Internal	Direct 3-phase throat connection (BUS) from inverter to transformer with 350kVCM (Cu) EGC in 3" conduit										
Mobile Storage Inverter	E3	301	250	400	2/0	2	Type-W (Cu)	6"	TRAY	2	(6) Hot, (2) NTRL, (1) EGC	50	0.43			
Aux Power	F4	120	100	150	2/0	1	XHHW-2	6"	3"	RMC	1	(3) Hot, (1) NTRL, (1) EGC	50	0.35		
Mobile Storage Service	E5	361	300	600	4/0	3	XHHW-2	2	4"	PVC	3	(3) Hot, (1) NTRL, (1) EGC	50	0.15		
Ground Reactors	F1	33	N/A	Relay				3"	PVC	1	(1) NTRL, (1) EGC	50	N/A			
Transformer #1	G1	226	5,400								6		100	0.03		
Transformer #2	G2	151	3,600		100/165						2		75	0.01		
Transformer #3	G3	75	1,800								2		150	0.01		
Transformer #4	G4	13	300		40/80						2	(3) Hot, (1) Concent. NTRL, (1) EGC	75	0.00		
Service	H	226	5,400	Relay							2		75	0.02		

1) All current carrying conductors <1/0 to be Cu & >= 1/0 to be AL unless otherwise noted. All equipment grounding conductors (EGC) to be bare stranded copper, EGC exposed to be jacketed copper.

2) Exposed above grade conduit at equipment pads shall be type RMC with transition to PVC below grade after RMC Sweep. All 15kV class circuits to have (1) spare conduit

3) MV105 URO-J (133%): Underground primary distribution cable. 133% insulation level & each phase cable has a 1/3 concentric neutral

1152 Main Street, Northridge MA			
National Grid NEDC			
PV Array Components			
PV Module Manufacturer	LG		
PV Module Model	LG400N2W-AS-72		
PV Module Nominal Rating	400		W
PV Modules per String	18		
Combiner Box Manufacturer	Bentek		
Combiner Box Model	AF2		
Source Strings per Combiner Box	25		
Storage Components			
Battery Manufacturer	SPS	Princeton	
Battery Model	ESS	PEMS 250	
Battery Nominal Rating	1,500	500	kWh
Inverters			
Component	Solar	Stationary	Mobile
Inverter Manufacturer	PE	PE	Princeton
Inverter Model	FS1501CU	FS1500CP-480	PEMS 250
Inverter Nominal Rating	1,610	1,500	250 kW
Inverter Voltage	1,610	1,500	250 KVA
Inverter Quantity	400 Delta	480 Delta	480 Wye-gnd
	2	1	1
Total AC System Rating			
Total PV Module quantity	9,000		
Total PV rating	3,600		
Total Energy Storage rating	2,000		
System Interconnection Voltage	13800 Wye-gnd		
System Interconnection Amperage Capacity	226		
System Interconnection kVA Capacity	4,970		

1152 Main Street, Northridge MA  
National Grid NEDC

INDUSTRIA ENGINEERING, INC.  
91 CEDAR STREET  
MILFORD, MA 01757

ELECTRICAL  
SINGLE-LINE DIAGRAM

PROJECT  
NEDC GENERATION STATION

SITE  
1152 MAIN ST, NORTHBRIDGE, MA

CLIENT  
NATIONAL GRID SOLAR - NEDC

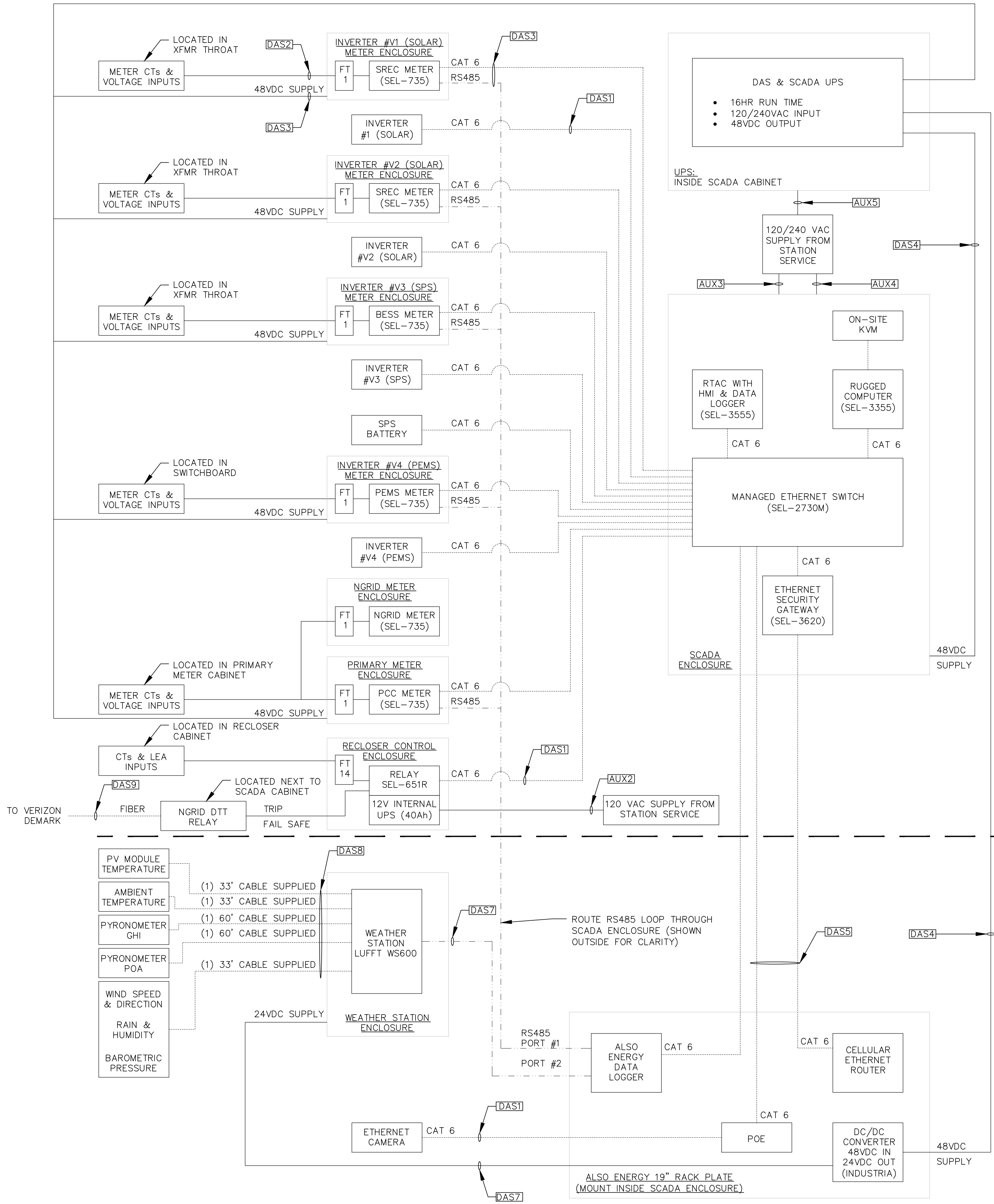
DESIGNED  
GM

CHECKED  
JS

FILENAME  
NEDC ASBUILT

DATE  
07/28/2022

FIGURE  
E-2



AUXILIARY CIRCUIT SPECIFICATIONS														
Component	ID	Voltage	Current	Power	Protect	Conductors <sup>(1)</sup>				Conduit <sup>(2)</sup>				Distance
		(V)	(A)	(kVA)	(A)	Size	Parallel	Type	EGC	Size	Type	Qty	Contents/Conduit	(ft)
Auxiliary Service	AUX1	240	63	15	80	4	1	XHHW-2 (Cu)	8	1.5"	PVC / RMC	1	(2) Hot, (1) NTRL, (1) EGC	50
SEL-651R Relay	AUX2	120	16	-	20	10	1	XHHW-2 (Cu)	12	1"			(1) Hot, (1) NTRL, (1) EGC	100
SCADA Enclosure	AUX3		16	-	20									
	AUX4	240	16	-	20								(2) Hot, (1) EGC	
UPS Enclosure	AUX5		16	-	20								(1) Hot, (1) NTRL, (1) EGC	150
Lighting	AUX6	120	16	-	20									
Convenience Outlets	AUX7		16	-	20									
Spare	AUX8	240	16	-	20									

1) All equipment grounding conductors (EGC) are to be stranded copper  
2) Exposed above grade conduit at equipment pads shall be type RMC with transition to PVC below grade after RMC Sweep.

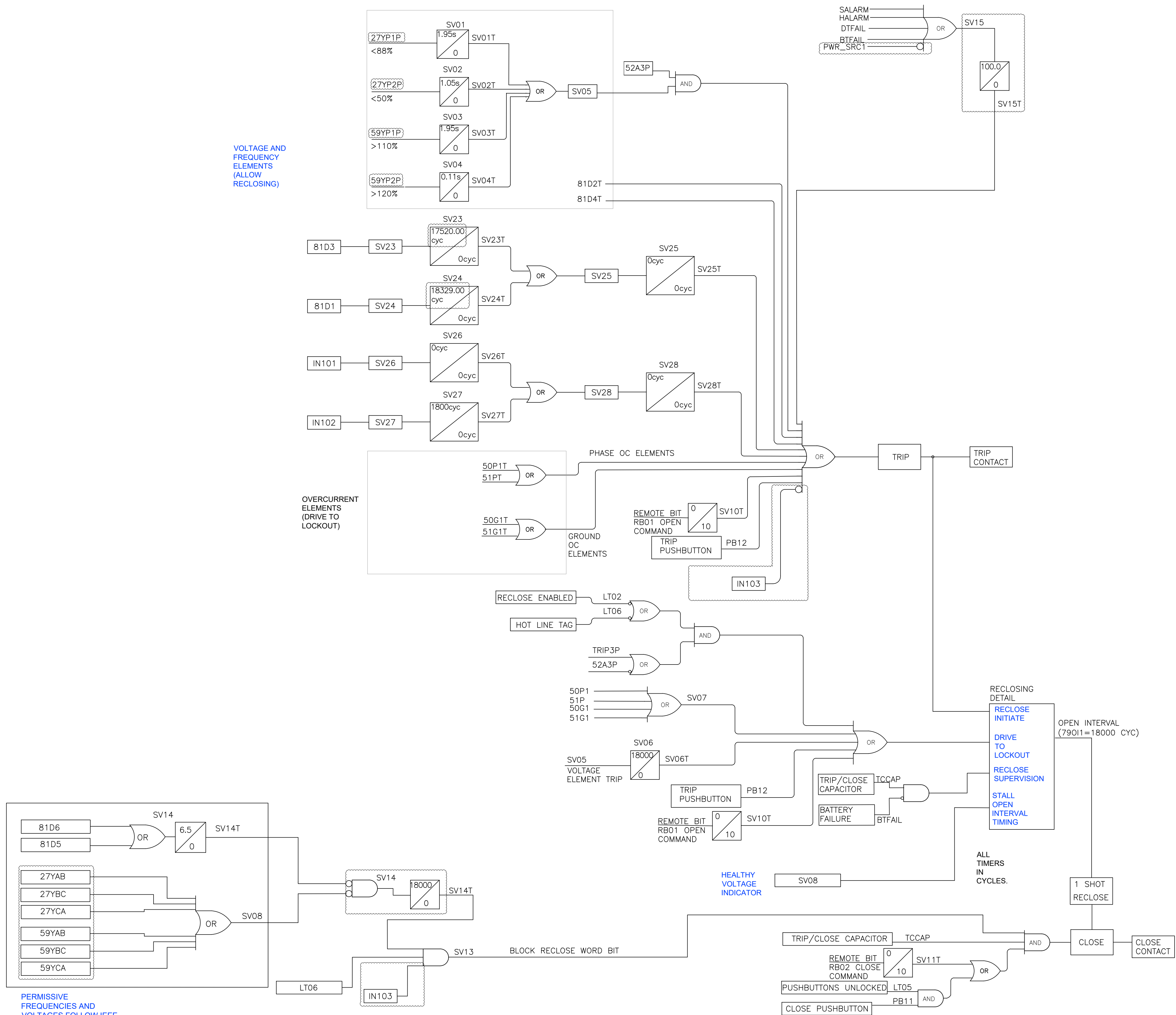
COMMUNICATION SPECIFICATIONS						
ID	Qty	Contents (in each)*	Conduit**			Distance (ft)
			Qty	Size	Type	
DAS1	7	(1) Ethernet, CAT6	1	1"	PVC / RMC	100
DAS2	4	(8) #12 AWG XHHW-2, (1) #14 EGC	1	2"	PVC / RMC	100
DAS3	5	(1) Ethernet, CAT6, (2) RS485 2-wire shielded, (2) #16AWG XHHW-2	1	1"	PVC / RMC	100
DAS4	2	(2) #12 AWG XHHW-2	1	1"	PVC / RMC	100
DAS5	1	(2) Ethernet, CAT6	1	1"	PVC / RMC	100
DAS6	0	(1) Ethernet, CAT6, (2) #16 AWG XHHW-2	1	1"	PVC / RMC	100
DAS7	1	(1) RS485 2-wire shielded, (2) #16 AWG XHHW-2	1	1"	PVC / RMC	100
DAS8	1	(7) Sensor cables	1	1"	PVC / RMC	100
DAS9	1	Fiber Optic Cable (multimode 6 fibers)	1	2"	PVC / RMC	100

\* All equipment grounding conductors (EGC) are to be bare stranded copper  
\*\*All exposed above grade conduit shall be type RMC minimum and is allowed to transition to PVC below grade after RMC sweep.

- SEL ENGINEERING SERVICES  
SCOPE OF WORK
- ALSO ENERGY  
SCOPE OF WORK
- SPEC.  
CHANGE
- NOTES FOR ALL PARTIES:
- ALL ABOVE-GRADE SIGNAL CONDUIT BETWEEN STRING INVERTERS WITHIN A GROUP SHALL BE MINIMUM 1" RMC.
  - ALL BELOW-GRADE SIGNAL CONDUIT BETWEEN STRING INVERTER GROUPS TO BE MINIMUM 1" PVC.
  - ALL BELOW GRADE CONDUIT BETWEEN ENCLOSURES AT EQUIPMENT PADS SHALL BE MINIMUM 1" PVC, WITH MINIMUM 1" RMC ABOVE-GRADE.
  - USE WIRE TROUGH BETWEEN ALL ENCLOSURES ON A PAD AND ADD ONE SPARE 1" RMC CONDUIT BETWEEN ALL ENCLOSURES AND THE WIRING TROUGH
  - MINIMUM 2" SIGNAL CONDUIT (PVC BELOW GRADE/ RMC ABOVE GRADE) BETWEEN EQUIPMENT PADS UNLESS OTHERWISE NOTED IN TABLES OR ON EQUIPMENT PAD PLANS
  - SEE DAS PROVIDER INSTALLATION INSTRUCTIONS AND SINGLELINE FOR EQUIPMENT SPECIFICATIONS, COMMUNICATION CABLE REQUIREMENTS AND MORE DETAILED INFORMATION. ANY DISCREPANCIES BETWEEN DAS PROVIDER SINGLELINE AND THIS DRAWING MUST BE BROUGHT TO THE ATTN OF THE PROJECT ENGINEER PRIOR TO INSTALLING THE DAS SYSTEM
  - ALL CABLES TO BE LABELED WITH TO & FROM INFORMATION WITHIN 6" OF EVERY TERMINATION
  - ALL CT & PT WIRES TO BE COLOR CODED AND/OR HAVE PRINTED NUMBERS ON THE WIRE INSULATION LABELED WITHIN 6" OF THEIR TERMINATION. NO COLOR/NUMBER MAYBE REPEATED.
  - ALL FIBER OPTIC CABLE TO BE MULTI-MODE AS CALLED OUT AND TERMINATED BASED ON CONNECTING EQUIPMENT. ALL FIBERS TO BE TERMINATED & TESTED WHETHER IN USE OR SPARE. TEST REPORTS TO BE SUBMITTED TO INDUSTRIA ENGINEERING FOR REVIEW
  - ALL ETHERNET CABLES 50 FEET AND LESS IN LENGTH MUST BE FACTORY TERMINATED AND TESTED. FIELD TERMINATED ETHERNET CABLES 50 FEET AND LESS WILL NOT BE ACCEPTED.
  - USE MOUNTING HOLES AND HARDWARE SUPPLIED WITH ENCLOSURES. DRILLING HOLES IN TOP, SIDES, BACK, & FRONT IS NOT ALLOWED WITHOUT WRITTEN PERMISSION
  - ALL FIELD WIRING AND TERMINATIONS IN ENCLOSURES TO BE NEAT AND SECURED. EXCESS WIRE IS TO BE PULLED BACK INTO WIRE TROUGH, COILED (MIN BEND RADIUS APPLIED), AND SECURED. WIRE NUTS NOT ALLOWED TO JOIN COMMUNICATION WIRES/CABLES. FIBER CABLES TO BE STRAIN RELIEVED AND SECURED PER INDUSTRY/MANUFACTURES STANDARDS/INSTRUCTIONS.
  - ALL UNDERGROUND CONDUIT SHALL BE SEALED WITH WATER TIGHT POLYWATER FOAM IN TROUGH. ALL CONDUIT NIPPLES LEAVING THE TROUGH ARE TO BE SEALED ON THE ENCLOSURE END USING DUCT SEAL.
  - CONTRACTOR TO PROVIDE INVENTORY OF OWNER SUPPLIED EQUIPMENT THAT ARRIVES ON SITE NOTING ANY DAMAGE WITHIN 4 BUSINESS DAYS OF THE EQUIPMENT ARRIVAL. ANY DAMAGE OR MISSING COMPONENTS REPORTED AFTER THE 4 DAY PERIOD WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR
  - RUNS OF ETHERNET CAT6 > 280' SHALL BE CONVERTED TO MULTI-MODE FIBER OPTICS. CONTACT EOR FOR MORE INFO.

Digital Signature on 7/28/2022  
by Jonathan E. Salsman

REV. #	7/28/2022	AS-BUILT
REV. #	DATE	DESCRIPTION OF REVISION
INDUSTRIA ENGINEERING, INC. 91 CEDAR STREET MILFORD, MA 01757		
TITLE DATA ACQUISITION & CONTROL SINGLE-LINE DIAGRAM		
PROJECT NEDC GENERATION STATION		
SITE 1152 MAIN ST, NORTHBRIDGE, MA		
CLIENT NATIONAL GRID SOLAR -- NEDC		
DESIGNED GM	CHECKED JS	FILENAME NEDC ASBUILT
DATE 07/28/2022	FIGURE E-3	



REL DTT NOTES:  
THE FOLLOWING IS IN THE 651R LOGIC FOR THE INTEGRATION OF THE DTT RELAY  
1) IN101 - DTT TRIP  
2) IN102 - DTT RELAY ALARM TRIP (30 SEC DELAY IN 651R TRIP)  
3) IN103 - DTT UPS ALARM (NO DELAY TRIP)  
4) OUT201 - RECLOSER STATUS

RECLOSING NOTES:  
RECLOSING WILL OCCUR IF HEALTHY VOLTAGE IS PRESENT AFTER THE OPEN INTERVAL HAS TIMED OUT (5 SECONDS).


IF THE SOLAR FARM REACHES A TOTAL OUTPUT HIGHER THAN 3600KW FOR 29.95 SECONDS, THE RECLOSER WILL TRIP. (32 OR 3PWR1P TRIP)

A LOCKOUT WILL OCCUR INSTANTLY IF:  
1) THE RELAY TRIPS OR THE BREAKER IS OPEN AND THE HOTLINE TAG IS ENABLED OR RECLOSING IS DISABLED.  
2) THE RELAY TRIPS DUE TO AN OVER CURRENT CONDITION,  
3) IF A 10 MINUTE TIMER HAS EXPIRED AFTER A VOLTAGE TRIP. THIS TIMER INDICATES SWITCHING OVER TO ANOTHER FEEDER, AND THE OPERATING MODE NEEDS TO BE CONFIRMED BEFORE CLOSING CAN OCCUR.  
4) IF SOMEONE TRIPS THE BREAKER USING A PUSH BUTTON OR REMOTE BIT.

Digital Signature on 7/28/2022  
by Jonathan E. Salsman

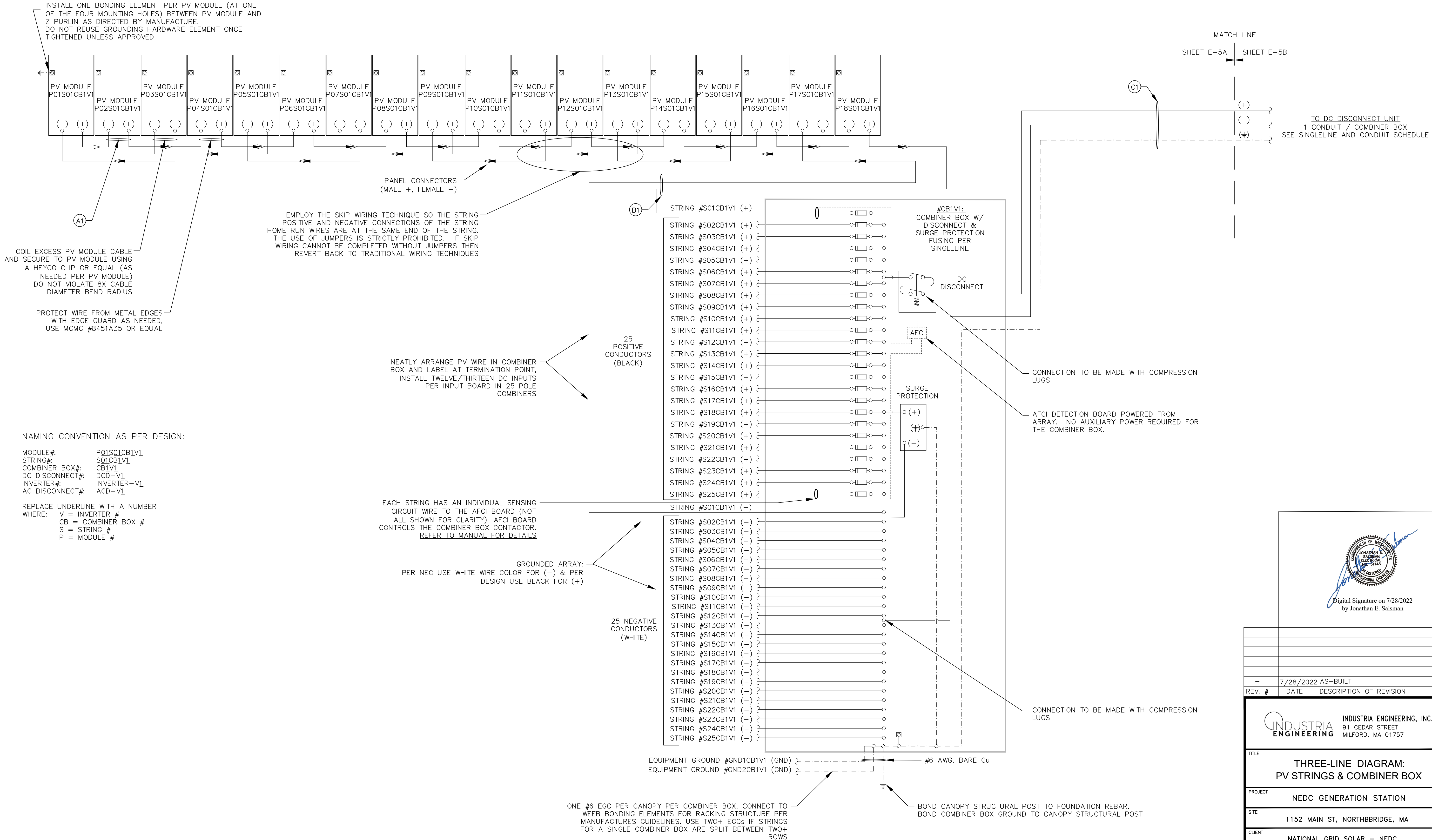
REV. #	DATE	DESCRIPTION OF REVISION
-	7/28/2022	AS-BUILT
1	7/28/2022	AS-BUILT
2	7/28/2022	AS-BUILT
3	7/28/2022	AS-BUILT
4	7/28/2022	AS-BUILT
5	7/28/2022	AS-BUILT
6	7/28/2022	AS-BUILT
7	7/28/2022	AS-BUILT
8	7/28/2022	AS-BUILT
9	7/28/2022	AS-BUILT
10	7/28/2022	AS-BUILT
11	7/28/2022	AS-BUILT
12	7/28/2022	AS-BUILT
13	7/28/2022	AS-BUILT
14	7/28/2022	AS-BUILT
15	7/28/2022	AS-BUILT
16	7/28/2022	AS-BUILT
17	7/28/2022	AS-BUILT
18	7/28/2022	AS-BUILT
19	7/28/2022	AS-BUILT
20	7/28/2022	AS-BUILT
21	7/28/2022	AS-BUILT
22	7/28/2022	AS-BUILT
23	7/28/2022	AS-BUILT
24	7/28/2022	AS-BUILT
25	7/28/2022	AS-BUILT
26	7/28/2022	AS-BUILT
27	7/28/2022	AS-BUILT
28	7/28/2022	AS-BUILT
29	7/28/2022	AS-BUILT
30	7/28/2022	AS-BUILT
31	7/28/2022	AS-BUILT
32	7/28/2022	AS-BUILT
33	7/28/2022	AS-BUILT
34	7/28/2022	AS-BUILT
35	7/28/2022	AS-BUILT
36	7/28/2022	AS-BUILT
37	7/28/2022	AS-BUILT
38	7/28/2022	AS-BUILT
39	7/28/2022	AS-BUILT
40	7/28/2022	AS-BUILT
41	7/28/2022	AS-BUILT
42	7/28/2022	AS-BUILT
43	7/28/2022	AS-BUILT
44	7/28/2022	AS-BUILT
45	7/28/2022	AS-BUILT
46	7/28/2022	AS-BUILT
47	7/28/2022	AS-BUILT
48	7/28/2022	AS-BUILT
49	7/28/2022	AS-BUILT
50	7/28/2022	AS-BUILT
51	7/28/2022	AS-BUILT
52	7/28/2022	AS-BUILT
53	7/28/2022	AS-BUILT
54	7/28/2022	AS-BUILT
55	7/28/2022	AS-BUILT
56	7/28/2022	AS-BUILT
57	7/28/2022	AS-BUILT
58	7/28/2022	AS-BUILT
59	7/28/2022	AS-BUILT
60	7/28/2022	AS-BUILT
61	7/28/2022	AS-BUILT
62	7/28/2022	AS-BUILT
63	7/28/2022	AS-BUILT
64	7/28/2022	AS-BUILT
65	7/28/2022	AS-BUILT
66	7/28/2022	AS-BUILT
67	7/28/2022	AS-BUILT
68	7/28/2022	AS-BUILT
69	7/28/2022	AS-BUILT
70	7/28/2022	AS-BUILT
71	7/28/2022	AS-BUILT
72	7/28/2022	AS-BUILT
73	7/28/2022	AS-BUILT
74	7/28/2022	AS-BUILT
75	7/28/2022	AS-BUILT
76	7/28/2022	AS-BUILT
77	7/28/2022	AS-BUILT
78	7/28/2022	AS-BUILT
79	7/28/2022	AS-BUILT
80	7/28/2022	AS-BUILT
81	7/28/2022	AS-BUILT
82	7/28/2022	AS-BUILT
83	7/28/2022	AS-BUILT
84	7/28/2022	AS-BUILT
85	7/28/2022	AS-BUILT
86	7/28/2022	AS-BUILT
87	7/28/2022	AS-BUILT
88	7/28/2022	AS-BUILT
89	7/28/2022	AS-BUILT
90	7/28/2022	AS-BUILT
91	7/28/2022	AS-BUILT
92	7/28/2022	AS-BUILT
93	7/28/2022	AS-BUILT
94	7/28/2022	AS-BUILT
95	7/28/2022	AS-BUILT
96	7/28/2022	AS-BUILT
97	7/28/2022	AS-BUILT
98	7/28/2022	AS-BUILT
99	7/28/2022	AS-BUILT
100	7/28/2022	AS-BUILT



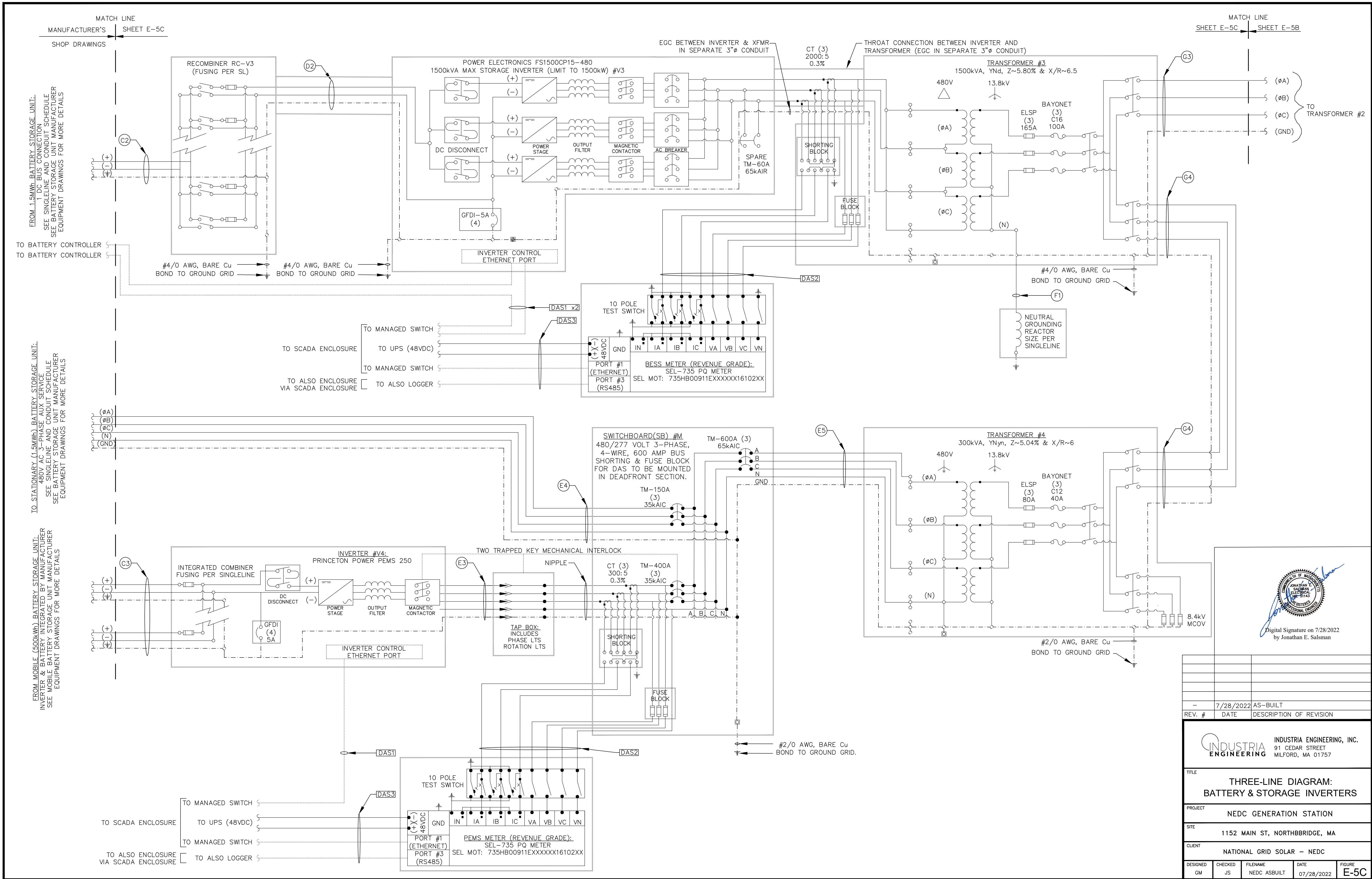
-	7/28/2022	AS-BUILT	
REV. #	DATE	DESCRIPTION OF REVISION	
 <div style="float: right; text-align: center;"> <b>INDUSTRIA ENGINEERING, INC.</b>              91 CEDAR STREET              MILFORD, MA 01757         </div>			
<b>TITLE</b>			
<b>RFL DTT RELAY DC SCHEMATIC &amp; PROTECTION LOGIC DIAGRAM</b>			
<b>PROJECT</b>			
<b>NEDC GENERATION STATION</b>			
<b>SITE</b>			
<b>1120 MAIN ST, NORTHBRIDGE, MA</b>			
<b>CLIENT</b>			
<b>NATIONAL GRID SOLAR – NEDC</b>			
<b>DESIGNED</b> <b>GM</b>	<b>CHECKED</b> <b>JS</b>	<b>FILENAME</b> <b>NEDC_ASBLT</b>	<b>DATE</b> 07/28/2022 <div style="float: right; font-size: 1.5em; font-weight: bold;">FIGURE E-4B</div>

STRING #S01CB1V1

TYPICAL OF A TOTAL OF 9,000 PV PANELS, 18 PV MODULES PER STRING, 25 STRINGS PER COMBINER BOX, 10 COMBINER BOXES PER INVERTER AS CALLED OUT ON SINGLELINE



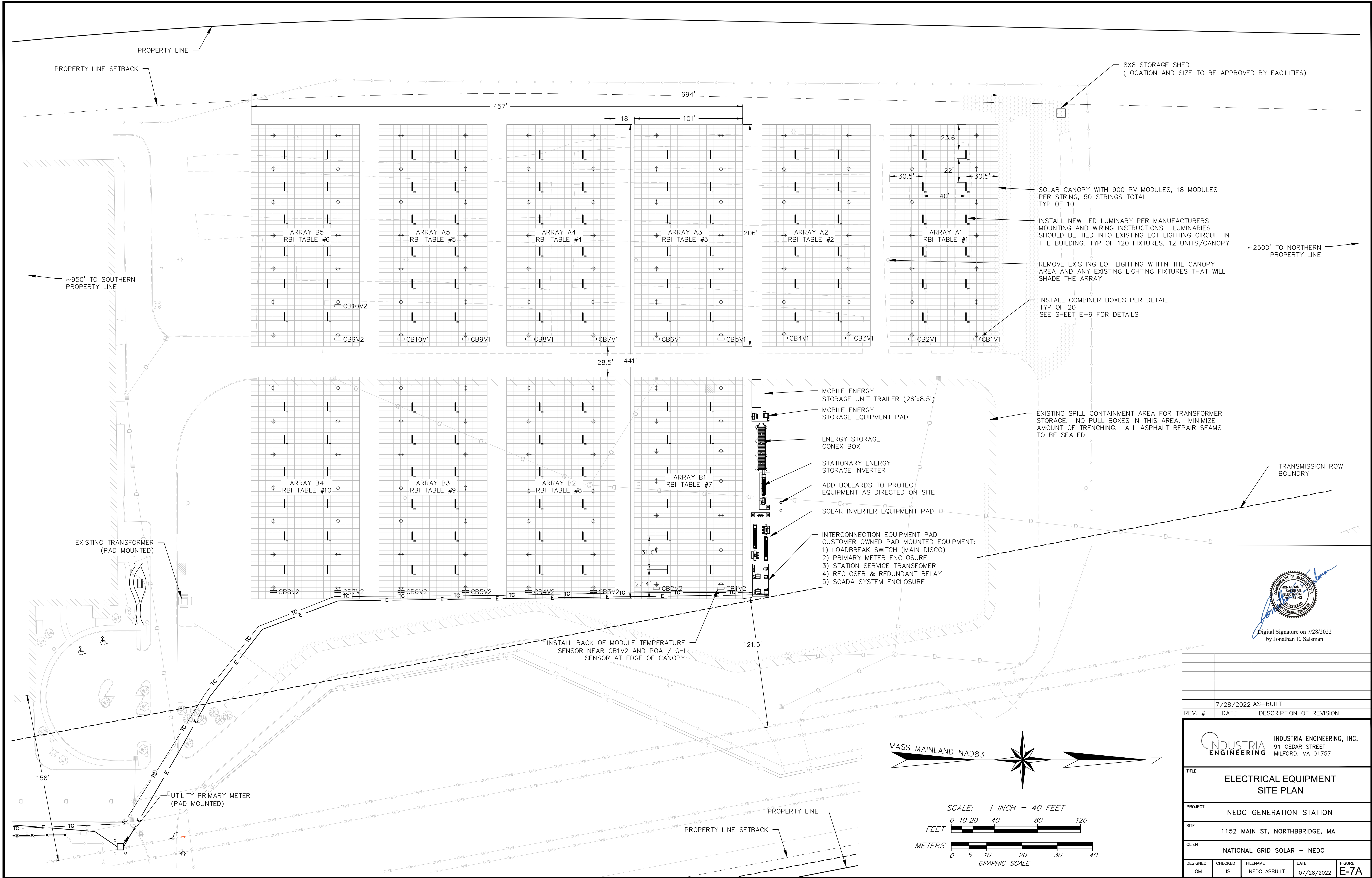




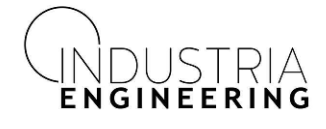
Digital Signature on 7/28/2022  
by Jonathan E. Salsman

TITLE	THREE-LINE DIAGRAM: BATTERY & STORAGE INVERTERS		
PROJECT	NEDC GENERATION STATION		
SITE	1152 MAIN ST, NORTHBRIDGE, MA		
CLIENT	NATIONAL GRID SOLAR - NEDC		
DESIGNED GM	CHECKED JS	FILENAME NEDC ASBUILT	DATE 07/28/2022
FIGURE E-5C			

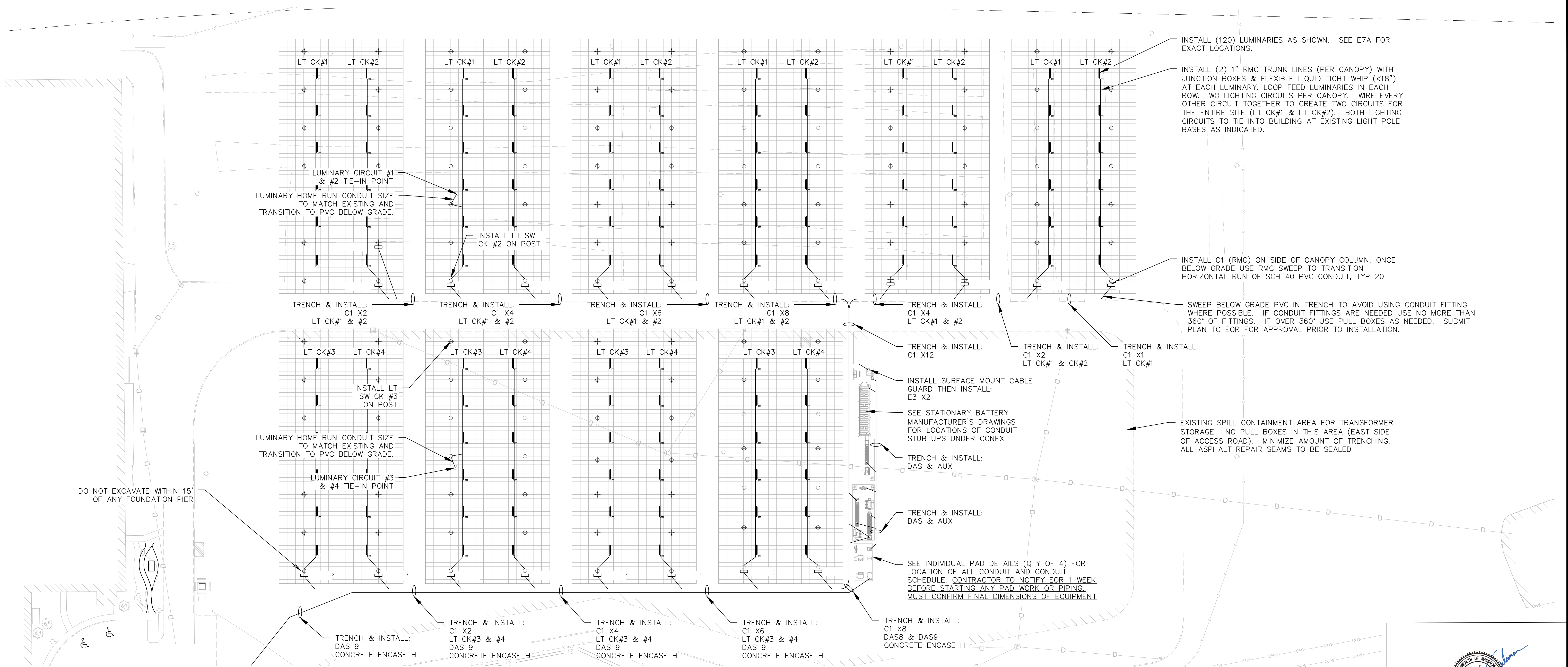




  
Digital Signature on 7/28/2022  
by Jonathan E. Salsman

REV. #	7/28/2022	AS-BUILT
	DATE	DESCRIPTION OF REVISION
 INDUSTRIA ENGINEERING, INC. 91 CEDAR STREET MILFORD, MA 01757		
TITLE <b>ELECTRICAL EQUIPMENT SITE PLAN</b>		
PROJECT <b>NEDC GENERATION STATION</b>		
SITE <b>1152 MAIN ST, NORTHBRIDGE, MA</b>		
CLIENT <b>NATIONAL GRID SOLAR - NEDC</b>		
DESIGNED GM	CHECKED JS	FILENAME NEDC ASBUILT
	DATE 07/28/2022	FIGURE <b>E-7A</b>

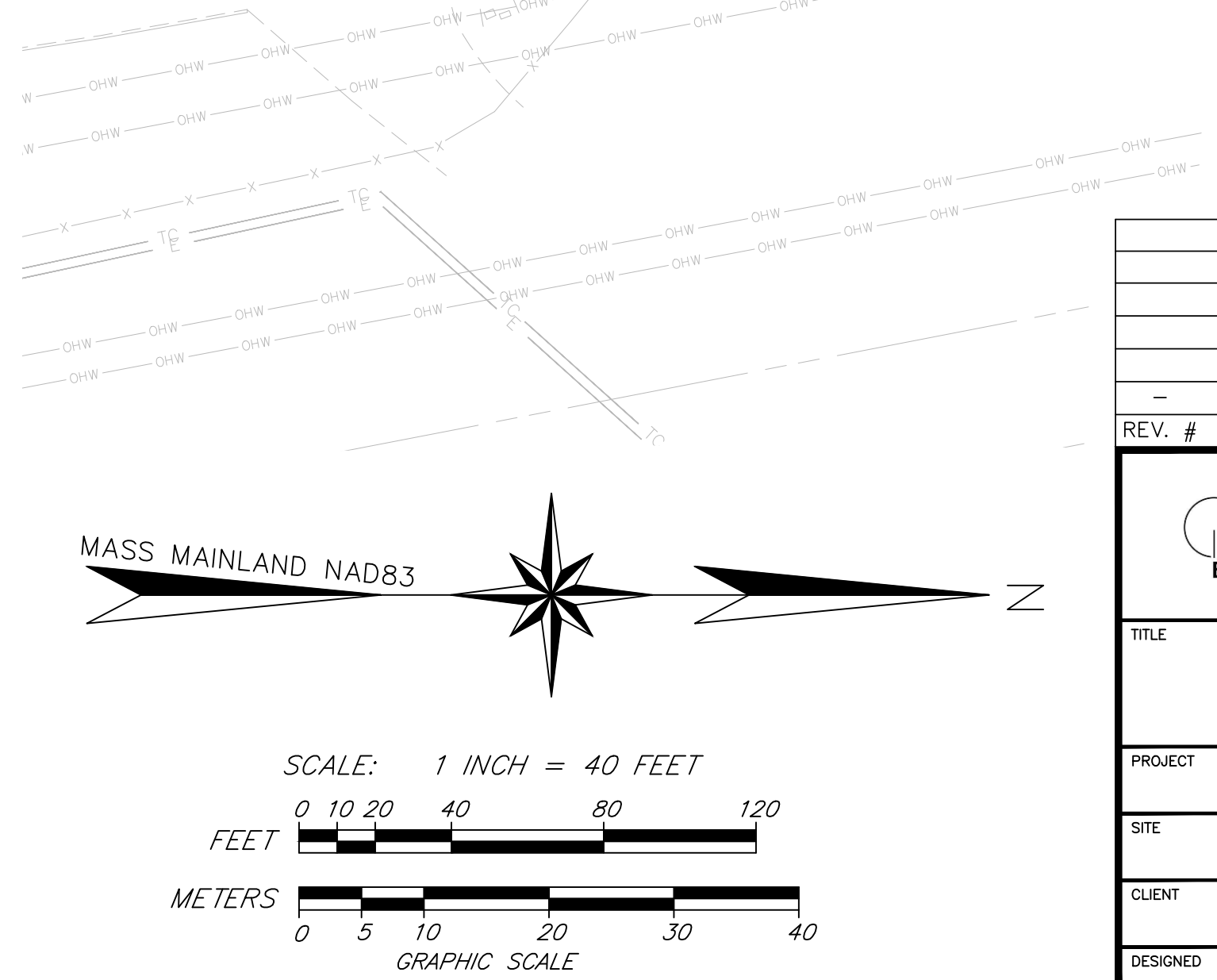




SCHEDULE OF CONDUIT					
DC Power Conduit					
Conduit #	Qty (ea.)	Size (in)	Origin	Destination	Length (ft)
C1	1	4"	CB1V1	DCD-V1	425
	1		CB2V1		375
	1		CB3V1		325
	1		CB4V1		275
	1		CB5V1		300
	1		CB6V1		350
	1		CB7V1		400
	1		CB8V1		450
	1		CB9V1		500
	1		CB10V1		550
	1		CB1V2	DCD-V2	200
	1		CB2V2		250
	1		CB3V2		300
	1		CB4V2		350
	1		CB5V2		400
	1		CB6V2		450
	1		CB7V2		500
	1		CB8V2		550
	1		CB9V2		650
	1		CB10V2		700
C2	BUS	-	BATT E-HOUSE	DCD-V3	15
C3	SEE MANUFACTURER'S SHOP DRAWINGS				
D1	BUS	-	DCD-V1	INV-V1	4
D2	BUS	-	DCD-V2	INV-V2	4
	BUS	-	DCD-V3	INV-V3	4

SCHEDULE OF CONDUIT					
AC Power & Auxiliary Circuit Conduit					
Conduit #	Qty (ea.)	Size (in)	Origin	Destination	Length (ft)
E1	1	3"	INV-V1	XFMR-1	25
	1		INV-V2	XFMR-2	25
E2	1	3"	INV-V3	XFMR-3	25
E3	2		INV-V4	TAP BOX	50
E4	1	3"	1.5MWh BATT	SB-M	50
E5	3	4"	SB-M	XFMR-3	50
	1		XFMR-1	REACTOR-1	50
F1	1	3"	XFMR-2	REACTOR-2	25
	1		XFMR-3	REACTOR-3	25
G1	2	5"	XFMR-1	RECLOSER	50
	1		RECLOSER	XFMR-AUX	50
G2	2	5"	XFMR-AUX	METER-PCC	50
	1		METER-PCC	MAIN GEN DISCO	50
G3	2	5"	XFMR-2	XFMR-1	75
G4	2		XFMR-3	XFMR-2	50
H	2	1.5"	MAIN GEN DISCO	NGRID METER	550
AUX1	1		XFMR-AUX	CP PANELBOARD	50
AUX2	1	1"	SEL-651R RELAY	SCADA ENCLOSURE	50
AUX3	1		SCADA ENCLOSURE	UPS ENCLOSURE	50
AUX4	1	1"	CP PANELBOARD	LIGHTING CIRCUIT	200
AUX5	1		UPS ENCLOSURE	PLUG CIRCUIT	200
AUX6	1	1.5"	Tie-in Point	LT JUNCTION BOX	Varies
AUX7	1		LT JUNCTION BOX	LT CK# 3&4	Varies
AUX8	1	1.5"	LT CK# 1&2	LT CK# 3&4	Varies
LT CK# 1&2	1		LT CK# 3&4	LT CK# 1&2	Varies

SCHEDULE OF CONDUIT					
Communications Conduit					
Conduit #	Qty (ea.)	Size (in)	Origin	Destination	Length (ft)
DAS1	1	1"	INV-V1	SCADA ENCLOSURE	100
	1		INV-V2		100
DAS2	1	2"	INV-V3	METER-V1	100
	1		INV-V4		100
DAS3	1	1"	1.5MWh BATT	CAMERA	200
	1		SEL-651R		150
DAS4	1	2"	NETWORK ENCLOSURE	METER-V2	50
	1		XFMR-1		50
DAS5	1	1"	XFMR-2	METER-V3	75
	1		XFMR-3		25
DAS6	1	1"	SB-M	METER-V4	25
	1		METER-V1		25
DAS7	1	2"	METER-V2	SCADA ENCLOSURE	100
	1		METER-V3		100
DAS8	1	1"	METER-V4	SCADA ENCLOSURE	200
	1		METER-PCC		50
DAS9	1	2"	UPS ENCLOSURE	SCADA ENCLOSURE	10
	1		SCADA ENCLOSURE		50
DAS10	1	1"	NETWORK ENCLOSURE	DAS ENCLOSURE	10
	1		NETWORK ENCLOSURE		10
DAS11	1	1"	DAS ENCLOSURE	WX STATION	50
	1		WX SENSORS		175
DAS12	1	2"	SCADA ENCLOSURE	LOADBREAK SW	50
	1		RECLOSER		50
DAS13	1	1"	LOADBREAK SW	TELCO DEMARK	50
	1		TELCO DEMARK		550



Digital Signature on 7/28/2022  
by Jonathan E. Salsman

REV. #	DATE	DESCRIPTION OF REVISION
-	7/28/2022	AS-BUILT

**INDUSTRIA ENGINEERING**

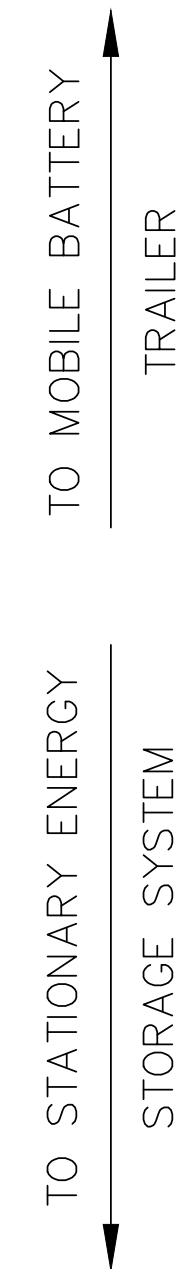
INDUSTRIA ENGINEERING, INC.  
91 CEDAR STREET  
MILFORD, MA 01757

TITLE	
CONDUIT PLAN	
PROJECT	
NEDC GENERATION STATION	
SITE	
1152 MAIN ST, NORTHBRIDGE, MA	
CLIENT	
NATIONAL GRID SOLAR - NEDC	
DESIGNED	CHECKED
GM	JS
FILENAME	DATE
NEDC ASBUILT	07/28/2022
FIGURE	E-7C

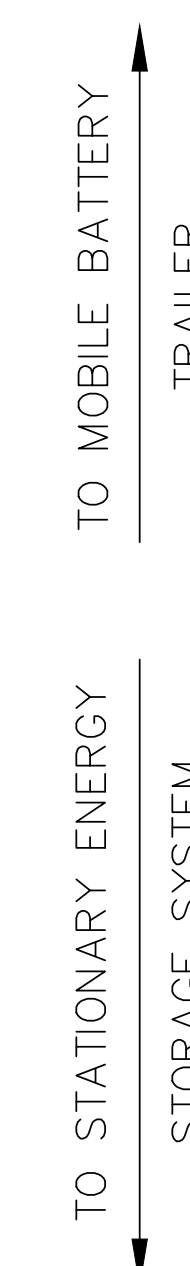





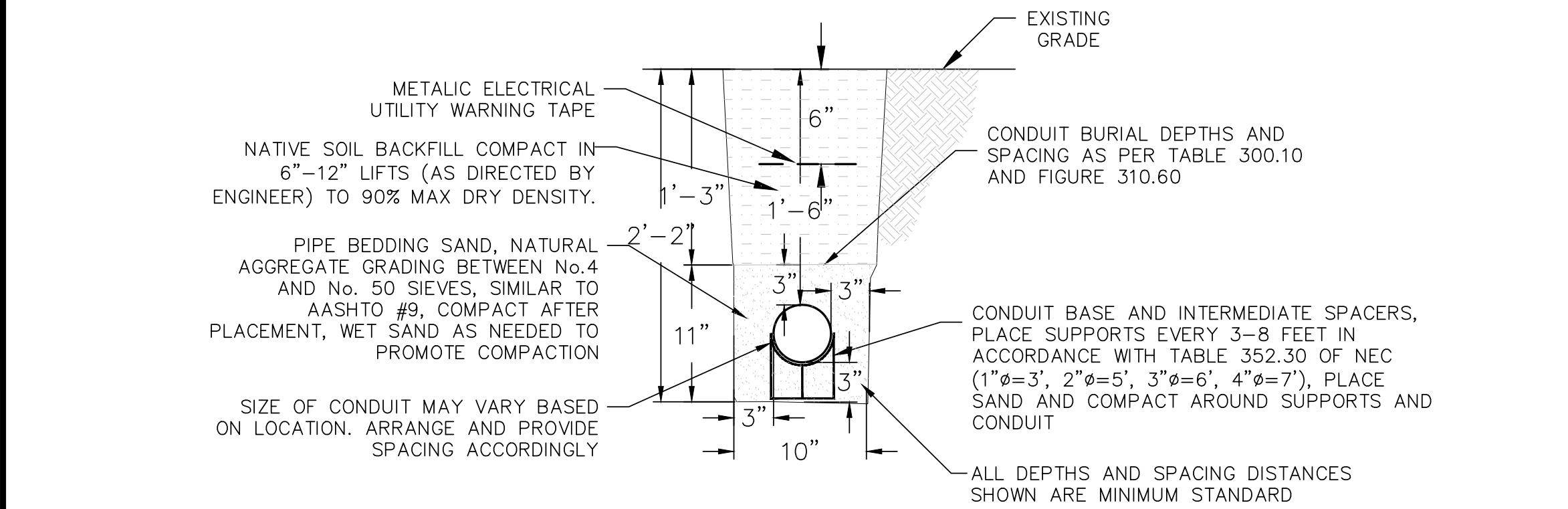




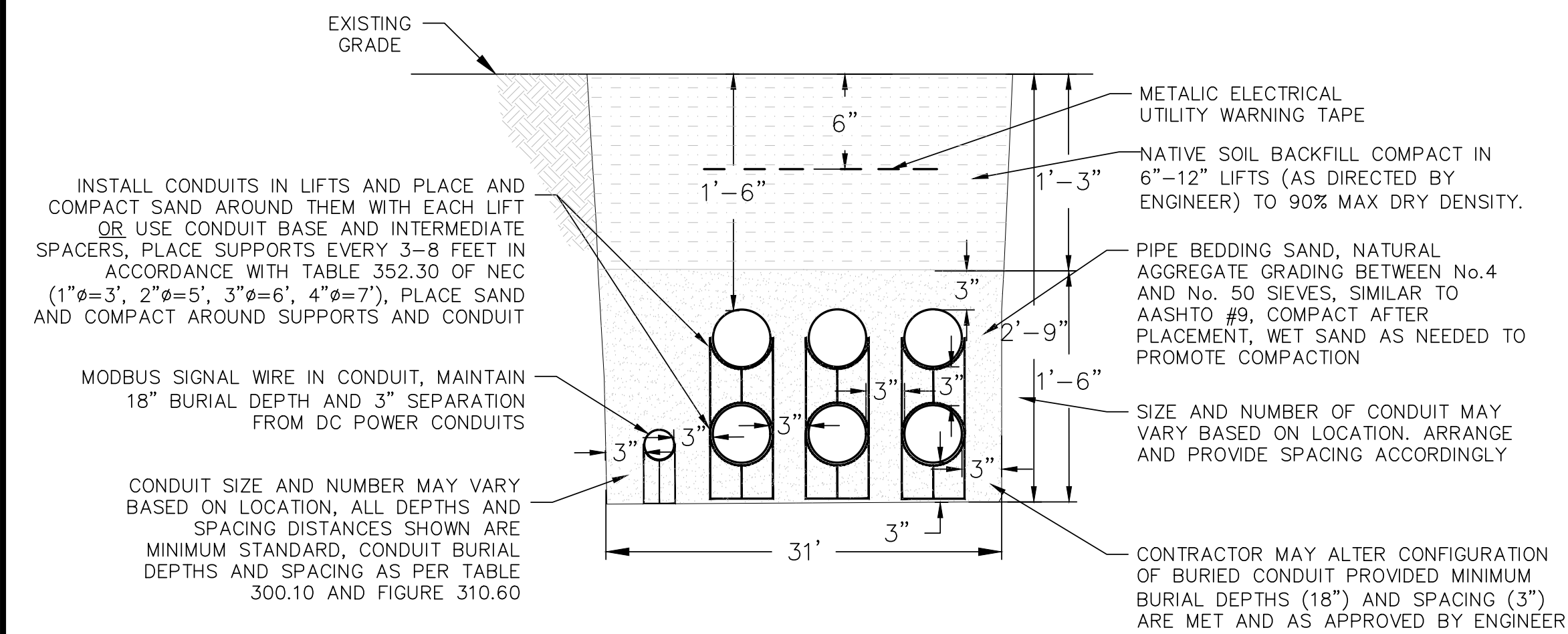
3) CONTRACTOR SHALL BRING AN EQUIPMENT  
GROUNDING CONDUCTOR INTO EVERY SECTION OF  
SWITCHGEAR, XFMR, & ONE PER DAS RACK



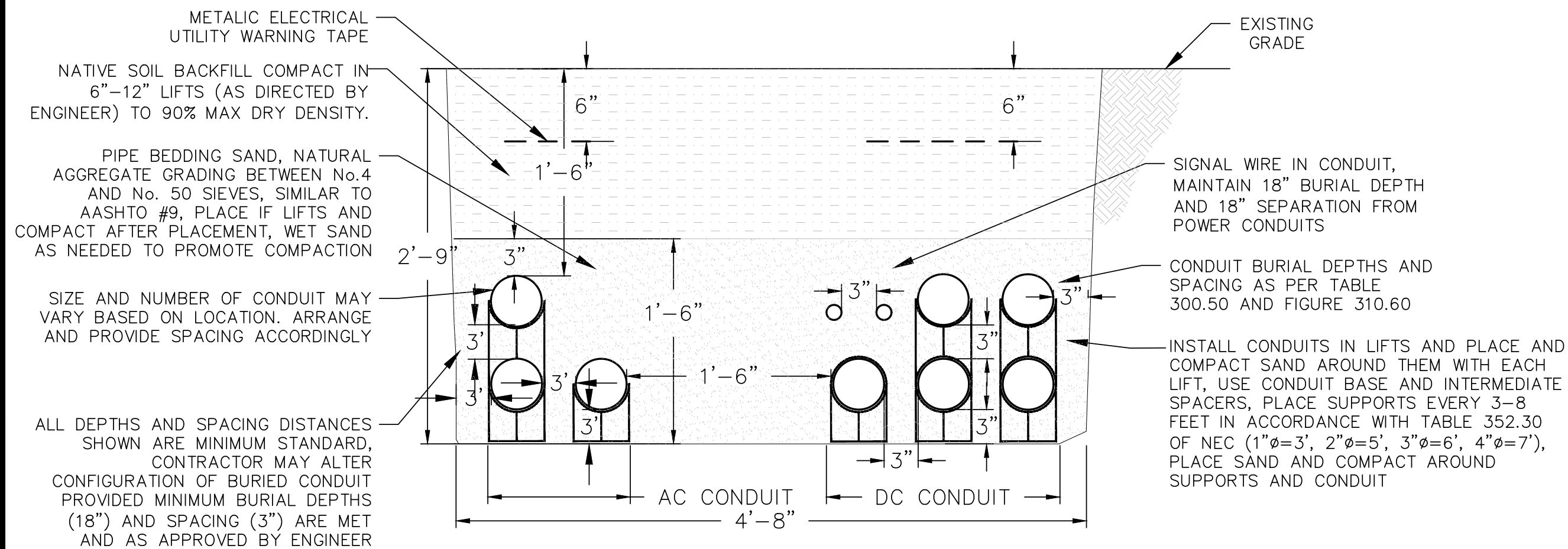
—	7/28/2022	AS—BUILT
REV. #	DATE	DESCRIPTION OF REVISION
 <div>INDUSTRIA ENGINEERING, INC. 91 CEDAR STREET MILFORD, MA 01757</div>		
TITLE		
MOBILE BATTERY PAD DETAIL		
PROJECT		
NEDC GENERATION STATION		
SITE		
1152 MAIN ST, NORTHBBRIDGE, MA		
CLIENT		
NATIONAL GRID SOLAR — NEDC		
DESIGNED	CHECKED	FILENAME
GM	JS	NEDC ASBUILT
		DATE
		07/28/2022
		FIGURE
		E-8D



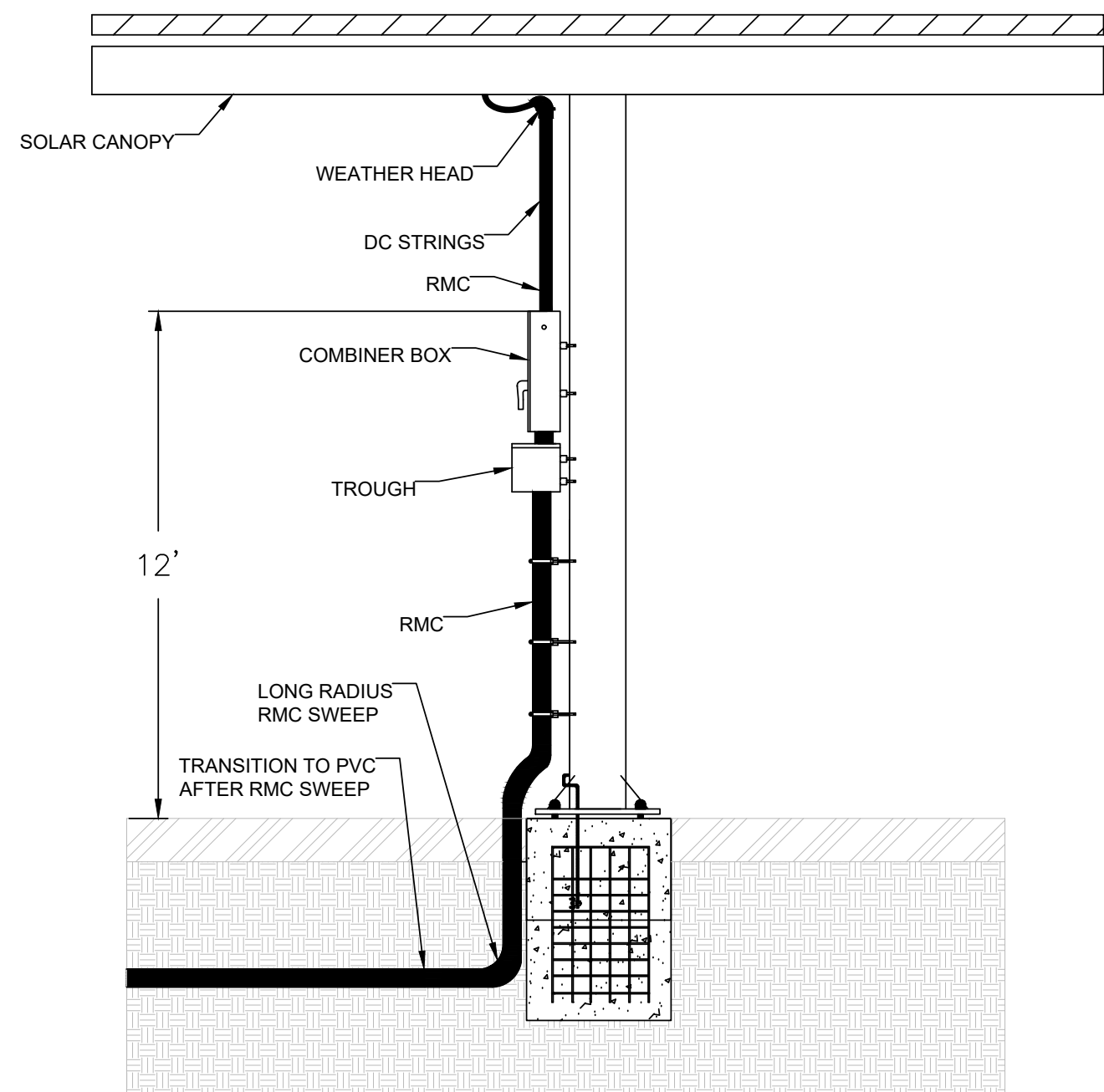
A SINGLE DC OR COMMUNICATION CONDUIT TRENCH DETAIL  
(NOT TO SCALE)



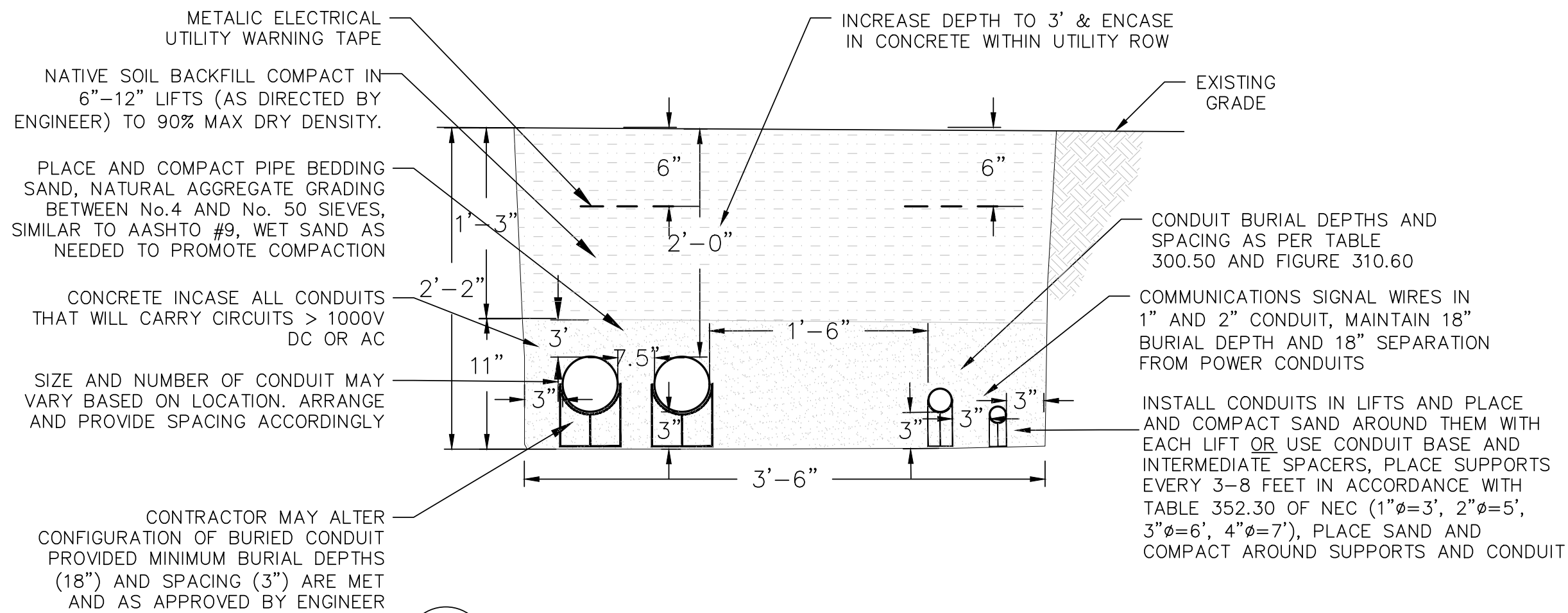
B DC AND COMMUNICATION CONDUIT TRENCH DETAIL  
(NOT TO SCALE, TYPICAL, SECTION VIEW LOOKING NORTH)



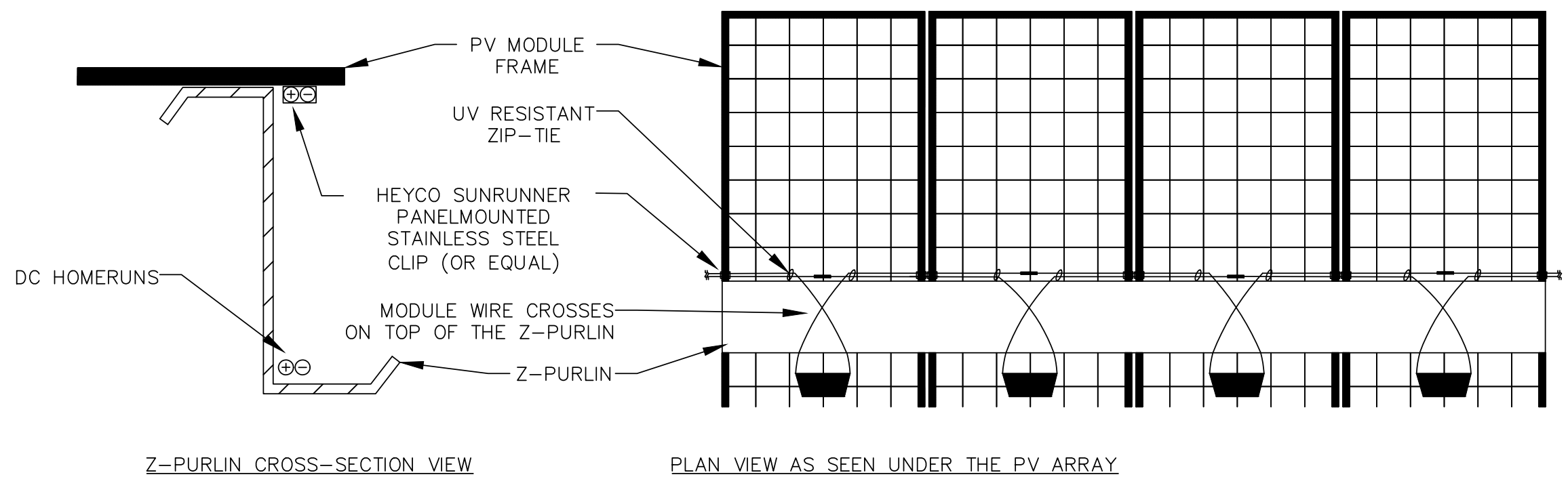
C DC, 1000V CLASS, AND COMMUNICATION CONDUIT TRENCH DETAIL  
(NOT TO SCALE, TYPICAL, SECTION VIEW LOOKING NORTH)



D 15 KV VOLTAGE CLASS AND COMMUNICATION CONDUIT TRENCH DETAIL  
(NOT TO SCALE, TYPICAL)



F COMBINER BOX MOUNTING DETAILS  
(NOT TO SCALE)



E PV ARRAY WIRE MANAGEMENT DETAILS  
(NOT TO SCALE)

Digital Signature on 7/28/2022  
by Jonathan E. Salsman

REV.	DATE	DESCRIPTION OF REVISION
-	7/28/2022	AS-BUILT
1	7/28/2022	AS-BUILT
2	7/28/2022	AS-BUILT
3	7/28/2022	AS-BUILT
4	7/28/2022	AS-BUILT
5	7/28/2022	AS-BUILT
6	7/28/2022	AS-BUILT
7	7/28/2022	AS-BUILT
8	7/28/2022	AS-BUILT
9	7/28/2022	AS-BUILT
10	7/28/2022	AS-BUILT
11	7/28/2022	AS-BUILT
12	7/28/2022	AS-BUILT
13	7/28/2022	AS-BUILT
14	7/28/2022	AS-BUILT
15	7/28/2022	AS-BUILT
16	7/28/2022	AS-BUILT
17	7/28/2022	AS-BUILT
18	7/28/2022	AS-BUILT
19	7/28/2022	AS-BUILT
20	7/28/2022	AS-BUILT
21	7/28/2022	AS-BUILT
22	7/28/2022	AS-BUILT
23	7/28/2022	AS-BUILT
24	7/28/2022	AS-BUILT
25	7/28/2022	AS-BUILT
26	7/28/2022	AS-BUILT
27	7/28/2022	AS-BUILT
28	7/28/2022	AS-BUILT
29	7/28/2022	AS-BUILT
30	7/28/2022	AS-BUILT
31	7/28/2022	AS-BUILT
32	7/28/2022	AS-BUILT
33	7/28/2022	AS-BUILT
34	7/28/2022	AS-BUILT
35	7/28/2022	AS-BUILT
36	7/28/2022	AS-BUILT
37	7/28/2022	AS-BUILT
38	7/28/2022	AS-BUILT
39	7/28/2022	AS-BUILT
40	7/28/2022	AS-BUILT
41	7/28/2022	AS-BUILT
42	7/28/2022	AS-BUILT
43	7/28/2022	AS-BUILT
44	7/28/2022	AS-BUILT
45	7/28/2022	AS-BUILT
46	7/28/2022	AS-BUILT
47	7/28/2022	AS-BUILT
48	7/28/2022	AS-BUILT
49	7/28/2022	AS-BUILT
50	7/28/2022	AS-BUILT
51	7/28/2022	AS-BUILT
52	7/28/2022	AS-BUILT
53	7/28/2022	AS-BUILT
54	7/28/2022	AS-BUILT
55	7/28/2022	AS-BUILT
56	7/28/2022	AS-BUILT
57	7/28/2022	AS-BUILT
58	7/28/2022	AS-BUILT
59	7/28/2022	AS-BUILT
60	7/28/2022	AS-BUILT
61	7/28/2022	AS-BUILT
62	7/28/2022	AS-BUILT
63	7/28/2022	AS-BUILT
64	7/28/2022	AS-BUILT
65	7/28/2022	AS-BUILT
66	7/28/2022	AS-BUILT
67	7/28/2022	AS-BUILT
68	7/28/2022	AS-BUILT
69	7/28/2022	AS-BUILT
70	7/28/2022	AS-BUILT
71	7/28/2022	AS-BUILT
72	7/28/2022	AS-BUILT
73	7/28/2022	AS-BUILT
74	7/28/2022	AS-BUILT
75	7/28/2022	AS-BUILT
76	7/28/2022	AS-BUILT
77	7/28/2022	AS-BUILT
78	7/28/2022	AS-BUILT
79	7/28/2022	AS-BUILT
80	7/28/2022	AS-BUILT
81	7/28/2022	AS-BUILT
82	7/28/2022	AS-BUILT
83	7/28/2022	AS-BUILT
84	7/28/2022	AS-BUILT
85	7/28/2022	AS-BUILT
86	7/28/2022	AS-BUILT
87	7/28/2022	AS-BUILT
88	7/28/2022	AS-BUILT
89	7/28/2022	AS-BUILT
90	7/28/2022	AS-BUILT
91	7/28/2022	AS-BUILT
92	7/28/2022	AS-BUILT
93	7/28/2022	AS-BUILT
94	7/28/2022	AS-BUILT
95	7/28/2022	AS-BUILT
96	7/28/2022	AS-BUILT
97	7/28/2022	AS-BUILT
98	7/28/2022	AS-BUILT
99	7/28/2022	AS-BUILT
100	7/28/2022	AS-BUILT

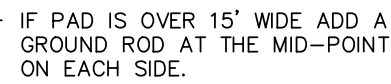

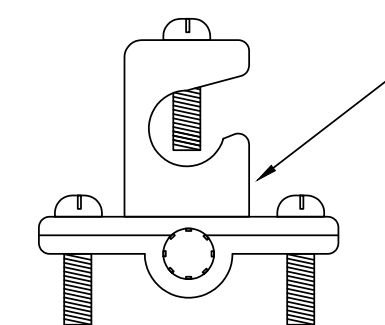


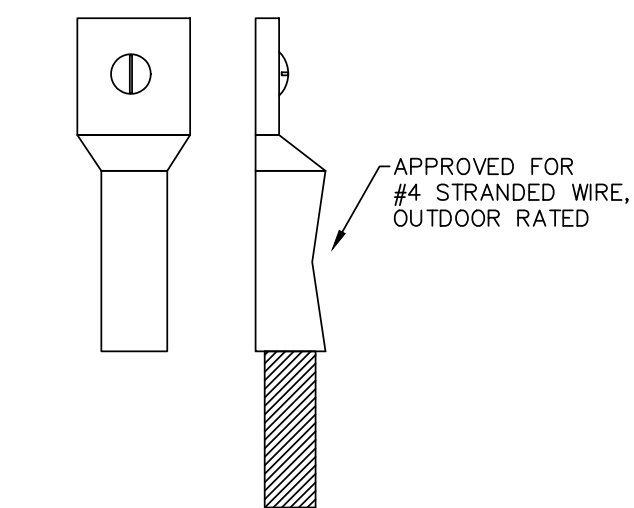
Diagram illustrating the rebar cage for a column foundation and its connection to the column. The diagram shows a cross-section of the foundation with a rebar cage. Key components and labels include:

- CLAMP GROUND WIRE TO I-BEAM USING IRREVERSIBLE METHOD
- 3" TAIL FROM FINAL CONCRETE FINISH LEVEL
- GROUND WIRE THROUGH COLUMN DRAINAGE HOLE
- #4 CU GROUND WIRE
- UL LISTED REBAR GROUNDING CLAMP FOR CONCRETE ENCASEMENT (MUST BE APPROVED BY EOR)
- GROUNDING CLAMP: INSTALL AND HAVE INSPECTED PRIOR TO FINAL CONCRETE POUR
- REBAR CAGE FOR COLUMN FOUNDATION
- 36"

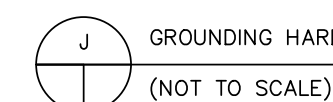
 CANOPY FOUNDATION GROUNDING DETAIL  
(NOT TO SCALE)




GROUND CLAMP DETAIL FOR  
CANOPY FOUNDATIONS  
(MUST BE APPROVED BY EOR)



IRREVERSIBLE GROUNDING LUG DETAIL  
FOR CANOPY POSTS



 GROUNDING HARDWARE DETAIL FOR CANOPY ONLY  
(NOT TO SCALE)

W1) ALL GROUNDED CONDUCTORS SHALL BE WHITE OR PERMANENTLY MARKED WITH WHITE AND EQUIPMENT GROUNDING CONDUCTORS SHALL BE GREEN OR BARE PER NEC ARTICLE 200.6(A) AND 250.119.

W2) ONLY ONE CONNECTION TO DC CIRCUITS (GROUNDED CONDUCTOR) AND ONE CONNECTION TO AC CIRCUITS WILL BE USED FOR SYSTEM GROUNDING

W3) EQUIPMENT GROUNDING CONDUCTORS AND SYSTEM GROUNDING CONDUCTORS WILL HAVE AS SHORT A DISTANCE TO GROUND AS POSSIBLE AND A MINIMUM NUMBER OF BENDS.

W4) NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER GROUNDING: NOTING THAT TERMINAL LUGS BOLTED ON AN ENCLOSURE'S FINISHED SURFACE MAY BE INSULATED BECAUSE OF PAINT/FINISHED SURFACE AT POINT OF CONTACT SHALL BE PROPERLY REMOVED.

W5) MODULES SHALL BE GROUNDED WITH EQUIPMENT GROUNDING CONDUCTOR USING THE LISTED GROUNDING POINT AND MATERIAL FIT FOR THIS PURPOSE GROUND LUGS SHALL BE RATED FOR OUTDOOR USE.

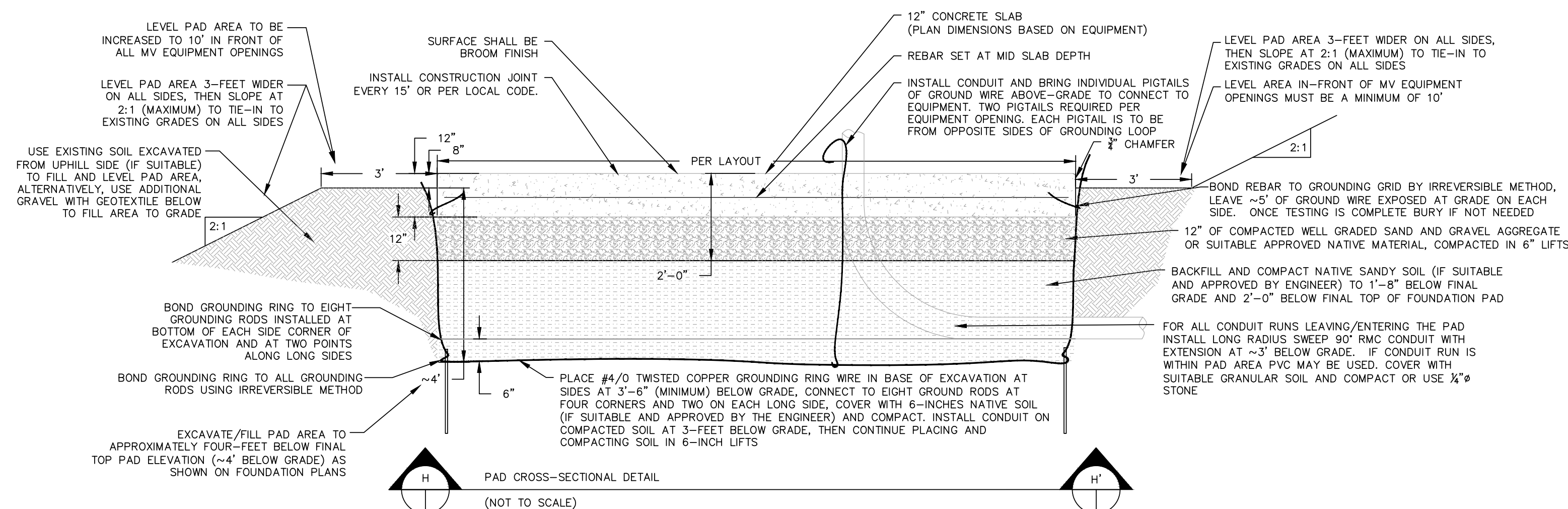
W6) EXACT LOCATION OF GROUND RODS AND EQUIPMENT RODS AND EQUIPMENT SHALL BE DETERMINED IN FIELD. AVOID EXISTING UNDERGROUND UTILITIES.

W7) NO WELDING TO COLUMN ANCHOR BOLTS OR FOUNDATION REBARS SHALL BE ALLOWED. ALL WELDING CONNECTIONS SHALL BE MADE USING SEPARATE GROUNDING RODS AND BOLTS TO FACILITATE WELDING. GROUNDING RODS AND BOLTS OR RODS EXPOSED TO THE WEATHER SHALL BE GALVANIZED.

W8) INSTALLATION SHALL BE IN ACCORDANCE WITH THE LATEST NATIONAL ELECTRIC CODE ARTICLE 250.

W9) ALL GROUND GRIDS MUST HAVE A GROUNDING GRID RESISTANCE OF 2 OHMS OR LESS TO GROUND. GROUND GRID RESISTANCE MUST BE VERIFIED BY IEEE STD 81 USING A BIDDLE GROUND TESTER USING FALL OF POTENTIAL METHOD. TEST RESULTS MUST BE SUBMITTED TO THE ENGINEER & UTILITY. GROUND RESISTANCE TEST RESULTS BASED ON IEEE STD 81 WITH A BIDDLE GROUND TESTER USING FALL OF POTENTIAL METHOD MUST BE 10 OHMS OR LESS, OTHERWISE ADDITIONAL GROUND RODS WILL BE REQUIRED. TEST RESULTS ABOVE 10 OHMS MAY BE ACCEPTED BASED ON ENGINEER'S REVIEW OF SITE CONDITIONS AND TEST RESULTS.

W10) ALL FENCE GATE FRAMES AND FABRIC TO BE BONDED TO THE FENCE GATE POSTS. FENCE GATE POSTS TO BE BONDED ACROSS OPENING WITH THE LOOP EXTENDING OUT BEYOND WHEN GATE IS OPEN AT 90 DEGREES, FENCE (FABRIC, POSTS, AND RAILS) ALONG TRANSMISSION RIGHT OF WAY TO BE GROUNDED EVERY 50' AND 50' INTO PROPERTY WITH 10' GROUND ROD AND #6 GROUND WIRE.



COMBUSTING SOLE IN 6 INCH LIPS

PAD CROSS-SECTIONAL DETAIL


(NOT TO SCALE)

H

H'



Digital Signature on 7/28/2022  
by Jonathan E. Salsman

—	7/28/2022	AS—BUILT	
REV. #	DATE	DESCRIPTION OF REVISION	
 <div style="display: inline-block; vertical-align: middle; margin-left: 20px;"> INDUSTRIA ENGINEERING, INC.  91 CEDAR STREET  MILFORD, MA 01757 </div>			
TITLE			
<h2>GROUNDING AND BONDING DETAILS</h2>			
PROJECT			
NEDC GENERATION STATION			
SITE			
1152 MAIN ST, NORTHBBRIDGE, MA			
CLIENT			
NATIONAL GRID SOLAR — NEDC			
DESIGNED GM	CHECKED JS	FILENAME NEDC ASBUILT	DATE 07/28/2022  FIGURE E-10

GENERAL ELECTRICAL NOTES:

E1) DRAWINGS THAT ARE NOT PE STAMPED BY A REGISTERED MASSACHUSETTS ELECTRICAL PE ARE TO BE CONSIDERED TO BE "DRAFT ONLY – NOT FOR CONSTRUCTION" AND ARE NOT VERSION CONTROLLED. ENGINEER OF RECORD (EOR) RESERVES THE RIGHT TO CHANGE/MODIFY THE DESIGN WITHOUT NOTICE. EOR IS NOT RESPONSIBLE FOR ANY CHANGES IN SCOPE FOR ANY CONTRACTOR BIDDING ON NON-STAMPED DRAWINGS. CONTRACTORS MUST CONSTRUCT TO FINAL PE STAMPED DRAWINGS ONLY.

E2) THESE ELECTRICAL DRAWINGS PRESENT THE PERFORMANCE BASED STANDARDS AND BASIC EQUIPMENT AND MATERIALS. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL EQUIPMENT AND MATERIALS SPECIFIED FOR THEIR SCOPE OF WORK AND AS REQUIRED FOR COMPLIANCE WITH THE NEC, NESC, MASSACHUSETTS ELECTRIC CODE, AND THE MANUFACTURES PROPER INSTALLATION AND COMMISSIONING INSTRUCTIONS REGARDLESS OF WHETHER THEY ARE INCLUDED AND SHOWN IN THESE DRAWINGS OR NOT.

E3) ELECTRICAL CONTRACTOR SHALL OBTAIN ALL PERMITS AND COORDINATE INSPECTIONS AS NEEDED FOR COMPLIANCE WITH LOCAL BUILDING CODES.

E4) SITE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL IN COMPLIANCE WITH THE NEC, NESC, & LOCAL CODE ALL CONDUIT, CONDUCTORS (TYPE AS NOTED, RATED MINIMUM 600 VOLTS, UL APPROVED) PULL BOXES (AS NEEDED), PANELS, TRANSFORMERS, FITTINGS, GROUNDING RODS, SWITCHES, AND SUPPORT BRACKETS NEEDED TO COMPLETE THE ELECTRICAL POWER DISTRIBUTION AS SHOWN IN THIS DRAWING PACKAGE.

E5) IN EVERY PULL BOX, TERMINAL BOX, AND AT ALL PLACES WHERE WIRES MAY NOT BE READILY IDENTIFIED BY NAMEPLATE MARKINGS ON THE EQUIPMENT TO WHICH THEY CONNECT, IDENTIFY EACH CIRCUIT WITH A PLASTIC LABEL OR TAG FOR NUMBER, POLARITY OR PHASE.

E6) CONTRACTOR SHALL ROUTE AND LOCATE THE CONDUITS TO SUIT SITE CONDITIONS BUT SHALL NOT EXCEED THE MAXIMUM CONDUCTOR LENGTHS IDENTIFIED ON THE SCHEDULE. CONTRACTOR WILL COORDINATE ALL CHANGES IN WIRING AND CONDUIT WITH THE ENGINEER.

E7) WHERE WIRE AND CABLE ROUTING IS NOT SHOWN, AND DESTINATION ONLY IS INDICATED, CONTRACTOR SHALL DETERMINE EXACT ROUTING AND LENGTHS REQUIRED. A SHOP DRAWING OF PROPOSED INSTALLATIONS SHALL BE SUPPLIED TO ENGINEER OF RECORD PRIOR TO INSTALLATION.

E8) BENDS SHALL NOT DAMAGE THE RACEWAY OR SIGNIFICANTLY CHANGE THE INTERNAL DIAMETER OF RACEWAYS (NO KINKS).

E9) SUPPORT CONDUCTORS IN VERTICAL CONDUITS IN ACCORDANCE WITH REQUIREMENTS IN NEC 300.19. BELOW GRADE PVC CONDUIT SHALL TRANSITION TO RMC BELOW GRADE & INCLUDE A RMC SWEEP IF EXPOSED ABOVE GRADE.

E10) INSTALL ALL WIRING MATERIALS IN NEAT WORKMANLIKE MANNER. USE GOOD TRADE PRACTICES AS REQUIRED BY CHAPTER 3 OF THE NEC. ALL EXPOSED CABLES, SUCH AS MODULE LEADS, TO BE SECURED WITH UV RATED POLYMER TYPE MECHANICAL OR OTHER APPROVED MEANS WITH A 25 YEAR LIFE.

E11) INSTALL CONDUIT TO MAINTAIN PROPER CLEARANCES AND IN A NEAT INCONSPICUOUS MANNER. RUN PARALLEL AND AT RIGHT ANGLES TO STRUCTURAL MEMBERS OR OTHER CONDUITS. PROVIDE BOXES, FITTINGS AND BENDS FOR CHANGES IN DIRECTION. FASTEN CONDUIT SECURELY IN PLACE.

E12) SUPPORT CONDUIT USING STEEL PIPE STRAPS (OR APPROVED EQUIVALENT), LAY-IN ADJUSTABLE HANGERS, CLEVIS HANGERS OR SPLIT-HANGERS. HANGER SPACING SHALL BE INSTALLED PER NEC REQUIREMENTS FOR THE TYPE OF CONDUIT BEING INSTALLED. USE APPROVED BEAM CLAMPS FOR CONNECTION TO STRUCTURAL MEMBERS

E13) PROVIDE PULL, JUNCTION OR CHRISTY BOXES WHERE REQUIRED TO FACILITATE THE INSTALLATION OF WIRING IN ADDITION TO THOSE SHOWN ON THE DRAWINGS. BENDS IN CONDUITS BETWEEN PULL BOXES SHALL NOT EXCEED THE EQUIVALENT OF FOUR 90 DEGREE BENDS. ALL EXPOSED CONDUIT TO BE A MINIMUM OF RMC.

E14) WHEN FIELD CUTTING IS REQUIRED, THE CONDUIT SHALL BE CUT SQUARE AND DEBURRED.

E15) CONDUIT SIZES NOT SPECIFIED SHOULD CONFORM TO NEC SPECIFICATIONS, TO INCLUDE FILL FACTOR AND DERATING FOR NUMBER OF CONDUCTORS WITH A MINIMUM CONDUIT SIZE BEING 1".

E16) POWER WIRING MINIMUM SIZE SHOULD BE #14 AWG. THIS DOES NOT APPLY TO DAS / SIGNAL WIRING.

E17) SAFETY REGULATIONS (LOCK OUT – TAG OUT, ETC.) IS THE FULL RESPONSIBILITY OF THE CONTRACTOR DURING CONSTRUCTION.

E18) THE WIRING SIZE IS BASED ON THE ESTIMATED CONDUIT ROUTING AS SHOWN IN THIS DRAWING PACKAGE. SHOULD THE CONDUITS LENGTH INCREASE DUE TO RELOCATION OF SOURCE AND/OR ROUTING, THE CONDUITS AND THE CONDUCTORS MAY NEED TO BE RESIZED. PLEASE CONTACT THE ENGINEER PRIOR TO MAKING ANY FIELD CHANGES.

E19) ALL WIRING IN CONDUIT SHALL BE XHHW-2 FOR 90°C APPLICATIONS. USE BARE COPPER FOR GROUND FOR ALL EXTERNAL GROUNDING. USE-2, PV WIRE OR APPROVED EQUIVALENT SHALL BE USED FOR ALL EXPOSED OR HOMERUN WIRING.

E20) FOR INTERCONNECTION VIA BUS TAP:

A) OVERCURRENT PROTECTION (SWITCHING DEVICE AND MEANS OF DISCONNECT) MUST BE LOCATED PER NEC 240.21.

B) THE CONDUCTORS SHALL BE CRIMPED WITH A CRIMP-ON TERMINAL LUG. THE TERMINAL LUG SHALL HAVE IDENTIFICATION OR COLOR CODING TO MATCH THE CONDUCTOR SIZE. TERMINAL LUGS SHALL HAVE LONG BARRELS TO PROVIDE 2 CRIMPS PER TERMINAL LUG PER CONDUCTOR.

C) CRIMPED TERMINAL LUGS SHALL BE CONSTRUCTED OF PURE COPPER AND TIN PLATED FOR HIGH CONDUCTIVITY AND RATED FOR 600V AT 90°C.

D) THE CRIMP MUST BE MADE WITH THE MANUFACTURER'S APPROVED TOOL DEVICE TO ACHIEVE THE PROPER CRIMP CONNECTION.

E) TORQUE FASTENER TO MANUFACTURER'S RECOMMENDATIONS ON ALL THREE PHASES TO COMPLY WITH NEC ARTICLE 110.14 OF THE NEC.

F) MINIMUM BEND RADIUS SHALL BE OBSERVED TO MAINTAIN GOOD CONDUCTOR QUALITY AND WIRE MANAGEMENT IN THE LOAD CENTER OR TRANSFORMER. IF THIS BEND RADIUS IS TOO CONSTRICTING, USE A 90° CRIMP-ON LUG WITH RATED INSULATION THAT MEETS OR EXCEEDS THE CONDUCTORS' INSULATION IT IS BEING USED WITH. IT IS RECOMMENDED THAT ACCEPTABLE CLEARANCES ARE MAINTAINED WITH THIS BUS TAP FOR SAFE, CONTINUOUS OPERATION.

G) FOLLOW MANUFACTURER'S GUIDELINES, OR THE APPLICABLE AHJ, FOR MODIFICATION OF BUS BAR(S).

E21) ALL CONDUITS SHALL BE FREE OF ANY OBSTRUCTIONS AND PROPERLY SECURED BEFORE WIRE IS PULLED.

E22) MEGGER TESTING: MEGGER (INSULATION) TEST ALL CONDUCTORS BETWEEN THE CONDUCTOR UNDER TEST AND GROUND WIRE. CONDUCT TEST AFTER WIRE IS PULLED THROUGH THE CONDUIT BUT BEFORE TERMINATION. DO NOT MEGGER TEST THE MODULES AS THEY MAY BE DESIGN LIMITED TO 600V AND MAY DAMAGE THE DEVICE.

MINIMUM DESIGN AND CONSTRUCTION ELECTRICAL STANDARDS:

ES1) NATIONAL ELECTRIC CODE 2017 (NFPA 70)  
ES2) MASSACHUSETTS ELECTRICAL CODE (527 CMR 12.00)  
ES3) NATIONAL ELECTRIC SAFETY CODE 2012 (IEEE C2-2012)  
ES4) UTILITY ELECTRICAL SAFETY BULLETINS / CONSTRUCTION STANDARDS  
ES5) UTILITY STANDARDS FOR INTERCONNECTING DISTRIBUTED GENERATION  
ES6) UNITED STATES DEPARTMENT OF AGRICULTURE RURAL UTILITIES SERVICE BULLETINS  
ES7) DETAILED INTERCONNECTION STUDY BY THE UTILITY FOR THIS PROJECT.

1/4" BOLD

3/16" BOLD

3/16"

1/8" BOLD

1/8"

PHOTOVOLTAIC  
INVERTER #\_\_ AC DISCONNECT

WARNING:

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

INVERTER AC POWER RATINGS

MAXIMUM VOLTAGE	400	VAC
MAXIMUM CURRENT	2324	AMPS

A AC DISCONNECT LABEL FOR INVERTER  
(QTY OF 2, ONE PER INVERTER & ONE PER BREAKER)

1/4" BOLD

3/16" BOLD

3/16"

1/8" BOLD

1/8"

PHOTOVOLTAIC  
INVERTER #\_\_ DC DISCONNECT

WARNING:

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

INVERTER DC POWER RATINGS

OPERATING VOLTAGE (Vmp)	731	VDC
OPERATING CURRENT (Imp)	2465	AMPS
MAXIMUM VOLTAGE (Voc)	991	VDC
MAXIMUM CURRENT (Isc)	2618	AMPS

B DC DISCONNECT LABEL FOR INVERTER  
(QTY OF 2, ONE PER INVERTER & ONE PER BREAKER)

5/16" BOLD

1/4" BOLD

3/16"

WARNING!

IDENTIFICATION OF MULTIPLE  
SERVICE DISCONNECTS

GENERATION SYSTEM IS CONNECTED TO THE SECONDARY  
(LOW VOTAGE) SIDE OF THE TRANSFORMER!

DISCONNECT ALL SOURCES OF POWER PRIOR TO SERVICING.

A SECOND POWER SOURCE IS PRESENT IN THIS EQUIPMENT

PV SYSTEM BREAKERS ADJACENT TO TRANSFORMER

C LABEL FOR ALL PAD MOUNTED TRANSFORMER & SWITCHBOARD

(QTY OF 2)

1/4" BOLD

1/4" BOLD

1/4" BOLD

1/4" BOLD

MAIN # \_\_ OF \_\_

RELAY CABINET

SB # \_\_

RELAY POWER

SUB-PNL # \_\_

INVERTER # \_\_

UPS POWER

J MISCELLANEOUS LABELS

(QTY AS REQUIRED)

MAIN PHOTOVOLTAIC  
GENERATOR DISCONNECT

WARNING:

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

GENERATOR POWER RATINGS

MAXIMUM VOLTAGE	13800	VAC
MAXIMUM CURRENT	226	AMPS

D MAIN GENERATOR DISCONNECT LABEL FOR LOADBREAK POLE

(QTY OF 1)

G

WARNING!

GENERATION INSTALLED

GENERATION SYSTEM IS CONNECTED TO THE CUSTOMER SIDE  
OF THE UTILITY NET METER!

DISCONNECT ALL SOURCES OF POWER PRIOR TO SERVICING.

A SECOND POWER SOURCE IS PRESENT IN THIS EQUIPMENT

MAIN GENERATOR DISCONNECT LOCATED ADJACENT TO THIS  
EQUIPMENT.

E LABEL FOR ALL UTILITY METERS

(QTY OF 1)

STATIONARY ENERGY STORAGE  
INVERTER #V3 AC DISCONNECT

WARNING:

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

INVERTER AC POWER RATINGS

MAXIMUM VOLTAGE	480	VAC
MAXIMUM CURRENT	1804	AMPS

F AC DISCONNECT LABEL FOR MOBILE ESS INVERTER

(QTY OF 1, ONE PER INVERTER)

25 POLE  
DC COMBINER/DISCONNECT BOX  
CB - - -

WARNING:

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

BOX DC POWER RATINGS

OPERATING VOLTAGE (Vmp)	731	VDC
OPERATING CURRENT (Imp)	247	AMPS
MAXIMUM VOLTAGE (Voc)	991	VDC
MAXIMUM CURRENT (Isc)	262	AMPS

G 25 STRING COMBINER BOX LABEL FOR ALL COMBINER BOXES

(QTY OF 20, COMPLETE BOX NUMBER BASE ON SHEET E-1)

SERVICE ENTRANCE RECLOSER  
( ! AUTOMATED EQUIPMENT ! )

WARNING:

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

GENERATOR POWER RATINGS

MAXIMUM VOLTAGE	13800	VAC
MAXIMUM CURRENT	226	AMPS

H MAIN SERVICE ENTRANCE LABEL FOR MAIN BREAKER

(QTY OF 1)

STATIONARY ENERGY STORAGE  
INVERTER #V3 DC DISCONNECT

WARNING:

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

INVERTER DC POWER RATINGS

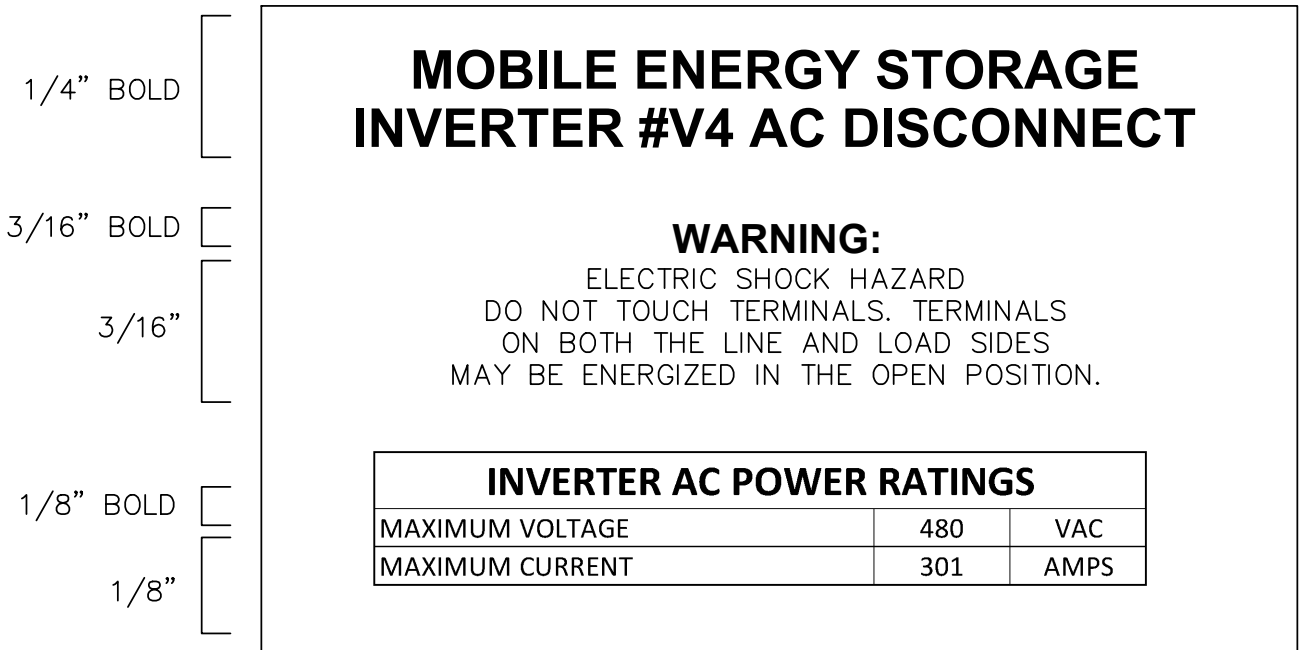
MAXIMUM VOLTAGE	850	VDC
MAXIMUM CURRENT	2278	AMPS

I DC DISCONNECT LABEL FOR STATIONARY STORAGE INVERTER

(QTY OF 2 , ONE PER INVERTER & ONE PER ESS CONTAINER)

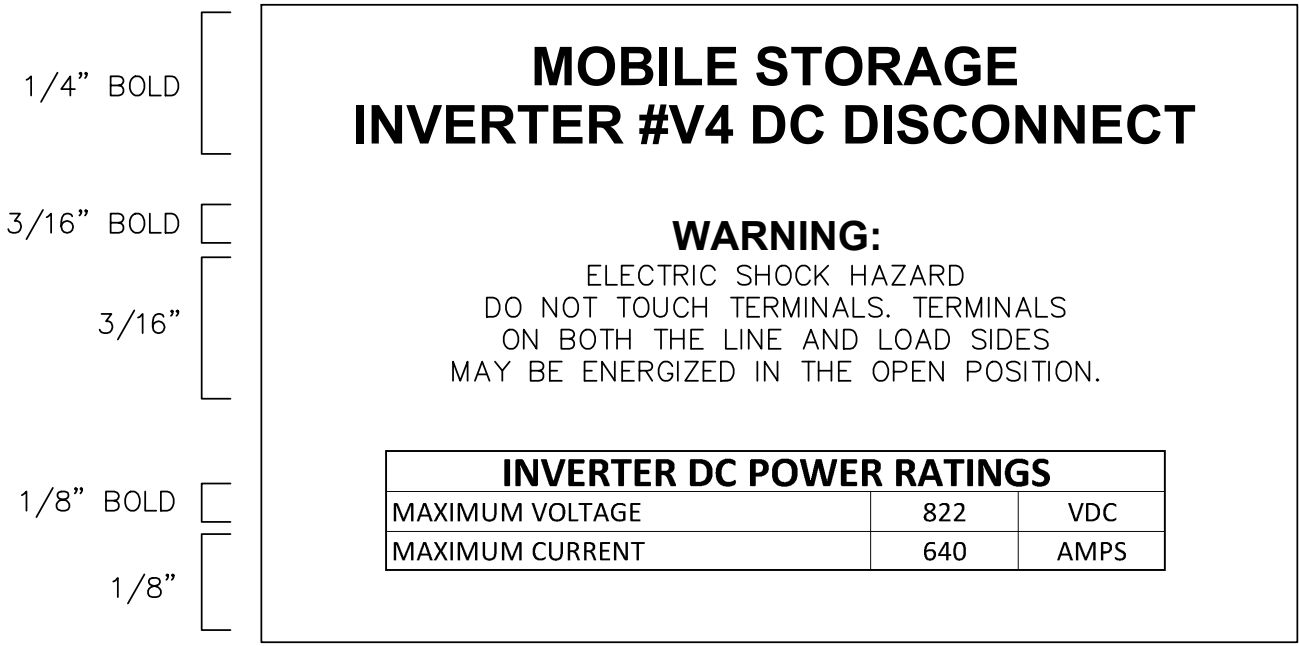
  
Digital Signature on 7/28/2022  
by Jonathan E. Salsman

-	7/28/2022	AS-BUILT
REV. #	DATE	DESCRIPTION OF REVISION
<div><div>INDUSTRIA ENGINEERING</div><div>INDUSTRIA ENGINEERING, INC. 91 CEDAR STREET MILFORD, MA 01757</div></div>		
TITLE ELECTRICAL NOTES AND PLAQUES		
PROJECT NEDC GENERATION STATION		
SITE 1152 MAIN ST, NORTHBRIDGE, MA		
CLIENT NATIONAL GRID SOLAR – NEDC		
DESIGNED GM	CHECKED JS	FILENAME NEDC ASBUILT
	DATE 07/28/2022	FIGURE E-11



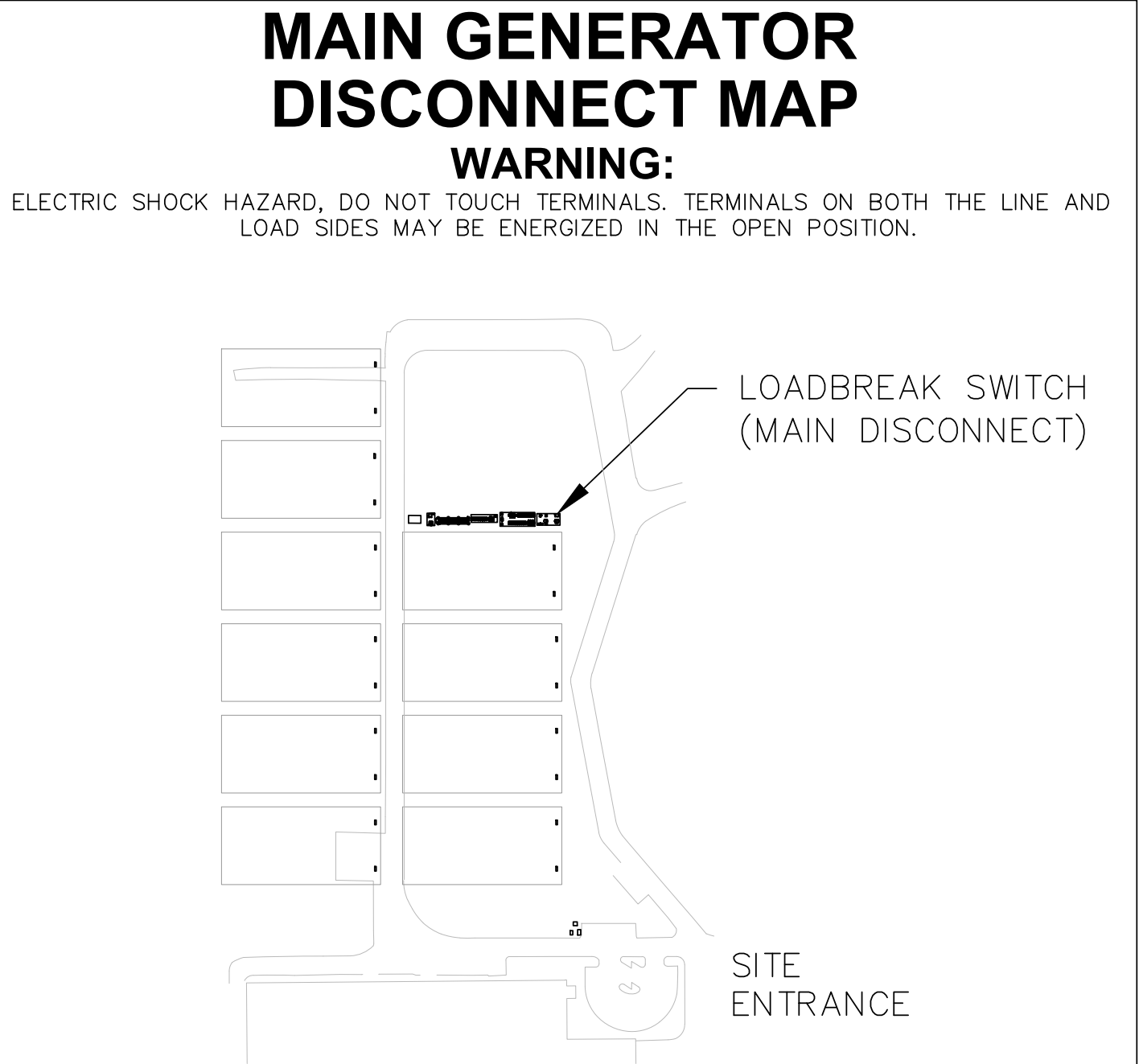
K

AC DISCONNECT LABEL FOR MOBILE ESS INVERTER  
(QTY OF 2, ONE PER INVERTER & ONE PER BREAKER)



L

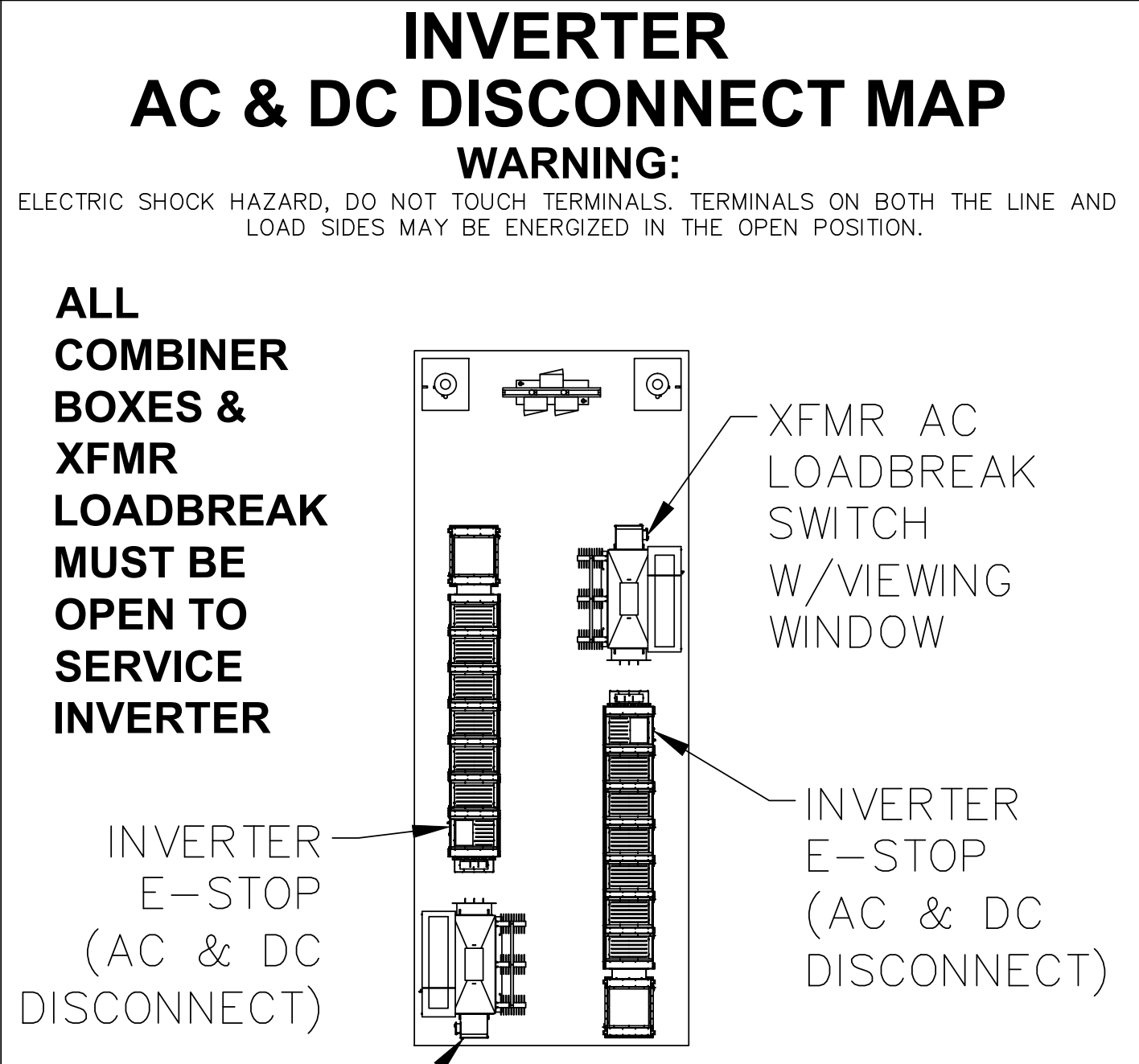
DC DISCONNECT LABEL FOR MOBILE STORAGE INVERTER  
(QTY OF 1, ONE PER INVERTER)



**CONTACT INFORMATION:**  
IN CASE OF EMERGENCY:  
DIAL 911  
OWNER: NATIONAL GRID SOLAR  
(800) 322-3223  
UTILITY: NATIONAL GRID  
(800) 465-1212

**MAIN GENERATOR DISCONNECT MAP FOR ALL MV EQUIPMENT & INVERTERS**  
(QTY OF 12)

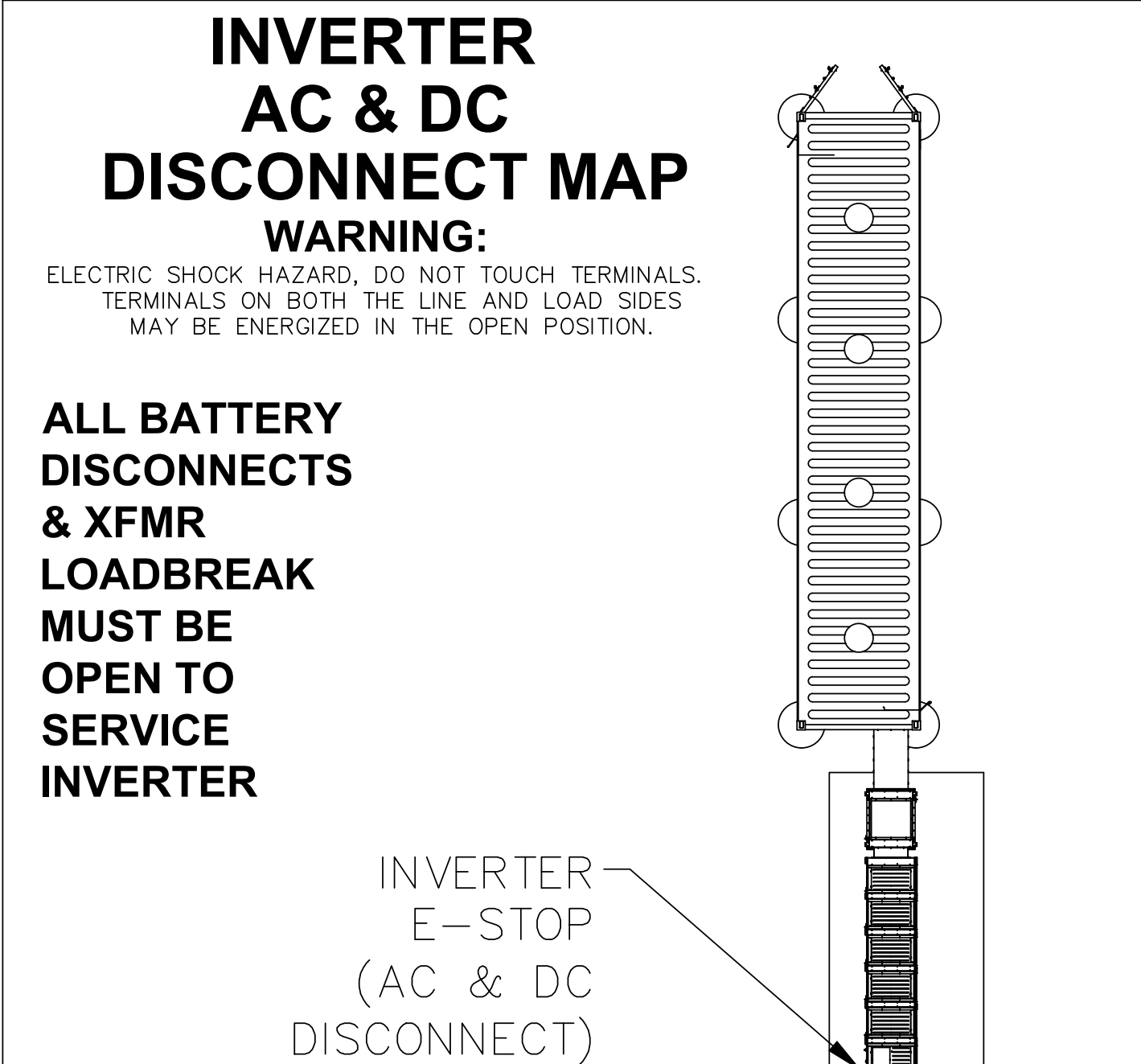
N



**CONTACT INFORMATION:**  
IN CASE OF EMERGENCY:  
DIAL 911  
OWNER: NATIONAL GRID SOLAR  
(800) 322-3223  
UTILITY: NATIONAL GRID  
(800) 465-1212

**AC / DC DISCONNECT MAP FOR XFMRs, INVERTERS & DISCONNECT UNITS**  
(QTY OF 6)

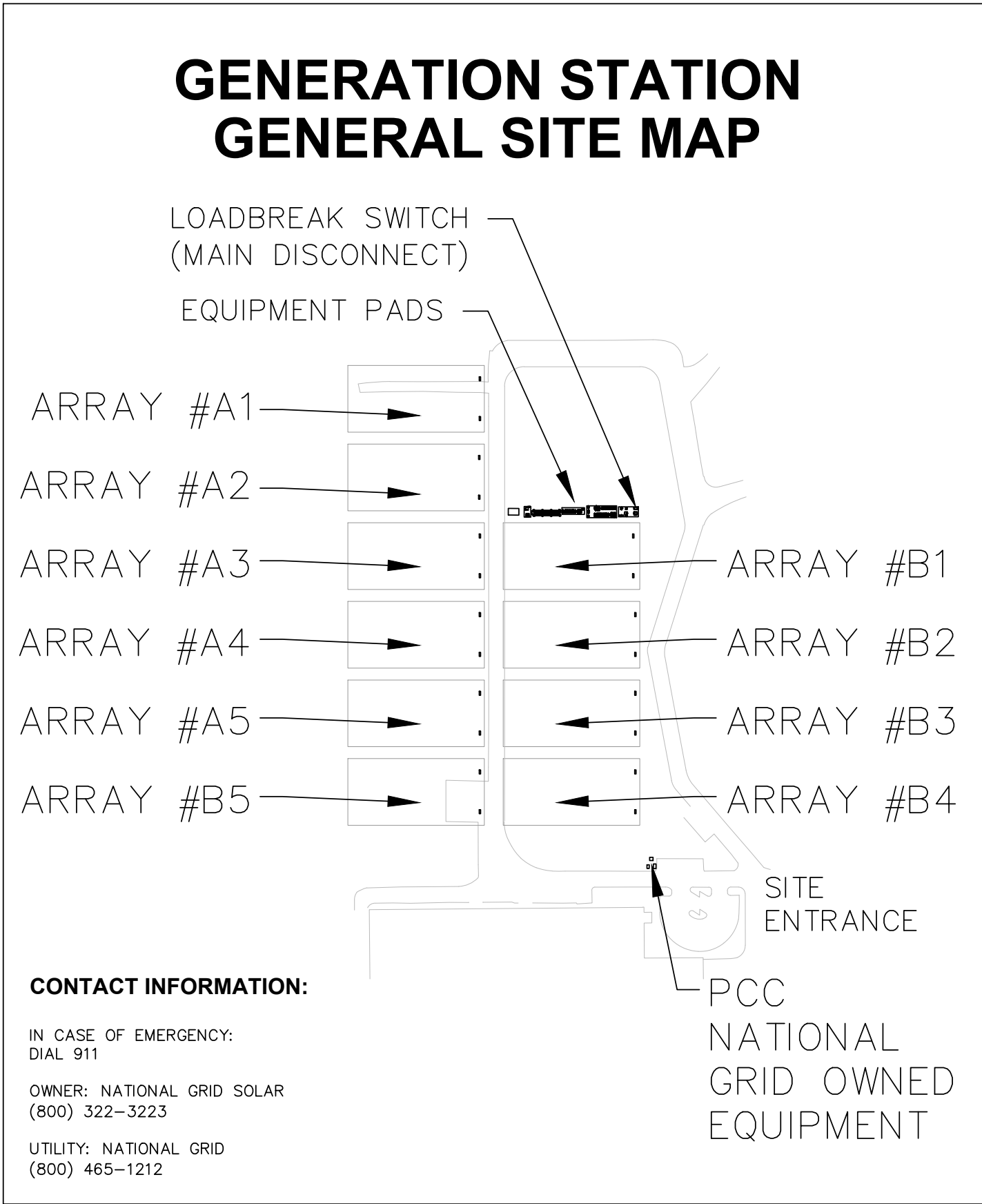
P



**CONTACT INFORMATION:**  
IN CASE OF EMERGENCY:  
DIAL 911  
OWNER: NATIONAL GRID SOLAR  
(800) 322-3223  
UTILITY: NATIONAL GRID  
(800) 465-1212

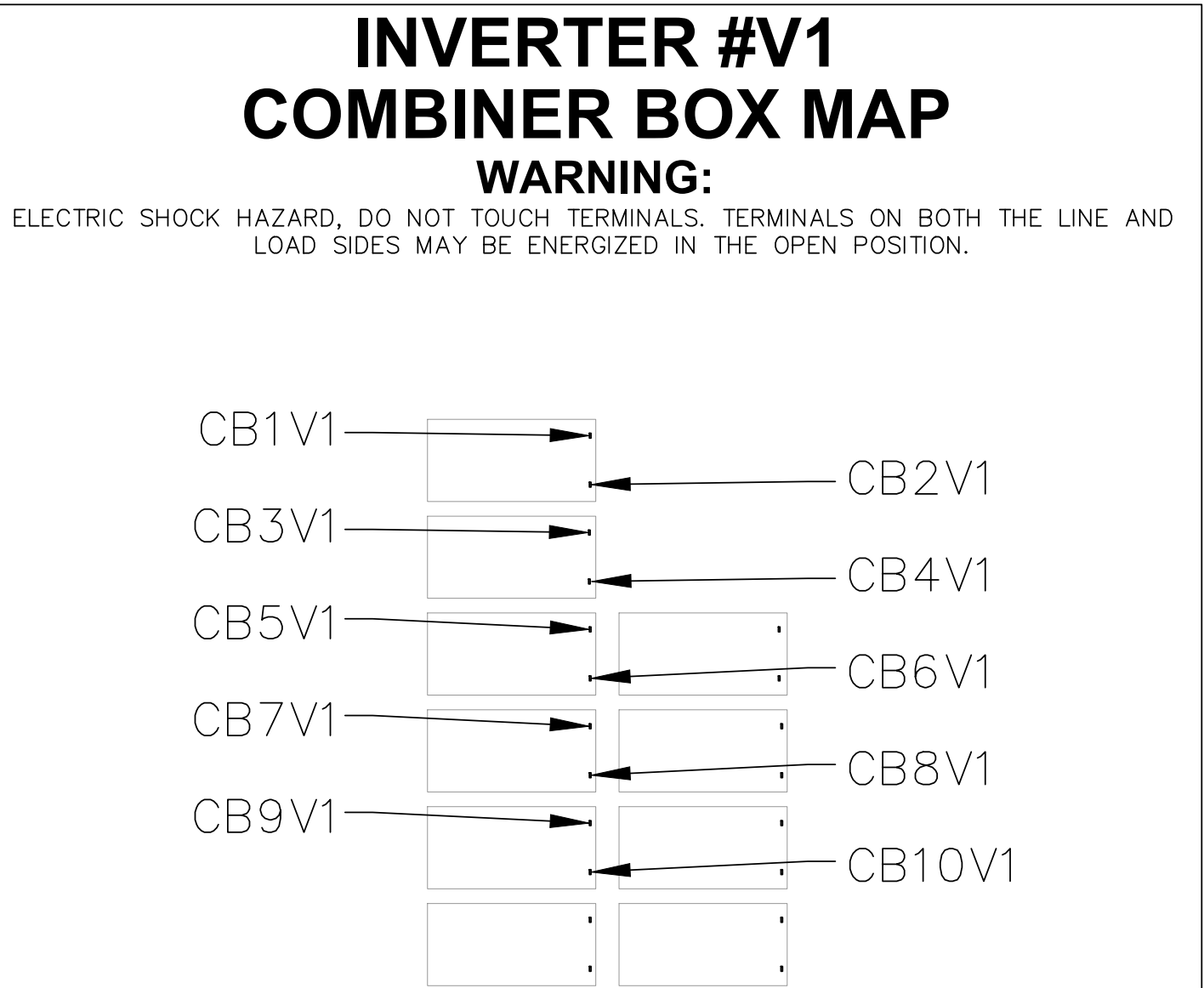
**AC / DC DISCONNECT MAP FOR XFMRs, INVERTERS, & DISCONNECT UNITS**  
(QTY OF 3)

R



M

SOLAR SITE MAP FOR ALL ACCESS GATES  
(QTY OF TBD ON SITE)

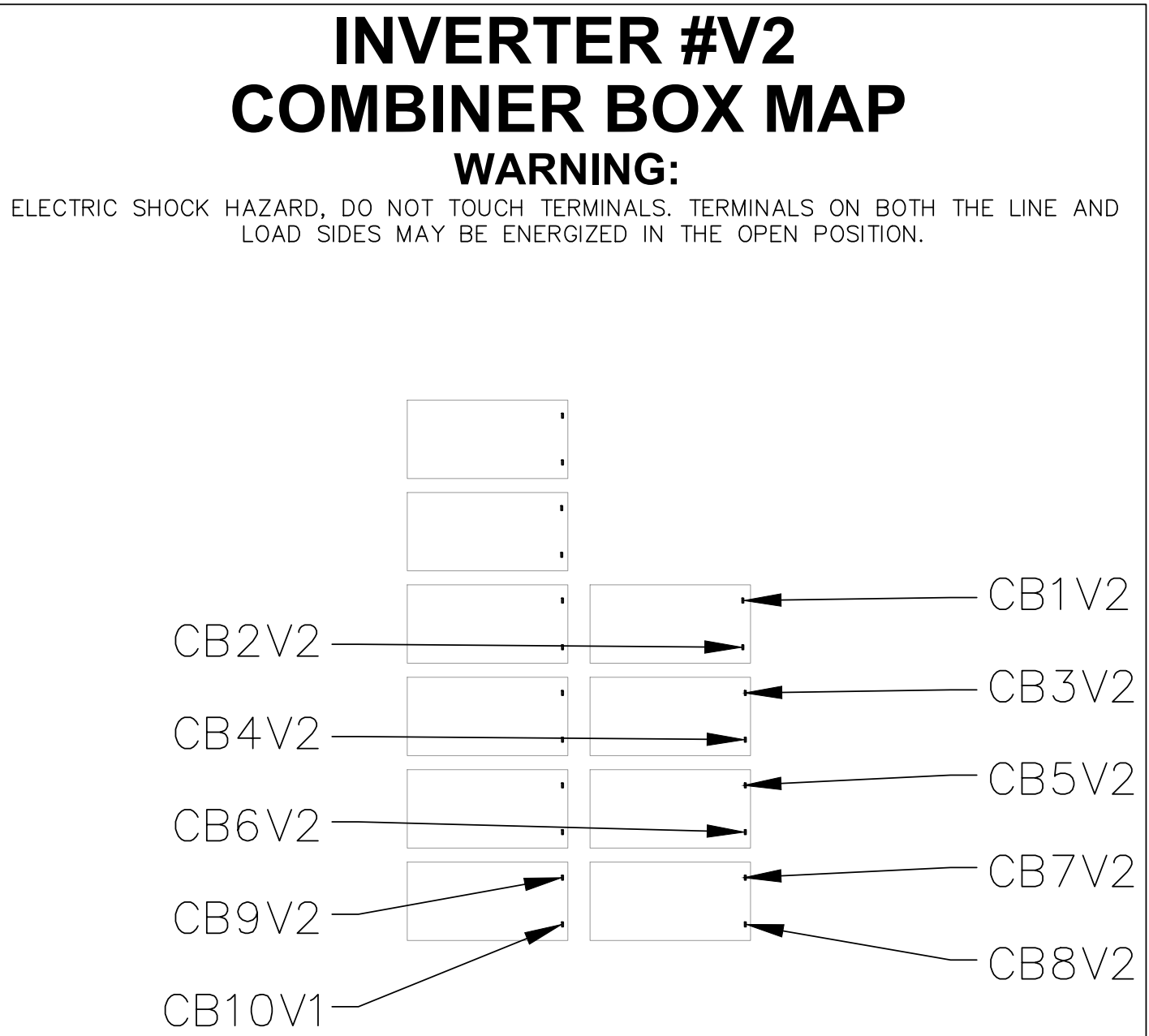


**CONTACT INFORMATION:**  
IN CASE OF EMERGENCY:  
DIAL 911  
OWNER: NATIONAL GRID SOLAR  
(800) 322-3223  
UTILITY: NATIONAL GRID  
(800) 465-1212

**ALL COMBINER BOXES  
SHOWN MUST BE OPEN TO  
SERVICE INVERTER #V1**

**DC DISCONNECT MAP FOR INVERTERS, DC DISCONNECT UNITS & COMBINERS**  
(QTY OF 12)

O



**CONTACT INFORMATION:**  
IN CASE OF EMERGENCY:  
DIAL 911  
OWNER: NATIONAL GRID SOLAR  
(800) 322-3223  
UTILITY: NATIONAL GRID  
(800) 465-1212

**ALL COMBINER BOXES  
SHOWN MUST BE OPEN TO  
SERVICE INVERTER #V2**

**COMBINER BOX MAP FOR INVERTERS, DC DISCONNECT UNITS, & COMBINERS**  
(QTY OF 12)

Q

- PLAQUE & DIRECTORY NOTES:
- 1) CONTRACTOR RESPONSIBLE FOR ALL PLACARDS PER NEC, NESC, AND UTILITY WHETHER SHOWN HERE OR NOT.
  - 2) ALL PLAQUES ARE TO BE RED BACKGROUND WITH WHITE LETTERING.
  - 3) ALL PLAQUES ARE A NOMINAL 5.5" WIDE BY 4" TALL.
  - 4) TEXT USED IS TO BE AERIAL WITH SIZE AND BOLDING AS SHOWN.
  - 5) CLEAN AND DRY SURFACE TO REMOVE DIRT, GREASE AND MOISTURE PRIOR TO MOUNTING SIGNS.
  - 6) CONTRACTOR TO COMPLETE BLANKS AND EMPTY POSITIONS ON TABLES BASED ON THE INFORMATION IN THE ELECTRICAL DRAWING FOR THE PROJECT

Digital Signature on 7/28/2022  
by Jonathan E. Salsman

REV. #	DATE	DESCRIPTION OF REVISION
-	7/28/2022	AS-BUILT

**INDUSTRIA ENGINEERING, INC.**  
91 CEDAR STREET  
MILFORD, MA 01757

TITLE: **ELECTRICAL DIRECTORIES**

PROJECT: **NEDC GENERATION STATION**

SITE: **1152 MAIN ST, NORTHBRIDGE, MA**

CLIENT: **NATIONAL GRID SOLAR -- NEDC**

DESIGNED	CHECKED	FILENAME	DATE	FIGURE
GM	JS	NEDC ASBUILT	07/28/2022	E-12

