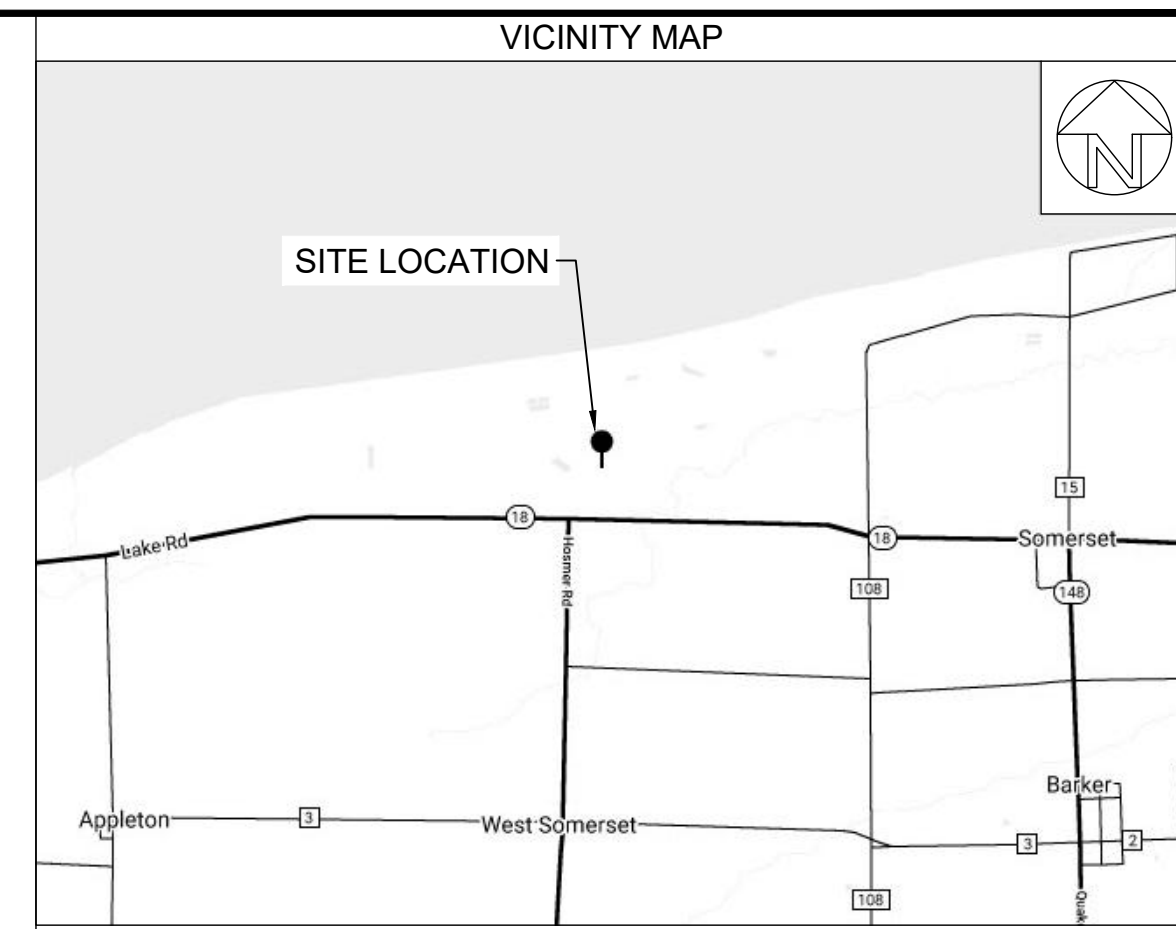
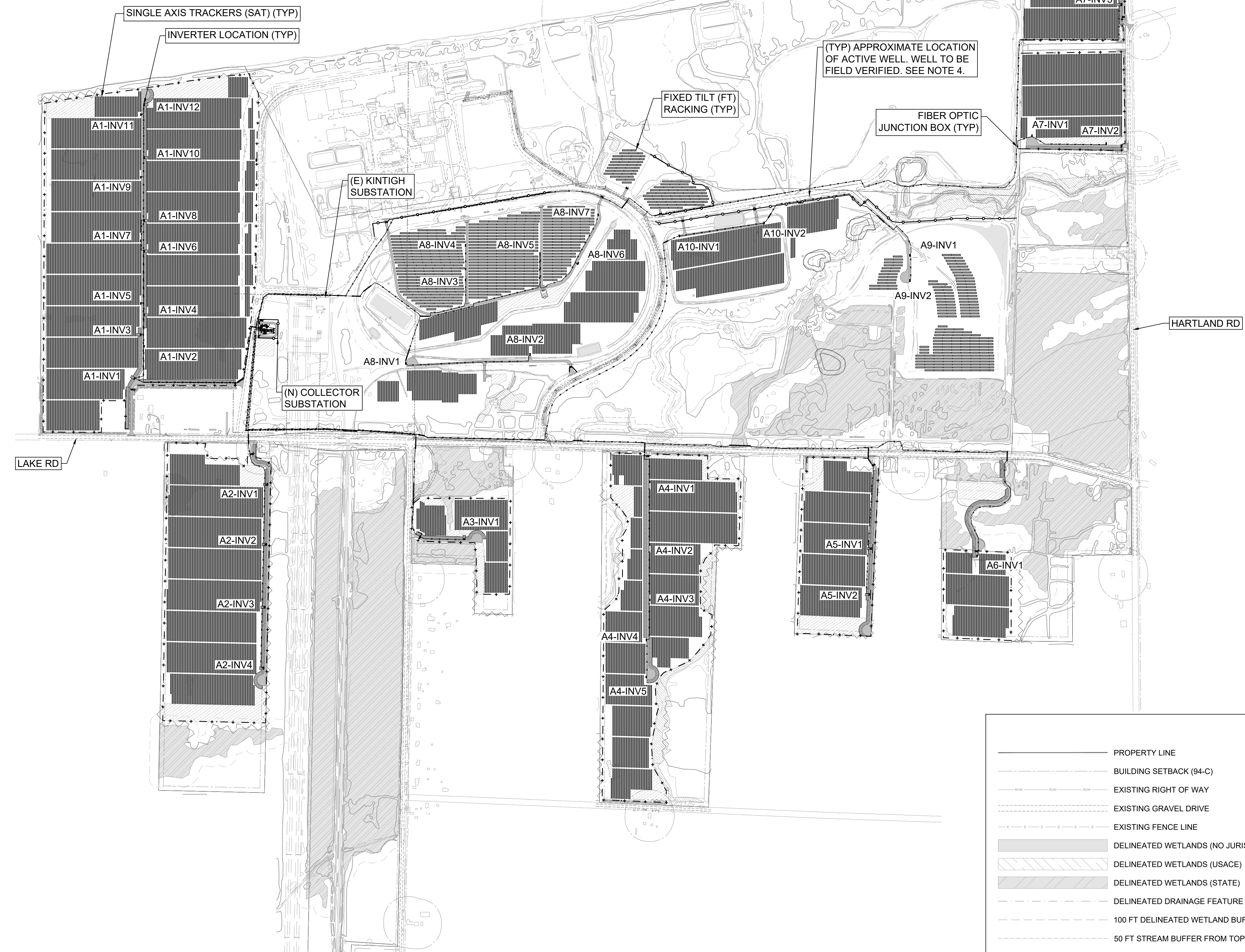


- NOTES:**
- NOTE THAT THE CIVIL DESIGNS AS SHOWN ON THE PV-E PLANS ARE FOR REFERENCE ONLY. ALL FINAL CIVIL DESIGNS, CONFIGURATIONS, AND SPECIFICATIONS ARE TO BE FOUND IN THE CIVIL PLANS.
 - THERE ARE NO PROPOSED SPLICE VAULTS (19 NYCRR §900-2.6(f)(1)(i)(c)) ON THIS PROJECT. ALL MV SPLICES ARE TO BE ABOVE GRADE IN SECTIONALIZER OR SIMILAR JUNCTION CABINETS. SEE DETAIL 1 ON PV-E.06.01.
 - FIBER OPTIC CABLE TO BE ROUTED WITH MV CIRCUITS.
 - ALL BURIED CONDUITS AND CABLE ROUTING SHALL BE ADJUSTED TO AVOID ALL MONITORING WELLS.



PROJECT SPECIFICATIONS DESIGN SUMMARY

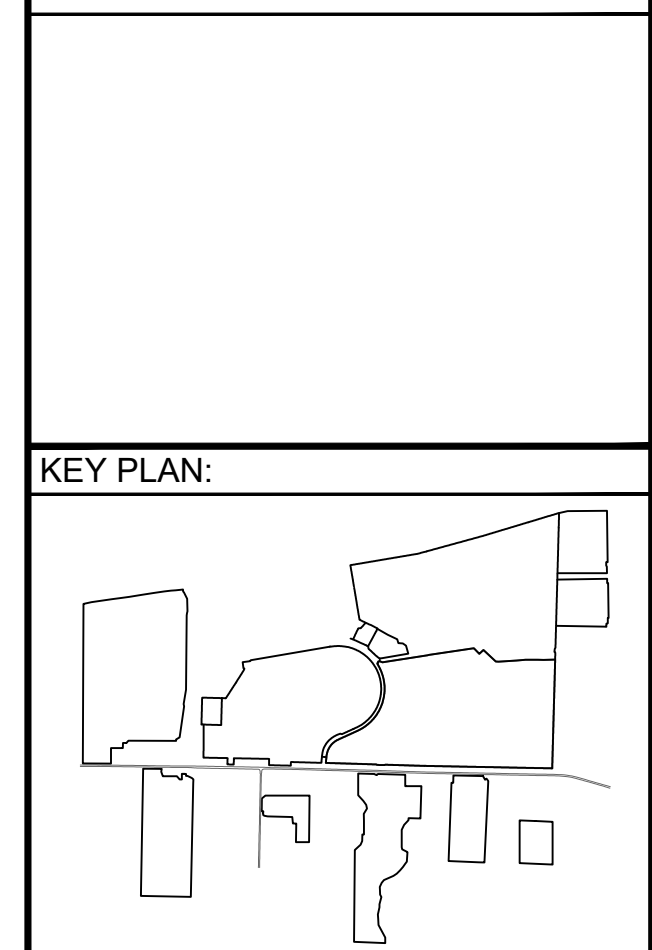
AC SYSTEM SIZE AT POI (MW)	125.000
AC INVERTER NAMEPLATE (MW)	136.800
POWER FACTOR	0.95 LEADING TO 0.95 LAGGING
DC SYSTEM SIZE (MW)	153.057
DC/AC RATIO AT POI	1.224
MV TRANSFORMER & INVERTER	(16) SUNGROW SG3150U-MV (24) SUNGROW SG3600UD-MV
RACKING SYSTEM	NEXTRACKER SINGLE-AXIS TRACKER (SAT) TERRASMART FIXED TILT (FT) RACKING
STRING SIZE AND VOLTAGE	SAT: 27 MODS PER STRING, 1500 VDC FT: 26 MODS PER STRING, 1500 VDC
PV MODULE	BYD MLTK-36 540
PV MODULE RATING	540 W
QUANTITY OF PV MODULES BY RACKING SYSTEM AND FOUNDATION TYPES	BALLASTED FT: 35,698 DRIVEN FT: 4,524 DRIVEN SAT: 243,216 TOTAL: 283,438
TOTAL STRING COUNT	10,555
RACK CONFIGURATION	SAT, 1 IN PORTRAIT FIXED TILT, 2 IN PORTRAIT
TILT (°)	± 60° (SAT) 20° (FIXED TILT)
AZIMUTH (°)	180°
GCR (%)	41.52% (SAT) 44.70% (FIXED TILT)
PITCH	18.00 FT (SAT) 31.82 FT (FIXED TILT)
CLEAR ROW SPACING	10.53 FT (SAT) 17.49 FT (FIXED TILT)
LATITUDE (°)	43.3525680
LONGITUDE (°)	-78.6014000
UTILITY	NYSEG
CODE CYCLE	NEC 2017

aes
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REVISIONS:

NO.	DATE	DESCRIPTION
0	03/08/2023	ISSUED FOR 94-C PERMIT
1	08/11/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:
SOMERSET SOLAR PROJECT

PROJECT LOCATION:
LAKE ROAD
SOMERSET, NY

SHEET TITLE & DESCRIPTION:
COMMUNICATIONS SITE PLAN

ISSUED FOR 94-C PERMIT ONLY
NOT FOR CONSTRUCTION

PROJ NUM:	SU20.0012
DES:	CB
DWN:	CB
CHK:	KL
APV:	KL
DATE:	08/05/2022
SCALE AT 22" x 34":	

AS SHOWN

SHEET NO:	PV-E.10.01	REV:	1
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PLOTTED: 8/10/2023 10:48 AM FILE: PV-E.10.01 COMMUNICATIONS SITE PLAN.DWG

1 COMMUNICATIONS SITE PLAN
SCALE: 1" = 600'

LEGEND

—	PROPERTY LINE	~~~~~	EXISTING TREE LINE
- - -	BUILDING SETBACK (94-C)	~~~~~	EXISTING BRUSH LINE
- - -	EXISTING RIGHT OF WAY	- - -	EXISTING EASEMENTS
- - -	EXISTING GRAVEL DRIVE	~~~~~	PROPOSED TREE LINE
- - -	EXISTING FENCE LINE	~~~~~	PROPOSED BRUSH LINE
▨	DELINEATED WETLANDS (NO JURISDICTION)	○—○	PROPOSED CHAIN LINK FENCE
▨	DELINEATED WETLANDS (USACE)	- + - + -	PROPOSED AGRICULTURAL FENCE
▨	DELINEATED WETLANDS (STATE)	—	PROPOSED ACCESS ROAD
- - -	DELINEATED DRAINAGE FEATURE	▨	PROPOSED GRASSED FILTER STRIP
- - -	100 FT DELINEATED WETLAND BUFFER	▨	PROPOSED VEGETATIVE SCREENING
- - -	50 FT STREAM BUFFER FROM TOP OF BANK	—	TEMPORARY LAYDOWN/ PARKING AREA
- - -	EXISTING DRAINAGE DITCH	—	FIBER OPTIC CABLE
- - -	EXISTING WATER EDGE		
- - -	APPROXIMATE TOP OF STREAM BANK		
- - -	EXISTING RAILROAD		



APPENDIX 5-B REVISED

Electrical Design Drawings – High Voltage Design



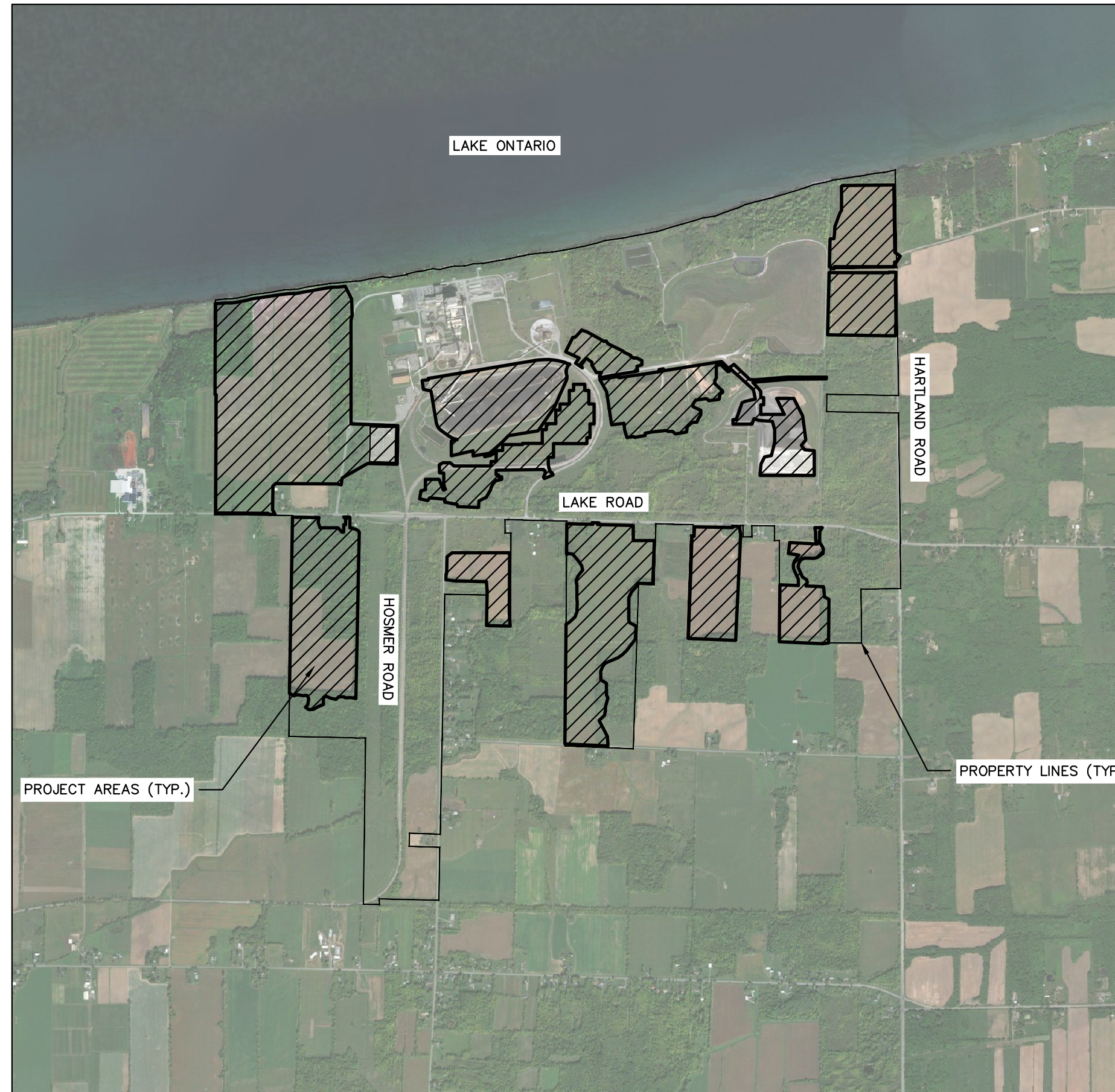
SOMERSET SOLAR PV FACILITY

NIAGARA COUNTY, SOMERSET, NY

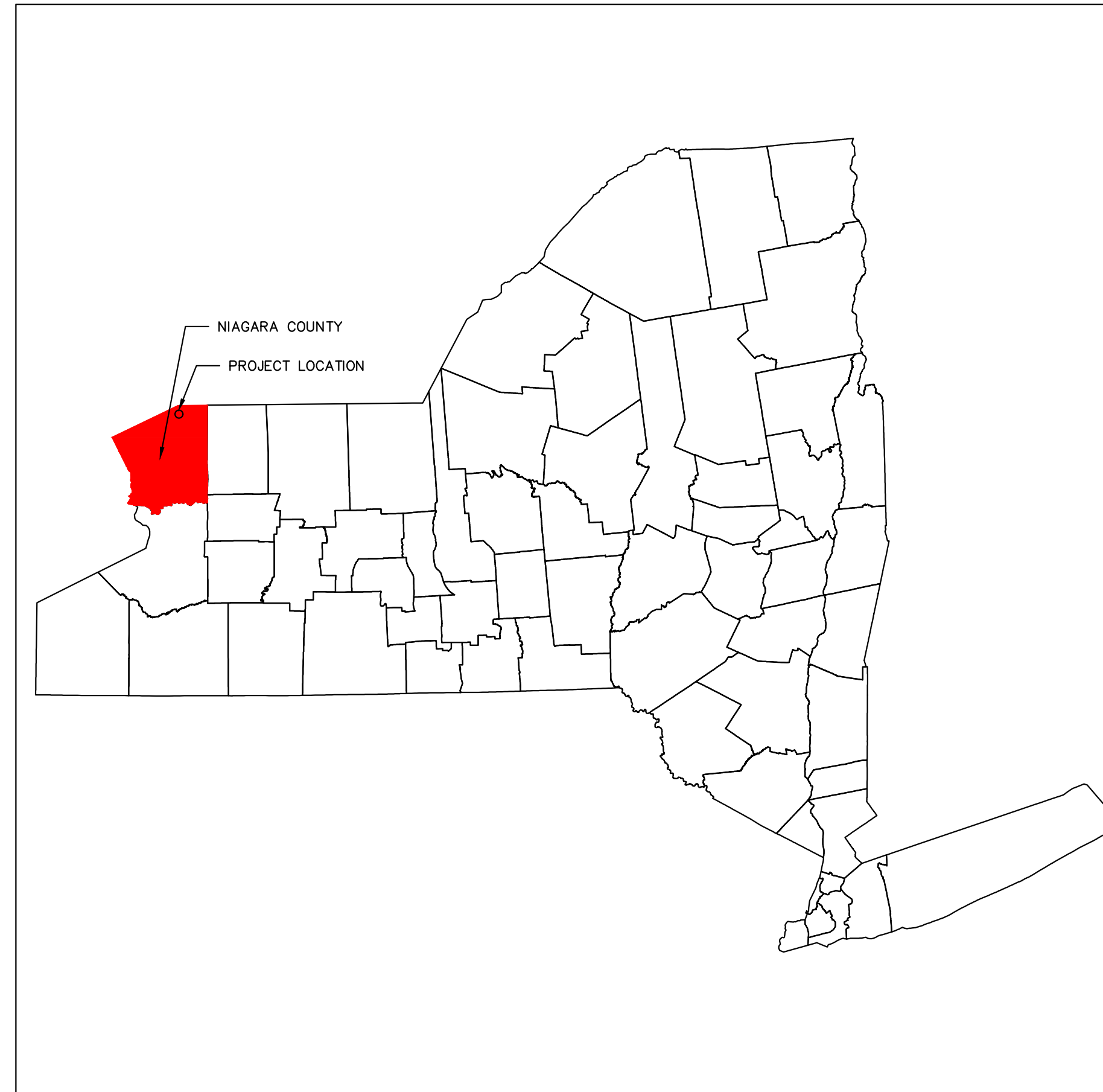
HIGH VOLTAGE ELECTRICAL PLANS



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LOCATION MAP
SCALE 1"=2000'



PROJECT COUNTY LOCATION MAP
NOT TO SCALE

DRAWING INDEX			
SHEET NUMBER	SHEET TITLE	REV NO.	DATE
HV-00.01	HIGH VOLTAGE ELECTRICAL TITLE SHEET	1	07/24/2023
HV-E.00.01	PROTECTION PHILOSOPHY SOMERSET SOLAR PROJECTS	0	03/08/2023
HV-E.02.01	345KV/34.5KV SUBSTATION SWITCHING ONE-LINE DIAGRAM	1	07/24/2023
HV-E.03.01	345KV/34.5KV SUBSTATION DETAILED ONE-LINE DIAGRAM SHT 1/2	1	07/24/2023
HV-E.03.02	345KV/34.5KV SUBSTATION DETAILED ONE-LINE DIAGRAM SHT 2/2	1	07/24/2023
HV-E.06.01	345KV/34.5KV SUBSTATION SCADA BLOCK DIAGRAM	1	07/24/2023
HV-E.09.01	345KV/34.5KV SUBSTATION CONTROL PANEL ELEVATIONS OVERALL FRONT VIEW	1	07/24/2023
HV-E.10.01	345KV/34.5KV SUBSTATION 120/240V AC STATION POWER OVERALL DISTRIBUTION	1	07/24/2023
HV-E.11.01	345KV/34.5KV SUBSTATION 125V DC STATION POWER OVERALL DISTRIBUTION	1	07/24/2023
HV-P.01.01	345KV/34.5KV SUBSTATION GENERAL PLAN	1	07/24/2023
HV-P.02.01	345KV/34.5KV SUBSTATION 345 KV ELEVATION VIEW	1	07/24/2023
HV-P.02.02	345KV/34.5KV SUBSTATION 34.5 KV ELEVATION VIEW	1	07/24/2023
HV-P.08.01	345KV/34.5KV SUBSTATION GROUNDING PLAN	1	07/24/2023
HV-P.13.01	PHOTOMETRIC LIGHTING PLAN	1	07/24/2023
HV-P.14.01	345KV/34.5KV SUBSTATION CONTROL BUILDING LAYOUT	1	07/24/2023
HV-P.15.01	345KV/34.5KV SUBSTATION CONTROL BUILDING ELEVATION	1	07/24/2023
HV-G.02.01	BILL OF MATERIAL - MAJOR SUBSTATION MATERIAL AND EQUIPMENT	1	07/24/2023
HV-G.02.02	P&C MAJOR EQUIPMENT (BILL OF MATERIAL)	1	07/24/2023
CL-E.01.01	PROPOSED SOMERSET HIGH-VOLTAGE SUBSTATION GEN-TIE PROXIMITY TO RESIDENCE	1	07/24/2023
TL-P.00.01	345KV GEN-TIE TRANSMISSION LINE ROUTE MAP	1	07/24/2023
TL-P.01.01	345KV GEN-TIE TRANSMISSION LINE ELEVATION VIEW	1	07/24/2023
TL-P.02.01	345KV GEN-TIE TRANSMISSION LINE WOOD H-FRAME FRAMING DRAWING	1	07/24/2023

<p>PROJECT DEVELOPER</p> <p>AES CLEAN ENERGY DEVELOPMENT, LLC 292 MADISON AVENUE, 15TH FLOOR NEW YORK, NY 10017</p>	<p>PROJECT SCOPE</p> <p>THIS PERMITTING PACKAGE PROVIDES DRAWINGS AND DETAILS FOR THE INSTALLATION OF A SOLAR PHOTOVOLTAIC SYSTEM IN THE STATE OF NEW YORK, INCLUDING TEMPORARY AND PERMANENT STORMWATER AND EROSION & SEDIMENT CONTROL FEATURES. THIS DRAWING SET IS FOR PERMITTING PURPOSES ONLY AND NOT FOR CONSTRUCTION.</p>
<p>ELECTRICAL ENGINEER</p> <p>TETRA TECH ENGINEERING CORPORATION, P.C. CERT #0018815 3136 SOUTH WINTON RD, SUITE 303 ROCHESTER, NEW YORK 14623 (585) 417-4002 JONATHAN R. LEMON, P.E. P.E. No. 105799 EXP. 04/30/25 ZHONG BING SHEN, P.E. P.E. No. 101390 EXP. 05/31/24 GREG KLOSSNER, P.E. P.E. No. 098261-01 EXP. 04/30/23</p>	<p>APPLICABLE CODES & STANDARDS</p> <ul style="list-style-type: none"> NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 2020 FIRE CODE OF NEW YORK STATE 2020 BUILDING CODE OF NEW YORK STATE 2016 NEW YORK STATE STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL 2015 NEW YORK STATE STORMWATER MANAGEMENT DESIGN MANUAL

KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
0	03/08/2023	ISSUED FOR 94-C PERMIT
1	07/24/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

LAKE ROAD,
SOMERSET NY

SHEET TITLE & DESCRIPTION:

ISSUED FOR 94-C PERMIT ONLY
NOT FOR CONSTRUCTION

PROJ NUM:	SU20.0012
DES:	CAN
DWN:	CAN/DS
CHK:	JRL/ZBS/AS
APV:	
DATE:	02/17/2023
SCALE AT 22" x 34":	

AS SHOWN

SHEET NO:	REV:
	1

Protection Philosophy

SOMERSET SOLAR Projects

Document No. HV-E.00.01

TT Document Number: 705-2161910300-REP-E0012-0

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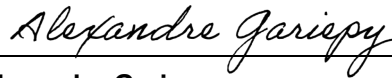
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2023-03-08

Reviewed by:



Abe Ghazi

2023-03-08

Authorized by:



Zhong Bing Shen, P.E.

2023-03-08

REVISION HISTORY

REV. NO	ISSUE DATE	PREPARED BY AND DATE	REVIEWED BY AND DATE	APPROVED BY AND DATE	DESCRIPTION OF REVISION
0	08 Mar, 2023	Alexandre Gariepy 08 Mar, 2023	Abe Ghazi 08 Mar, 2023	Zhong Bing Shen, P.E. 08 Mar, 2023	ISSUED FOR 94-C PERMIT

TABLE OF CONTENTS

1.0 INTRODUCTION.....	1
1.1 Background.....	1
1.2 Arrangement.....	1
2.0 PROTECTION SYSTEM DESIGN DESCRIPTION.....	2
3.0 345 KV LINE PROTECTION.....	3
3.1 Protection Relays.....	3
3.2 protection elements.....	3
4.0 ANTI-ISLANDING PROTECTION.....	3
5.0 BREAKER FAILURE PROTECTION.....	4
5.1 Protection relay.....	4
6.0 345/34.5 KV INTERFACE TRANSFORMER PROTECTION.....	4
6.1 Protection relay.....	4
6.2 . Protection elements.....	4
7.0 34.5 KV BUS PROTECTION.....	5
7.1 Protection relays.....	5
7.2 Protection elements.....	5
8.0 34.5KV FEEDER PROTECTION.....	5
8.1 Protection relays.....	5
8.2 Protection elements.....	5
9.0 34.5KV CAPACITOR BANK PROTECTION.....	6
9.1 Protection relay.....	6
9.2 Protection elements.....	6
10.0 34.5KV FILTER BANK PROTECTION.....	6
10.1 Protection relay.....	6
10.2 Protection elements.....	6
11.0 STATION COMMUNICATION.....	7

1.0 INTRODUCTION

1.1 BACKGROUND

The Somerset Solar Farm located in the Town of Somerset, Niagara County, New York has a rated capacity of 125 MW, consisting of solar photovoltaic modules at a voltage of approximately 51.8V DC. The DC power from the photovoltaic modules will be collected by inverters, that convert the power from DC to AC and direct it to medium voltage transformers to step up the voltage to 34.5 kV for the solar farm collector system.

The 345/34.5kV Substation connects the solar farm collector system through three feeder breakers, a 34.5 kV bus, a manual disconnect switch and a 34.5/345kV step-up interface transformer. A motor operated disconnect switch and a circuit breaker are installed on the high voltage side of the step-up transformer, linking the 345 kV overhead line to the interconnecting Kintigh Substation (approx 159ft).

The electrical protection schemes are designed to selectively detect and isolate faults within the protection zone.

1.2 ARRANGEMENT

At the 345kV/34.5kV Substation, the interface transformer's (T1) primary switching is provided by a 345kV circuit breaker (52-H1) in series with a motor operated disconnect switch (89-H1) immediately after 159ft of overhead transmission line to Kintigh Substation. Refer to single line diagram: HV-E-03-01. The HV circuit breaker is capable of switching transformer in and out as well as isolating the transformer from the 345kV side under fault conditions.

The interface transformer (T1), 34.5/345 kV rated 84/112/140 MVA (ONAN/ONAF/ONAF), steps up the solar farm collector system voltage from 34.5 kV to 345 kV. The configuration is Wye grounded on the primary side (345 kV) and Wye on the secondary (34.5 kV), grounded through a neutral reactor. A buried corner-grounded delta tertiary will be used to mitigate the third harmonics and zero sequence components.

Equipment connected downstream of the transformer T1 are as follows: one 34.5 kV manual operated disconnect switch (89-B1); one outdoor air insulated rigid bus (BUS1); one outdoor feeder circuit breaker (52-C1) connected to two 12 MVAR capacitor banks, and three outdoor feeder circuit breakers (52-F1 through 52-F3). Each feeder circuit breaker except 52-F3 connects to two solar circuits. Please refer to single line diagram: HV-E-03.02.

The 345 kV circuit breaker, 52-H1 and the motorized disconnect switch 89-H1 will be controlled remotely from SCADA, and locally from the selector switches located on the protection panels. HV breaker and HV motorized disconnect switch will have their own local/remote switch.

All circuit breakers on the 34.5 kV side will be controlled remotely from SCADA and locally through Trip/Close safe-lock pushbuttons on the protection relays. All required interlocks will be considered in the design to safely open/close the breakers.

The primary station service will be supplied by a 19.9 kV / 240-120 V single phase station service transformer (SS1); with the 19.9 kV winding connected to the 34.5 kV bus between T1 terminal and switch 89-B1, through a fuse cut-out (89-SS1). During the non-availability of the primary AC supply, an emergency backup supply will be connected to the AC distribution panelboards. An automatic transfer switch, with break-before-make transition will connect the backup power supply from local distribution line to the main AC distribution panelboards (ACP1 and ACP2). The AC station service supply to Battery Charger#1 will be provided from the AC panelboard ACP1 and the supply to Battery Charger#2 will be provided from AC panelboard ACP2.

The 125 VDC services will be supplied from two battery and battery charger systems.

2.0 PROTECTION SYSTEM DESIGN DESCRIPTION

The protection system for the 345kV/34.5kV Substation at Somerset will be designed to detect:

- Balanced and unbalanced faults (line to ground, line to line, three-phase) at the Distributed Generation (DG) facility and the 345 kV transmission line
- Abnormal frequencies
- Abnormal voltages
- Islanding conditions

The system will also be designed to protect the station against internal and external faults.

A redundant protection scheme will be installed to protect 345 kV system. Redundant Intelligent Electronic Devices (IED) relays from Schweitzer Engineering Laboratories Inc. (SEL) and GE Multilin (GE), will be used to separate the two protection systems along with their own independent components (CT, PT, DC supply and tripping coils) to avoid the risk of simultaneous failure of both systems.

The protection system will also be equipped with Breaker Failure Protection (BF) functionality to protect the system if the breaker fails to clear the fault. This is achieved by tripping the adjacent breakers to clear the fault.

Remote transfer trip (TT) schemes are provided to trip 345 kV CB 52-H1 at the 345kV/34.5kV Somerset Substation from Kintigh substation and the 345 kV circuit breaker at the remote end in Kintigh substation from 345kV/34.5kV Somerset Substation. Additionally, all protection operation schemes shall initiate respective lockout relays to trip and block close associated circuit breakers at the 345kV/34.5kV Somerset Substation.

The specific protection functions and settings for each relay will be determined during further study and settings coordinated with the 345 kV line protection. The relays are provided with a GPS time synchronizing clock signal. Critical features, such as protection operation, or circuit breaker operation will be annunciated and monitored by IEDs' internal Disturbance Fault Recorder.

3.0 345 KV LINE PROTECTION

3.1 PROTECTION RELAYS

The selected 'A' and 'B' line protection relays will be SEL-411L and GE-L90 respectively. If required, the relays will be updated based on NYSEG's standards during detailed design.

3.2 PROTECTION ELEMENTS

The protection functions used in the 'A' and 'B' relays include:

- Current Differential (87L)
- Phase and Ground Distance (21)
- Overcurrent and Time-Overcurrent (50, 51)
- Undervoltage (27)
- Overvoltage (59)
- Over-Frequency and Under-Frequency (81O, 81U)

In the event of a 345 kV line fault, the fault will only be cleared by tripping all circuit breakers connected to the line. The isolation points include the 52-H1 circuit breaker at the 345kV/34.5kV Somerset Substation and the 345 kV circuit breaker at upstream Kintigh station. Each of the 'A' and 'B' protections will use a dedicated overhead OPGW fiber optic communication to send and receive remote trip signals. The transfer trip fiber optic communication channel along with the local relay protection operated functions will trip the 345 kV circuit breaker at Somerset Substation and upstream Kintigh station to isolate the line from the fault current contribution.

For all line faults, operation of line protection relays will operate both 86L1A and 86L1B lockout relays which will remain in the lockout position until reset by the maintenance personnel. Anytime a lockout relay operates, it will send a trip command and a block close command to 52-H1 circuit breaker as well.

However, for Transfer trip signal received from the Kintigh station, the line protection relays will directly trip the 52-H1 circuit breaker in order to avoid delay via lockout relays.

4.0 ANTI-ISLANDING PROTECTION

The Somerset 345kV/34.5kV Substation will be protected against islanding conditions in two ways:

- Transfer trip signals received from Kintigh switchyard
- Self-clearing anti-islanding protection through under/over frequency 81U/O, under/over voltage 27/59 protection elements to detect the islanding condition and isolate the DG. Any islanding detection disconnects the generating station from the line.

The anti-islanding functionality will be programmed in the line protection relays.

5.0 BREAKER FAILURE PROTECTION

5.1 PROTECTION RELAY

SEL-351S relay will be used for the 345 kV breaker fail protection.

The operation of the Somerset Substation 345 kV line 'A' or 'B' protections at both ends of the line will trip 52-H1 circuit breaker and will also initiate the breaker failure function in the SEL 351S relay.

Upon operation of either 'A' or 'B' 345kV line protection, a breaker failure signal will automatically be initiated in the SEL 351S breaker failure relay. The breaker failure BF function can be initiated by L1 'A' and 'B' protection relays, Transfer Trip Signals received from upstream Kintigh station, Direct Transfer Trip from L1 line protection at the Somerset Substation end or internally within the BF SEL 351S protection.

When Line protection relay, Transformer protection relay or Bus protection relay detects a fault, it trips the high voltage breaker 52-H1 and initiates breaker failure via BF relay (SEL 351S).

Upon a breaker failure initiation of 52-H1, if protection initiation signals are still received and if current through the circuit breaker is above specific pick-up current, the following actions will occur after a specific time delay:

- Re-trip (early trip) command without any delays to 52-H1 (TC1 and TC2)
- The 345kV circuit breaker at Kintigh Substation via the Direct Transfer Trip signal.

Current monitoring and breaker status will be used to declare a breaker fail condition (50BF) and trips will be sent to the adjacent zone to clear the fault. To clear the fault, a trip command will be sent through 86BFH lock out relay to all the upstream and downstream breakers. A transfer trip will be sent to upstream station via line protection relays.

6.0 345/34.5 KV INTERFACE TRANSFORMER PROTECTION

6.1 PROTECTION RELAY

The selected 'A' and 'B' transformer protection relays will be SEL-487E and GE-T60 respectively.

6.2 . PROTECTION ELEMENTS

The functions in the 'A' and 'B' protections include:

- Differential protection (87)
- Overcurrent for phase and neutral faults (50P/51P/50N/51N)
- Neutral Directional Overcurrent (67N), 'A' protection only.
- Restricted Earth Fault (REF)

In addition, transformer mechanical protections will be bundled together and wired to both protections relays. The typical transformer mechanical protections include:

- Temperature rise detection (26)
- Thermal relay / thermal overload detection (49)
- Pressure detection (63)

- Liquid level detection (71Q)

To clear the fault within the transformer protection zone, both 'A' and 'B' protections will directly trip circuit breaker 52-H1 for only 50/51 overcurrent faults. For any other faults the protection relays will trip 52-H1 through lockout relays 86-T1A and 86-T1B. The lockout relays will trip and lock out the transformer's primary and the secondary circuit breakers. The operation of the 'A' or 'B' transformer protection will also initiate breaker failure in the SEL-351S relay.

7.0 34.5 KV BUS PROTECTION

7.1 PROTECTION RELAYS

The selected SEL-487B low impedance protection relay will be used to protect 34.5 kV bus.

7.2 PROTECTION ELEMENTS

The typical protection functions include:

- Differential protection (87)
- Overcurrent faults (50/51)

50/51 overcurrent faults on the 34.5 kV bus will be detected by SEL-487B and cleared by directly tripping high voltage 345 kV circuit breaker 52-H1, as well as all low voltage feeder circuit breakers (52-F1, 52-F2, 52-3 and 52-C1). For any other faults or abnormal conditions on the 34.5 kV bus, the bus protection relays will trip all the breakers through lockout relay 86B1 and will remain in the lockout position until reset by the maintenance personnel. Anytime a lockout relay operates, close commands to 345 kV breaker and 34.5 kV circuit breakers will be blocked.

8.0 34.5KV FEEDER PROTECTION

8.1 PROTECTION RELAYS

Each 34.5 kV feeder will be protected by an SEL-351S relay.

8.2 PROTECTION ELEMENTS

Faults or abnormal conditions on the 34.5 kV feeders are detected by the feeder protection, and cleared by tripping the associated feeder breaker. The fault clearing will be selective; therefore for a fault on a feeder, the feeder circuit breaker trips first. The upstream protection would operate if the feeder protection fails.

The typical protection functions that will be implemented are:

- Instantaneous overcurrent and time-overcurrent (50/51)
- Neutral overcurrent and Neutral Time-overcurrent (50N/51N)
- Undervoltage (27)
- Overvoltage (59)
- Over-Frequency and Under-Frequency (81O, 81U)
- Breaker Fail (50BF)

3-Phase under voltage protection will prevent closing of the feeders during a dead bus condition. In other words, closing of the feeder breaker will be blocked whenever the 34.5kV bus is not energized.

Breaker failure logic for each feeder breaker will be programmed in the corresponding feeder protection relay to re-trip both trip coils of the breaker. If the breaker failure logic is qualified, the feeder relay will trip the 86BFM1 as a common lockout relay to trip and block all 34.5 kV circuit breakers and the 345 kV circuit breaker.

9.0 34.5KV CAPACITOR BANK PROTECTION

9.1 PROTECTION RELAY

The selected relay to protect the 34.5 kV capacitor bank will be SEL-487V relay.

9.2 PROTECTION ELEMENTS

The typical protection functions that will be implemented are:

- Instantaneous overcurrent and time-overcurrent (50/51)
- Neutral overcurrent and Neutral Time-overcurrent (50N/51N)
- Undervoltage (27)
- Overvoltage (59)
- Voltage differential (87V)
- Reverse Phase or Phase balance current (46P)

Faults or abnormal conditions on the 34.5 kV capacitor bank are detected by the relay and cleared by tripping of the associated 52-C1 breaker. The upstream protection would operate if the capacitor bank protection fails.

3-Phase under voltage protection will prevent closing of the breaker during a dead bus condition. In other words, closing of the breaker will be blocked whenever the 34.5kV bus is not energized.

Capacitor bank protection operation will initiate breaker failure via the same relay. Upon breaker failure initiation, re-trip (early trip) command will be sent to both circuit breaker trip coils.

The relay logic will monitor the current as well as breaker status and if the breaker fails to operate after the time expires, relay will trip and lockout all the other 34.5kV circuit breakers as well as the high voltage breaker 52-H1 via the 86BFM1 lockout relay.

10.0 34.5KV FILTER BANK PROTECTION

10.1 PROTECTION RELAY

The selected relay to protect the 34.5 kV filter bank will be SEL-351S relay.

10.2 PROTECTION ELEMENTS

The typical protection functions that will be implemented are:

- Neutral instantaneous overcurrent (50N)
- Time overcurrent (51)
- Ground overcurrent (50G)

Faults or abnormal conditions on the 34.5 kV filter bank are detected by the relay and cleared by tripping of the associated 52-C1 breaker.

Filter bank protection operation will initiate breaker failure via the Capacitor Bank protection relay. Upon breaker failure initiation, re-trip (early trip) command will be sent to both circuit breaker trip coils by the Capacitor Bank protection relay.

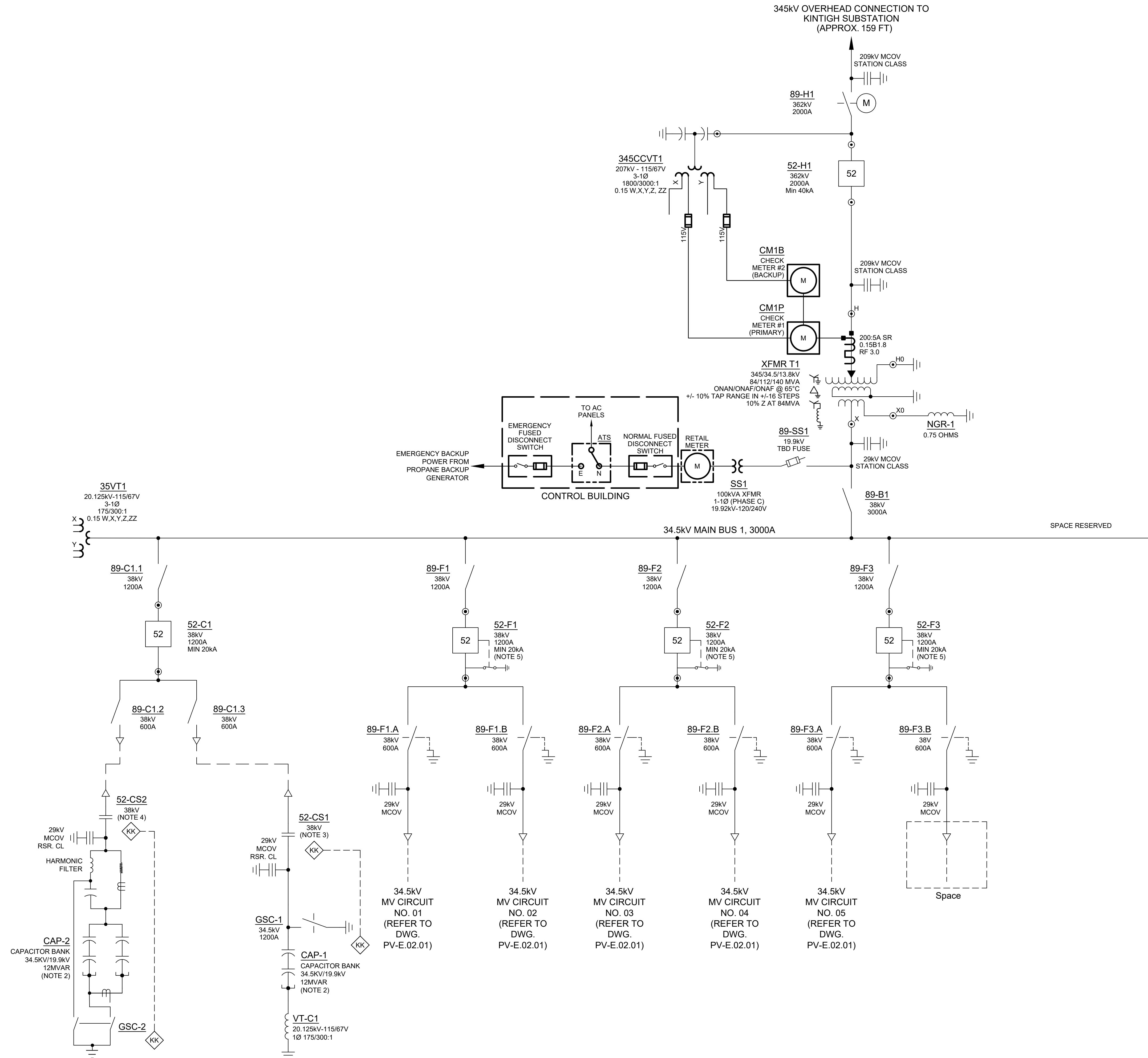
11.0 STATION COMMUNICATION

The communication infrastructure in Somerset will include the following systems:

- One SEL-3555 RTAC as the RTU that will communicate with all IEDs and act as a slave device to provide real time operating information to control center.
- Two SEL-2440 DPACs as RTU digital I/O interfaces to monitor and control station switching & equipment.
- Two redundant groups of SEL-2730M ethernet switches. All fiber connections between protection relays and the switches shall be 100FX.
- The time synchronization is provided by SEL-2488 IRIG-B device.

Communication protocol throughout the station will be DNP3. There is an OPGW fiber optic communication that connects the Somerset station to the remote Kintigh substation.

345KV OVERHEAD CONNECTION TO KINTIGH SUBSTATION (APPROX. 159 FT)



- NOTES:**
1. THIS IS A PRELIMINARY SINGLE LINE DIAGRAM AND IS FOR PERMITTING PURPOSES ONLY.
 2. FINAL CAP BANK OR FILTER RATING, TO BE CONFIRMED BASED ON FINAL LOAD FLOW AND HARMONICS STUDY.
 3. KIRK KEY ARRANGEMENT PREVENTS 52-CS1 CLOSURE WHILE GSC-1 IS CLOSED.
 4. KIRK KEY ARRANGEMENT PREVENTS 52-CS2 CLOSURE WHILE GSC-2 IS CLOSED.
 5. 38kV VACUUM CIRCUIT BREAKER IS EQUIPPED WITH A HIGH-SPEED, MECHANICALLY INTERLOCKED GROUNDING SWITCH. WHEN BREAKER IS OPEN, COLLECTION CIRCUIT IS GROUNDED.
 6. EQUIPMENT RATINGS AND DESIGN ARE PRELIMINARY AND SHALL BE FINALIZED AT DETAILED DESIGN PHASE.

DRAWING NUMBER	DRAWING DESCRIPTION
HV-P.01.01	345/34.5kV SUBSTATION GENERAL PLAN
HV-P.08.01	345/34.5kV SUBSTATION GROUNDING PLAN
HV-P.14.01	345/34.5kV SUBSTATION CONTROL BUILDING LAYOUT
HV-P.02.01	345/34.5kV SUBSTATION 345kV ELEVATION VIEW
HV-P.02.02	345/34.5kV SUBSTATION 34.5kV ELEVATION VIEW
PV-E.02.01	34.5kV AC COLLECTOR SYSTEM ONE LINE DIAGRAM

LEGEND

	TRANSFORMER
	BREAKER
	REACTOR
	DISCONNECT SWITCH (PLAIN)
	DISCONNECT SWITCH (FUSED)
	DISCONNECT SWITCH (GANG OPERATED MANUAL)
	DISCONNECT SWITCH (GANG OPERATED MOTOR)
	GROUNDING DISCONNECT SWITCH (MANUAL)
	CAPACITOR BANK
	CAPACITOR SWITCHER
	LIGHTNING ARRESTER
	CAPACITIVE VOLTAGE TRANSFORMER
	CURRENT TRANSFORMER
	VOLTAGE TRANSFORMER



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KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
0	03/08/2023	ISSUED FOR 94-C PERMIT
1	07/24/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

LAKE ROAD, SOMERSET NY

SHEET TITLE & DESCRIPTION:

345/34.5kV SUBSTATION

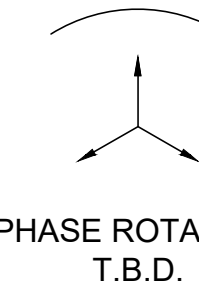
SWITCHING ONE-LINE DIAGRAM

PROJ NUM:	SU20.0012
DES:	MIKE MAILLE
DWN:	MIKE MAILLE/KRINA GANDHI
CHK:	AZIN SHAHAB
APV:	ZHONG BING SHEN, P.E.
DATE:	02/17/2023
SCALE AT 22" x 34":	

NONE

SHEET NO.	REV.
HV-E.02.01	1

ISSUED FOR 94-C PERMIT ONLY
NOT FOR CONSTRUCTION



345kV O/H CONNECTION TO KINTIGH SUBSTATION (APPROX. 159FT)

209kV MCOV STATION CLASS

345CCVT1
207kV-115/67V
3-1Ø
1800/3000:1
0.15 W,X,Y,Z,ZZ

89-H1
362kV
2000A

52-H1
1200:5A MR
C800, RF 2.0
400:5A TAP

52
362kV, 2000A
Min 40kA

209kV MCOV STATION CLASS

84/112/140 MVA
ONAN/ONAF/ONAF @ 65°C
345Y/34.5Y-13.8ΔkV
TAPS +/- 16 @ 5/8%
10% Z AT 64MVA

200:5A SR
0.15B1.8
RF 3.0

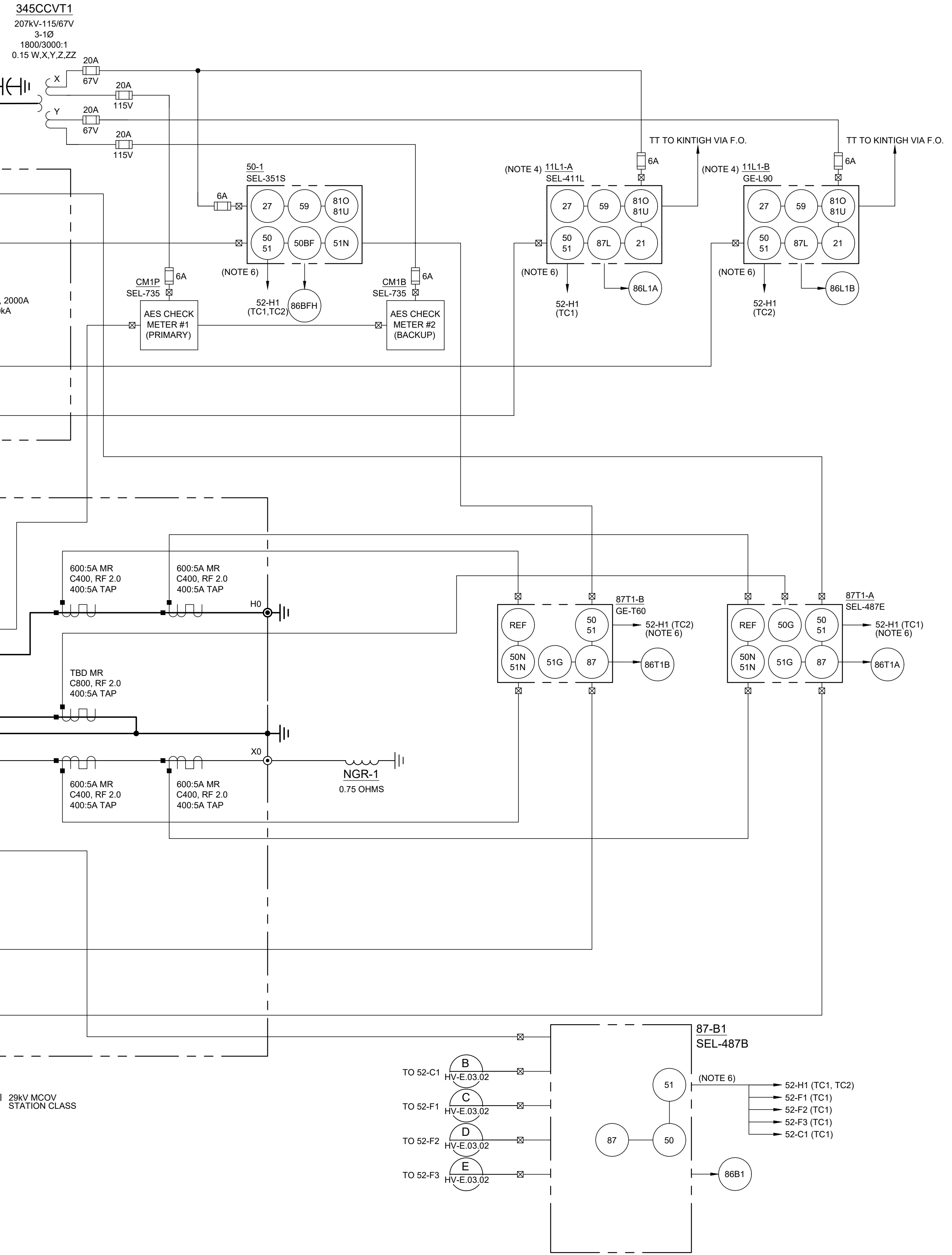
3000:5A MR
C800, RF 2.0
2000:5A TAP

3000:5A MR
C800, RF 2.0
3000:5A TAP

3000:5A MR
C800, RF 2.0
3000:5A TAP

29kV MCOV STATION CLASS

HV-E.03.02
TO 34.5kV
MAIN BUS 1



NOTES

- PRELIMINARY DRAWING FOR PERMITTING PURPOSES ONLY.
- CT RATINGS SHALL BE CONFIRMED AFTER APPROPRIATE STUDIES.
- EQUIPMENT RATINGS AND DESIGN ARE PRELIMINARY AND SHALL BE FINALIZED AT DETAILED DESIGN PHASE.
- PROTECTION RELAYS SHOWN ARE PRELIMINARY AND WILL BE UPDATED BASED ON NYSEG'S STANDARDS DURING DETAILED DESIGN.
- RELAY PROTECTION FUNCTIONS SHOWN AS PRELIMINARY AND SHALL BE FINALIZED AS PER APPROVED RELAY ORDER CODE AND/OR PROTECTION STUDIES IN DETAIL STAGE.
- THE TRIP/TRIPS ARE ONLY FOR 50/51 FAULTS.

LEGEND

ANSI DEVICE NUMBERS FOR PROTECTION FUNCTIONS:
11 - MULTIFUNCTION DEVICE
21 - DISTANCE PROTECTION
26 - THERMAL DEVICE / TEMPERATURE SWITCH
27 - UNDERVOLTAGE PROTECTION
46P - REVERSE PHASE OR PHASE BALANCE CURRENT PROTECTION
49 - THERMAL RELAY / OVERLOAD PROTECTION
50 - INSTANTANEOUS OVERCURRENT PROTECTION
50BF - BREAKER FAILURE PROTECTION
50G - GROUND OVERCURRENT PROTECTION
50N - NEUTRAL OVERCURRENT PROTECTION
51 - TIME OVERCURRENT PROTECTION
51G - GROUND TIME OVERCURRENT PROTECTION
51N - NEUTRAL TIME OVERCURRENT PROTECTION
52 - AC CIRCUIT BREAKER
59 - OVERVOLTAGE PROTECTION
63 - PRESSURE SWITCH DETECTOR
71Q - LIQUID LEVEL SWITCH
81O - OVERFREQUENCY PROTECTION
81U - UNDERFREQUENCY PROTECTION
86 - LOCK-OUT RELAY
87 - DIFFERENTIAL PROTECTION
87B - BUS DIFFERENTIAL PROTECTION
87L - LINE CURRENT DIFFERENTIAL PROTECTION
87T - TRANSFORMER DIFFERENTIAL PROTECTION
87V - VOLTAGE DIFFERENTIAL
89 - LINE SWITCH
REF - RESTRICTED EARTH FAULT

DRAWING NUMBER	DRAWING DESCRIPTION
HV-E.03.02	345kV/34.5kV SUBSTATION DETAILED ONE-LINE DIAGRAM SHT 2/2
HV-E.06.01	345kV/34.5kV SUBSTATION SCADA BLOCK DIAGRAM
HV-E.09.01	345kV/34.5kV SUBSTATION CONTROL PANEL ELEVATIONS OVERALL FRONT VIEW
HV-E.10.01	345kV/34.5kV SUBSTATION 120/240V AC STATION POWER OVERALL DISTRIBUTION
HV-E.11.01	345kV/34.5kV SUBSTATION 125V DC STATION POWER OVERALL DISTRIBUTION



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0	03/08/2023	ISSUED FOR 94-C PERMIT
1	07/24/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

LAKE ROAD SOMERSET, NY

SHEET TITLE & DESCRIPTION:

345kV/34.5kV SUBSTATION

DETAILED ONE-LINE DIAGRAM SHT 1/2

PROJ NUM:	SU20.0012
DES:	PRATEEK SIKKA
DWN:	MARKO VUKOJEVIC
CHK:	ABE GHAZI
APV:	ZHONG BING SHEN, P.E.
DATE:	2/17/2023
SCALE AT 22" x 34":	

NONE

ISSUED FOR 94-C PERMIT ONLY
NOT FOR CONSTRUCTION

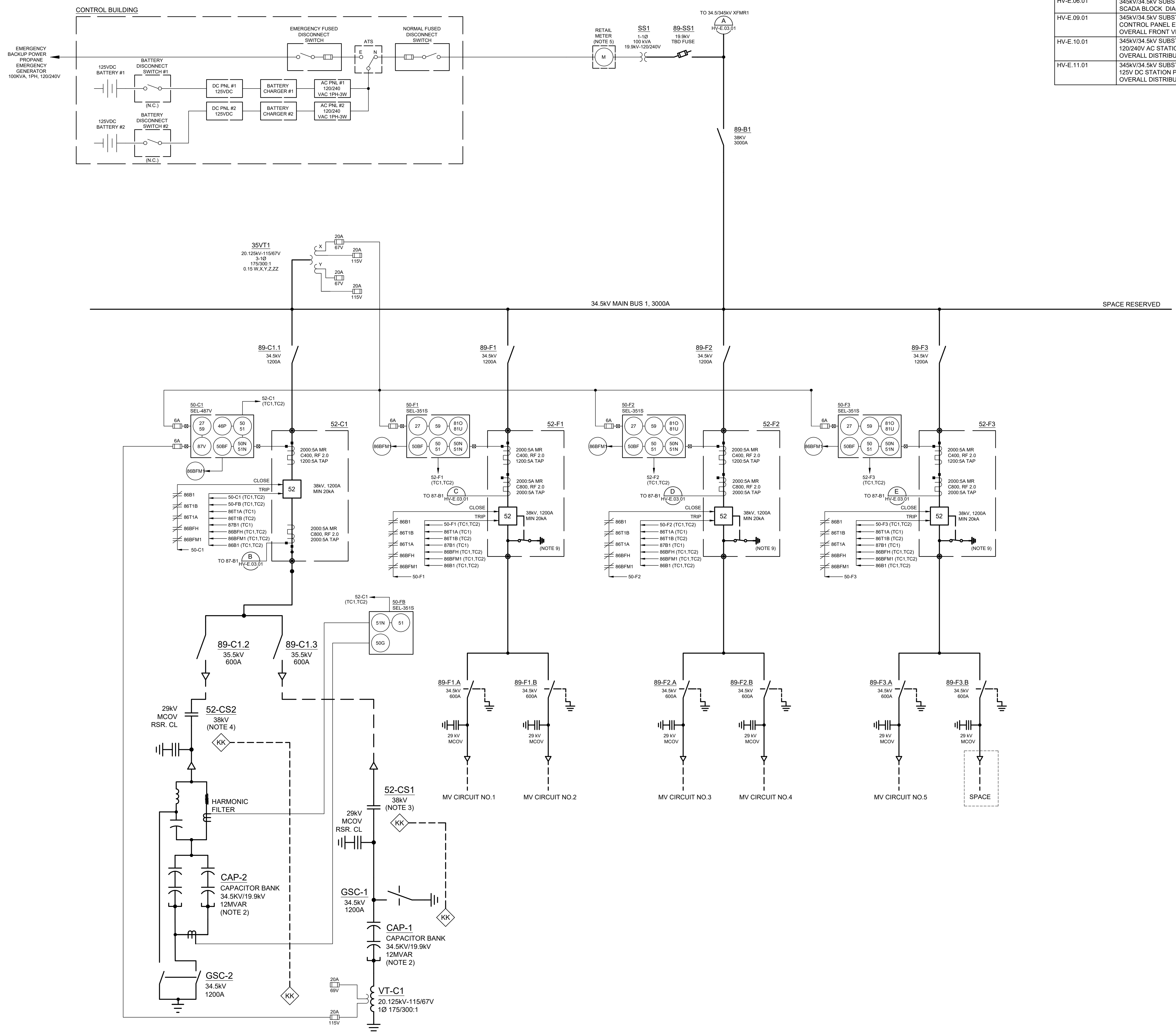


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DRAWING NUMBER	DRAWING DESCRIPTION
HV-E.03.01	345KV/34.5KV SUBSTATION DETAILED ONE-LINE DIAGRAM SHT 1/2
HV-E.06.01	345KV/34.5KV SUBSTATION SCADA BLOCK DIAGRAM
HV-E.09.01	345KV/34.5KV SUBSTATION CONTROL PANEL ELEVATIONS OVERALL FRONT VIEW
HV-E.10.01	345KV/34.5KV SUBSTATION 120V/240V AC STATION POWER OVERALL DISTRIBUTION
HV-E.11.01	345KV/34.5KV SUBSTATION 125V DC STATION POWER OVERALL DISTRIBUTION

NOTES
1. PRELIMINARY DRAWING FOR PERMITTING PURPOSES ONLY.
2. FINAL CAP BANK OR FILTER RATING TO BE CONFIRMED BASED ON FINAL LOAD FLOW AND HARMONICS STUDY.
3. KIRK KEY ARRANGEMENT PREVENTS 52-CS1 CLOSURE WHILE GSC-1 IS CLOSED.
4. KIRK KEY ARRANGEMENT PREVENTS 52-CS2 CLOSURE WHILE GSC-2 IS CLOSED.
5. RETAIL METER TO BE CONFIRMED BY UTILITY.
6. CT RATINGS SHALL BE CONFIRMED AFTER APPROPRIATE STUDIES.
7. EQUIPMENT RATINGS AND DESIGN ARE PRELIMINARY AND SHALL BE FINALIZED AT DETAILED DESIGN PHASE.
8. RELAY PROTECTION FUNCTIONS SHOWN AS PRELIMINARY AND SHALL BE FINALIZED AS PER APPROVED RELAY ORDER CODE AND/OR PROTECTION STUDIES IN DETAIL STAGE.
9. VACUUM CIRCUIT BREAKER IS EQUIPPED WITH A HIGH-SPEED, MECHANICALLY INTERLOCKED GROUNDING SWITCH.

LEGEND
ANSI DEVICE NUMBERS FOR PROTECTION FUNCTIONS:
11 - MULTIFUNCTION DEVICE
21 - DISTANCE PROTECTION
26 - THERMAL DEVICE / TEMPERATURE SWITCH
27 - UNDERVOLTAGE PROTECTION
46P - REVERSE PHASE OR PHASE BALANCE CURRENT PROTECTION
49 - THERMAL RELAY / OVERLOAD PROTECTION
50 - INSTANTANEOUS OVERCURRENT PROTECTION
50BF - BREAKER FAILURE PROTECTION
50G - GROUND OVERCURRENT PROTECTION
50N - NEUTRAL OVERCURRENT PROTECTION
51 - TIME OVERCURRENT PROTECTION
51G - GROUND TIME OVERCURRENT PROTECTION
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81O - OVERFREQUENCY PROTECTION
81U - UNDERFREQUENCY PROTECTION
86 - LOCK-OUT RELAY
87 - DIFFERENTIAL PROTECTION
87B - BUS DIFFERENTIAL PROTECTION
87L - LINE CURRENT DIFFERENTIAL PROTECTION
87T - TRANSFORMER DIFFERENTIAL PROTECTION
87V - VOLTAGE DIFFERENTIAL
89 - LINE SWITCH
REF - RESTRICTED EARTH FAULT



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KEY PLAN:

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1	07/24/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:
SOMERSET SOLAR PROJECT

PROJECT LOCATION:
LAKE ROAD SOMERSET, NY

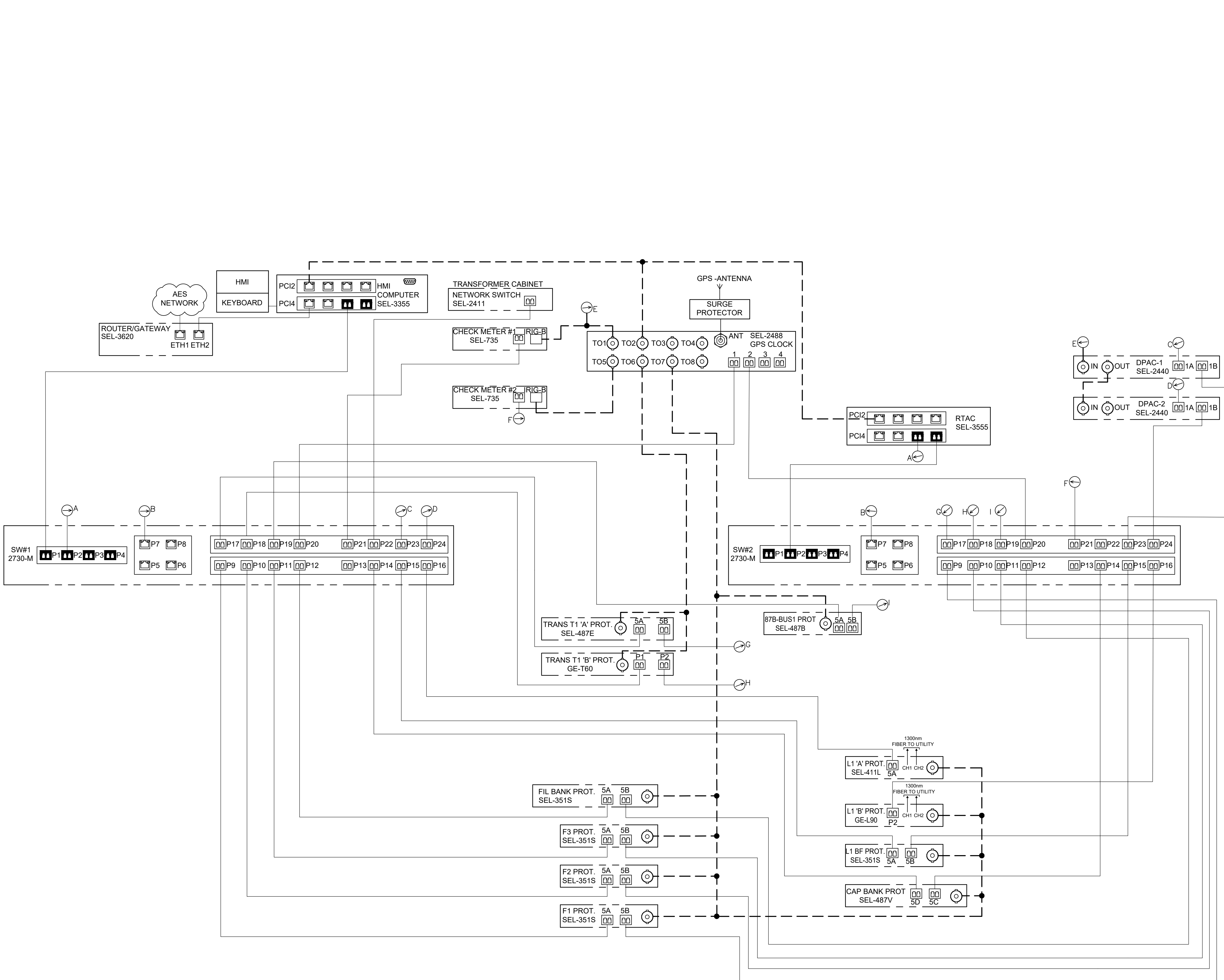
SHEET TITLE & DESCRIPTION:
345kV/34.5kV SUBSTATION

DETAILED ONE-LINE DIAGRAM SHT 2/2

PROJ NUM:	SU20.0012
DES:	PRATEEK SIKKA
DWN:	MARKO VUKOJEVIC
CHK:	ABE GHAZI
APV:	ZHONG BING SHEN, P.E.
DATE:	2/17/2023
SCALE AT 22" x 34":	NONE

SHEET NO:	HV-E.03.02	REV:	1
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AES Titleblock 2/23/24 12/03/19



NOTES

1. PRELIMINARY DRAWING FOR PERMITTING PURPOSES ONLY.
2. OVERALL CONNECTION ARCHITECTURE FOR SCADA SHOWN.
3. SWITCHES AND PROTECTION RELAY PORTS SHALL BE CONFIRMED AFTER CONFIRMATION OF ORDER CODE # OF THE SWITCHES AND/OR PROTECTION RELAYS.

LEGEND

- RS232/RS485 CONNECTOR
- 100FX CONNECTOR
- RJ45 PORT
- BNC CONNECTOR FOR IRIG-B SIGNAL
- SFP MODULE
- OM3 MULTIMODE FIBER OPTIC
- IRIG-B CABLE

DRAWING NO.	DRAWING DESCRIPTION
HV-E.03.01	345kV/34.5kV SUBSTATION DETAILED ONE-LINE DIAGRAM SHT 1/2
HV-E.03.02	345kV/34.5kV SUBSTATION DETAILED ONE-LINE DIAGRAM SHT 2/2
HV-E.09.01	345kV/34.5kV SUBSTATION CONTROL PANEL ELEVATIONS OVERALL FRONT VIEW
HV-E.10.01	345kV/34.5kV SUBSTATION 120/240V AC STATION POWER OVERALL DISTRIBUTION
HV-E.11.01	345kV/34.5kV SUBSTATION 125V DC STATION POWER OVERALL DISTRIBUTION



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KEY PLAN:

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1	07/24/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

LAKE ROAD SOMERSET, NY

SHEET TITLE & DESCRIPTION:

345kV/34.5kV SUBSTATION

SCADA BLOCK DIAGRAM

PROJ NUM:	SU20.0012
DES:	PRATEEK SIKKA
DWN:	MARKO VUKOJEVIC
CHK:	ABE GHAZI
APV:	ZHONG BING SHEN, P.E.
DATE:	2/17/2023
SCALE AT 22" x 34":	NONE

SHEET NO:	HV-E.06.01	REV:	1
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NOT FOR CONSTRUCTION

NOTES

1. PRELIMINARY DRAWING FOR PERMITTING PURPOSES ONLY.
2. REFER RELAY PANEL BILL OF MATERIAL SHEET FOR ITEM DESCRIPTIONS.
3. RELAY UNIT HEIGHTS AND TEST SWITCHES QUANTITY BASED ON PRELIMINARY RELAY ORDER# WITH MINIMUM I/O PORTS.
4. PANEL 1, PANEL 2, PANEL 7 AND PANEL 8 EQUIPMENT TBD IN DETAIL DESIGN.

DRAWING NO.	DRAWING DESCRIPTION
HV-E.03.01	345kV/34.5kV SUBSTATION DETAILED ONE-LINE DIAGRAM SHT 1/2
HV-E.03.02	345kV/34.5kV SUBSTATION DETAILED ONE-LINE DIAGRAM SHT 2/2
HV-E.06.01	345kV/34.5kV SUBSTATION SCADA BLOCK DIAGRAM
HV-E.10.01	345kV/34.5kV SUBSTATION 120/240V AC STATION POWER OVERALL DISTRIBUTION
HV-E.11.01	345kV/34.5kV SUBSTATION 125V DC STATION POWER OVERALL DISTRIBUTION



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PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

**LAKE ROAD
SOMERSET, NY**

SHEET TITLE & DESCRIPTION:

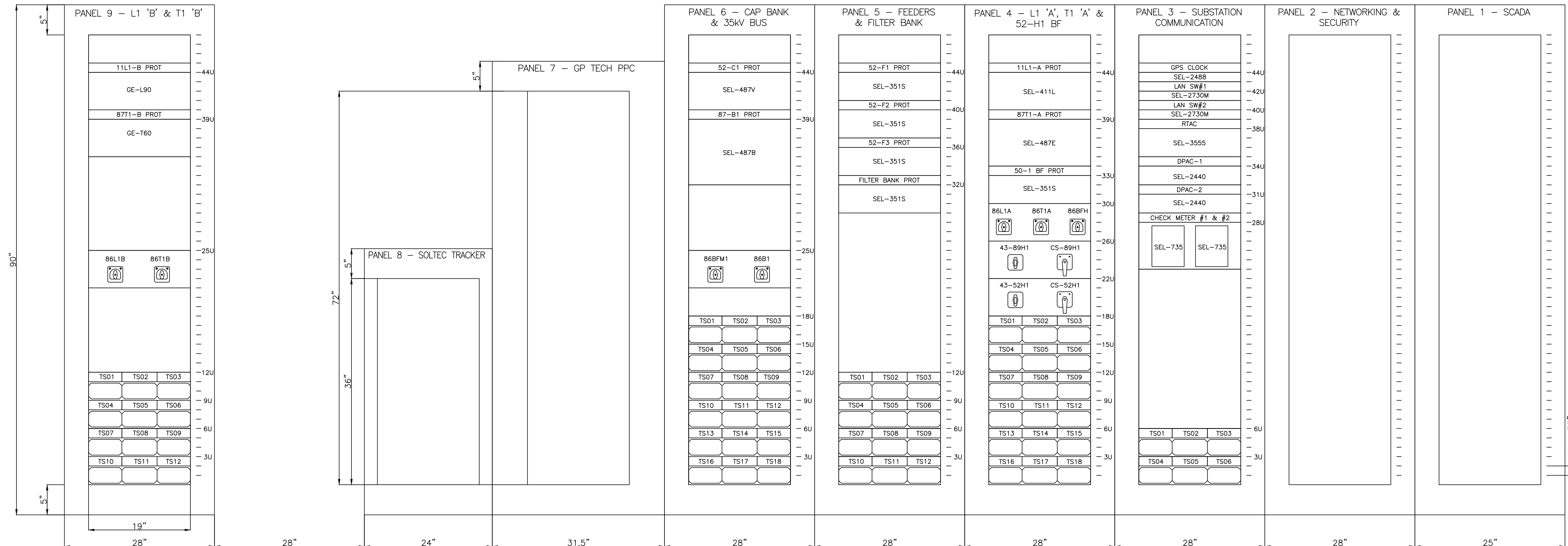
**345kV/34.5kV
SUBSTATION**

**CONTROL PANEL
ELEVATIONS OVERALL
FRONT VIEW**

PROJ NUM:	SU20.0012
DES:	PRATEEK SIKKA
DWN:	MARKO VUKOJEVIC
CHK:	ABE GHAZI
APV:	ZHONG BING SHEN, P.E.
DATE:	2/17/2023
SCALE AT 22" x 34":	

NONE

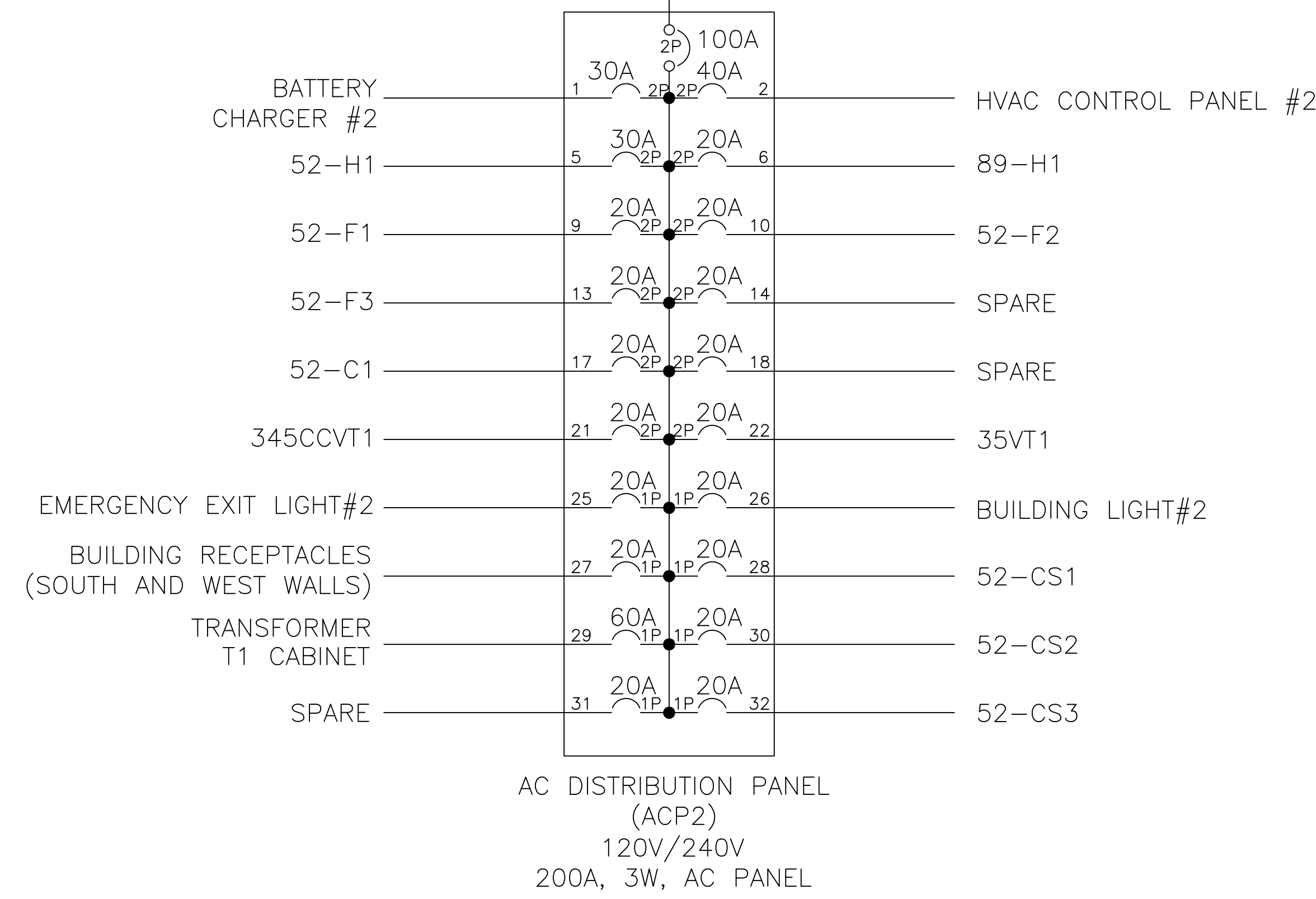
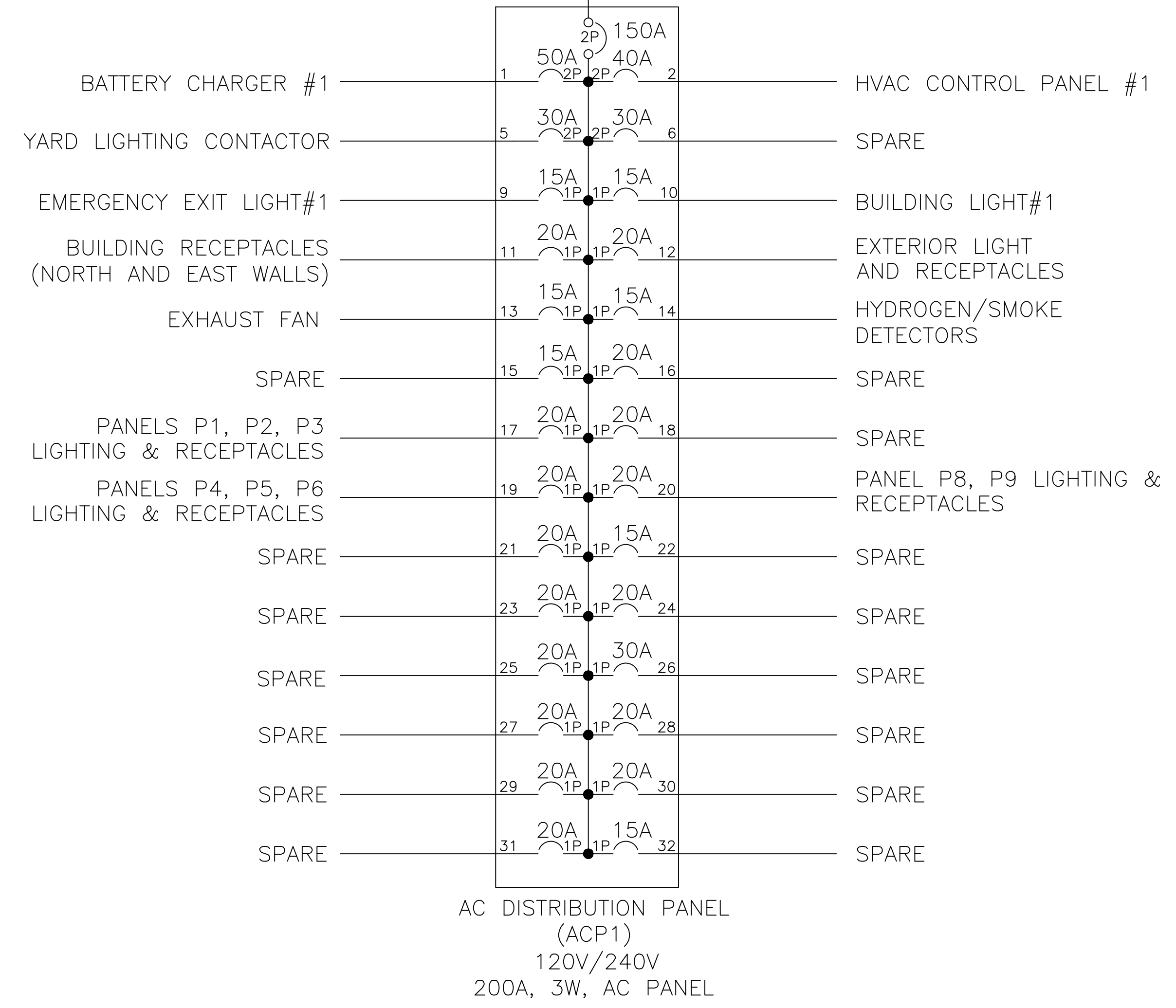
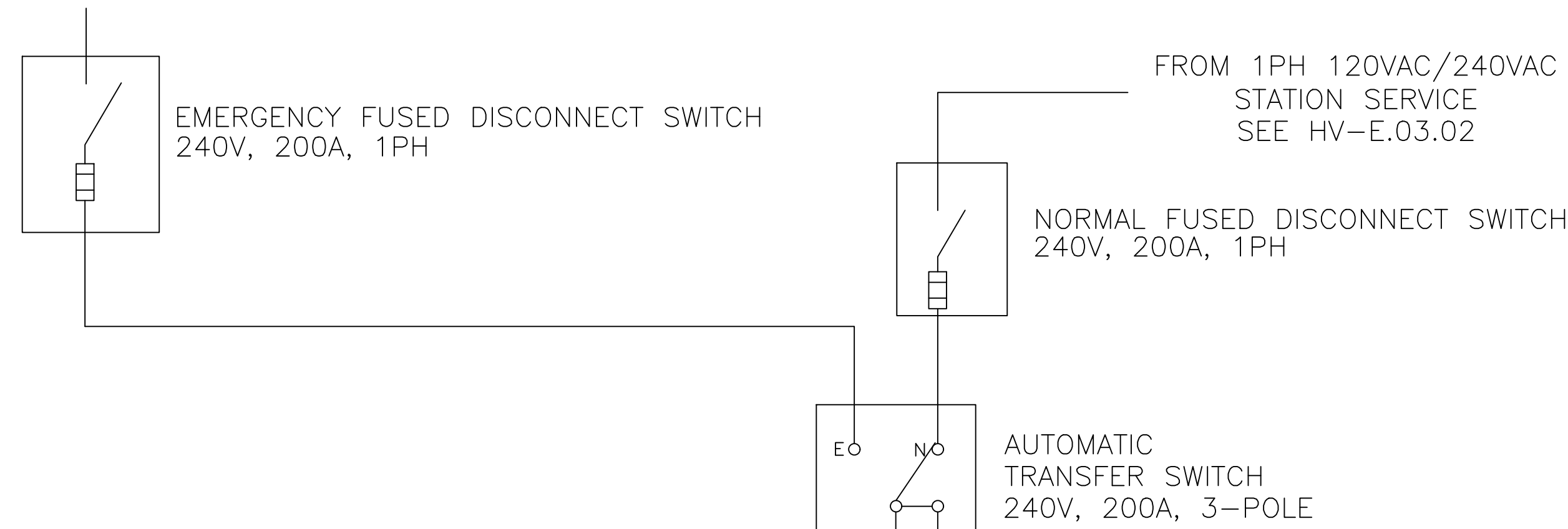
SHEET NO:	HV-E.09.01	REV:	1
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NOT FOR CONSTRUCTION

AES Titleblock 2/23/24 v2 10/1

EMERGENCY BACKUP
FROM 120/240V, 1PH,
100KV PROPANE
EMERGENCY GENERATOR
SEE HV-E.03.02



NOTES

1. PRELIMINARY DRAWING FOR PERMITTING PURPOSES ONLY.
2. EQUIPMENT RATINGS ARE AN ESTIMATE AND SHALL BE CONFIRMED AFTER APPROVED AC LOAD STUDIES.

DRAWING NO.	DRAWING DESCRIPTION
HV-E.03.01	345kV/34.5kV SUBSTATION DETAILED ONE-LINE DIAGRAM SHT 1/2
HV-E.03.02	345kV/34.5kV SUBSTATION DETAILED ONE-LINE DIAGRAM SHT 2/2
HV-E.06.01	345kV/34.5kV SUBSTATION SCADA BLOCK DIAGRAM
HV-E.09.01	345kV/34.5kV SUBSTATION CONTROL PANEL ELEVATIONS OVERALL FRONT VIEW
HV-E.11.01	345kV/34.5kV SUBSTATION 125V DC STATION POWER OVERALL DISTRIBUTION



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KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
0	03/08/2023	ISSUED FOR 94-C PERMIT
1	07/24/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

LAKE ROAD SOMERSET, NY

SHEET TITLE & DESCRIPTION:

345kV/34.5kV SUBSTATION

120/240V AC STATION POWER OVERALL DISTRIBUTION

PROJ NUM:	SU20.0012
DES:	PRATEEK SIKKA
DWN:	MARKO VUKOJEVIC
CHK:	ABE GHAZI
APV:	ZHONG BING SHEN, P.E.
DATE:	2/17/2023

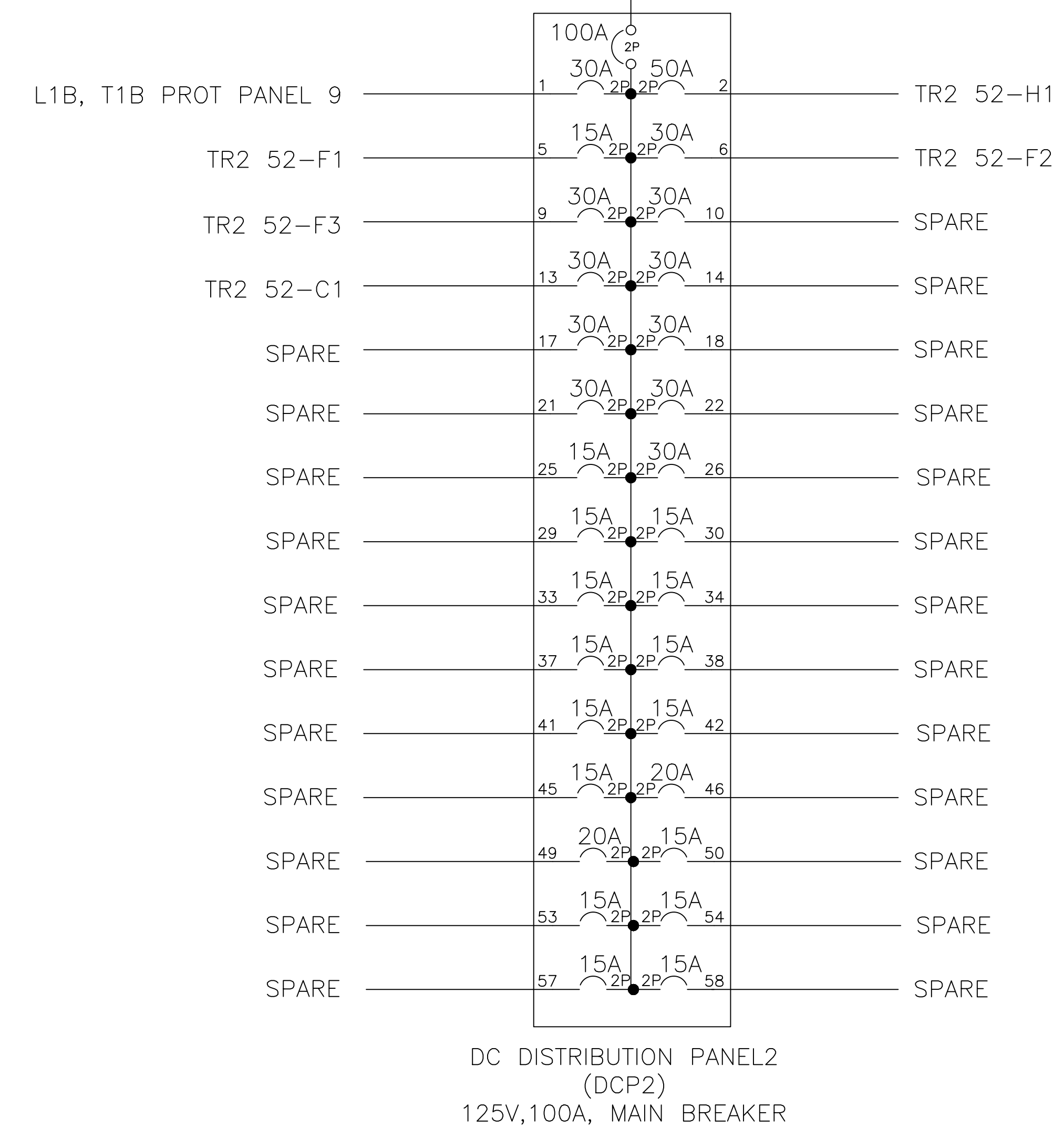
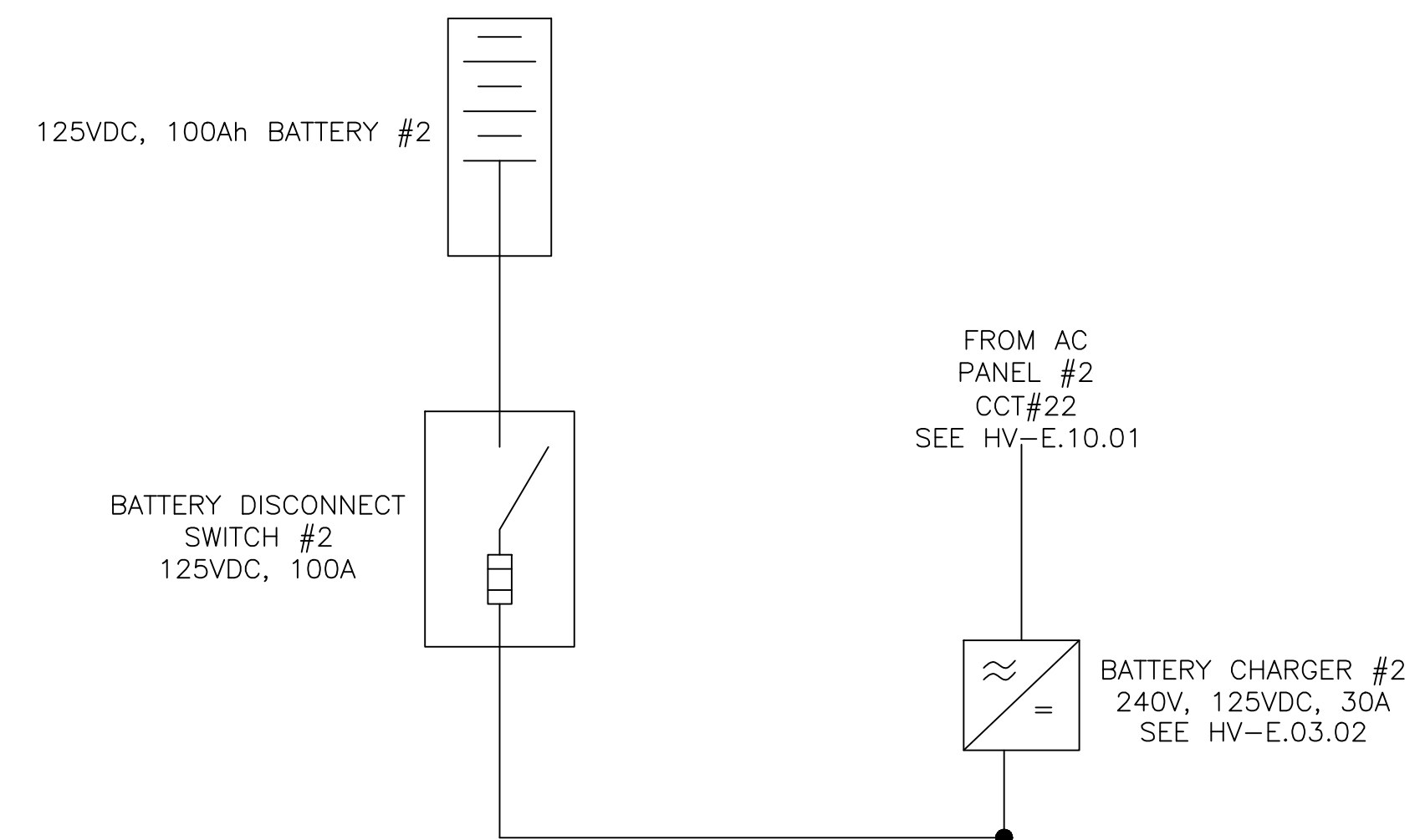
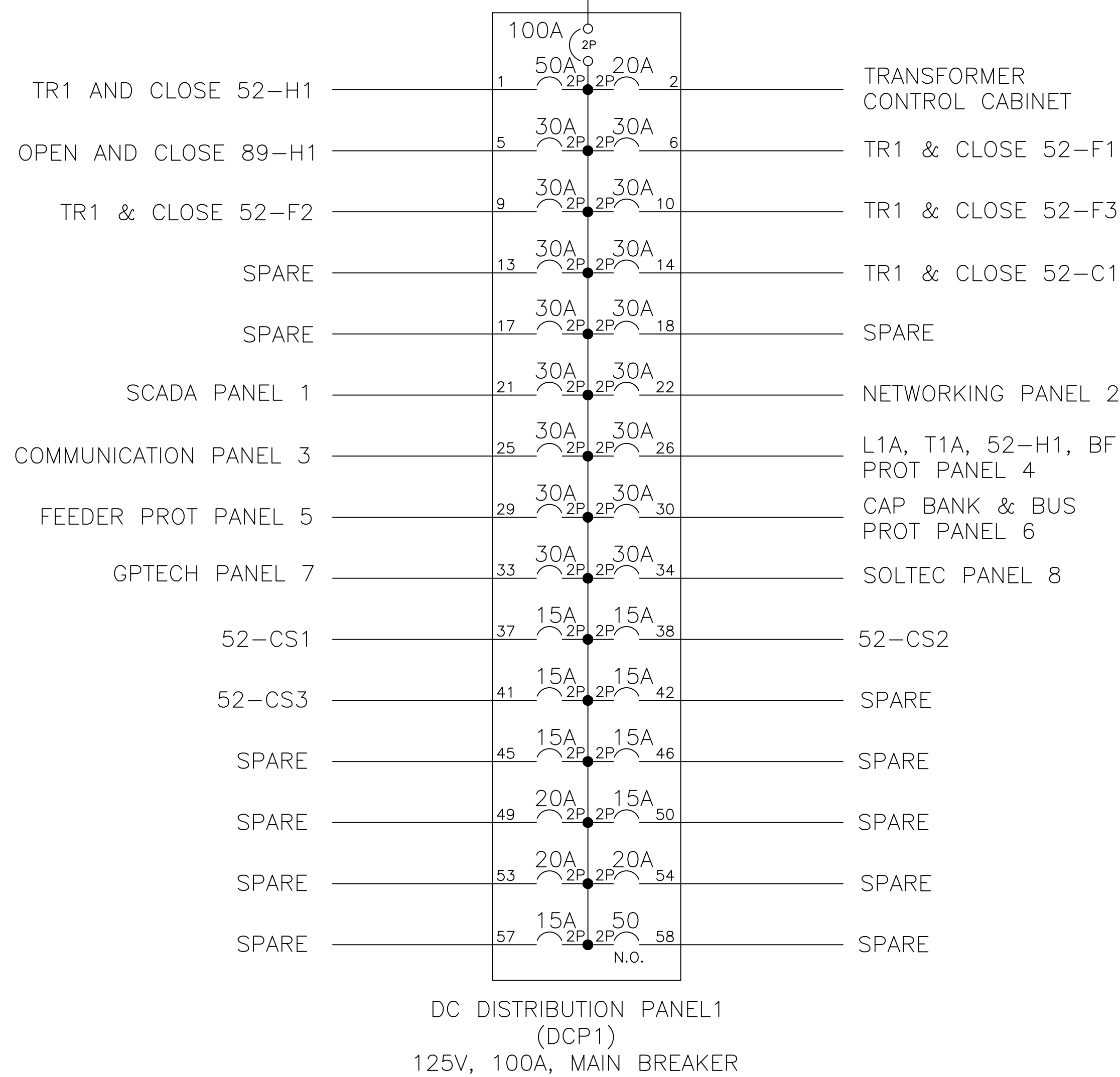
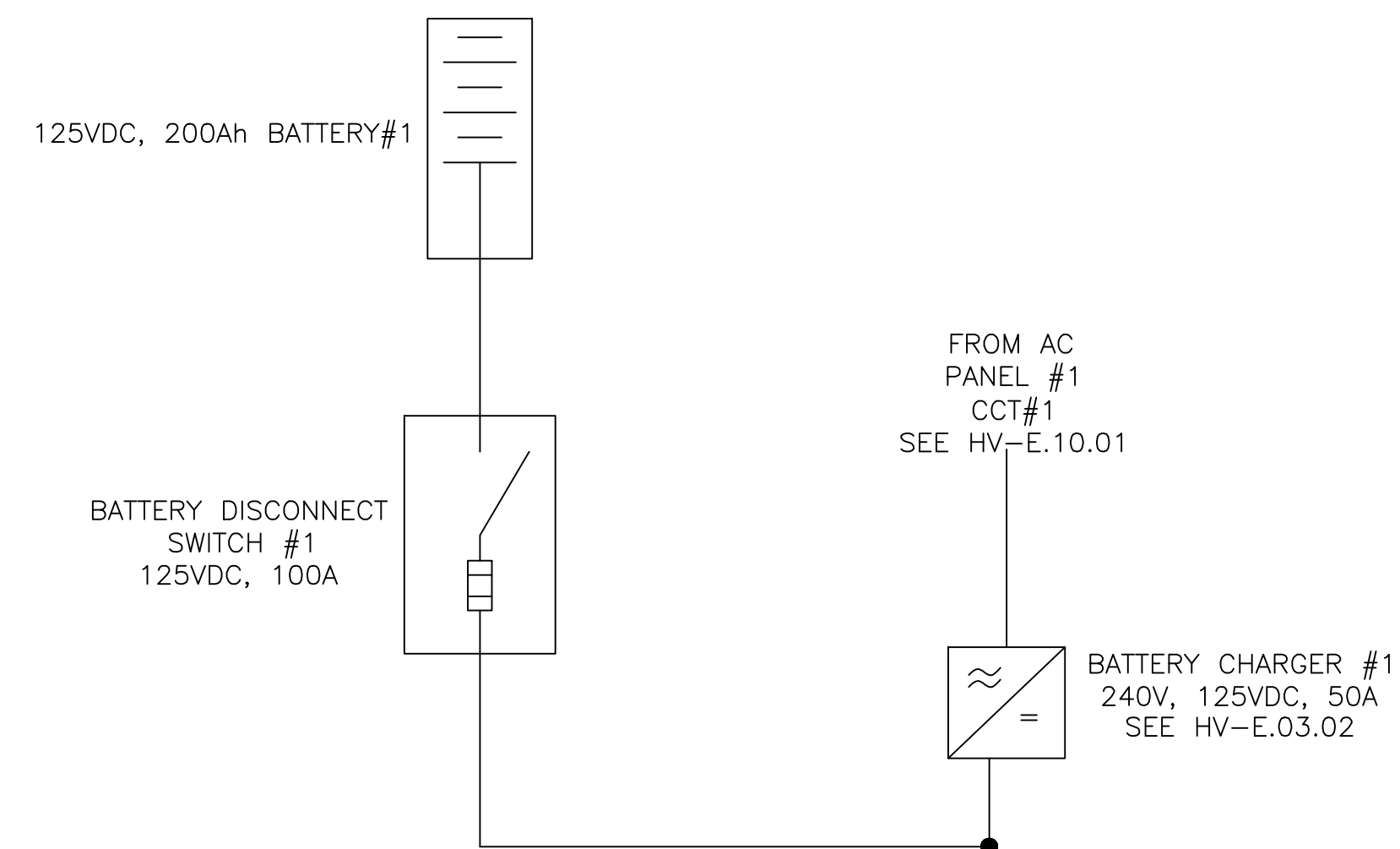
SCALE AT 22" x 34":

NONE

SHEET NO:	HV-E.10.01	REV:	1
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ISSUED FOR 94-C PERMIT ONLY
NOT FOR CONSTRUCTION

AES THROCK 2304-121818



NOTES

1. PRELIMINARY DRAWING FOR PERMITTING PURPOSES ONLY.
2. EQUIPMENT RATINGS ARE AN ESTIMATE AND SHALL BE CONFIRMED AFTER APPROVED DC LOAD STUDIES.

DRAWING NO.	DRAWING DESCRIPTION
HV-E.03.01	345kV/34.5kV SUBSTATION DETAILED ONE-LINE DIAGRAM SHT 1/2
HV-E.03.02	345kV/34.5kV SUBSTATION DETAILED ONE-LINE DIAGRAM SHT 2/2
HV-E.06.01	345kV/34.5kV SUBSTATION SCADA BLOCK DIAGRAM
HV-E.09.01	345kV/34.5kV SUBSTATION CONTROL PANEL ELEVATIONS OVERALL FRONT VIEW
HV-E.10.01	345kV/34.5kV SUBSTATION 120/240V AC STATION POWER OVERALL DISTRIBUTION



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KEY PLAN:

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0	03/08/2023	ISSUED FOR 94-C PERMIT
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PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

**LAKE ROAD
SOMERSET, NY**

SHEET TITLE & DESCRIPTION:

**345kV/34.5kV
SUBSTATION**

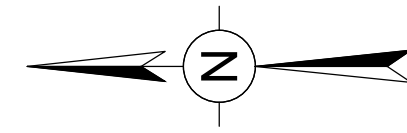
**125V DC STATION
POWER OVERALL
DISTRIBUTION**

PROJ NUM:	SU20.0012
DES:	PRATEEK SIKKA
DWN:	MARKO VUKOJEVIC
CHK:	ABE GHAZI
APV:	ZHONG BING SHEN, P.E.
DATE:	2/17/2023
SCALE AT 2" x 34":	

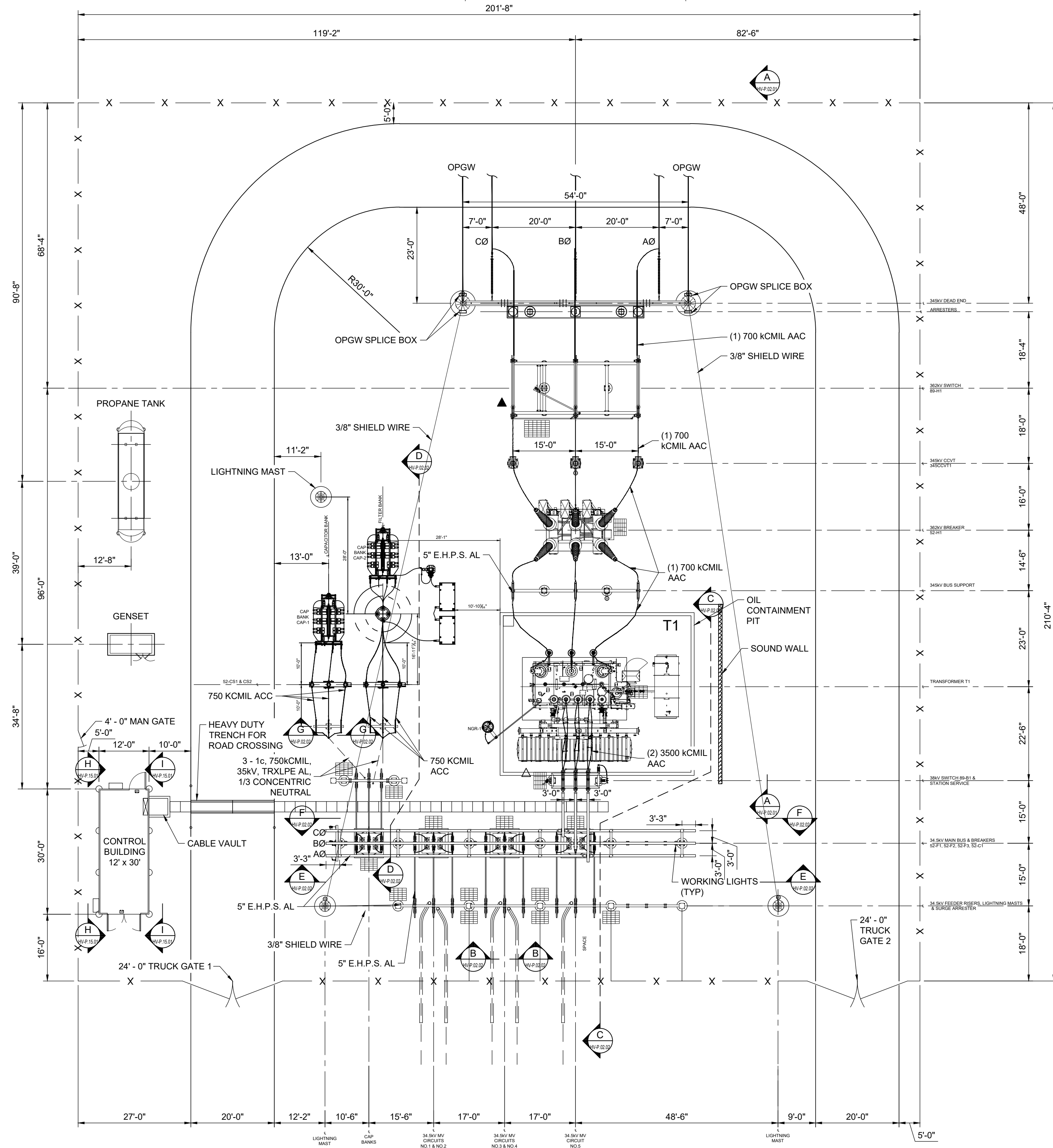
NONE

SHEET NO:	HV-E.11.01	REV:	1
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ISSUED FOR 94-C PERMIT ONLY
NOT FOR CONSTRUCTION



345kV OH CONNECTION TO KINTIGH SUBSTATION (APPROX. 159 FT)



NOTES

- TUBULAR BUS SHALL BE EXTRUDED, SEAMLESS BUS PIPE MADE OF 6063-T6 ALLOY, SCHEDULE 40.
- PHASING ARRANGEMENT TO BE CONFIRMED BASED ON THE TRANSMISSION LINE DESIGN.
- LEVELING NUTS SHALL BE USED ON ALL STEEL STRUCTURES.
- EQUIPMENT SHALL BE MOUNTED DIRECTLY ON PADS.
- EQUIPMENT RATINGS SUBJECT TO CHANGE BASED ON STUDIES RESULTS.
- DESIGN IS PRELIMINARY AND SHALL BE FINALIZED AT DETAILED DESIGN PHASE.

LEGEND

- LIGHT (STRUCTURE)
- SWITCH OPERATOR - MOTOR
- SWITCH OPERATOR - WORM GEAR
- FENCE
- 4'-0" x 6'-0" SWITCH GROUNDING MAT
- BURIED CABLE

MINIMUM CLEARANCE REQUIREMENT

345kV MINIMUM CLEARANCE (1300kV BIL):
 LIVE PARTS: Ø-G=106"
 Ø-G=119"
 TO GRADE: 18'-0" (BUS)
 30'-0" (DRIVEWAY)

34.5kV MINIMUM CLEARANCE (200kV BIL):
 LIVE PARTS: Ø-G=13"
 Ø-G=18"
 TO GRADE: 10'-0" (BUS)
 22'-0" (DRIVEWAY)

DRAWING NUMBER	DRAWING DESCRIPTION
HV-E.02.01	345/34.5kV SUBSTATION SWITCHING ONE-LINE DIAGRAM
HV-P.08.01	345/34.5kV SUBSTATION GROUNDING PLAN
HV-P.14.01	345/34.5kV SUBSTATION CONTROL BUILDING LAYOUT
HV-P.02.01	345/34.5kV SUBSTATION 345kV ELEVATION VIEW
HV-P.02.02	345/34.5kV SUBSTATION 34.5kV ELEVATION VIEW
HV-P.15.01	345/34.5kV SUBSTATION CONTROL BUILDING ELEVATION



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KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
0	03/08/2023	ISSUED FOR 94-C PERMIT
1	07/24/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

LAKE ROAD, SOMERSET NY

SHEET TITLE & DESCRIPTION:

345/34.5kV SUBSTATION

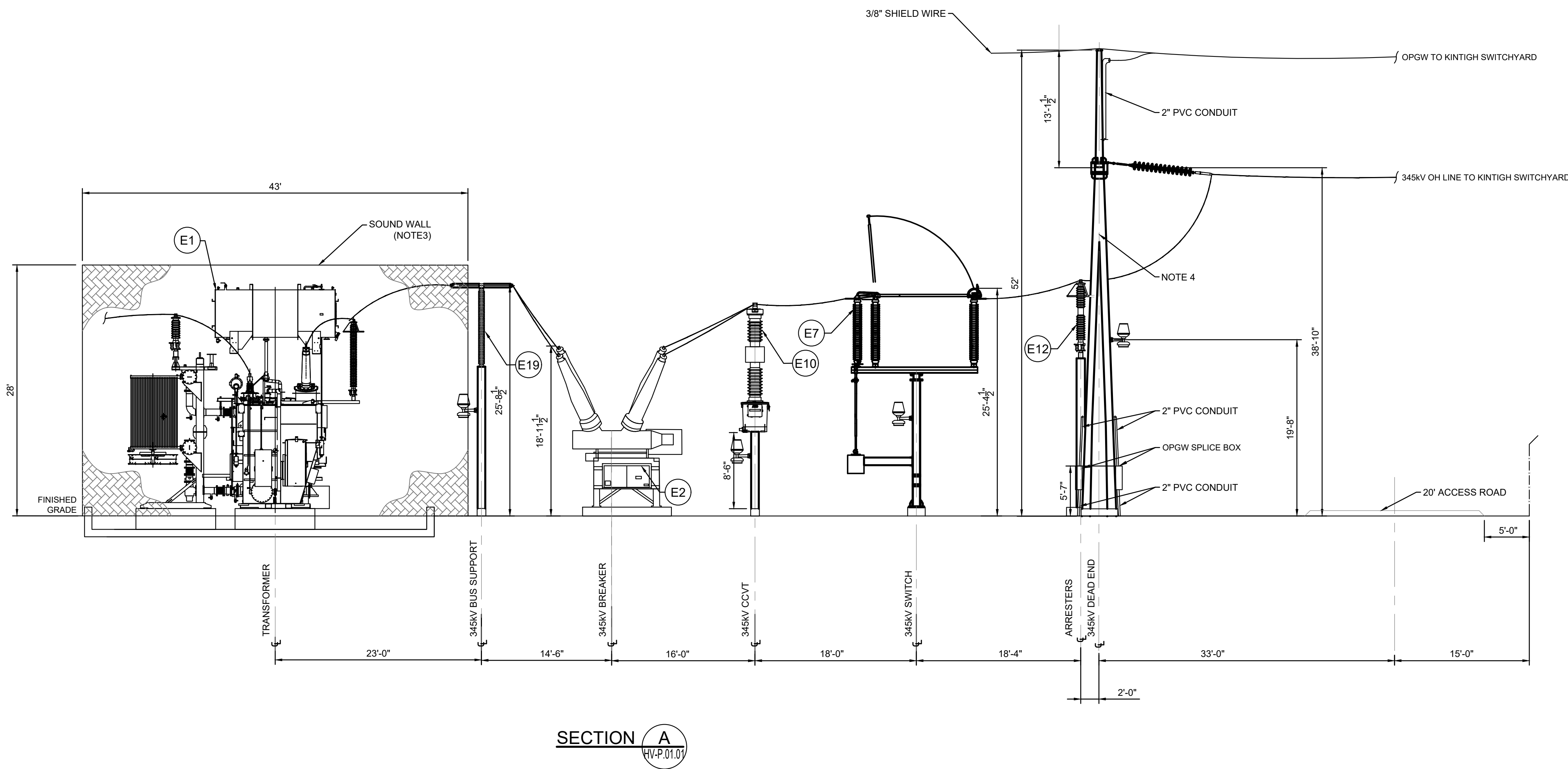
GENERAL PLAN

PROJ NUM:	SU20.0012
DES:	MIKE MAILLE
DWN:	MIKE MAILLE/KRINA GANDHI
CHK:	AZIN SHAHAB
APV:	ZHONG BING SHEN, P.E.
DATE:	02/17/2023

SCALE AT 22' x 34' 1/16" = 1'-0"

SHEET NO:	HV-P.01.01	REV:	1
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ISSUED FOR 94-C PERMIT ONLY
NOT FOR CONSTRUCTION



NOTES	
1.	THIS IS A PRELIMINARY ELEVATION VIEW AND IS FOR PERMITTING PURPOSES ONLY.
2.	DESIGN IS PRELIMINARY AND SHALL BE FINALIZED AT DETAILED DESIGN PHASE.
3.	REFER TO DETAIL 7 ON SHEET C.10.05
4.	DEADEND TAKEOFF STRUCTURE MATERIAL IS GALVANIZED STEEL.

LEGEND	
	LIGHT (MAST/DEADEND)
	MATERIAL ITEM OR SUB ITEM NUMBER

MINIMUM CLEARANCE REQUIREMENT	
345kV MINIMUM CLEARANCE (1300kV BIL):	
LIVE PARTS:	Ø-G=108"
	Ø-D=119"
TO GRADE:	18'-0" (BUS)
	30'-0" (DRIVEWAY)
34.5kV MINIMUM CLEARANCE (200kV BIL):	
LIVE PARTS:	Ø-G=13"
	Ø-D=18"
TO GRADE:	10'-0" (BUS)
	22'-0" (DRIVEWAY)

DRAWING NUMBER	DRAWING DESCRIPTION
C.10.05	SOUND WALL DETAILS
HV-P.01.01	345/34.5kV SUBSTATION GENERAL ARRANGEMENT
HV-P.08.01	345/34.5kV SUBSTATION GROUNDING PLAN
HV-P.14.01	345/34.5kV SUBSTATION CONTROL BUILDING LAYOUT
HV-E.02.01	345/34.5kV SUBSTATION SWITCHING ONE-LINE DIAGRAM
HV-P.02.02	345/34.5kV SUBSTATION 34.5kV ELEVATION VIEW



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KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
0	03/08/2023	ISSUED FOR 94-C PERMIT
1	07/24/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

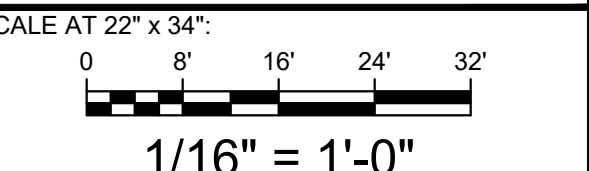
LAKE ROAD, SOMERSET NY

SHEET TITLE & DESCRIPTION:

345/34.5kV SUBSTATION

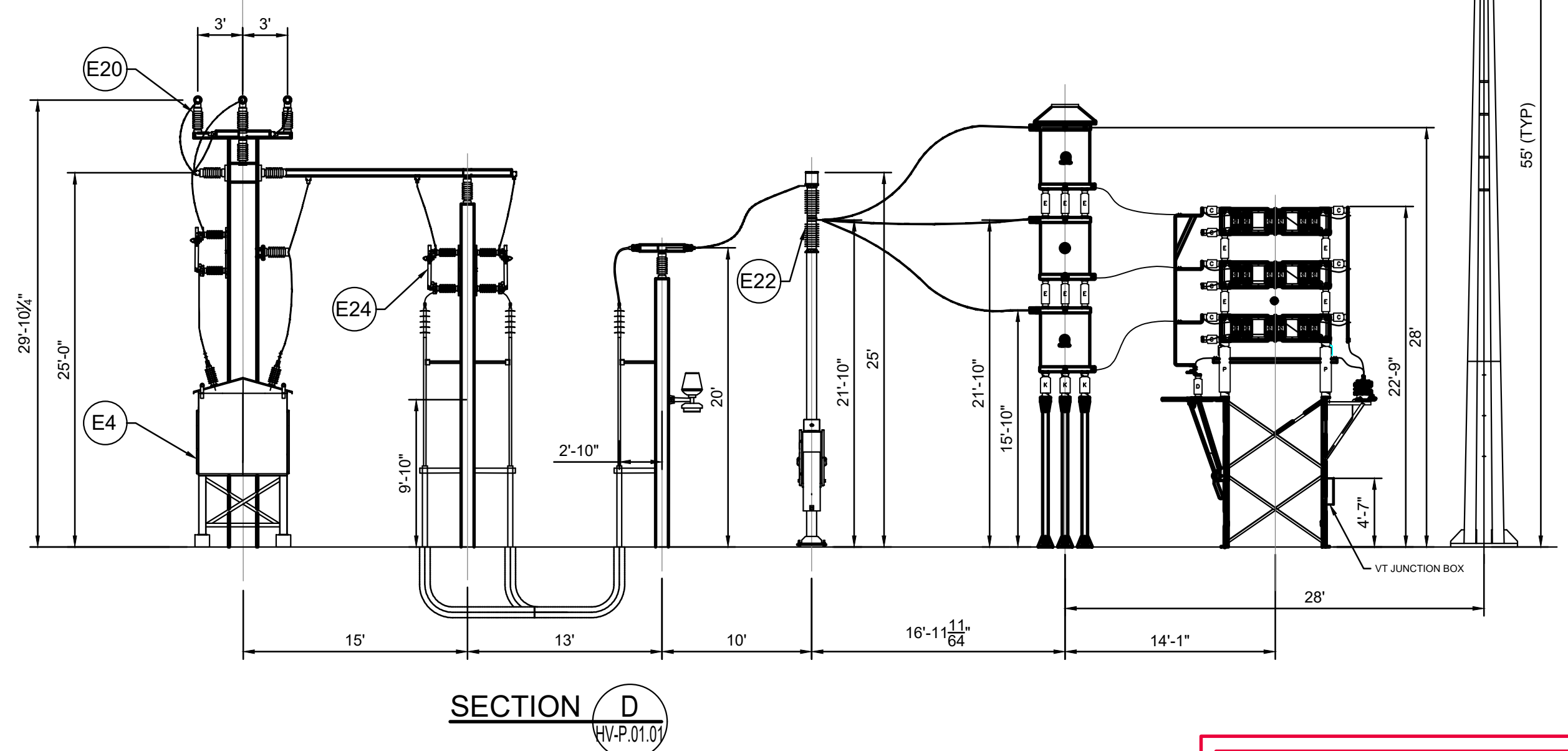
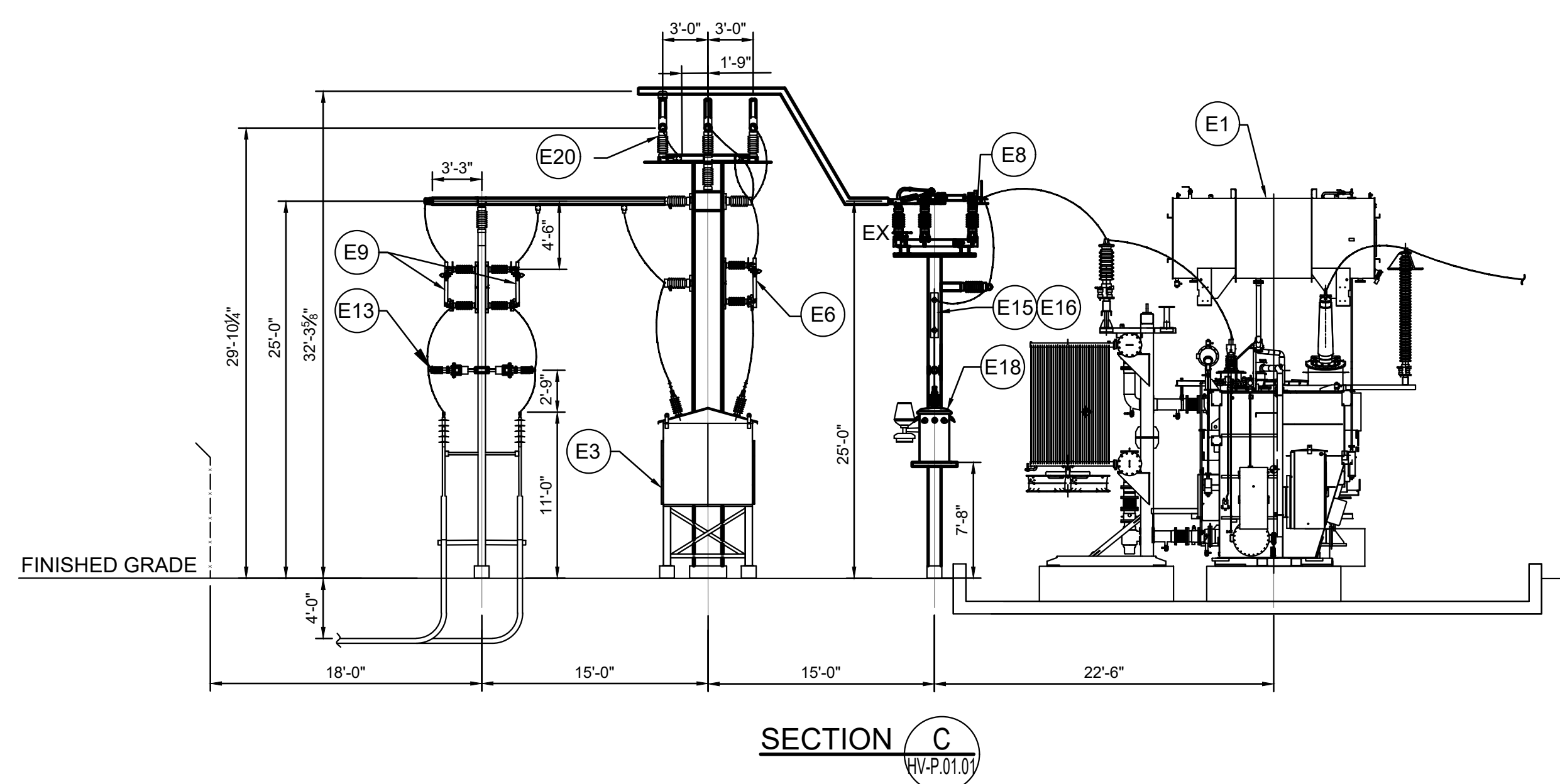
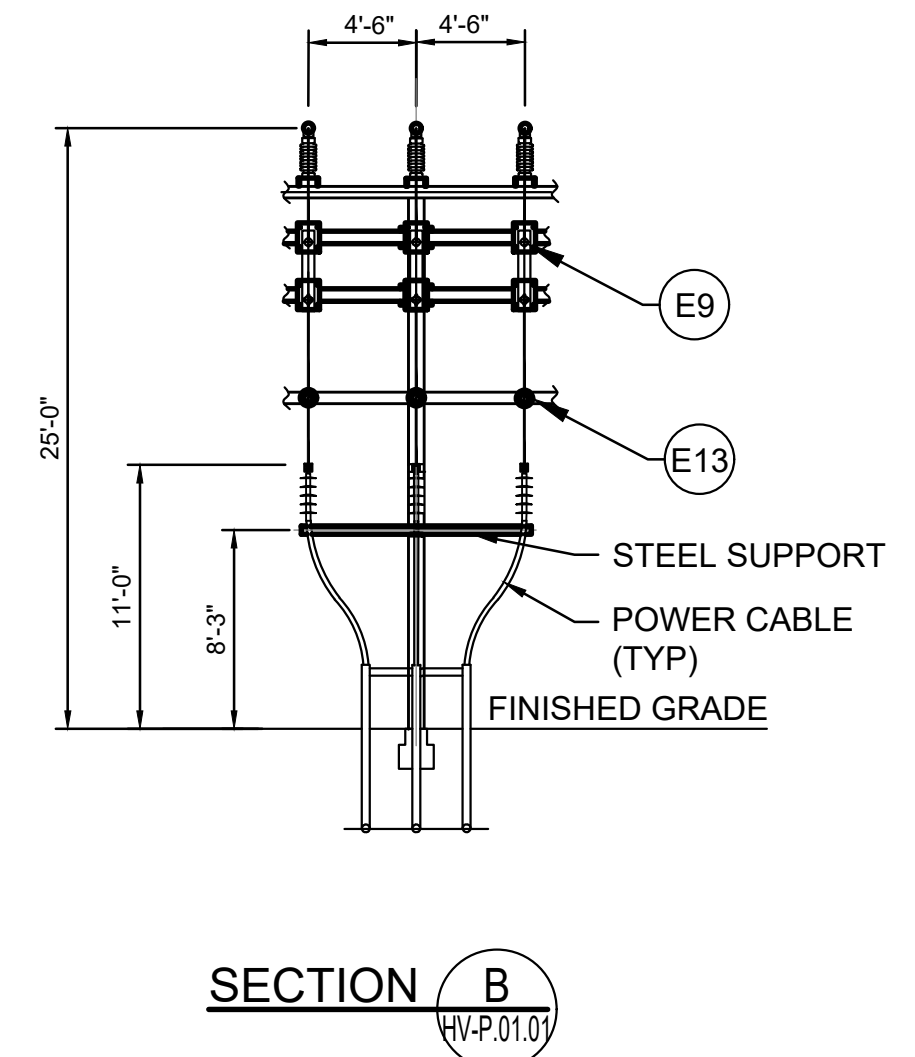
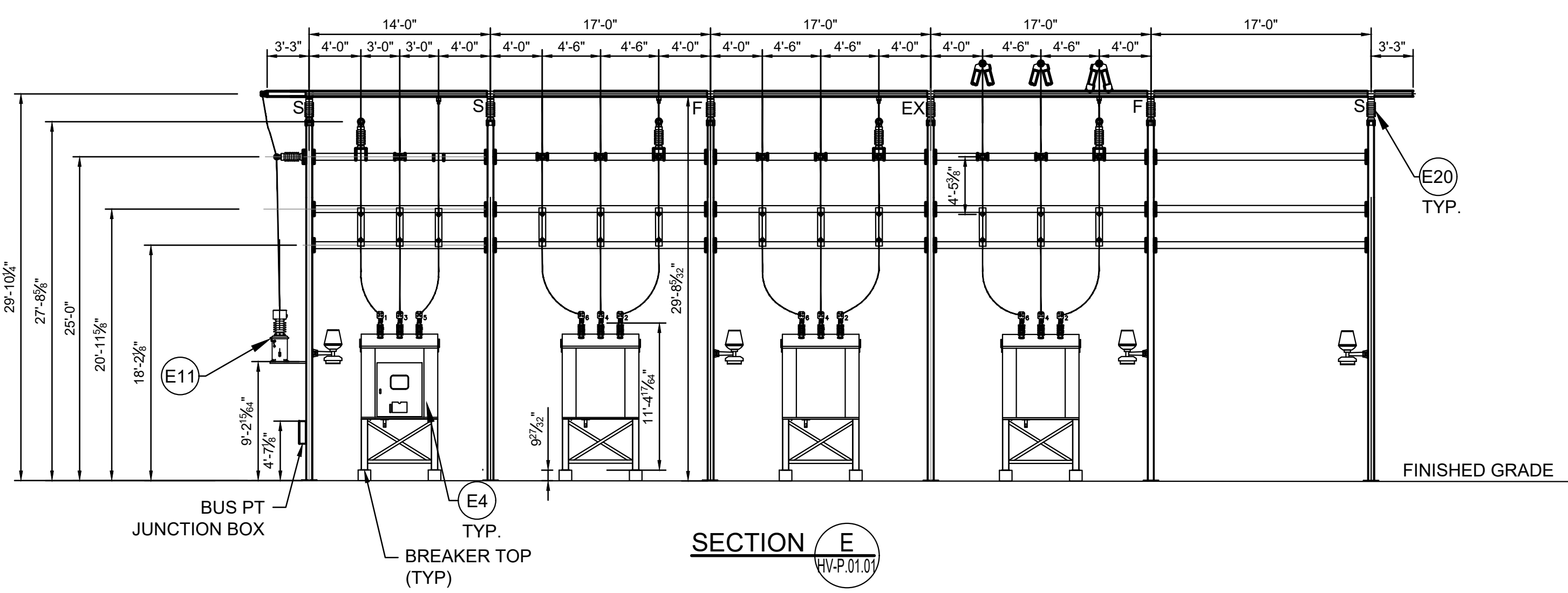
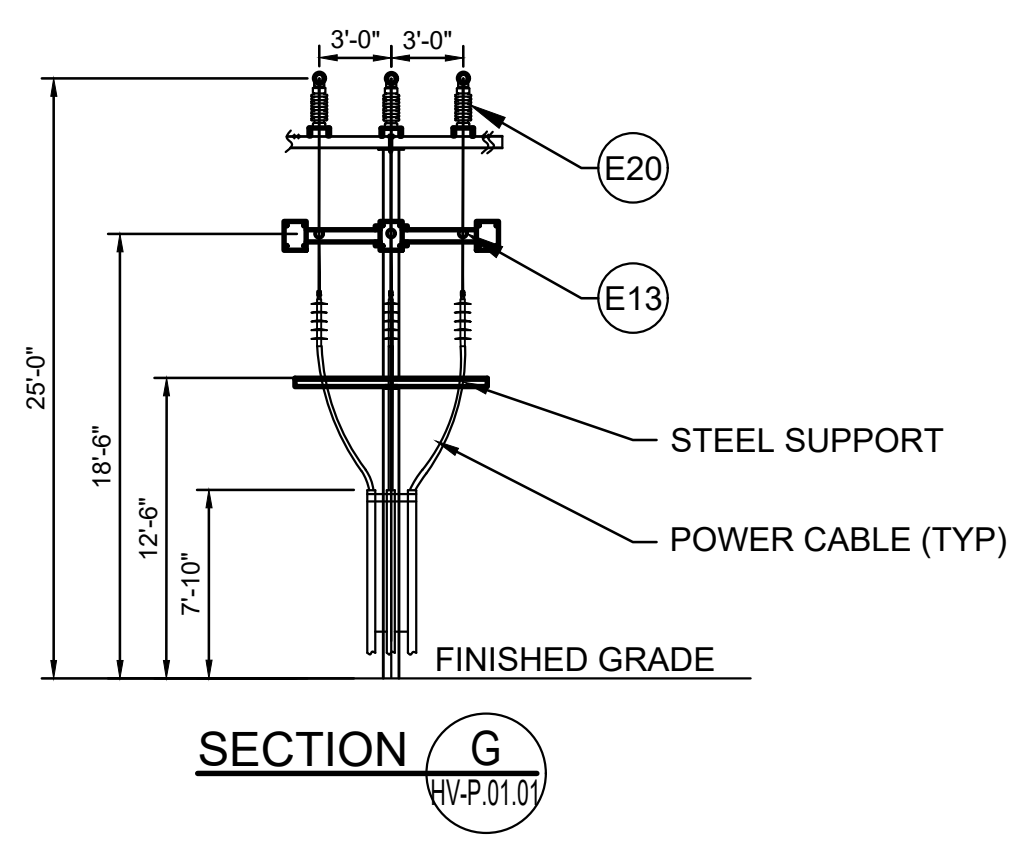
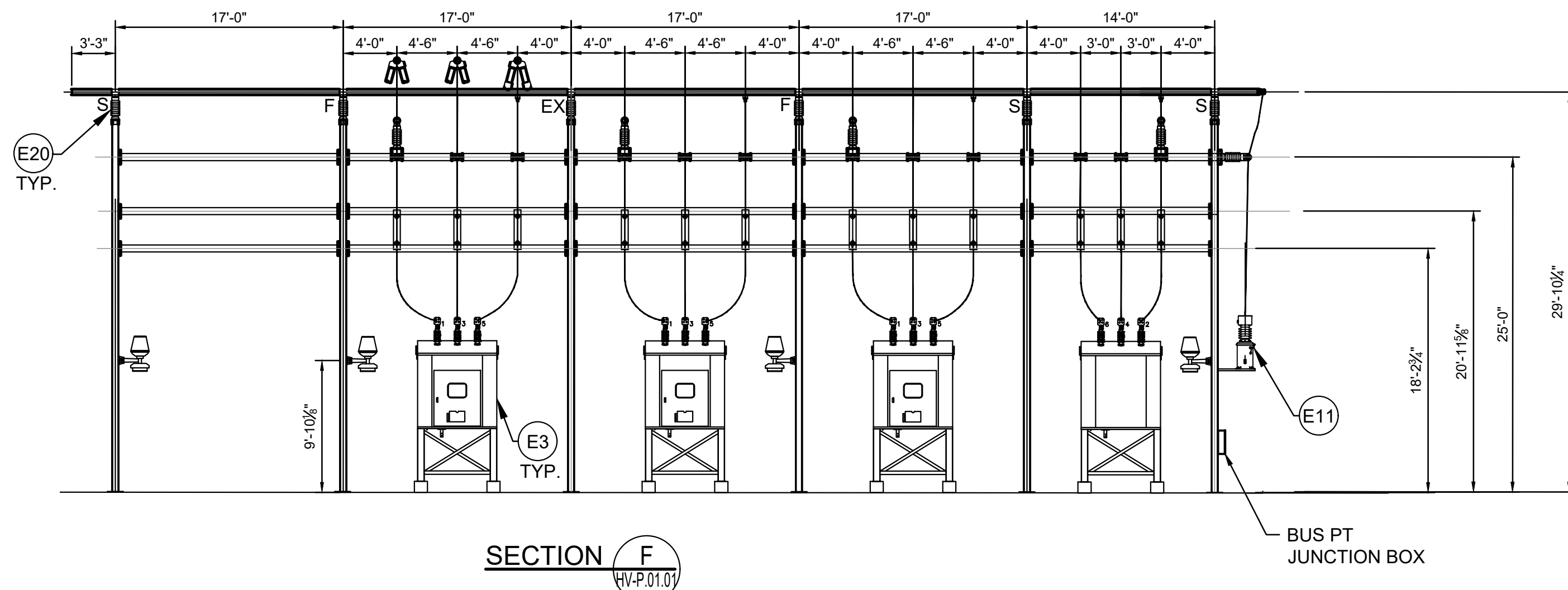
345kV ELEVATION VIEW

PROJ NUM:	SU20.0012
DES:	MIKE MAILLE
DWN:	MIKE MAILLE/KRINA GANDHI
CHK:	AZIN SHAHAB
APV:	ZHONG BING SHEN, P.E.
DATE:	02/17/2023



SHEET NO:	HV-P.02.01	REV:	1
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ISSUED FOR 94-C PERMIT ONLY
NOT FOR CONSTRUCTION



NOTES

- THIS IS A PRELIMINARY ELEVATION VIEW AND IS FOR PERMITTING PURPOSES ONLY.
- DESIGN IS PRELIMINARY AND SHALL BE FINALIZED AT DETAILED DESIGN PHASE.

LEGEND

- LIGHT (MAST/DEADEND)
- FENCE
- BURIED CABLE
- MATERIAL ITEM OR SUB ITEM NUMBER

MINIMUM CLEARANCE REQUIREMENT

345kV MINIMUM CLEARANCE (1300kV BIL):	
LIVE PARTS:	Ø-G=106"
	Ø-G=119"
TO GRADE:	18'-0" (BUS)
	30'-0" (DRIVEWAY)
34.5kV MINIMUM CLEARANCE (200kV BIL):	
LIVE PARTS:	Ø-G=13"
	Ø-G=18"
TO GRADE:	10'-0" (BUS)
	22'-0" (DRIVEWAY)

DRAWING NUMBER	DRAWING DESCRIPTION
HV-P.01.01	345/34.5kV SUBSTATION GENERAL ARRANGEMENT
HV-P.08.01	345/34.5kV SUBSTATION GROUNDING PLAN
HV-P.14.01	345/34.5kV SUBSTATION CONTROL BUILDING LAYOUT
HV-P.02.01	345/34.5kV SUBSTATION 345kV ELEVATION VIEW
HV-E.02.01	345/34.5kV SUBSTATION SWITCHING ONE-LINE DIAGRAM



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KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
0	03/08/2023	ISSUED FOR 94-C PERMIT
1	07/24/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

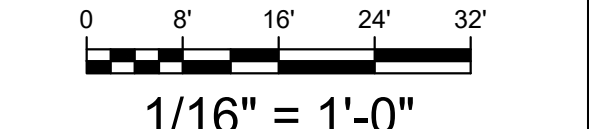
LAKE ROAD, SOMERSET NY

SHEET TITLE & DESCRIPTION:

345/34.5kV SUBSTATION

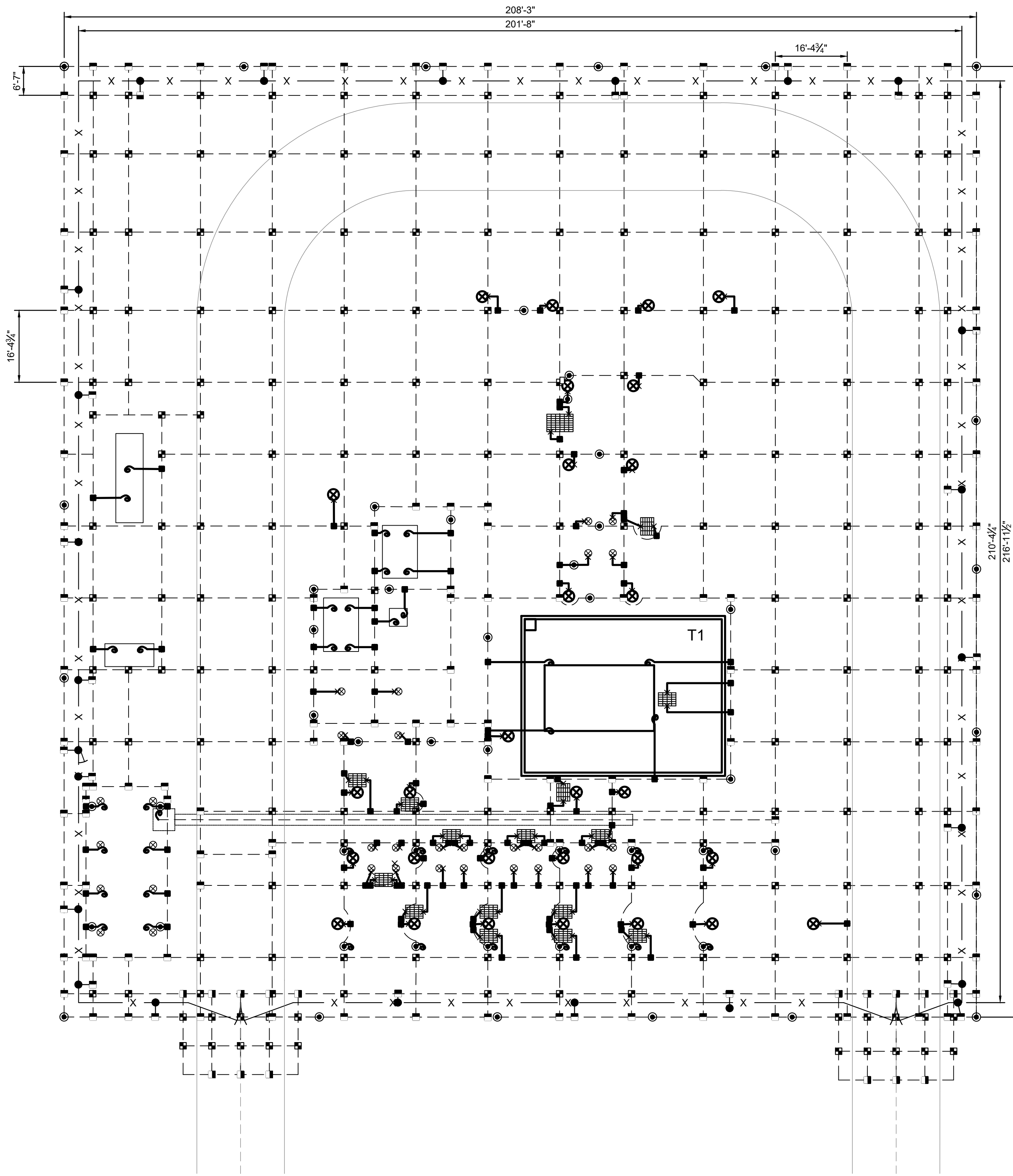
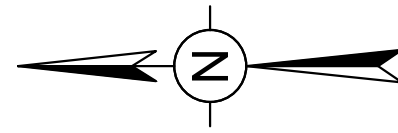
34.5kV ELEVATION VIEW

PROJ NUM:	SU20.0012
DES:	MIKE MAILLE
DWN:	MIKE MAILLE/KRINA GANDHI
CHK:	AZIN SHAHAB
APV:	ZHONG BING SHEN, P.E.
DATE:	02/17/2023



SHEET NO:	HV-P.02.02	REV:	1
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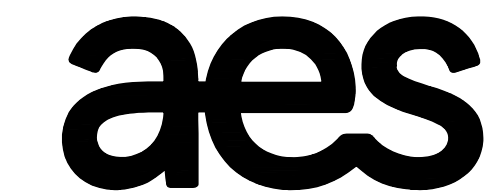
NOTES

1. THIS IS A PRELIMINARY GROUNDING PLAN AND IS FOR PERMITTING PURPOSES ONLY. A DETAILED GROUNDING PLAN WILL BE PROVIDED AFTER A GROUNDING STUDY HAS BEEN COMPLETED, DURING THE DETAILED DESIGN PHASE OF THE PROJECT.
2. ROUTE #4/0 AWG COPPER GROUND CONDUCTOR UP EACH CORNER OF POWER TRANSFORMER LOOPED THROUGH ALL GROUND CLAMPS, SURGE ARRESTERS, TERMINALS ON HO BUSHING AND DOWN THE OTHER SIDE TO FORM TWO PATHS TO GROUND FOR FAULT CURRENT. CONTRACTOR SHALL INSTALL SEPARATE LOOPS (ONE FOR HV SURGE ARRESTERS, LV SURGE ARRESTERS, AND ONE FOR THE HO BUSHING) AND TERTIARY TERMINAL GROUNDING. GROUND CONDUCTORS SHALL NOT REST ON ANY COMPONENT EXCEPT THE TANK CONTRACTOR SHALL INSTALL 2" BUS PIPE FROM POWER TRANSFORMER XO BUSHING TO NEUTRAL GROUNDING REACTOR.
3. ROUTE #4/0 AWG COPPER GROUND CONDUCTOR UP TO 34.5 kV STRUCTURES TO EACH SURGE ARRESTER AND CABLE TERMINATIONS AND DOWN THE OTHER LEG FORMING TWO CONTINUOUS PATHS TO GROUND FOR FAULT CURRENT.
4. ROUTE #4/0 AWG COPPER GROUND CONDUCTOR INTO CONTROL BUILDING THROUGH THE CABLE ENTRANCE. GROUND ALL TRAY, RELAY PANEL GROUND BUSES AND POWER EQUIPMENT. EACH RELAY AND CONTROL PANEL SHALL BE BONDED WITH A MINIMUM OF #1/0 AWG COPPER TO THE #4/0 AWG COPPER GROUND CONDUCTOR.
5. GROUND CONDUCTOR ON COLLECTOR CIRCUITS TO BE GROUNDED AT THE CLOSEST STEEL STRUCTURE COMPONENT.
6. CONTRACTOR TO INSTALL SEPARATE CONNECTION TO GROUND GRID FOR FEEDER BREAKER GROUND SWITCH (IN ADDITION TO FRAME GROUNDING).
7. GROUND CONTROL BUILDING STAIRS SEPARATELY FROM BUILDING.
8. MAIN GROUND CONDUCTOR AND TOP OF GROUND RODS TO BE 18" BELOW SUB-GRADE.

LEGEND

- X — FENCE LINE
- - - #4/0 AWG BARE COPPER CONDUCTOR.
- ⊙ COPPER-CLAD GROUND ROD 3/4" 10 FT LONG WITH CABLE TO ROD EXOTHERMIC CONNECTOR.
- ⊠ EXOTHERMIC WELD #4/0 AWG GROUND GRID CROSS CONNECTOR.
- ⊡ EXOTHERMIC WELD #4/0 AWG GROUND GRID TEE CONNECTOR.
- ⌚ GROUND PIGTAIL, #4/0 AWG BARE COPPER.
- ⌒ GROUND LOOP, #4/0 AWG COPPER.
- ⊗ PILE GROUNDING CONNECTION
- ▤ GROUNDING MAT

DRAWING NUMBER	DRAWING DESCRIPTION
HV-P.01.01	345/34.5kV SUBSTATION GENERAL PLAN
HV-E.02.01	345/34.5kV SUBSTATION SWITCHING ONE-LINE DIAGRAM
HV-P.14.01	345/34.5kV SUBSTATION CONTROL BUILDING LAYOUT
HV-P.02.01	345/34.5kV SUBSTATION 345kV ELEVATION VIEW
HV-P.02.02	345/34.5kV SUBSTATION 34.5kV ELEVATION VIEW



AES CLEAN ENERGY DEVELOPMENT, LLC
292 MADISON AVE, 15TH FLOOR
NEW YORK, NY 10017



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KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
0	03/08/2023	ISSUED FOR 94-C PERMIT
1	07/24/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

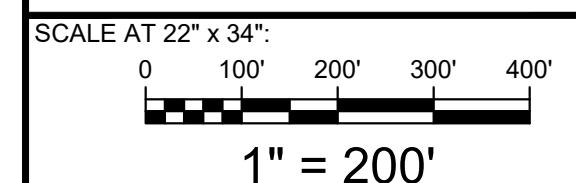
LAKE ROAD, SOMERSET NY

SHEET TITLE & DESCRIPTION:

345/34.5kV SUBSTATION

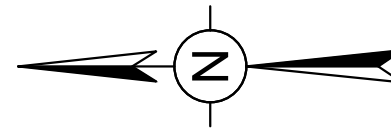
GROUNDING PLAN

PROJ NUM: SU20.0012
DES: MIKE MAILLE
DWN: MIKE MAILLE/KRINA GANDHI
CHK: AZIN SHAHAB
APV: ZHONG BING SHEN, P.E.
DATE: 02/17/2023

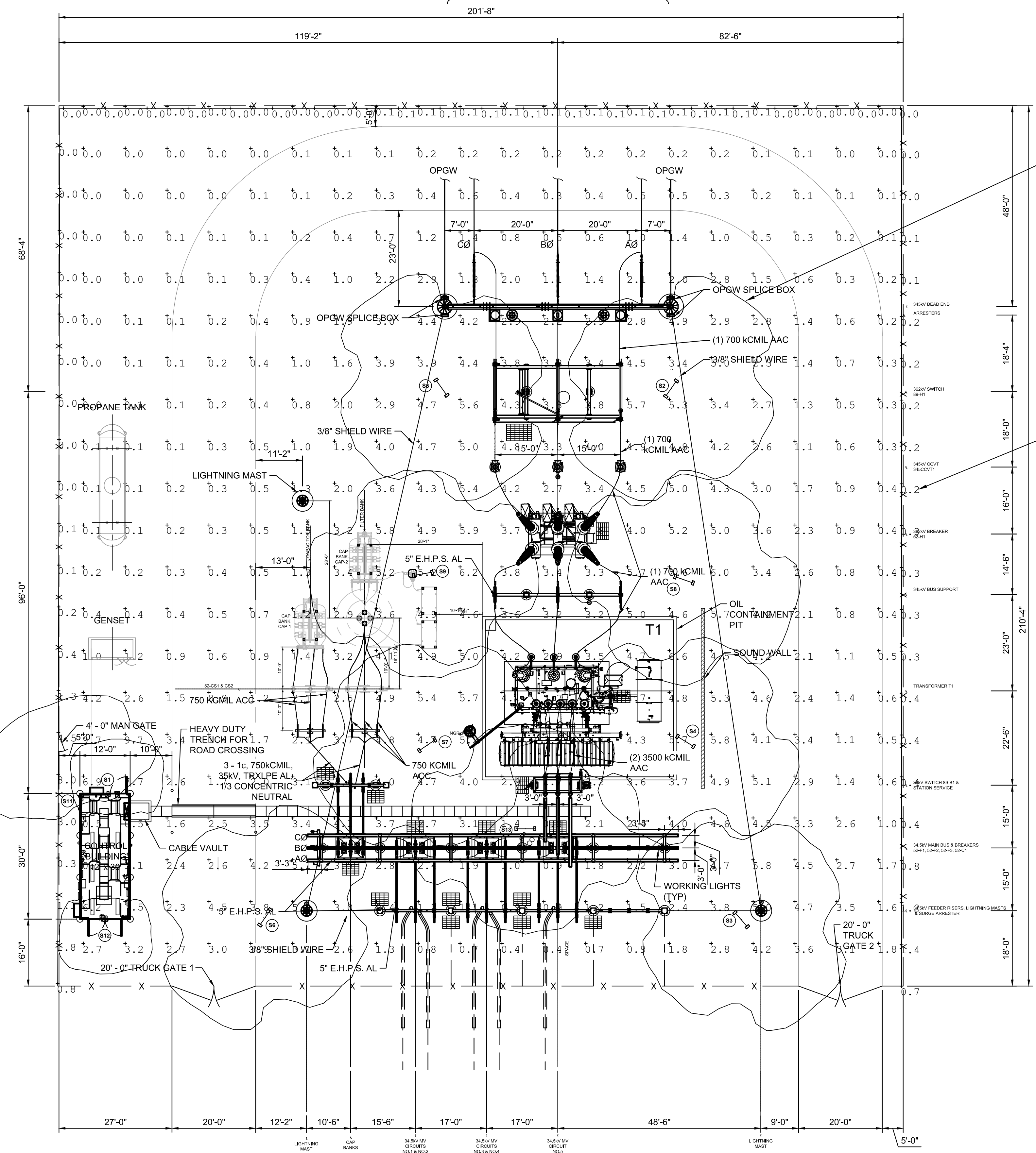


SHEET NO: HV-P.08.01 REV: 1

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**345kV OH CONNECTION TO
KINTIGH SUBSTATION
(APPROX. 159 FT)**



2.0 PHOTOMETRIC ISOLINE (TYP)

PHOTOMETRIC CALCULATION AT FENCE LINE

- NOTES**
- STATION LIGHTING IS COMPROMISED OF 120 AV LED FLOOD LIGHTS.
 - LUMINAIRES TO MOUNTED IN INDICATED 4" DIAMETER POLES 15'-0" ABOVE FINISHED GRADE. THE LUMINAIRES SHALL BE AIMED AS SHOWN ON THE PLAN AND HAVE TILT ANGLE BASED ON LUMINAIRE SCHEDULE. BACK TO BACK HEADS HAVE 1'-0" ARMS.
 - YARD CONTOURS ARE 2.0 FT CANDLES (F.C.) FOR THIS STATION. 2 FT CANDLES IS THE EQUIVALENT OF 22 LUMENS PER SQUARE METER.
 - LUMINAIRES INSTALLED WITH TOP AND SIDE VISORS ACHIEVE FULL CUTOFF REQUIREMENT (0 F.C.) ABOVE LUMINAIRE.
 - LUMINAIRES SHALL BE CABLE OF MANUAL SHUT OFF.

MINIMUM CLEARANCE REQUIREMENT

345kV MINIMUM CLEARANCE (1300kV BIL):
 LIVE PARTS: Ø-G=106"
 Ø-G=119"
 TO GRADE: 18'-0" (BUS)
 30'-0" (DRIVEWAY)

34.5kV MINIMUM CLEARANCE (200kV BIL):
 LIVE PARTS: Ø-G=13"
 Ø-G=18"
 TO GRADE: 10'-0" (BUS)
 22'-0" (DRIVEWAY)

DRAWING NUMBER	DRAWING DESCRIPTION
HV-E.02.01	345/34.5kV SUBSTATION SWITCHING ONE-LINE DIAGRAM
HV-P.08.01	345/34.5kV SUBSTATION GROUNDING PLAN
HV-P.14.01	345/34.5kV SUBSTATION CONTROL BUILDING LAYOUT
HV-P.02.01	345/34.5kV SUBSTATION 345kV ELEVATION VIEW
HV-P.02.02	345/34.5kV SUBSTATION 34.5kV ELEVATION VIEW
HV-P.15.01	345/34.5kV SUBSTATION CONTROL BUILDING ELEVATION

LUMINAIRE SCHEDULE

LUMINAIRE #	ARRANGEMENT	WATTAGE	LUMENS	TOP/SIDE VISOR	TILT ANGLE	DESCRIPTION
A1	WALL MOUNT	21	2900	-	0	EWAS01_A3AW730
S2	BACK TO BACK	110	13360	TSVBLC	0	(2) EAEL01_C4AF730
S3	BACK TO BACK	110	13360	TSVBLC	0	(2) EAEL01_C4AF730
S4	BACK TO BACK	110	13360	TSVBLC	0	(2) EAEL01_C4AF730
S5	BACK TO BACK	110	13360	TSVBLC	0	(2) EAEL01_C4AF730
S6	BACK TO BACK	110	13360	TSVBLC	0	(2) EAEL01_C4AF730
S7	BACK TO BACK	110	13360	TSVBLC	0	(2) EAEL01_C4AF730
S8	BACK TO BACK	110	13360	TSVBLC	0	(2) EAEL01_C4AF730
S9	BACK TO BACK	110	13360	TSVBLC	0	(2) EAEL01_C4AF730
S10	BACK TO BACK	110	13360	TSVBLC	0	(2) EAEL01_C4AF730
S11	ROOF MOUNT	55	13360	TSVBLC	0	EAEL01_C4AF730
S12	WALL MOUNT	21	2900	-	0	EWAS01_A3AW730
S13	BACK TO BACK	110	13360	TSVBLC	0	(2) EAEL01_C4AF730

CALCULATION SUMMARY

UNITS	AVERAGE	MAX	MIN
FC	2.43	9.7	0
FC (FENCE LINE)	.49	8	0

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KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
0	03/08/2023	ISSUED FOR 94-C PERMIT

PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

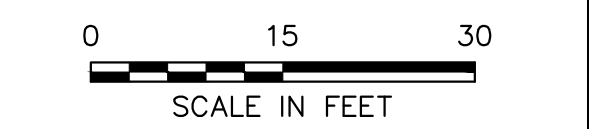
**LAKE ROAD,
SOMERSET NY**

SHEET TITLE & DESCRIPTION:

345/34.5kV SUBSTATION

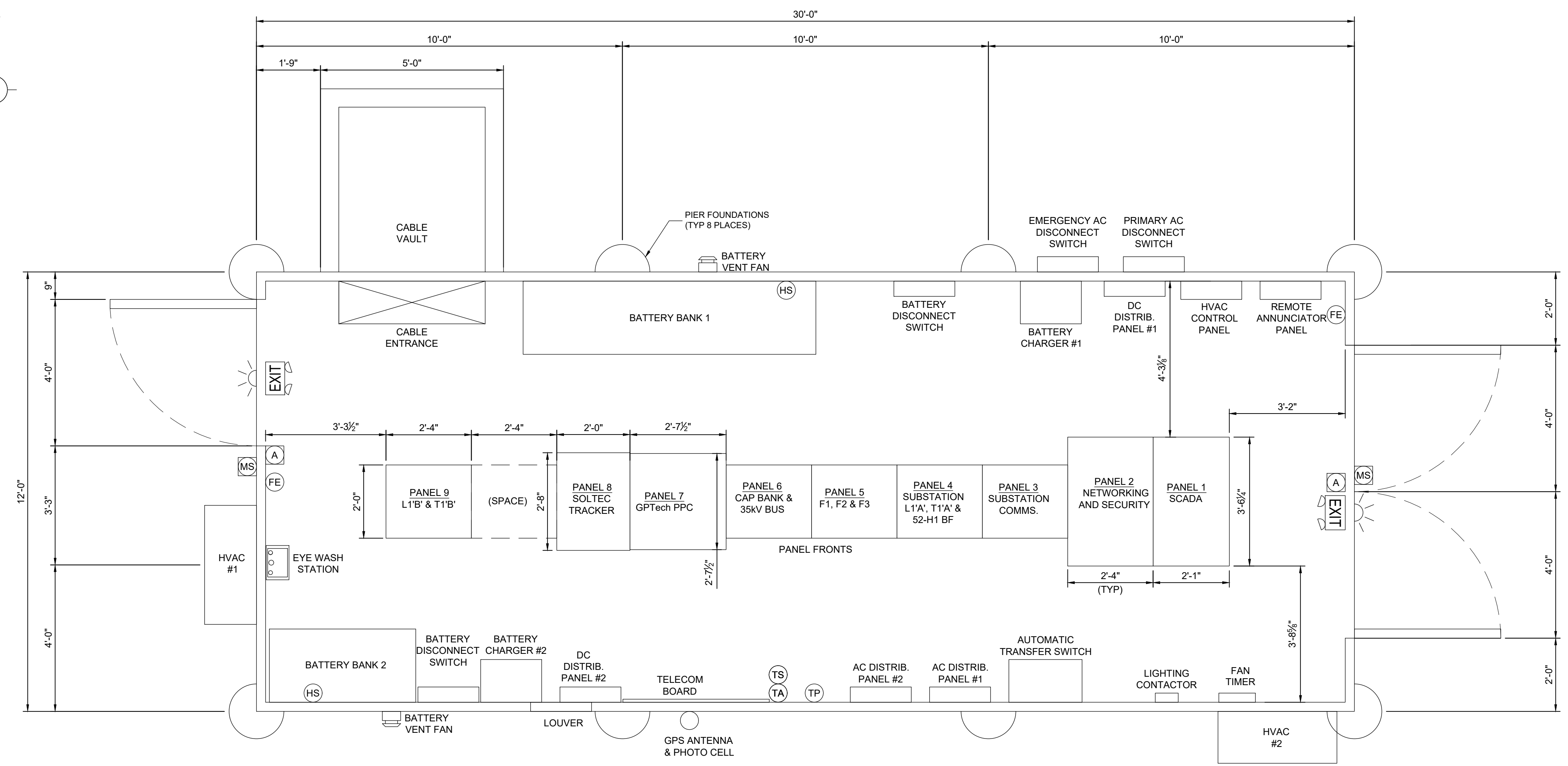
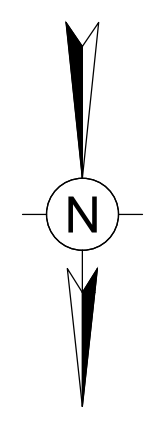
PHOTOMETRIC LIGHTING PLAN

PROJ NUM: SU20.0012
 DES: MIKE MAILLE
 DWN: MIKE MAILLE/KRINA GANDHI
 CHK: AZIN SHAHAB
 APV: ZHONG BING SHEN, P.E.
 DATE: 03/11/2022
 SCALE AT 22" x 34":

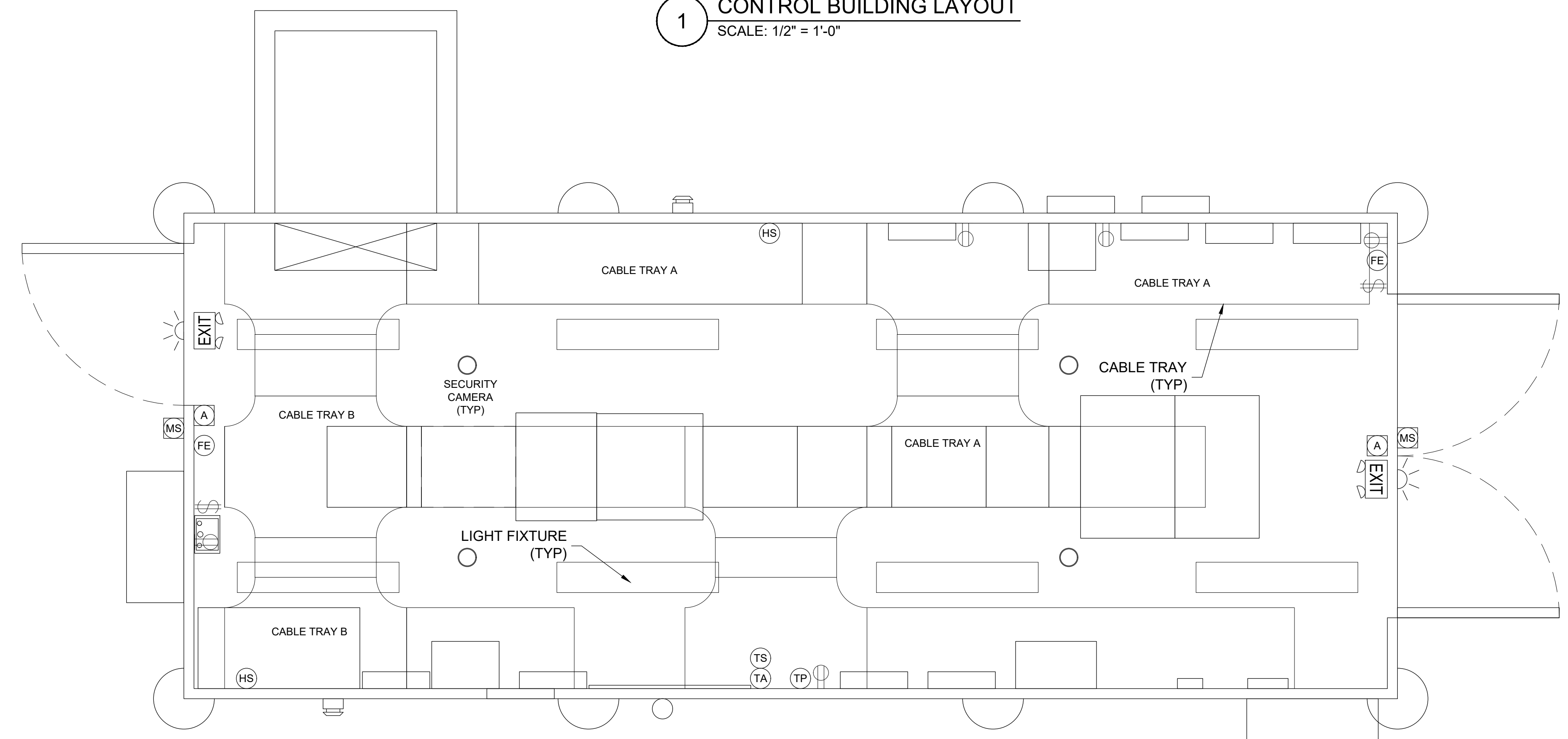


SHEET NO: HV-P.13.01 REV: C

AES-220000-02/2023-02/10/23



1 CONTROL BUILDING LAYOUT
SCALE: 1/2" = 1'-0"



2 LIGHTING & CABLE TRAY LAYOUT
SCALE: 1/2" = 1'-0"

NOTES

- THIS IS A PRELIMINARY CONTROL BUILDING LAYOUT AND IS FOR PERMITTING PURPOSES ONLY.
- DESIGN IS PRELIMINARY AND SHALL BE FINALIZED AT DETAILED DESIGN PHASE.

LEGEND

- RECEPTACLE
- LIGHT SWITCH
- EXIT SIGN W/ EMERGENCY LIGHT
- SECURITY CAMERA-P3356-V FIXED DOME
- EXTERIOR LIGHT
- DOOR ALARM, MAGNETIC SWITCH
- FIRE EXTINGUISHER
- HYDROGEN SENSOR
- MOTION SENSOR
- THERMOSTAT
- TEMPERATURE ALARM
- TELEPHONE

DRAWING NUMBER	DRAWING DESCRIPTION
HV-P.01.01	345/34.5KV SUBSTATION GENERAL PLAN
HV-P.02.01	345/34.5KV SUBSTATION 345KV ELEVATION VIEW
HV-P.02.02	345/34.5KV SUBSTATION 34.5KV ELEVATION VIEW
HV-P.08.01	345/34.5KV SUBSTATION GROUNDING PLAN
HV-E.02.01	345/34.5KV SUBSTATION SWITCHING ONE-LINE DIAGRAM



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KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
0	03/08/2023	ISSUED FOR 94-C PERMIT
1	07/24/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

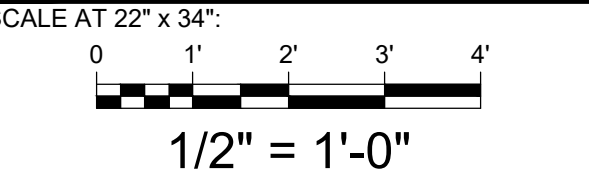
LAKE ROAD, SOMERSET NY

SHEET TITLE & DESCRIPTION:

345/34.5KV SUBSTATION

CONTROL BUILDING LAYOUT

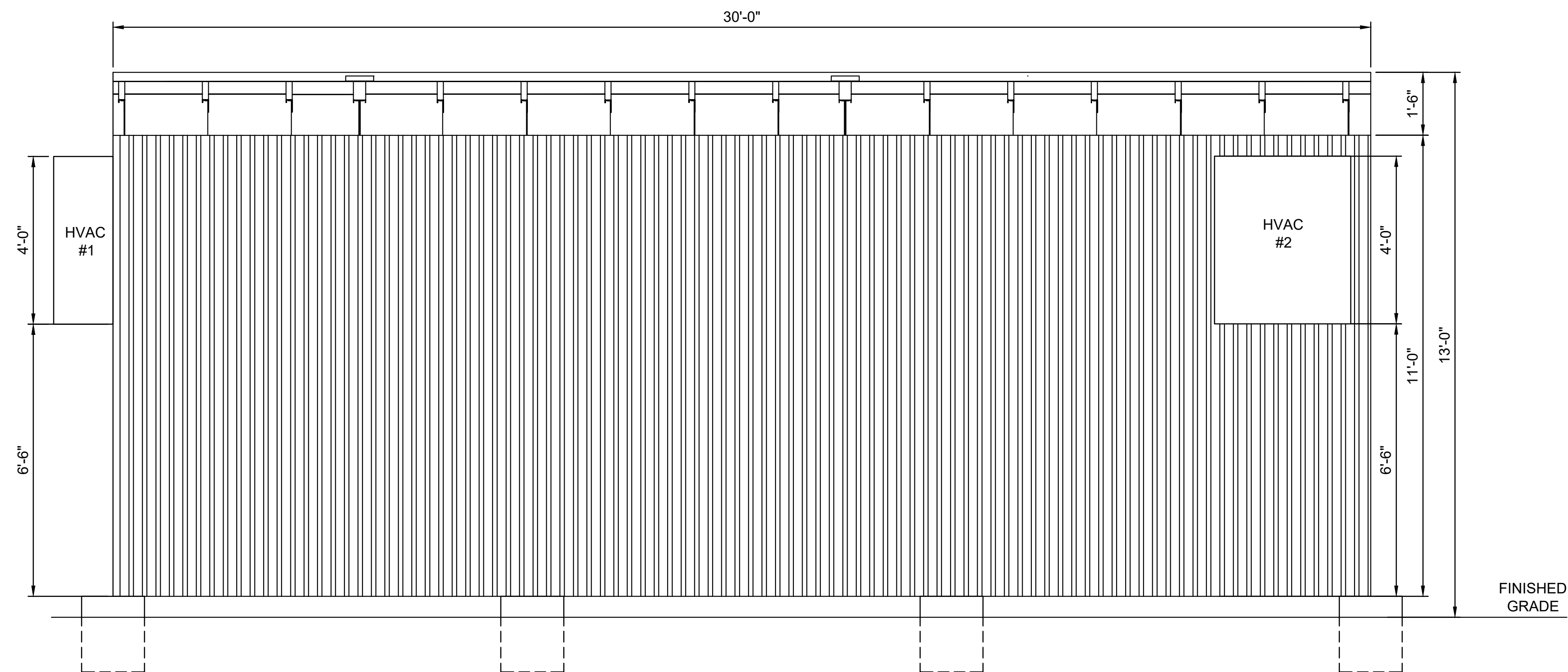
PROJ NUM:	SU20.0012
DES:	MIKE MAILLE
DWN:	MIKE MAILLE/KRINA GANDHI
CHK:	AZIN SHAHAB
APV:	ZHONG BING SHEN, P.E.
DATE:	02/17/2023



SHEET NO:	HV-P.14.01	REV:	1
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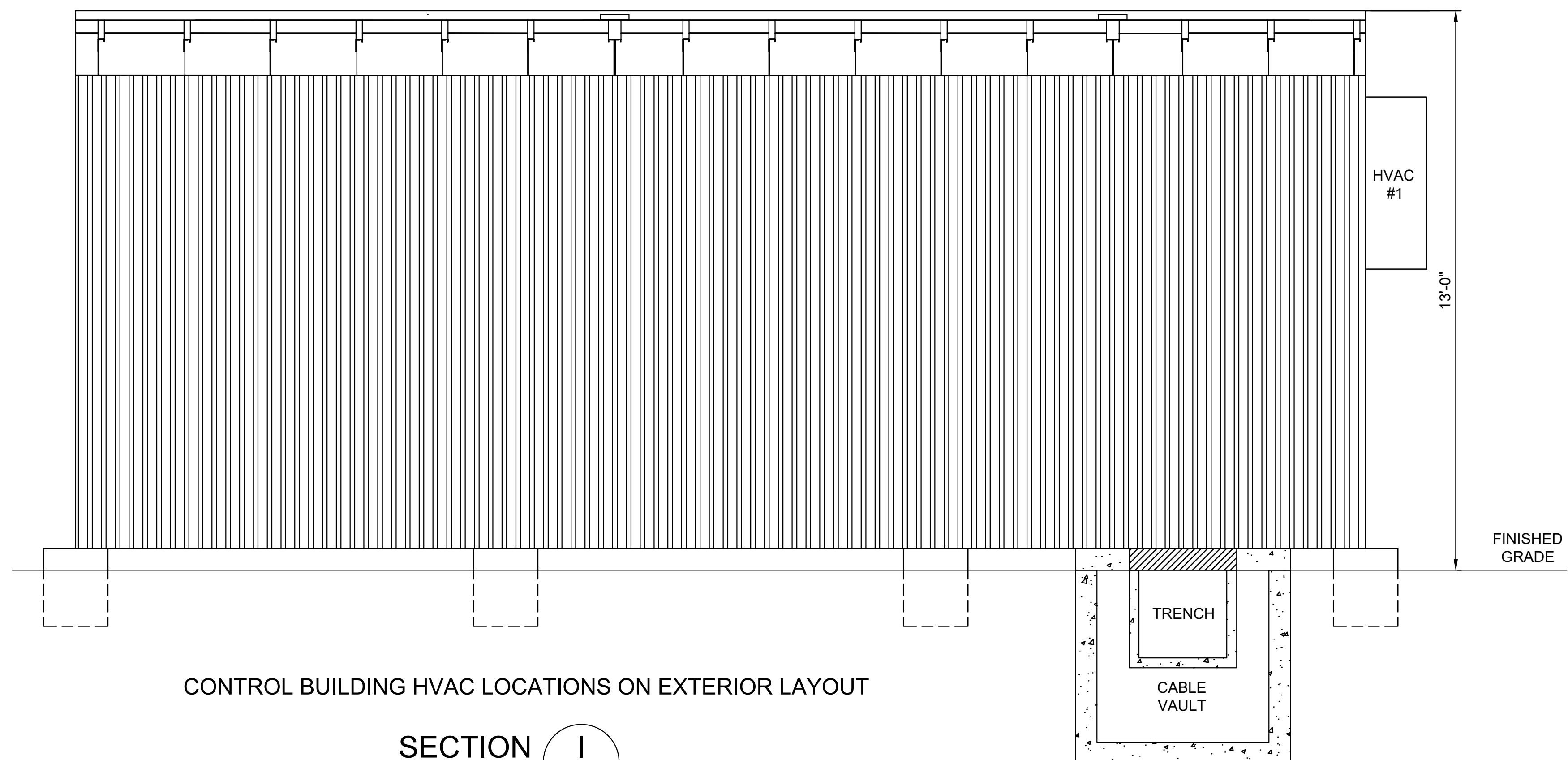
ISSUED FOR 94-C PERMIT ONLY
NOT FOR CONSTRUCTION

AES-THREDA 25/24-V10101



CONTROL BUILDING HVAC LOCATIONS ON EXTERIOR LAYOUT

SECTION H
1/2" = 1'-0" HV-P.01.01



CONTROL BUILDING HVAC LOCATIONS ON EXTERIOR LAYOUT

SECTION I
1/2" = 1'-0" HV-P.01.01

NOTES	
1.	THIS IS A PRELIMINARY CONTROL BUILDING EXTERIOR LAYOUT WITH THE INTENSION OF SHOWING HVAC LOCATIONS, AND IS FOR PERMITTING PURPOSES ONLY.
2.	DESIGN IS PRELIMINARY AND SHALL BE FINALIZED AT DETAILED DESIGN PHASE.
3.	CONTROL BUILDING COLOR IS GRAY, MATERIAL IS CORRUGATED STEEL.

DRAWING NUMBER	DRAWING DESCRIPTION
HV-P.01.01	345/34.5kV SUBSTATION GENERAL PLAN
HV-P.02.01	345/34.5kV SUBSTATION 345kV ELEVATION VIEW
HV-P.02.02	345/34.5kV SUBSTATION 34.5kV ELEVATION VIEW
HV-P.08.01	345/34.5kV SUBSTATION GROUNDING PLAN
HV-P.14.01	345/34.5kV SUBSTATION CONTROL BUILDING LAYOUT
HV-E.02.01	345/34.5kV SUBSTATION SWITCHING ONE-LINE DIAGRAM



AES CLEAN ENERGY DEVELOPMENT, LLC
292 MADISON AVENUE, 15TH FLOOR
NEW YORK, NY 10017



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KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
0	03/08/2023	ISSUED FOR 94-C PERMIT
1	07/24/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

LAKE ROAD, SOMERSET NY

SHEET TITLE & DESCRIPTION:

345/34.5kV SUBSTATION

CONTROL BUILDING ELEVATION

PROJ NUM:	SU20.0012
DES:	KRINA GANDHI
DWN:	KRINA GANDHI
CHK:	AZIN SHAHAB
APV:	ZHONG BING SHEN, P.E.

DATE: 02/17/2023

SCALE AT 22" x 34":



1/2" = 1'-0"

ISSUED FOR 94-C PERMIT ONLY
NOT FOR CONSTRUCTION

SHEET NO:	REV:
HV-P.15.01	1



Bill of Material

Client: AES
Project: Somerset Solar

Document Number: HV-G.02.01
TT Document ID: 705-2161940300-BOM-E0001
Revision Date: July 17, 2023
Revision: 1
Issue Status: Preliminary (Re-issued for 94-C Permit)
Created By: Mike Maille
Checked By: Azin Shahab
Approved By: Zhong Bing Shen, P.E.

Engineering Seal

Item #	Description	Manufacture	Quantity	Units	Reference Dwg #	Notes
Title - Major Substation Material and Equipment						
E1	POWER TRANSFORMER 84/112/140 MVA ONAN/ONAF/ONAF @ 65C, 345KV Y - 34.5KV Y - 13.8KV DELTA, BURIED TERTIARY, GROUNDED THROUGH NEUTRAL GROUNDING REACTOR ON 34.5KV SIDE	GE PROLEG MEXICO, VTC (OR OTHER APPROVED VENDORS)	1	EA	HV-P.02.01	REFER TO NOTES 1 AND 2
E2	POWER CIRCUIT BREAKER, 345 KV NOMINAL, 362KV MAX, 2000A, SF6 GAS, 2 CYCLE, 63KAIC, 125VDC CONTROL & MOTOR, 120VAC, DEAD TANK, 3 POLE GANG OPERATED.	GE ALSTOM (OR OTHER APPROVED VENDORS)	1	EA	HV-P.02.01	REFER TO NOTES 1 AND 2
E3	38KV, 1200A, DEAD TANK, OUTDOOR VACUUM CIRCUIT BREAKER, 25KA, 125VDC CONTROL & MOTOR, 120VAC, 3 POLE GANG OPERATED. WITH INTERNAL MECHANICALLY INTERLOCKED GROUND SWITCH.	EMA (OR OTHER APPROVED VENDORS)	3	EA	HV-P.02.02	REFER TO NOTES 1 AND 2
E4	38KV, 1200A, DEFINITE PURPOSE FOR CAP BANK OPERATION, DEAD TANK OUTDOOR VACUUM CIRCUIT BREAKER, 25KA, 125VDC CONTROL & MOTOR, 3 POLE GANG OPERATED.	SIEMENS (OR OTHER APPROVED VENDORS)	1	EA	HV-P.02.02	REFER TO NOTES 1 AND 2
E5	SHUNT CAPACITOR BANK, EXTERNALLY FUSED, 12MVAR MVAR AT 34.5 KV LINE TO LINE PER STAGE, THREE PHASE, 60 Hz, 200 KV BIL, CONNECTED SINGLE UNGROUNDED WYE, INCLUDES STEEL STRUCTURES.	ABB (OR OTHER APPROVED VENDORS)	1	EA	HV-P.02.02	REFER TO NOTES 1, 2 AND 3
E6	MANUAL HOOKSTICK OPERATED DISCONNECT SWITCH, 38KV, 1200A, 200KV BIL, WITH 34.5KV EHS INSULATOR 200 KV BIL (single phase unit)	SOUTHERN STATES (OR OTHER APPROVED VENDORS)	12	EA	HV-P.02.02	REFER TO NOTES 1 AND 2
E7	345KV NOMINAL, 362KV MAX, 2000A, 63KA, 1300KV BIL, 3-PHASE MOTORIZED DISCONNECT SWITCH, VERTICAL BREAK	SOUTHERN STATES (OR OTHER APPROVED VENDORS)	1	EA	HV-P.02.01	REFER TO NOTES 1 AND 2
E8	38KV, 3000A, 89KA, 200KV BIL, 3-PHASE DISCONNECT SWITCH, VERTICAL BREAK	SOUTHERN STATES (OR OTHER APPROVED VENDORS)	1	EA	HV-P.02.02	REFER TO NOTES 1 AND 2
E9	MANUAL HOOKSTICK OPERATED DISCONNECT SWITCH, 38KV, 600A, 200KV BIL, WITH 34.5KV EHS INSULATOR 200 KV BIL (SINGLE PHASE UNIT WITH GROUNDING SWITCH)	SOUTHERN STATES (OR OTHER APPROVED VENDORS)	18	EA	HV-P.02.02	REFER TO NOTES 1 AND 2
E10	COUPLING CAPACITIVE VOLTAGE TRANSFORMER, 345 KV CLASS, 1550 KV BIL, OIL FILLED 207000-67/115V (WITH 2 SECONDARY WINDINGS, EACH WINDING WITH 67V AND 115V TAP), 0.15 W, X, Y, Z, ZZ	KUHLMAN ELECTRIC (OR OTHER APPROVED VENDORS)	3	EA	HV-P.02.01	REFER TO NOTES 1 AND 2
E11	1-PHASE, 34.5KV CLASS POTENTIAL TRANSFORMER, 20,125KV-67/115V (WITH 2 SECONDARY WINDINGS, EACH WINDING WITH 67V AND 115V TAP), 0.15 W, X, Y, Z, ZZ	ABB (OR OTHER APPROVED VENDORS)	3	EA	HV-P.02.02	REFER TO NOTES 1 AND 2
E12	SURGE ARRESTER, STATION CLASS, 209 KV MCOV	HUBBELL (OR OTHER APPROVED VENDORS)	3	EA	HV-P.02.01	REFER TO NOTES 1 AND 2
E13	SURGE ARRESTER, STATION CLASS, 29 KV MCOV	HUBBELL (OR OTHER APPROVED VENDORS)	27	EA	HV-P.02.02	REFER TO NOTES 1 AND 2
E14	NEUTRAL GROUNDING REACTOR, 0.75 OHMS, DRY-TYPE AIR CORE, 34.5 KV NOMINAL, WITH 34.5KV INSULATOR 200 KV BIL	GE GRID SOLUTIONS (OR OTHER APPROVED VENDORS)	1	EA	HV-P.01.01	REFER TO NOTES 1 AND 2
E15	POWER FUSE HOLDER 38KV MAX, 200KV BIL, 300A, 25KA	S&C ELECTRIC (OR OTHER APPROVED VENDORS)	1	EA	HV-P.02.02	REFER TO NOTES 1 AND 2
E16	POWER FUSE 38KV MAX, 200KV BIL, 3A, 25KA	S&C ELECTRIC (OR OTHER APPROVED VENDORS)	1	EA	HV-P.02.02	FOR STATION SERVICE TRANSFORMER. REFER TO NOTES 1 AND 2
E18	1-PHASE, 100 KVA, STATION SERVICE TRANSFORMER, 19.9KV-120/240V POLE MOUNTED	ABB (OR OTHER APPROVED VENDORS)	1	EA	HV-P.02.02	REFER TO NOTES 1 AND 2
E19	345 KV, PORCELAIN POST INSULATOR, 1300KV BIL	LAPP (OR OTHER APPROVED VENDORS)	3	EA	HV-P.02.01	REFER TO NOTES 1 AND 2
E20	34.5 KV, PORCELAIN POST INSULATOR, 200KV BIL	LAPP (OR OTHER APPROVED VENDORS)	74	EA	HV-P.02.02	REFER TO NOTES 1 AND 2
E21	PROTECTION AND CONTROL BUILDING (including two sets of 125VDC batteries, chargers, AC and DC panels, etc.)	INTERMOUNTAIN ELECTRONICS (OR OTHER APPROVED VENDORS)	1	EA	HV-P.01.01	REFER TO NOTES 1 AND 2
E22	CAP SWITCHER, 38KV, 200 KV BIL, 600A	SOUTHERN STATES (OR OTHER APPROVED VENDORS)	2	EA	HV-P.02.02	REFER TO NOTES 1 AND 2
E23	FILTER BANK, 3PH, 34.5KV, R=44.21 OHMS, XL=4.7OHMS, CAP-2= 4 MVAR PER PHASE, C1= 1.051 MVAR PER PHASE	APPROVED VENDORS	1	EA	HV-P.02.02	REFER TO NOTES 1 AND 4
E24	MANUAL HOOKSTICK OPERATED DISCONNECT SWITCH, 38KV, 600A, 200KV BIL, WITH 34.5KV EHS INSULATOR 200 KV BIL (SINGLE PHASE UNIT)	SOUTHERN STATES (OR OTHER APPROVED VENDORS)	6	EA	HV-P.02.02	REFER TO NOTES 1 AND 2
E25	1-PHASE, 100 KVA, 120/240V PROPANE EMERGENCY GENERATOR AND TANK	GENERAC (OR OTHER APPROVED VENDORS)	1	EA	HV-P.01.01	REFER TO NOTES 1 AND 2

- NOTES:**
1) EQUIPMENT SHALL BE FINALIZED IN DETAILED DESIGN STAGE
2) EQUIPMENT VENDORS CAN BE SELECTED BASED ON THE LIST OF AES APPROVED VENDORS
3) CAPACITOR BANK RATINGS TO BE CONFIRMED AFTER FINAL LOAD FLOW AND HARMONIC STUDY
4) FILTER BANK RATINGS TO BE CONFIRMED AFTER FINAL LOAD FLOW AND HARMONIC STUDY



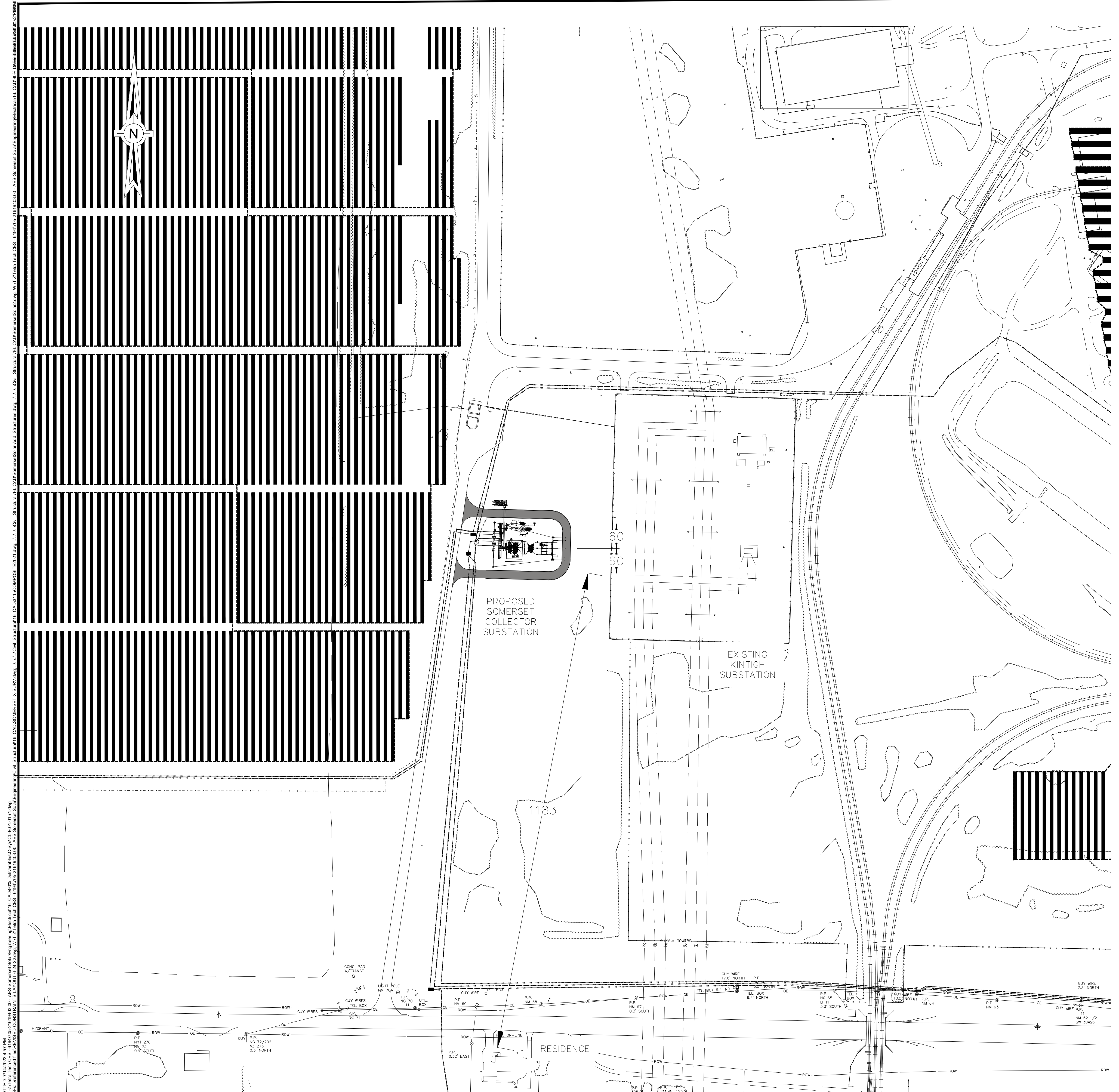
P&C Major Equipment (Bill of Material)

TT Document ID: 705-2161940300-BOM-E0002
Revision Date: July 24, 2023
Revision: 1
Issue Status: ISSUED FOR 94-C PERMIT
Created By: Abe Ghazi
Checked By: Azin Shahab
Approved By: Zhong Bing Shen, P.E.

Client: AES
Project: Somerset Solar
Client Doc# HV-G.02.02

Preliminary Engineering Seal

Table with columns: Item #, MAT. ID (if applicable), Description, Manufacture, Manufacture Part Number, Quantity, Units, Reference Dwg #, Notes. Rows are categorized into Networking and Communication Equipment, Protection Relays, Auxiliary Equipment, and Panels and Plates.



NOTES	
1. ALL DIMENSIONS IN FEET.	
REFERENCE DRAWINGS	
1. TL-P.00.01	
2. PV-E.01.01	

aes
 AES CLEAN ENERGY DEVELOPMENT, LLC
 282 MADISON AVENUE, 15TH FLOOR,
 NEW YORK, NY 10017

Tt TETRA TECH

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PE STAMP:

KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
0	03/08/2023	ISSUED FOR 94-C PERMIT
1	07/24/2023	RE-ISSUED FOR 94-C PERMIT

PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

LAKE ROAD SOMERSET, NY

SHEET TITLE & DESCRIPTION:

PROPOSED SOMERSET HIGH-VOLTAGE SUBSTATION

GEN-TIE PROXIMITY TO RESIDENCE

PROJ NUM:	SU20.0012
DES:	SAAD HARIS
DWN:	SAHARNAZ BODAGHI
CHK:	JON LEMON, P.E.
APV:	JON LEMON, P.E.
DATE:	07/22/2022
SCALE:	

ISSUED FOR 94-C PERMIT ONLY
 NOT FOR CONSTRUCTION

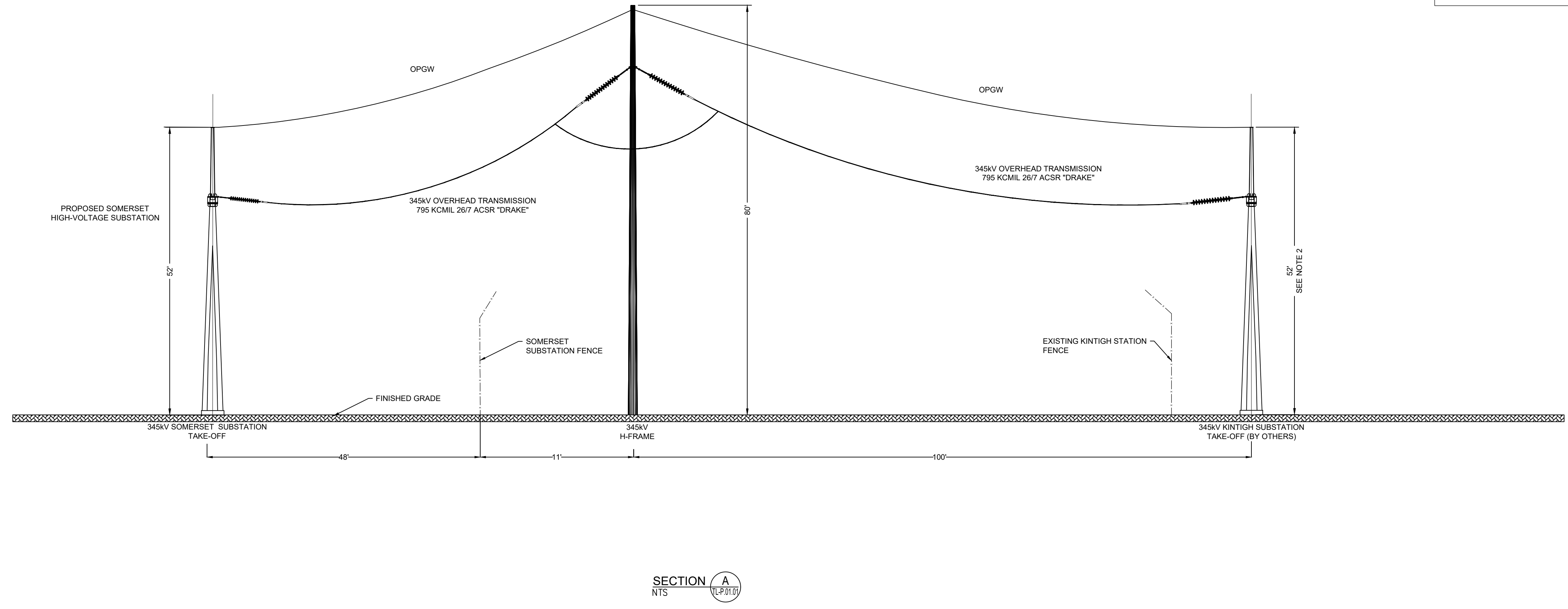
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REV:	1

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AES Tibbets 2323A-V210110
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 11/14/2023 14:45:58
 11/14/2023 14:45:58
 11/14/2023 14:45:58
 11/14/2023 14:45:58

NOTES	
1.	DESIGN IS PRELIMINARY.
2.	HEIGHT OF PROPOSED TAKE-OFF ASSUMED TO BE SAME AS COLLECTOR SYSTEM TAKE-OFF.
3.	PER ASSUMPTIONS LOG (REVIEWED BY AES), KINTIGH STATION WILL BE EXPANDED TO ACCOMMODATE GEN-TIE INTERCONNECTION. PROPOSED FENCELINE LOCATION IS ASSUMED TO BE 17'-0" FROM THE TRANSMISSION LINE STRUCTURE H-FRAME.
4.	GEN-TIE SCOPE LINE OF DEMARCACTION IS THE DEADEND CABLE CONNECTIONS ON COLLECTOR SIDE OF STRUCTURE. JUMPERS AND CONNECTION TO KINTIGH STATION ARE BY OTHERS.
5.	DIMENSIONS ARE APPROXIMATE.
6.	SOMERSET SUBSTATION TAKE-OFF DETAILS PROVIDED IN HV-P.01.01 AND HV-P.02.01
7.	KINTIGH SUBSTATION TAKE-OFF BY NYSEG, AS SUCH STRUCTURE DETAILS CANNOT BE PROVIDED.


REFERENCE DRAWINGS	
HV-P.02.01	- 345/34.5KV SUBSTATION 345KV ELEVATION VIEW
TL-P.00.01	- 345KV GEN-TIE TRANSMISSION LINE ROUTE MAP
TL-P.02.01	- 345KV GEN-TIE TRANSMISSION LINE WOOD H-FRAME FRAMING



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 292 MADISON AVENUE, 15TH FLOOR,
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PROJECT LOCATION:

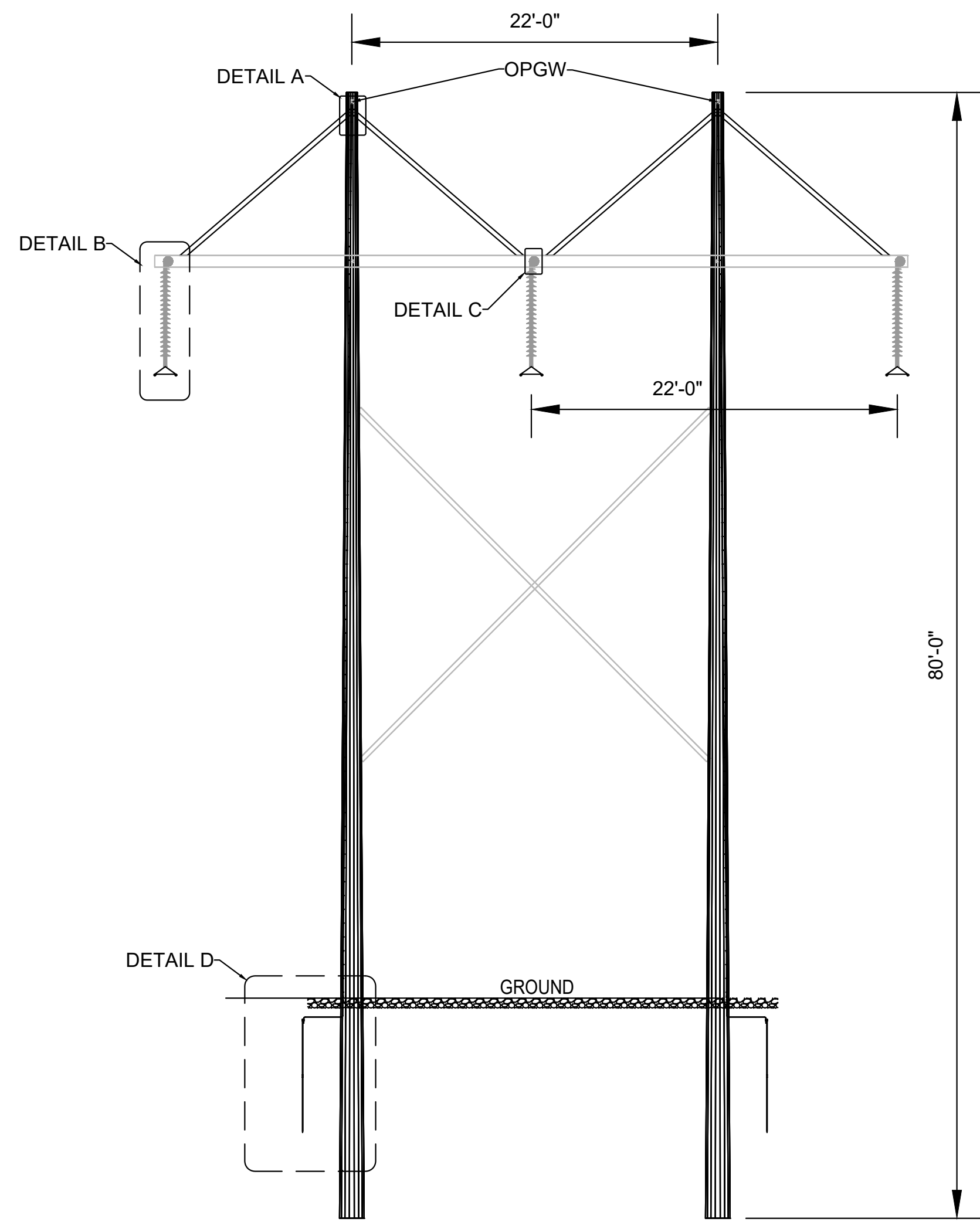
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SOMERSET, NY

SHEET TITLE & DESCRIPTION:

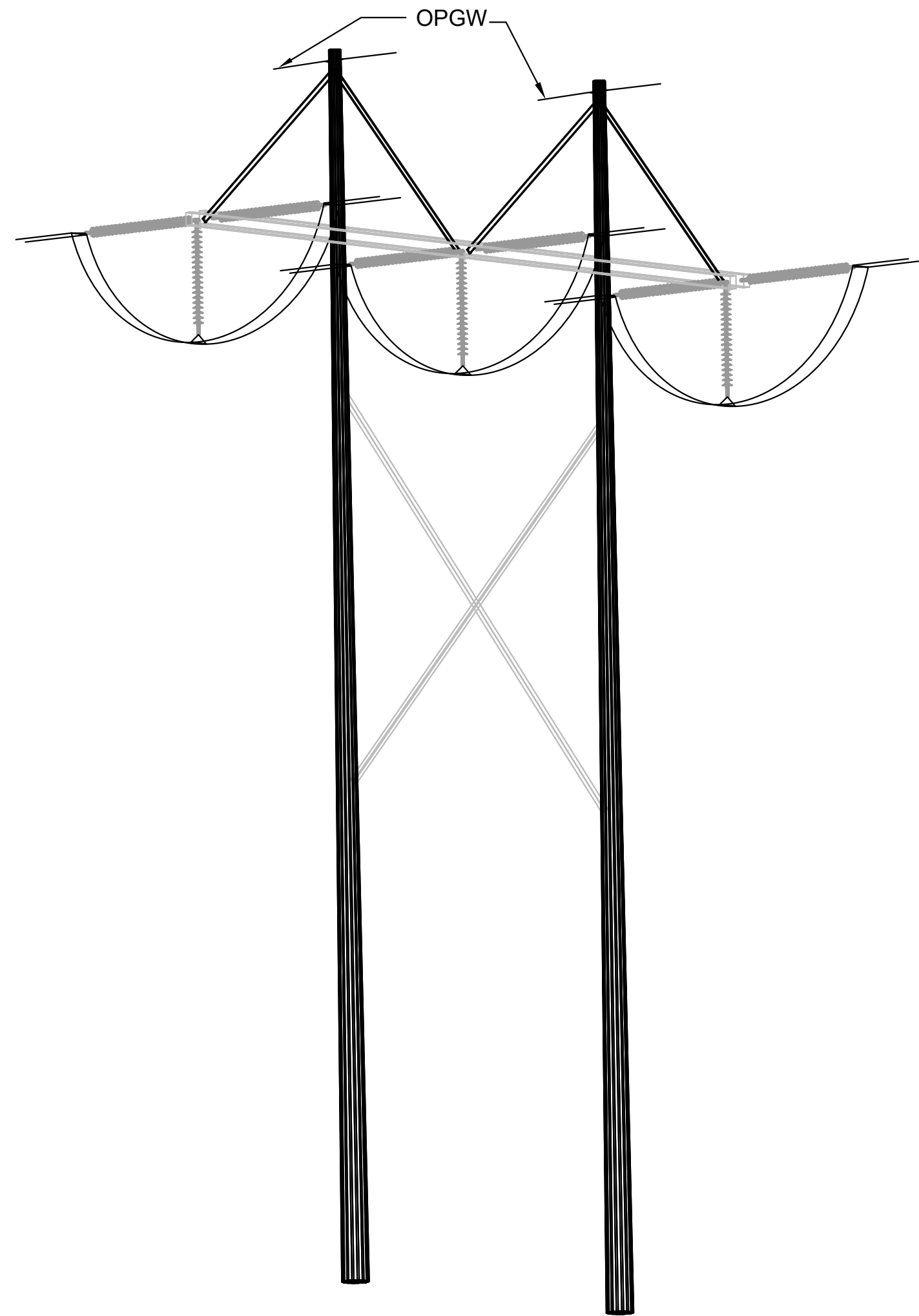
345kV GEN-TIE
TRANSMISSION LINE

ELEVATION VIEW

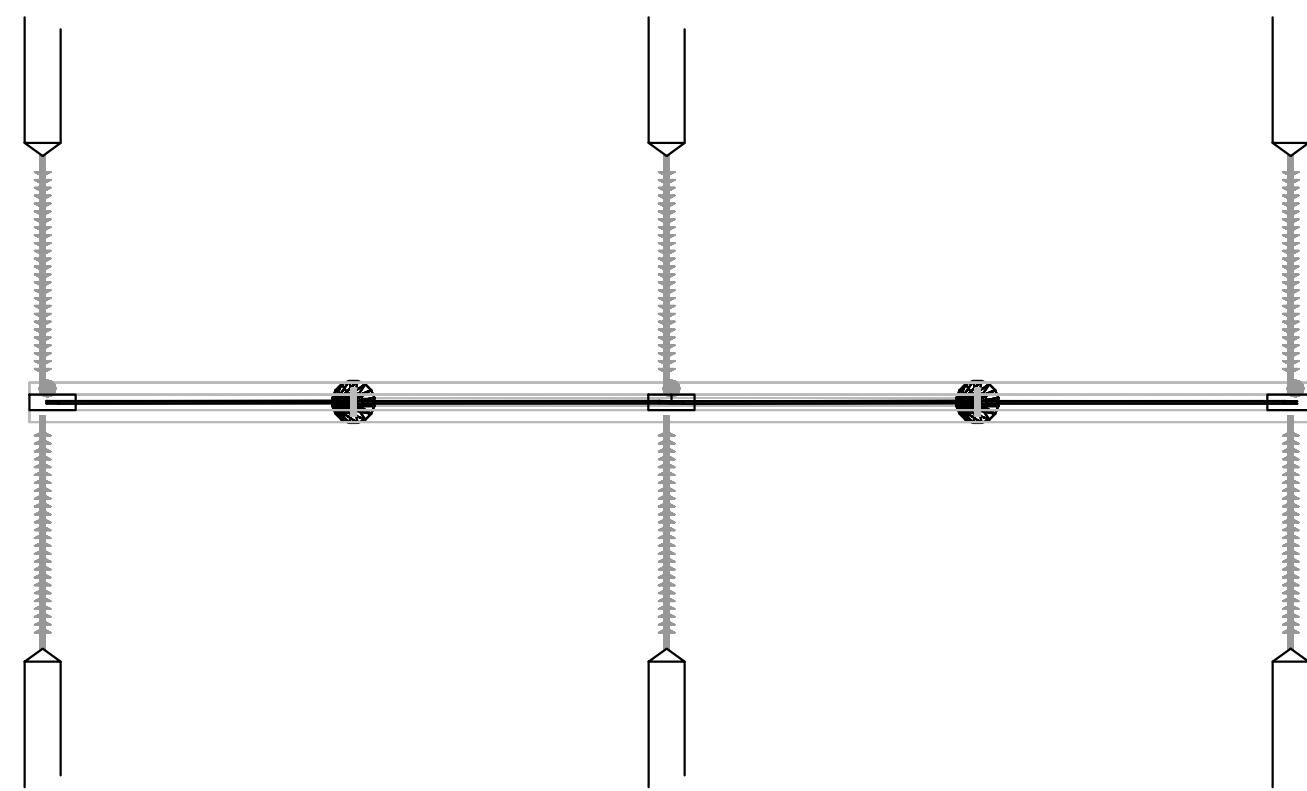
PROJ NUM:	SU20.0012
DES:	HAMDI GATO
DWN:	HAMDI GATO
CHK:	JON LEMON, P.E.
APV:	JON LEMON, P.E.
DATE:	07/22/2022
SCALE:	N.T.S
SHEET NO:	TL-P.01.01
REV:	1



ELEVATION VIEW
1:8



ISOMETRIC VIEW
1:8



PLAN VIEW
1:8

NOTES

1. DESIGN IS PRELIMINARY.
2. CONDUCTOR SIZE SELECTED IS ACSR 795kcmil DRAKE.
3. SFPOC/SFSJ-J-13587 IS SELECTED FOR OPGW.
4. TYPICAL EMBEDMENT IS 10% POLE LENGTH + 2 FT.

REFERENCE DRAWINGS

- TL-P.00.01 - 345kV GEN-TIE TRANSMISSION LINE ROUTE MAP
- TL-P.01.01 - 345kV GEN-TIE TRANSMISSION LINE ELEVATION VIEW



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PROJECT LOCATION:

LAKE ROAD
SOMERSET, NY

SHEET TITLE & DESCRIPTION:

345kV GEN-TIE
TRANSMISSION LINE

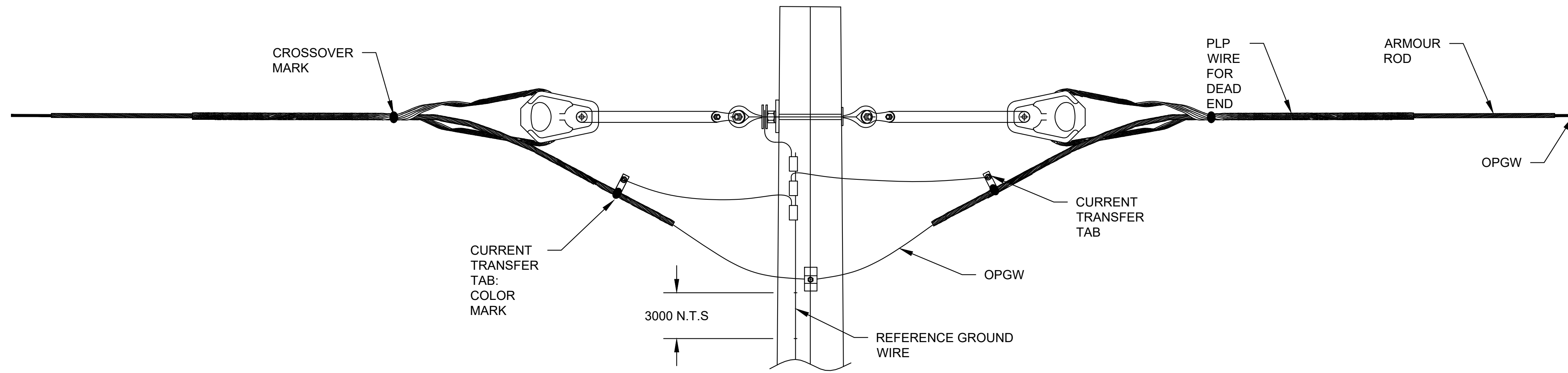
WOOD H-FRAME
FRAMING DRAWING

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APV:	JON LEMON, P.E.
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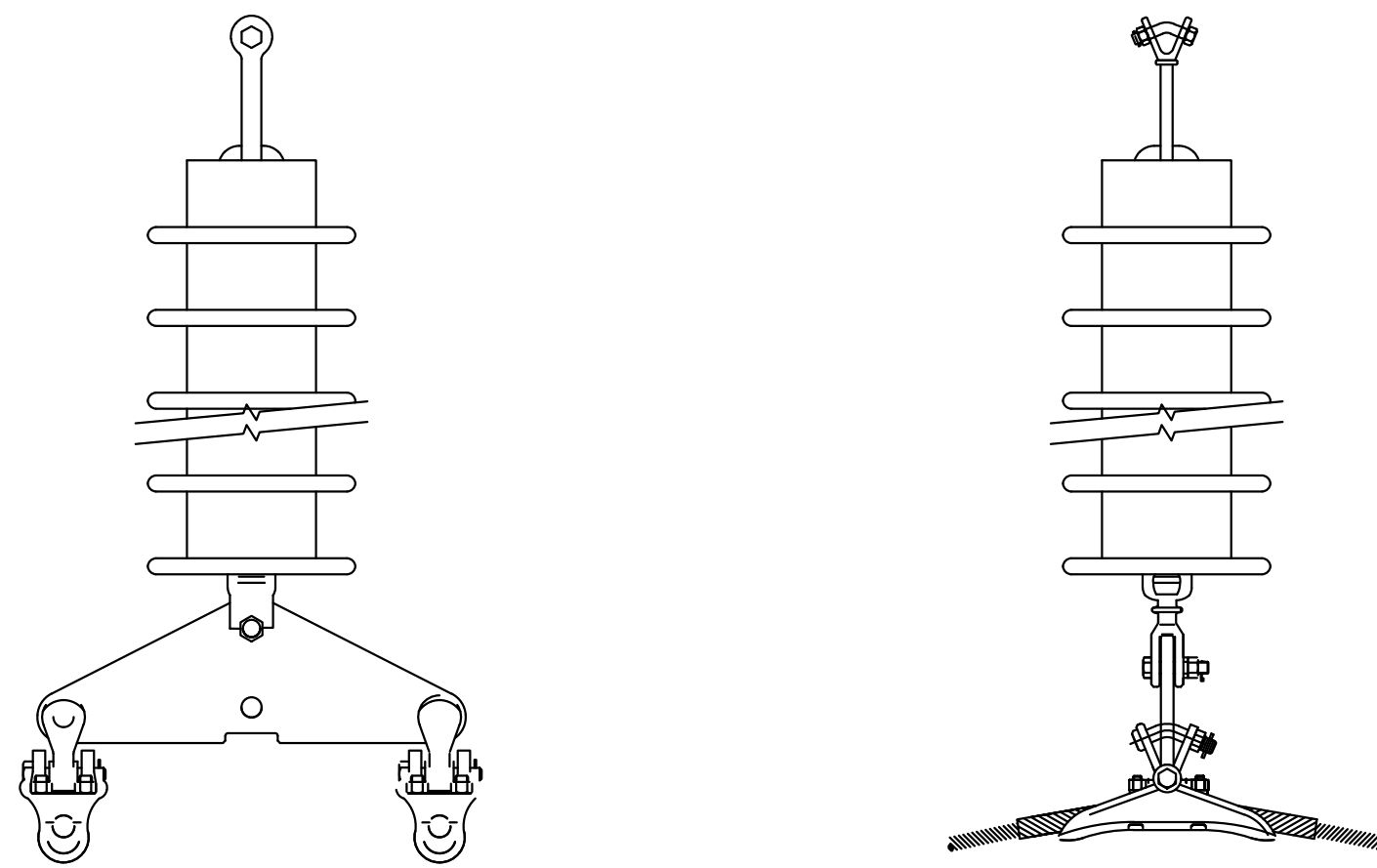
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N.T.S

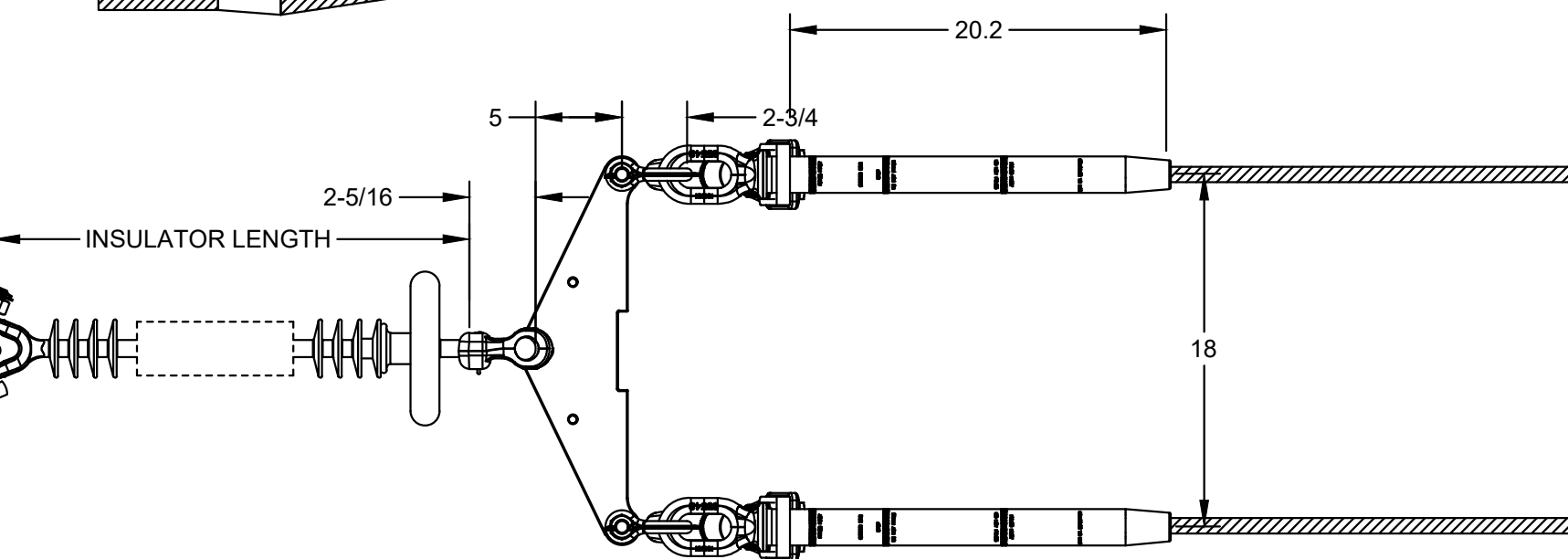
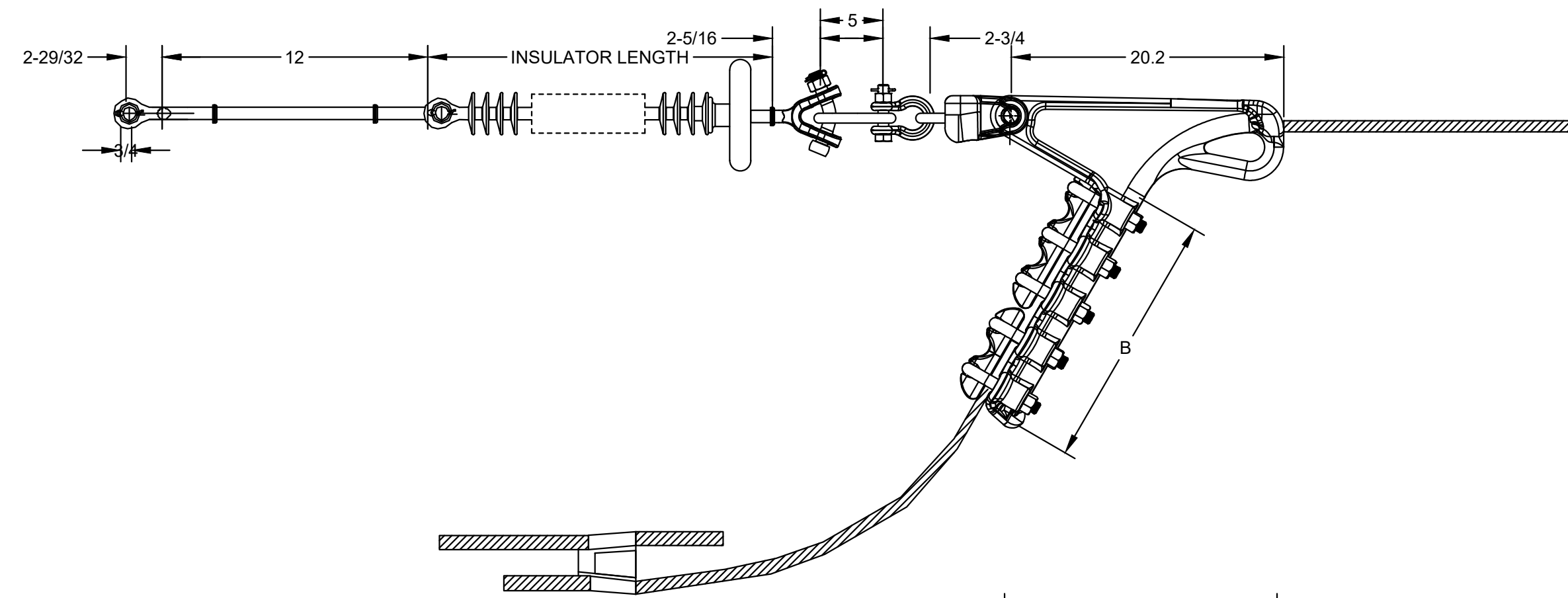
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TL-P.02.01-SHEET 10F3	1



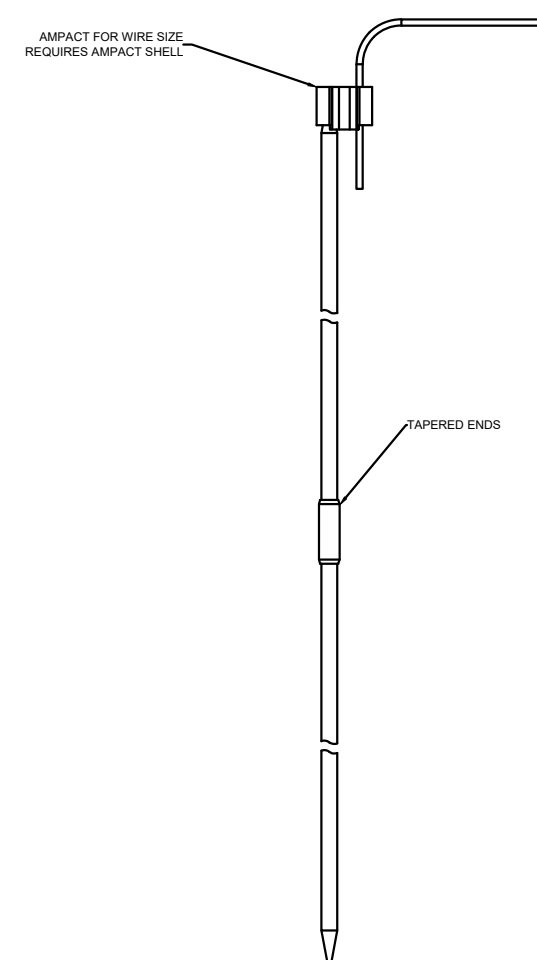
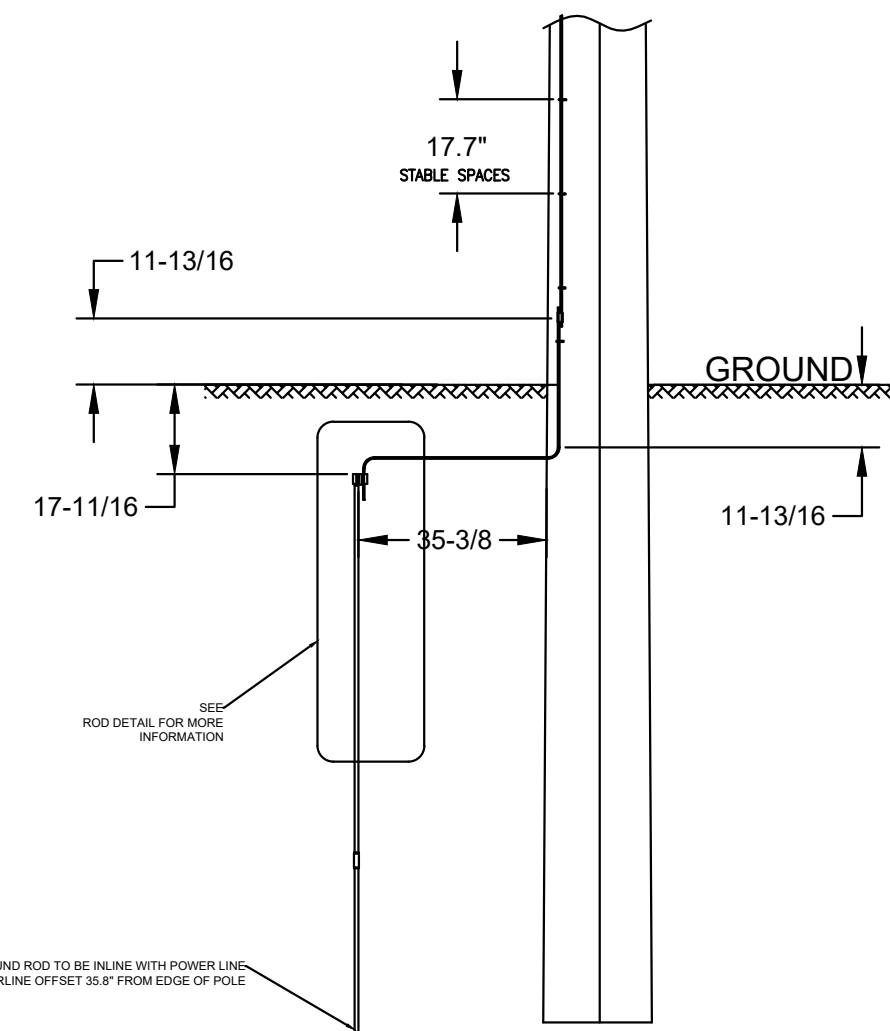
DETAIL A - OPGW DOUBLE DEADEND ASSEMBLY
N.T.S



DETAIL B - JUMPER INSULATOR ASSEMBLY
N.T.S



DETAIL C - STRAIN INSULATOR ASSEMBLY
N.T.S



ROD DETAIL

DETAIL D - GROUNDING
N.T.S

NOTES	
1.	DESIGN IS PRELIMINARY.
2.	CONDUCTOR SIZE SELECTED IS ACSR 795kcmil DRAKE.
3.	SFPOC/SFSJ-J-13587 IS SELECTED FOR OPGW.
4.	TYPICAL EMBEDMENT IS 10% POLE LENGTH + 2 FT.

REFERENCE DRAWINGS	
TL-P.00.01 -	345KV GEN-TIE TRANSMISSION LINE ROUTE MAP
TL-P.01.01 -	345KV GEN-TIE TRANSMISSION LINE ELEVATION VIEW



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PROJECT TITLE:

SOMERSET SOLAR PROJECT

PROJECT LOCATION:

LAKE ROAD SOMERSET, NY

SHEET TITLE & DESCRIPTION:

345KV GEN-TIE TRANSMISSION LINE

WOOD H-FRAME FRAMING DRAWING

PROJ NUM:	SU20.0012
DES:	HAMDI GATO
DWN:	HAMDI GATO
CHK:	JON LEMON, P.E.
APV:	JON LEMON, P.E.
DATE:	07/22/2022
SCALE:	

N.T.S	
SHEET NO:	REV:
TL-P.02.01-SHEET 20F3	1

BILL OF MAJOR MATERIAL				
ITEM	QTY	UNIT	DESCRIPTION	MANUFACTURE PART # OR DESIGNER APPROVED EQUIVALENT
1	2	EA	CLASS H1 80' GALVANIZED STEEL POLE	
2	145	m	TWO OPGW	SFPOC/SFSJ-J-13587
3	225	m	TWO CONDUCTOR PER PHASE OF ACSR 795kcmil DRAKE	
4	2	EA	CROSS BRACE STRAP FOR H FRAME 32.5FT	
5	2	EA	STEEL CROSS ARM 45.5FT	
6	4	EA	CROSS BRACE STRAP 14.5FT	
7	174	EA	GLASS BELL SUSPENSION W/ZINC SLEEVE (18 BELLS FOR JUMPER AND 20 BELLS FOR STRAIN)	

NOTES
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3. SFPOC/SFSJ-J-13587 IS SELECTED FOR OPGW.
4. TYPICAL EMBEDMENT IS 10% POLE LENGTH + 2 FT.

REFERENCE DRAWINGS
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TL-P.01.01 - 345KV GEN-TIE TRANSMISSION LINE ELEVATION VIEW



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**LAKE ROAD
SOMERSET, NY**

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**345KV GEN-TIE
TRANSMISSION LINE**

**WOOD H-FRAME
FRAMING DRAWING**

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SCALE:	N.T.S	
SHEET NO:	TL-P.02.01-SHEET 30F3	REV: 1