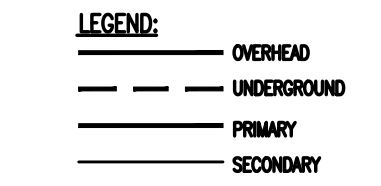
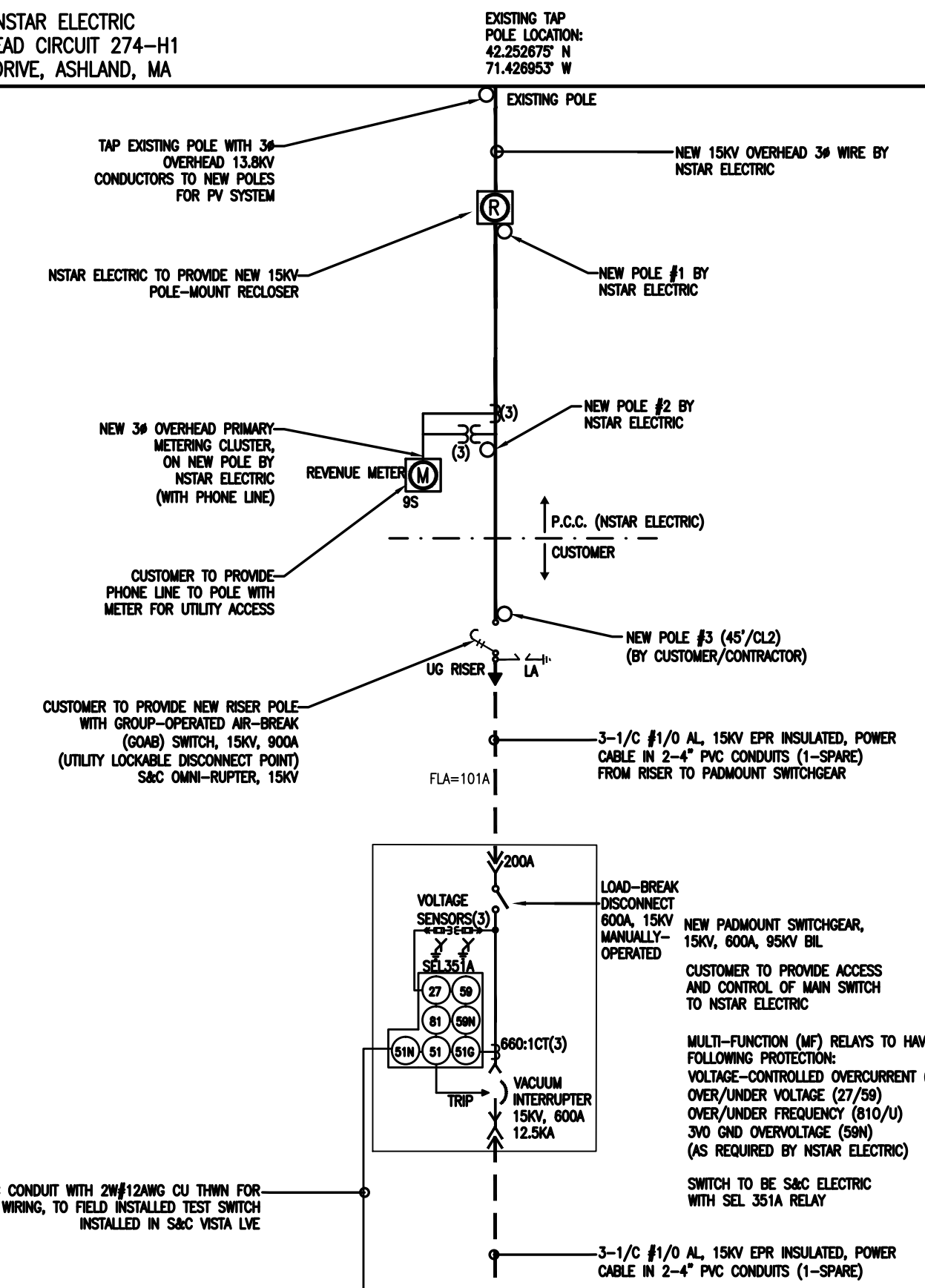


EXISTING NSTAR ELECTRIC
13.8KV OVERHEAD CIRCUIT 274-H1
BUTTERFIELD DRIVE, ASHLAND, MA

PV SYSTEM SUMMARY
500A PANELS
310 WATTS EACH
3065.04 KW DC NAMEPLATE
2412.8 KW AC CAPACITY
104 X 23.2KW INVERTERS
5 X 500KVA TRANSFORMERS

- UTILITY INTERCONNECTION NOTES:**
- TRANSFORMERS TO BE GROUNDED WYE PRIMARY AND SECONDARY.
 - GROUNDED TRANSFORMER NEUTRAL BUSHING TO BE FULLY INSULATED, FOR CT CONNECTION BETWEEN NEUTRAL BUSHING AND TANK GROUND.
 - PROTECTIVE RELAYS TO HAVE BATTERY BACKUP OR UPS FOR BACKUP.



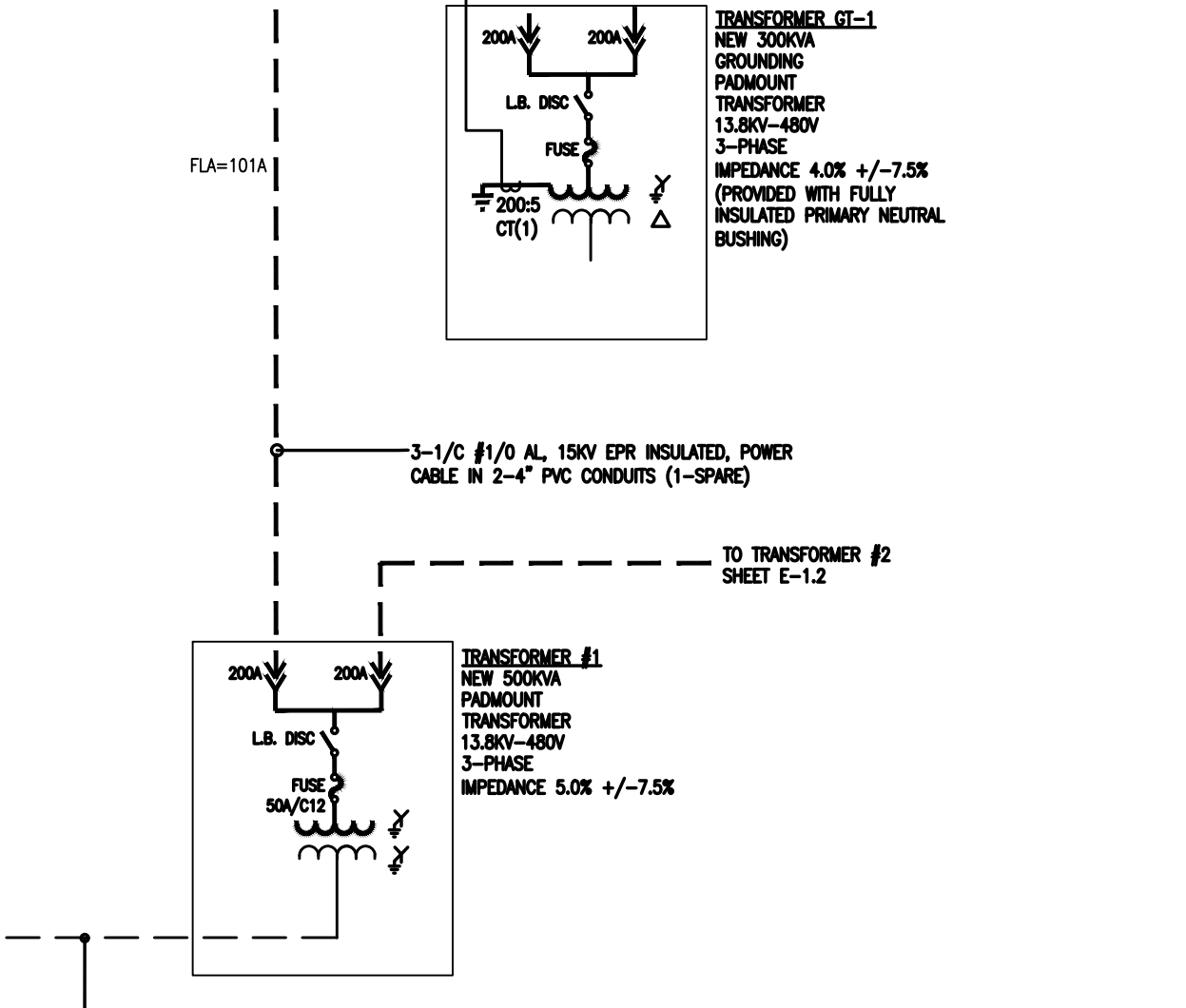
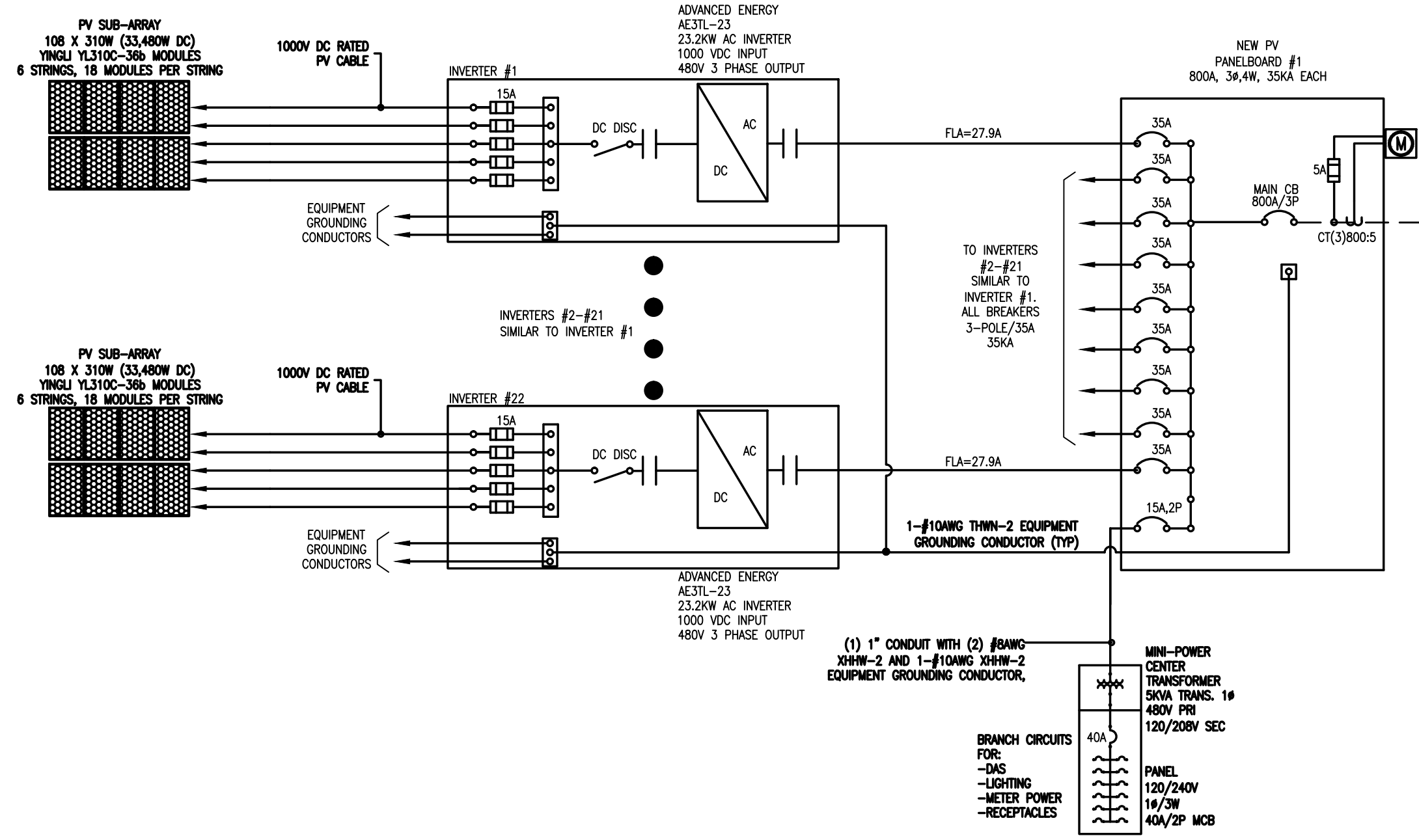
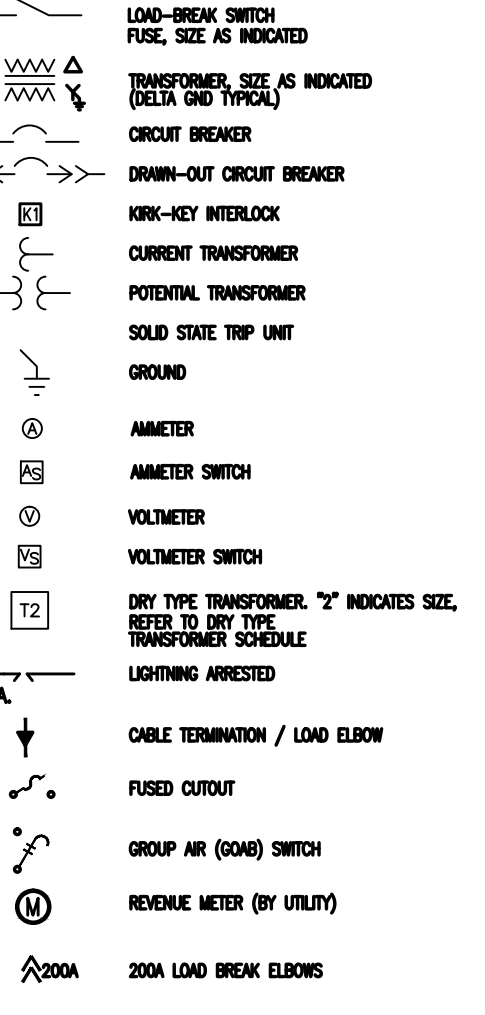
DEVICE NO.	DESCRIPTION
277	TIME UNDER VOLTAGE RELAY
271	INSTANTANEOUS UNDER VOLTAGE RELAY
32F	FORWARD OVER POWER RELAY
32R	REVERSE POWER RELAY
46	NEGATIVE PHASE SEQUENCE OVERCURRENT RELAY
47	REVERSE PHASE VOLTAGE RELAY
50/51	GROUND OVERCURRENT RELAY
51N	INSTANTANEOUS OVERVOLTAGE RELAY
58	TIME OVERVOLTAGE RELAY
59T	VOLTAGE BALANCE RELAY
60	OVER FREQUENCY RELAY
81/0	UNDER FREQUENCY RELAY
81/U	

PROPOSED 351A RELAY SETTINGS:

DEVICE	PICKUP	TIME DELAY
27-1	50%	6.5 CYC
27-2	85%	117 CYC
59-1	110%	57 CYC
59-2	125%	6.5 CYC
81U-1	57.9HZ	6.5 CYC
81U-2	58.5HZ	100 SEC
81O-1	60.5HZ	6.5 CYC
51	180A	2.0TD U4
51G	90A	1.5TD U4
51N	50A	1.0TD U4
58N	100V	80.0 CYC

(SETTINGS INCLUDED 3 CYCLE ESTIMATE CONTRACTOR OPENING TIME)

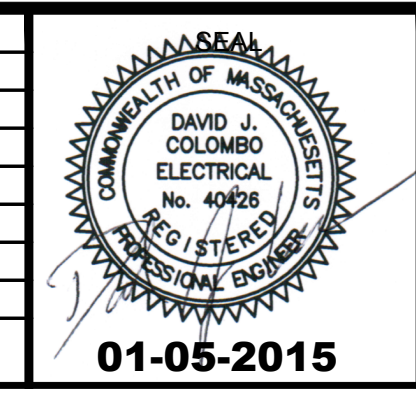
ONE LINE POWER DIAGRAM



No.	DATE	DESCRIPTION
0	1/05/2015	ISSUED FOR REVIEW & INT APPLICATION

No.	DATE	DESCRIPTION

PROJ. MANAGER:
CHIEF DESIGNER:
REVIEWED BY: _____ DATE _____

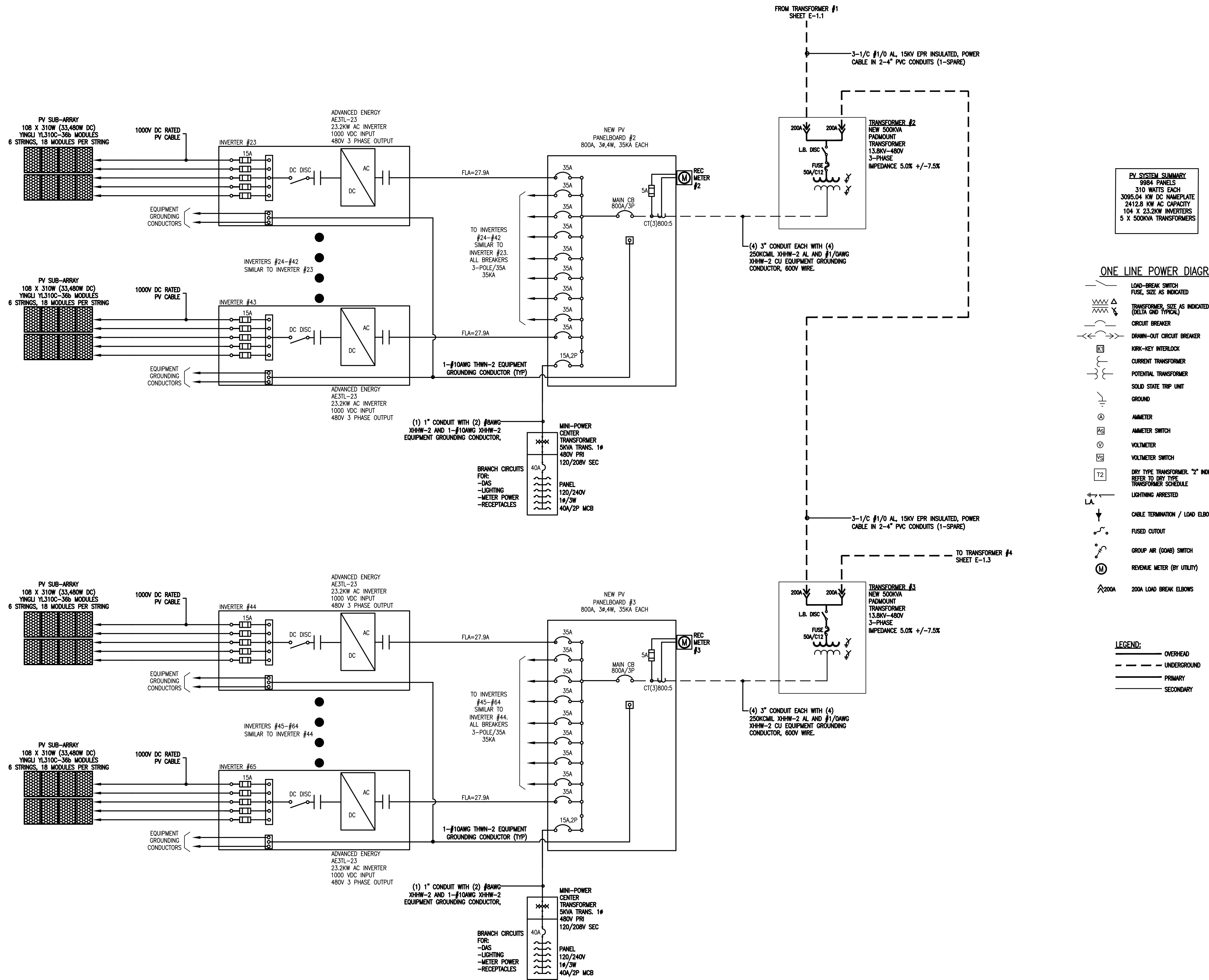


SCALE:
HORIZ.: NONE
VERT.: _____
DATUM: _____
HORIZ.: _____
VERT.: _____
GRAPHIC SCALE

POWER ENGINEERS, LLC
37 Fox Den Road
Kingston, MA 02364-2150
(508) 612-0382
www.PowerEngineersLLC.com
Electrical Engineering, Power, Lighting,
Technical Studies and Utility Consulting

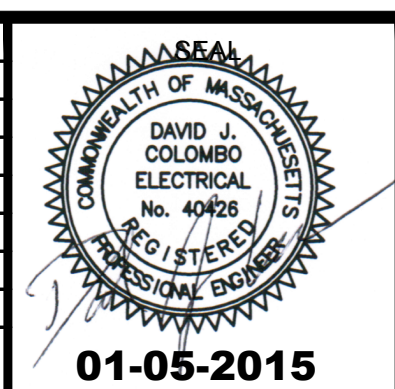
LODESTAR ENERGY
20 BUTTERFIELD DRIVE - PV PROJECT
2500KW AC ONE-LINE DIAGRAM
ASHLAND MASSACHUSETTS

PROJ. No.: 319A
DATE: JAN 2015
E-1.1
SIZE: D REV: 0



No.	DATE	DESCRIPTION	No.	DATE	DESCRIPTION
0	1/05/2015	ISSUED FOR REVIEW & INT APPLICATION			
REVISIONS					

PROJ. MANAGER:	
CHIEF DESIGNER:	
REVIEWED BY:	DATE



SCALE:	
HORIZ.: NONE	
VERT.:	
DATUM:	
HORIZ.:	
VERT.:	
0	
GRAPHIC SCALE	

POWER ENGINEERS, LLC

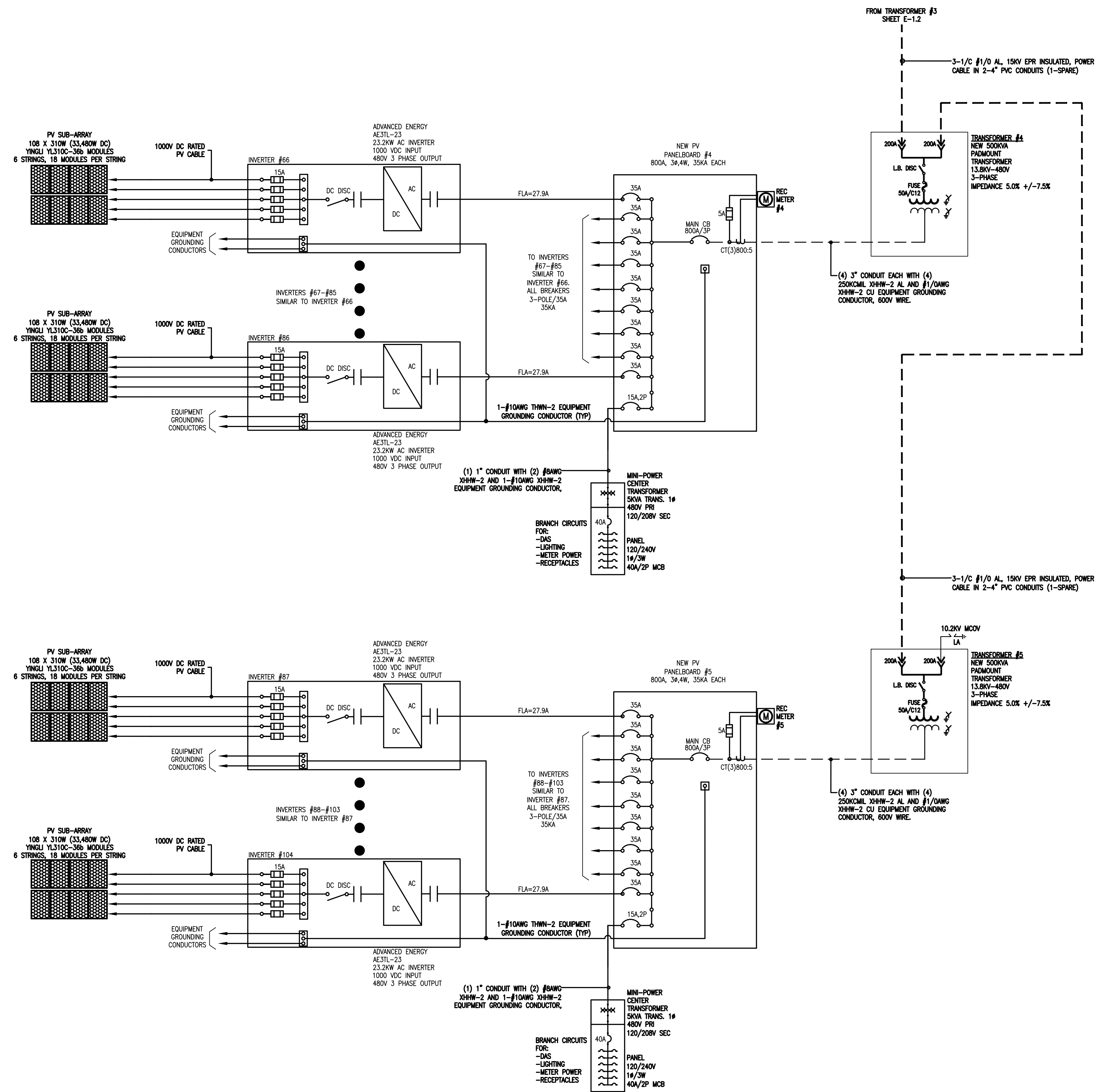
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*Electrical Engineering, Power, Lighting,
 Technical Studies and Utility Consulting*

LODESTAR ENERGY
 20 BUTTERFIELD DRIVE - PV PROJECT
 2500KW AC ONE-LINE DIAGRAM

ASHLAND MASSACHUSETTS

PROJ. No.: 319A
DATE: JAN 2015
E-1.2
SIZE: D REV: 0



PV SYSTEM SUMMARY
 9984 PANELS
 310 WATTS EACH
 3085.04 KW DC NAMEPLATE
 2412.8 KW AC CAPACITY
 104 X 23.2KW INVERTERS
 5 X 500KVA TRANSFORMERS

ONE LINE POWER DIAGRAM

- LOAD-BREAK SWITCH
- FUSE, SIZE AS INDICATED
- TRANSFORMER, SIZE AS INDICATED (DELTA GRID TYPICAL)
- CIRCUIT BREAKER
- DRAWN-OUT CIRCUIT BREAKER
- KIRK-KEY INTERLOCK
- CURRENT TRANSFORMER
- SOLID STATE TRIP UNIT
- GROUND
- AMMETER
- AMMETER SWITCH
- VOLTMETER
- VOLTMETER SWITCH
- DRY TYPE TRANSFORMER, "2" INDICATES SIZE, REFER TO DRY TYPE TRANSFORMER SCHEDULE
- LIGHTNING ARRESTED
- CABLE TERMINATION / LOAD ELBOW
- FUSED OUTLET
- GROUP AIR (COAB) SWITCH
- REVENUE METER (BY UTILITY)
- 200A LOAD BREAK ELBOWS

LEGEND:
 --- OVERHEAD
 - - - UNDERGROUND
 --- PRIMARY
 --- SECONDARY

No.	DATE	DESCRIPTION	No.	DATE	DESCRIPTION
0	1/05/2015	ISSUED FOR REVIEW & INT APPLICATION			
REVISIONS					

PROJ. MANAGER:	
CHIEF DESIGNER:	
REVIEWED BY:	DATE



SCALE:	
HORZ.:	NONE
VERT.:	
DATUM:	
HORZ.:	
VERT.:	
0	
GRAPHIC SCALE	

POWER ENGINEERS, LLC
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LODESTAR ENERGY
 20 BUTTERFIELD DRIVE - PV PROJECT
 2500KW AC ONE-LINE DIAGRAM
 ASHLAND MASSACHUSETTS

PROJ. No.: 319A
DATE: JAN 2015
E-1.3
SIZE: D REV: 0