

1265 WOODEND ROAD  
 STRATFORD CT 06615  
 TEL: (203) 375-5228  
 FAX: (203) 375-3219  
 WWW.ENCONHVAC.COM

REV. DATE:	8.5.2015						
REVISIONS:	REVISION 3						
DC RATING:	39.528KW						
ARRAY PITCH:	30°						
AZIMUTH:	205°						
INVERTER:	MULTIPLE						
NO. OF MODULES:	155						
RACKING SYSTEM:	UniRac SM						
SCALE:	NTS						
DRAWN:	AP						

DRAWING TITLE:  
**One-Line Schematic**

PROJECT:  
**STAFFORDVILLE  
 ELEMENTARY  
 SCHOOL  
 21 LYONS ROAD  
 STAFFORD, CT**

DRAWING NUMBER:  
**PV-100**

PROJECT NUMBER:

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ELECTRICAL CALCULATIONS AND SCHEDULES:

INVERTER DC INPUT CONFIGURATION		
INVERTER 1	MPPT - 1	3
	MPPT - 2	3
INVERTER 2	MPPT - 1	2
INVERTER 3	MPPT - 1	2

DC VOLTAGE DROP			
	STRING HOME RUN WIRE SIZE	LONGEST STRING LENGTH (ft)	STRING VOLTAGE DROP (%)
INVERTER 1	#10 AWG	150	0.37
INVERTER 2	#10 AWG	100	0.27
INVERTER 3	#10 AWG	100	0.27

AC WIRE AND CONDUIT SCHEDULE					
CONDUIT ID	MINIMUM WIRE SIZE	WIRE SIZE AND TYPE	MINIMUM CONDUIT	CONDUCTOR LENGTH	VOLTAGE DROP (%)
Ⓐ	#6 AWG	(8) # 6 CU THHN + #10 GND	1.5"	<50'	0.95%
Ⓑ	#8 AWG	(4) # 8 CU THHN + #10 GND	1.5"	<10'	0.3%
Ⓒ	#1 AWG	(3) # 1/0 CU THHN + #6 GND	1.5"	<60'	0.5%
Ⓓ	#2/0 AWG	(3) # 2/0 CU THHN + #6 GND	1.5"	<60'	0.4%

ARRAY CONFIGURATION

INVERTER NUMBER	MODULE TYPE	# OF MODULES	TILT	AZIMUTH	kW
INVERTER 1	JAP6 60-255/3BB	72	30°	205°	18.36
INVERTER 2	JAP6 60-255/3BB	44	30°	205°	11.22
INVERTER 3	JAP6 60-255/3BB	39	30°	205°	9.945
TOTAL		155			39.525

INVERTER PROPERTIES

INVERTER - SYMO 10.0-3		INVERTER - SYMO 10.0-3 TRIP SETTINGS	
MAX DC VOLTAGE:	600V	VOLTAGE PICKUP (p.u)	CLEARING TIME (S)
MPP VOLTAGE RANGE:	300-500V	V<0.5	0.16
MIN. DC VOLTAGE/START VOLTAGE:	200V	V<0.88	2.0
NOMINAL INPUT CURRENT (MPPT 1/MPPT 2):	25A/16.5A	V>1.1	1.0
# OF MPP TRACKERS/STRINGS PER:	2 / 2	V>= 1.2	0.16
AC NOMINAL POWER:	9,995W	FREQUENCY PICKUP (Hz)	CLEARING TIME (S)
MAX AC APPARENT POWER:	9,995VA	F>60.5	0.16
NOMINAL AC VOLTAGE:	208V, 3-PH	F<57.0	0.16
AC VOLTAGE RANGE:	-12%/+10%	F< (59.8-57.0) ADJUSTABLE	[0.16-300] ADJ
AC GRID FREQUENCY RANGE:	60Hz/59.3-60.5Hz	F<59.3 STANDARD	0.16 STD
MAX OUTPUT CURRENT:	31.5A		
POWER FACTOR:	0-1 IND./CAP.		
HARMONICS:	<1.75%		

INVERTER - PVI14TL		INVERTER - PVI14TL TRIP SETTINGS	
MAX DC VOLTAGE:	600V	VOLTAGE PICKUP (p.u)	CLEARING TIME (S)
MPP VOLTAGE RANGE:	180-580V	V<0.5	0.16
MIN. DC VOLTAGE/START VOLTAGE:	300V	V<0.88	2.0
NOMINAL INPUT CURRENT:	50A	V>1.1	1.0
# OF MPP TRACKERS/STRINGS PER:	2/4	V>= 1.2	0.16
AC NOMINAL POWER:	14,000W	FREQUENCY PICKUP (Hz)	CLEARING TIME (S)
MAX AC APPARENT POWER:	14,000VA	F>60.5	0.16
NOMINAL AC VOLTAGE:	208V, 3-PH	F<57.0	0.16
AC VOLTAGE RANGE:	-12%/+10%	F< (59.8-57.0) ADJUSTABLE	[0.16-300] ADJ
AC GRID FREQUENCY RANGE:	60Hz/59.3-60.5Hz	F<59.3 STANDARD	0.16 STD
MAX OUTPUT CURRENT:	39A		
POWER FACTOR:	>0.99 (+/- 0.8 ADJ)		
HARMONICS:	<3%		

MODULE PROPERTIES AND STRING CALCULATIONS

PV MODULE - JA SOLAR JAP6 60-255/3BB	
MAX POWER (W)	255w
OPEN CIRCUIT VOLTAGE (Voc)	34.68
MAX POWER VOLTAGE (Vmp)	27.71
MAX POWER CURRENT (Imp)	6.68
SHORT CIRCUIT CURRENT (Isc)	7.18

STRING SIZING CALCULATIONS	
# PANELS PER STRING	13
MIN TEMPERATURE (°C)	-19
TEMP. COEFF. OF VOLT (%/°C)	-0.33%
TEMPERATURE CORR FAC.	
=(25°C - MIN TEMP) x TEMP COEFF	14.52%
MAX SYSTEM VOLTAGE (NEC690.7)	
=Voc x TEMP CORR FAC x PANELS/STRING	516.3V
PV SOURCE CIRCUIT CURRENT (NEC690.8(A)(I))	8.98V
=Isc x 1.25	
PV SHORT CIRCUIT CURRENT (NEC690.8(A)(I))	11.22A

STRING SIZING CALCULATIONS	
# PANELS PER STRING	12
MIN TEMPERATURE (°C)	-19
TEMP. COEFF. OF VOLT (%/°C)	-0.33%
TEMPERATURE CORR FAC.	
=(25°C - MIN TEMP) x TEMP COEFF	14.52%
MAX SYSTEM VOLTAGE (NEC690.7)	
=Voc x TEMP CORR FAC x PANELS/STRING	476.59V
PV SOURCE CIRCUIT CURRENT (NEC690.8(A)(I))	8.98V
=Isc x 1.25	
PV SHORT CIRCUIT CURRENT (NEC690.8(A)(I))	11.22A

STRING SIZING CALCULATIONS	
# PANELS PER STRING	11
MIN TEMPERATURE (°C)	-19
TEMP. COEFF. OF VOLT (%/°C)	-0.33%
TEMPERATURE CORR FAC.	
=(25°C - MIN TEMP) x TEMP COEFF	14.52%
MAX SYSTEM VOLTAGE (NEC690.7)	
=Voc x TEMP CORR FAC x PANELS/STRING	436.87V
PV SOURCE CIRCUIT CURRENT (NEC690.8(A)(I))	8.98V
=Isc x 1.25	
PV SHORT CIRCUIT CURRENT (NEC690.8(A)(I))	11.22A

GENERAL NOTES:	KEY NOTES:
<ol style="list-style-type: none"> <li>THE INSTALLATION CONTRACTOR WILL BE REQUIRED TO INSTALL WEATHERPROOF STRAIN RELIEFS FOR ALL WIRES ENTERING OR EXITING THE COMBINER BOX THAT ARE NOT PULLED THROUGH CONDUIT.</li> <li>THE INSTALLATION CONTRACTOR WILL BE RESPONSIBLE FOR MAINTAINING THE INTEGRITY OF THE NEMA RATING OF THE INVERTER AND ENCLOSURES. ALL CONDUIT MUST ENTER THE EQUIPMENT AND BE PROPERLY GASKETED.</li> <li>ELECTRICAL CONTRACTOR SHALL COLOR CODE SOURCE WIRING AS POSITIVE-RED AND NEGATIVE-WHITE. IF THE REQUIRED INSULATION COLOR IS NOT AVAILABLE, TAPING WITH CORRECT COLOR SHALL SUFFICE.</li> <li>PROVIDE COMPRESSION LUGS AT BUS TERMINATIONS.</li> </ol>	<ol style="list-style-type: none"> <li>13 JA SOLAR JAP6 60-255/3BB SOLAR PANELS WIRED IN SERIES. EACH MODULE INCLUDES 1 #10 AWG OUTDOOR RATED QUICK CONNECT FOR MODULE INTERCONNECTION. DO NOT REMOVE QUICK CONNECTS, OTHERWISE THE MODULE WARRANTY AND UL LISTING MAY BE INVALIDATED. QUICK CONNECTS WILL COMPLY WITH NEC 690.33</li> <li>12 JA SOLAR JAP6 60-255/3BB SOLAR PANELS WIRED IN SERIES. EACH MODULE INCLUDES 1 #10 AWG OUTDOOR RATED QUICK CONNECT FOR MODULE INTERCONNECTION. DO NOT REMOVE QUICK CONNECTS, OTHERWISE THE MODULE WARRANTY AND UL LISTING MAY BE INVALIDATED. QUICK CONNECTS WILL COMPLY WITH NEC 690.33</li> <li>11 JA SOLAR JAP6 60-255/3BB SOLAR PANELS WIRED IN SERIES. EACH MODULE INCLUDES 1 #10 AWG OUTDOOR RATED QUICK CONNECT FOR MODULE INTERCONNECTION. DO NOT REMOVE QUICK CONNECTS, OTHERWISE THE MODULE WARRANTY AND UL LISTING MAY BE INVALIDATED. QUICK CONNECTS WILL COMPLY WITH NEC 690.33.</li> <li>SOLECTRIA PVI14TL INVERTER. 120/208 VAC, 3ø, 4W.</li> </ol>

- Ⓐ FRONTIUS SYMO 10.0-3 SOLAR PV INVERTER. 120/208 VAC, 3ø, 4W.
- Ⓑ NEW SQUARE D QO318L200GRB 120/208V, 200A, MLO, NEMA 3R. EACH INVERTER PROTECTED BY OVERCURRENT DEVICE AS INDICATED.
- Ⓒ NEW LOCUS ENERGY REVENUE GRADE PV GENERATION METER.
- Ⓓ NEW CL&P ZREC METER. HOUSED IN FORM 16S, CLASS 200 METER SOCKET. TO BE REVIEWED AND APPROVED BY UTILITY.
- Ⓔ NEW SQUARE D D324NRB, EXTERNAL FUSIBLE, 120/208V, 200A, 3ø, 4W NEMA 3R DISCONNECT MOUNTED ON WEST FACING EXTERIOR WALL, ADJACENT TO UTILITY REVENUE METER. INSTALL 150A FUSES.
- Ⓕ EXISTING 800A MAIN DISTRIBUTION PANEL. CONNECT SOLAR PV SYSTEM VIA 150A BACKFED BREAKER IN MDP.
- Ⓖ EXISTING UTILITY REVENUE METER LOCATED ON WEST FACING EXTERIOR WALL.

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REV. DATE	REVISIONS
8.5.2015	REVISION 3

DC RATING: 39.528kW	INVERTER: MULTIPLE
ARRAY PITCH: 30°	NO. OF MODULES: 155
AZIMUTH: 205°	RACKING SYSTEM: UniRac SM
SCALE: NTS	DRAWN: AP

DRAWING TITLE:  
**ELECTRICAL CALCULATIONS**

PROJECT:  
**STAFFORDVILLE  
 ELEMENTARY  
 SCHOOL  
 21 LYONS ROAD  
 STAFFORD, CT**

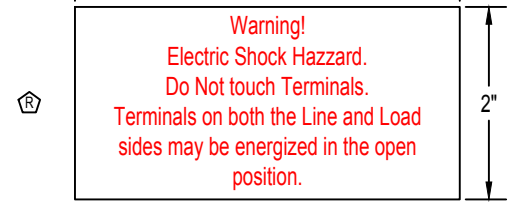
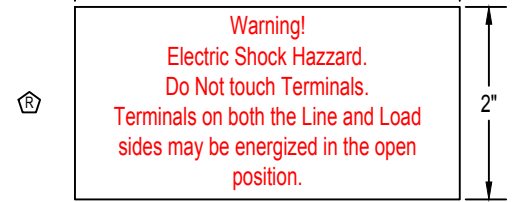
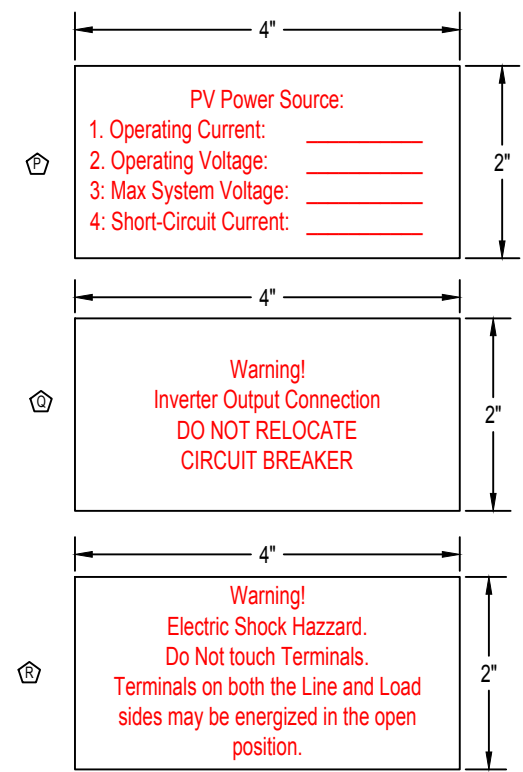
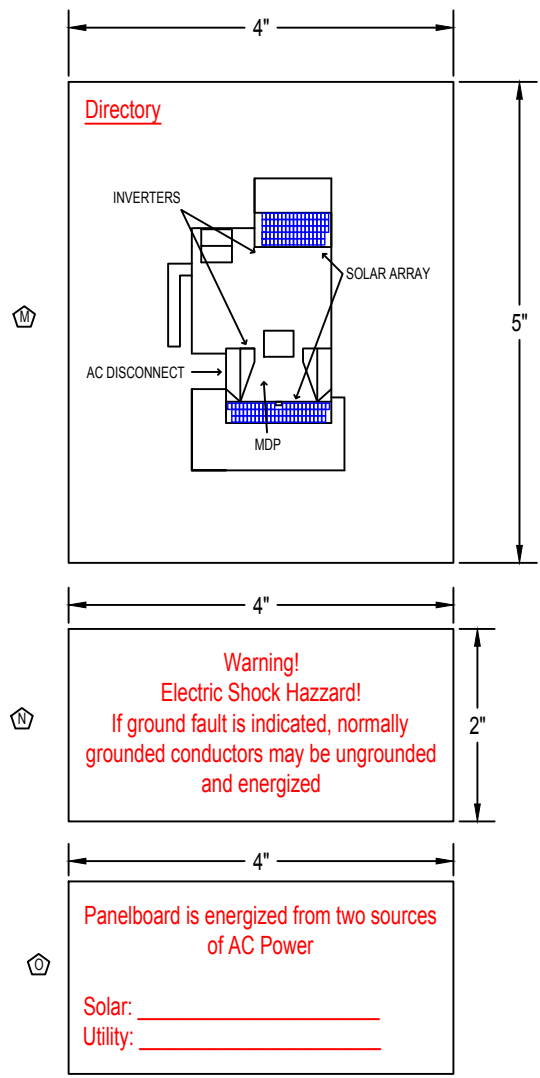
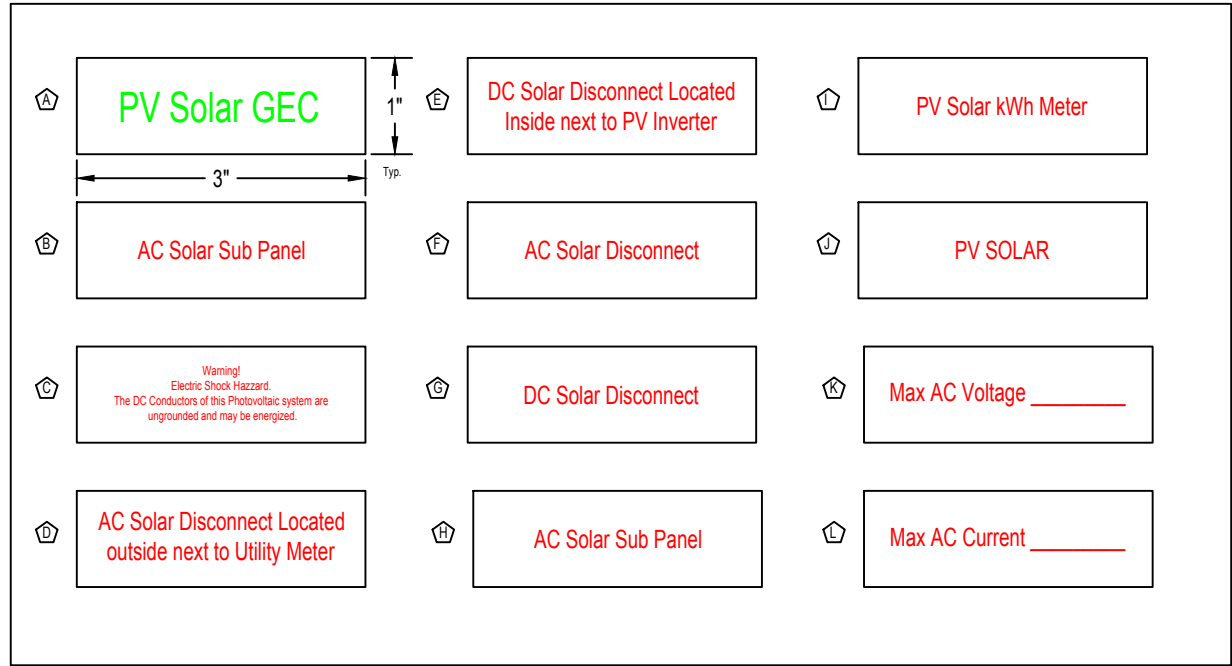
DRAWING NUMBER:  
**PV-100**

PROJECT NUMBER:

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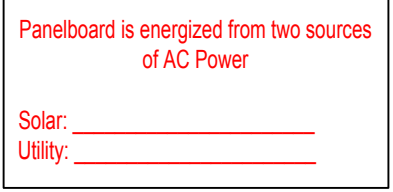
7 6 5 4 3 2 1

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**General Notes**  
 1. LABELS AND MARKINGS SHALL BE APPLIED TO THE APPROPRIATE COMPONENTS IN ACCORDANCE WITH NEC 2011  
 2. SOLAR MODULES ARE SUPPLIED FROM THE MANUFACTURER WITH MARKINGS PRE-APPLIED TO MEET THE REQUIREMENTS OF NEC 2011  
 3. THE INVERTERS ARE SUPPLIED FROM THE MANUFACTURER WITH THE APPROPRIATE LABELS AND MARKINGS  
 4. TEXT LABELS WILL BE ADHESIVE POLYVINYL STICKERS USING WHITE BACKGROUND AND RED LETTERING  
 5. MASTER DIRECTORY, LABEL "L", WILL BE ETCHED WITH RED GRAPHICS ONTO RED PLASTIC PLACARD

A	Grounding Electrode conductor will be identified	Label on Grounding Electrode Conductor	J	PV Solar equipment label	Label on all PV equipment
B	Inverter disconnect breaker label	Label inverter breaker enclosure	K	AC Solar Disconnect - Max Voltage	Label on AC Disconnect
C	Ungrounded System Label	Label on inverter	L	AC Solar Disconnect - Max Current	Label on AC Disconnect
D	AC Solar Disconnect location label	Label on DC Disconnect	M	Master Directory	Label on Utility Meter
E	DC Solar Disconnect location label	Label on AC Disconnect	N	Ground Fault Warning Label - Applied to all inverters	Label on Inverter
F	AC Solar Disconnect Label	Label on AC Solar Disconnect	O	Warning Label for PV Electric Panel and Facilities Main Distribution Panel	Label on Solar and/or Main Distribution Panels
G	DC Solar Disconnect Label	Label on DC Solar Disconnect	P	PV Power Source Label - Located at Inverter	Label on Inverter
H	AC Solar Sub Panel	Label on AC Sub Panel	Q	Back-Fed Breaker warning label - located at Main Distribution Panel	Label at breaker location on MDP cover panel
I	Solar kWh Meter Label	Label on kWh Meter	R	AC Disconnect warning label	Label on AC Disconnect



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REV. DATE:	8.5.2015
REVISIONS:	REVISION 3
DC RATING:	39.528KW
INVERTER:	MULTIPLE
NO. OF MODULES:	155
NO. OF RACKS:	Unirac SM
SCALE:	N/A
DRAWN:	AP

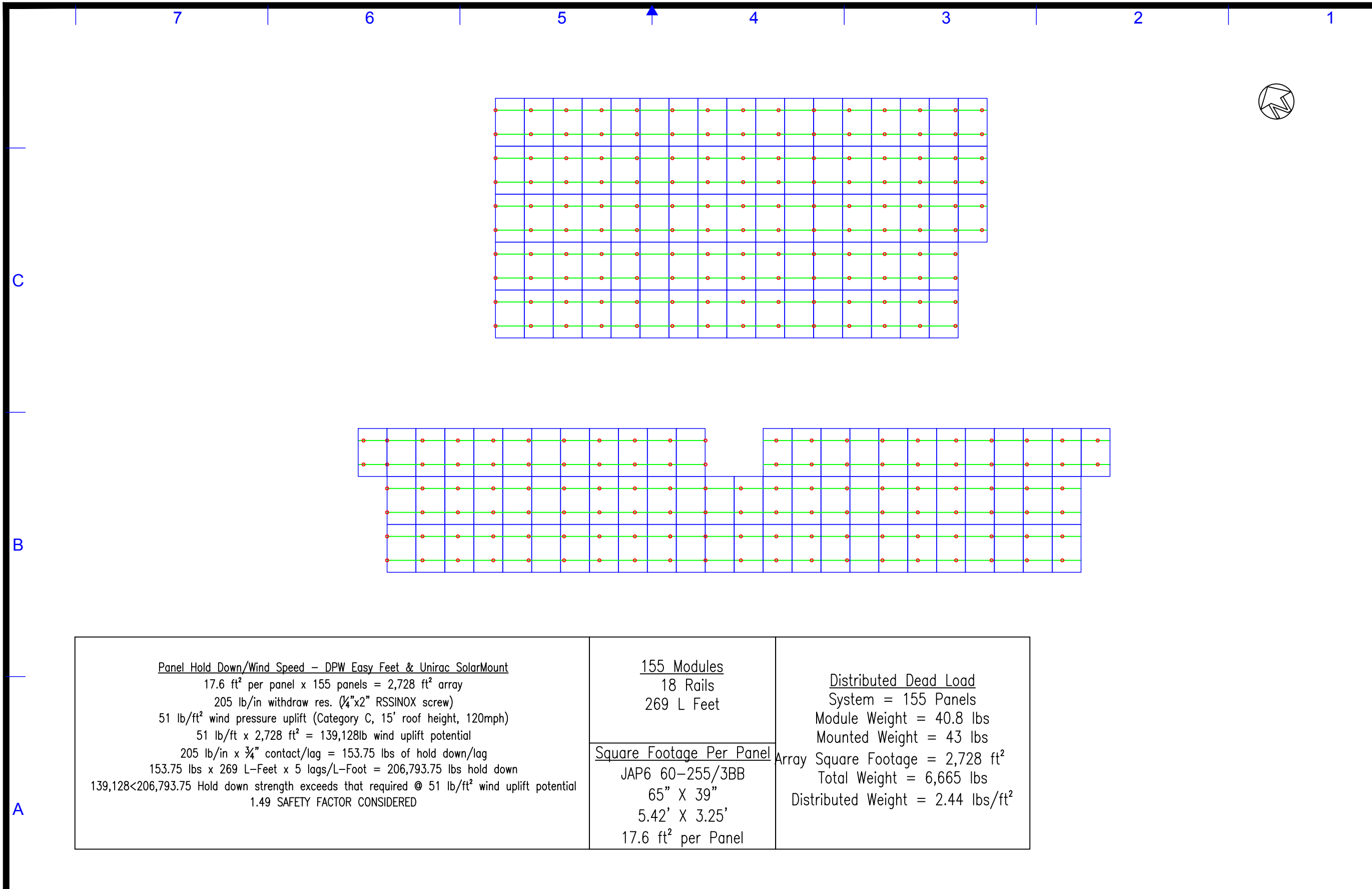
DRAWING TITLE:  
**Label Schedule**

PROJECT:  
**STAFFORDVILLE  
 ELEMENTARY SCHOOL  
 21 LYONS ROAD  
 STAFFORD, CT**

DRAWING NUMBER:  
**PV-101**

PROJECT NUMBER:

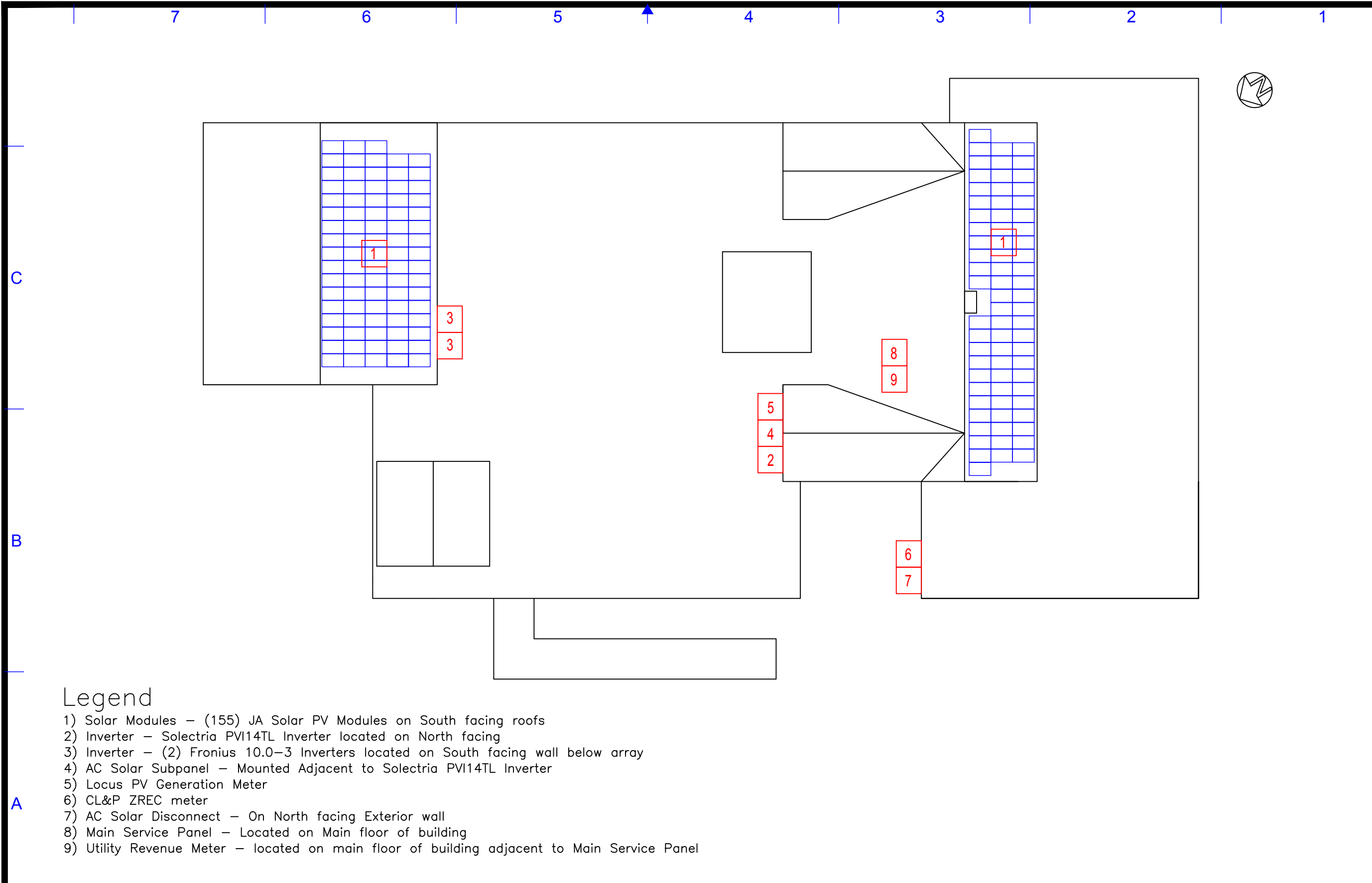
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<p><u>Panel Hold Down/Wind Speed – DPW Easy Feet &amp; Unirac SolarMount</u>  17.6 ft<sup>2</sup> per panel x 155 panels = 2,728 ft<sup>2</sup> array  205 lb/in withdraw res. (1/4"x2" RSSINOX screw)  51 lb/ft<sup>2</sup> wind pressure uplift (Category C, 15' roof height, 120mph)  51 lb/ft x 2,728 ft<sup>2</sup> = 139,128lb wind uplift potential  205 lb/in x 3/4" contact/lag = 153.75 lbs of hold down/lag  153.75 lbs x 269 L-Feet x 5 lags/L-Foot = 206,793.75 lbs hold down  139,128 &lt; 206,793.75 Hold down strength exceeds that required @ 51 lb/ft<sup>2</sup> wind uplift potential  1.49 SAFETY FACTOR CONSIDERED</p>	<p><u>155 Modules</u>  18 Rails  269 L Feet</p>	<p><u>Distributed Dead Load</u>  System = 155 Panels  Module Weight = 40.8 lbs  Mounted Weight = 43 lbs  Array Square Footage = 2,728 ft<sup>2</sup>  Total Weight = 6,665 lbs  Distributed Weight = 2.44 lbs/ft<sup>2</sup></p>
	<p><u>Square Footage Per Panel</u>  JAP6 60-255/3BB  65" X 39"  5.42' X 3.25'  17.6 ft<sup>2</sup> per Panel</p>	

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REV. DATE:	8.5.2015	REVISIONS:	REVISION 3
DC RATING:	39.528KW	ARRAY PITCH:	30°
NO. OF MODULES:	155	AZIMUTH:	205°
INVERTER:	MULTIPLE	NO. OF RAILS:	18
TRACKING SYSTEM:	Unirac SM	SCALE:	3/16" = 1'
DRAWN:	AP	DRAWING TITLE: <b>Array Layout</b>	
DRAWING NUMBER: <b>PV-200</b>		PROJECT: <b>STAFFORDVILLE  ELEMENTARY SCHOOL  21 LYONS ROAD  STAFFORD, CT</b>	
PROJECT NUMBER:		PROJECT:	

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### Legend

- 1) Solar Modules – (155) JA Solar PV Modules on South facing roofs
- 2) Inverter – Solectria PVI14TL Inverter located on North facing
- 3) Inverter – (2) Fronius 10.0–3 Inverters located on South facing wall below array
- 4) AC Solar Subpanel – Mounted Adjacent to Solectria PVI14TL Inverter
- 5) Locus PV Generation Meter
- 6) CL&P ZREC meter
- 7) AC Solar Disconnect – On North facing Exterior wall
- 8) Main Service Panel – Located on Main floor of building
- 9) Utility Revenue Meter – located on main floor of building adjacent to Main Service Panel

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REV. DATE:	8.5.2015	REVISION 3	
DC RATING:	39.525KW	INVERTER:	MULTIPLE
ARRAY PITCH:	30°	NO. OF MODULES:	155
AZIMUTH:	205°	TRACKING SYSTEM:	UniRac SM
SCALE:	1/8" = 1'	DRAWN:	AP
DRAWING TITLE: <b>Site Layout</b>			
PROJECT: <b>STAFFORDVILLE ELEMENTARY SCHOOL 21 LYONS ROAD STAFFORD, CT</b>			
DRAWING NUMBER: <b>PV-300</b>		PROJECT NUMBER:	