PV Building Committee Meeting Agenda
June 1, 2020
6:00PM

This meeting will be held via:
Join Zoom Meeting
https://us04web.zoom.us/j/74167416045?pwd=M2dlQjhwT3FDdDhySjltYU9Pa2cwQT09
Meeting ID: 741 6741 6045
Password: w5m165

1. Establish a quorum
2. Public Comments
3. Approval of Previous Meeting Minutes:
    a. April 24, 2019
    b. January 29, 2020
4. Project Update
    a. DAS Meeting June 2, 2020
    b. Next Steps
5. Other Business
6. Public Comment
7. Adjournment

Solar Construction Committee

Meeting Minutes

Wednesday January 29, 2020

School Administrative Office

5:00-5:53 P.M.

Present:
Building Committee Members: Joe Voccio, Chair; Jules D , Lou Brodeur, Ken Dykstra, Mae Lyons (arrived at 5:19PM)
Others: Allen Sabins, CSW Project Manager, Patti Buell Brooklyn Public Schools

1. Call to Order
   The meeting was called to order at 5:05PM
2. Public Comments
   There were no members in attendance, no comments
3. Approval of Previous Meeting Minutes
   This item was tabled until the next meeting
4. Project Manager Report
   -Allen Sabins from CSW was present and reviewed his presentation. (See attached)
   -Of note, 100 bids were sought, 9 companies completed a walk through and 2 bids were submitted. Bids were received from CTEC Solar and Horton Electrical Services, LLC. Mr. Sabins reviewed thier analysis of the bids.
   -DAS was contacted and confirmed that because we have at least two qualified bidders that we can move forward with the process without discussion with DAS. Once the bid is awarded CSW will contact the successful bidder to begin the process. This is all time sensetive so we want to keep moving forward.
   -Next steps were reviewed by Mr. Voccio and confirmed by Mr. Sabins. This includes awarding the contract(January 2020), execute the contract (February),create plans, receiving local and DAS approval (March), begin construction (spring) and commission project (fall).
5. Discussion and Possible Action on Bid Submissions
   -The project managers recommended that the bid be awarded to Horton Electrical Services, LLC.
   -**Motion was made:** (Lyons/Brodeur) to award the PV contract for the Brooklyn Elementary School, DAS Grant ID 019-0031PV, to Horton Electrical Solutions, LLC.
   Motion passed 5/0
   -**Motion was made:** (Lyons/Brodeur) to award the PV contract for the Brooklyn Middle School, DAS Grant ID 019-0032 PV, to Horton Electrical Solutions, LLC.
   Motion passed 5/0
   -The Committee discussed using the AIA Contract and determined that the contract would be with Horton
6. Other Business
7. Scheduling of Next Meeting

8. Public Comment
9. Adjournment

Sincerely,

Joe Voccio, Committee Chair

PV Building Committee Meeting Notes
April 24, 2019, 7:00 PM

Members: Lou Brodeur, Ken Dykstra, Mae Lyons, Joe Voccio
Guests: Tony Tusia, Patti Buell, CSW Team: Allen Sabins, Chris Palmer, Sam Dziekan

1. Called to order: 7:26 PM
2. Public Comments: None
3. Approval of Previous Meeting Minutes:
   Motion: Approval of March 27, 2019 meeting minutes (Brodeur/Dykstra)
   Vote: Passed unanimously
4. Project Manager Presentation
5. Discussion and Action-Approval of Education Specifications and DAS Application

   There was discussion about CSW presentation given at the BOE meeting and the budget and fees that might be incurred for inspections/permits. CSW will work out the fees for school or town fees. The amount listed is the ceiling and the cost shouldn't go over. There are contingencies that have been included for upgrades as well.

   The budget for the project is attached to the Education Specifications and DAS Application.

   Motion to approve: (Voccio/Broder)
   Vote: Passed unanimously
   1. The Brooklyn Building Committee approves the Educational Specifications for the roof-mounted photovoltaic system project at Brooklyn Middle School.
   2. The Brooklyn Building Committee approves the Educational Specifications for the roof-mounted photovoltaic system project at Brooklyn Elementary School.

6. Other Business: None
7. Public Comment: None
8. Adjournment: (Brodeur/Lyons) 7:45 PM

I, The Brooklyn Board of Education Clerk, certify that these meeting minutes are accurate.

_____ _____
Donna DiBenedetto Date
Board Clerk

BROOKLYN ELEMENTARY SCHOOL

STATE PROJECT NUMBER 019-0031 PV

CONSTRUCTED IN PARTNERSHIP

STATE OF CONNECTICUT
NED LAMONT, GOVERNOR

DEPARTMENT OF ADMINISTRATIVE SERVICES
JOSH GEBALLE, COMMISSIONER

AND THE
BROOKLYN, CT
JOHN BERARD, BUILDING INSPECTOR
DOUGLAS KRAMER, FIRE MARSHALL
SUSAN STARKEY, HEALTH INSPECTOR
RICHARD IVES, ADA 504 COODINATOR

ENGINEER

PUREPOWER ENGINEERING
5 MARINE VIEW PLAZA, SUITE 301
HOBOKEN, NEW JERSEY, 07030

DEVELOPER

Greenskies
a Clean Focus company
180 JOHNSON STREET,
MIDDLETOWN, CT 06457

CONSTRUCTION MANAGER

Horton Electrical Services, LLC
CANTON BUSINESS PARK,
97 RIVER ROAD
CANTON, CT 06457

DRAWING TITLE: COVER SHEET

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

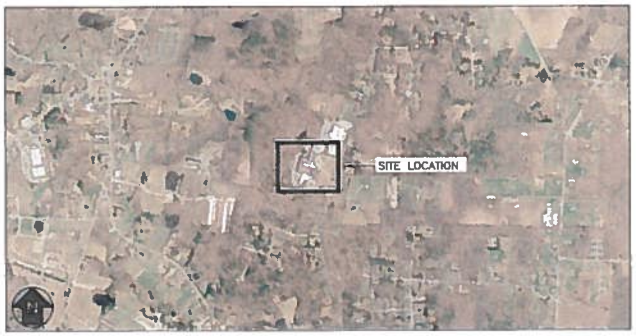
DRAWING #: G00C

332.640 KW SOLAR ROOFTOP SYSTEM AT

BROOKLYN ELEMENTARY SCHOOL

019–0031 PV

119 GORMAN ROAD, BROOKLYN, CT 06234



LOCATION MAP
SCALE: 1" = 1000'–0"

SYSTEM PLAN
SCALE: 1" = 80'–0"

TOTAL SYSTEM SUMMARY:

TOTAL DC SYSTEM SIZE:	332.640 kWDC
AC SYSTEM SIZE:	240.000 kWAC
MODULE MANUFACTURER:	PHONO SOLAR
MODULE MODEL:	PS385MH–24/TH 385W
MODULES PER STRING:	18
MODULE QUANTITY:	864
STRING QUANTITY:	48
MODULE TILT:	10°
MODULE AZIMUTH:	–74°/106°
INVERTER MANUFACTURER:	SOLECTRIA RENEWABLES
INVERTER MODEL:	PVI–60TL
INVERTER QUANTITY:	4

SCOPE OF WORK SUMMARY

ROOFTOP PV ARRAY:
INSTALL SOLAR MODULES AND ROOFTOP RACKING SYSTEM ON TOP OF EXISTING 1 STORY BUILDING. INSTALL INVERTERS AND ELECTRICAL DISTRIBUTION EQUIPMENT AND INTERCONNECT AT EXISTING MAIN ELECTRICAL DISTRIBUTION EQUIPMENT.

SIGNATURES

JOHN BERARD, BUILDING INSPECTOR
860–779–3411 X15

DOUGLAS KRAMER, FIRE MARSHALL
860–779–3411 X32

SUSAN STARKEY, HEALTH INSPECTOR
860–774–7350

RICHARD IVES, ADA 504 COORDINATOR
860–779–3411 X11

DEVELOPER:

Greenskies
a Clean Focus company
180 JOHNSON STREET,
MIDDLETOWN, CT 06457

Horton Electrical Services, LLC
Electrical Contractors
CANTON BUSINESS PARK,
97 RIVER ROAD
CANTON, CT 06457

ENGINEERED BY:

PUREPOWER ENGINEERING
5 MARINE VIEW PLAZA, SUITE 301
HOBOKEN, NEW JERSEY, 07030

DRAWING INDEX

		CONCEPTUAL DESIGN 03/13/2020	PERMIT SET 03/24/2020	PERMIT SET (REV 1) 04/24/2020		
GENERAL						
G000	COVER SHEET		●	○		
G001	TITLE SHEET	●	●	●		
G100	SITE PLAN	●	●	●		
G200	ARRAY PLAN		●	●		
G300	FIRE ACCESS PLAN		●	●		
ELECTRICAL						
E001	ELECTRICAL NOTES & SYMBOL LIST		●	○		
E100	AC ELECTRICAL PLAN		●	●		
E110	ELECTRICAL & INVERTER ELEVATIONS		●	●		
E200	DC ELECTRICAL PLAN		●	○		
E300	ONE LINE DIAGRAM	●	●	●		
E310	SCHEDULES & CALCULATIONS		●	○		
E401	GROUNDING DETAILS		●	○		
E402	ELECTRICAL DETAILS		●	●		
E403	ELECTRICAL DETAILS		●	●		
E500	LABELS & SIGNAGE		●	●		
E600	EQUIPMENT DATA SHEETS		●	○		
E700	MONITORING SYSTEM		●	●		

LEGEND:

UPDATED DRAWING ISSUED	
UNCHANGED, PREVIOUSLY ISSUED DRAWING STILL CURRENT	●
DRAWING REMOVED FROM SET	⊗

DATE	REVISION DESCRIPTION	PM	ENG	CHK
04/24/2020	PERMIT SET (REV 1)	DX	SK	RI
03/24/2020	PERMIT SET	DX	PB	RI

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RICHARD A. IVES

GREENSKIES
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WWW.GREENSKIES.COM

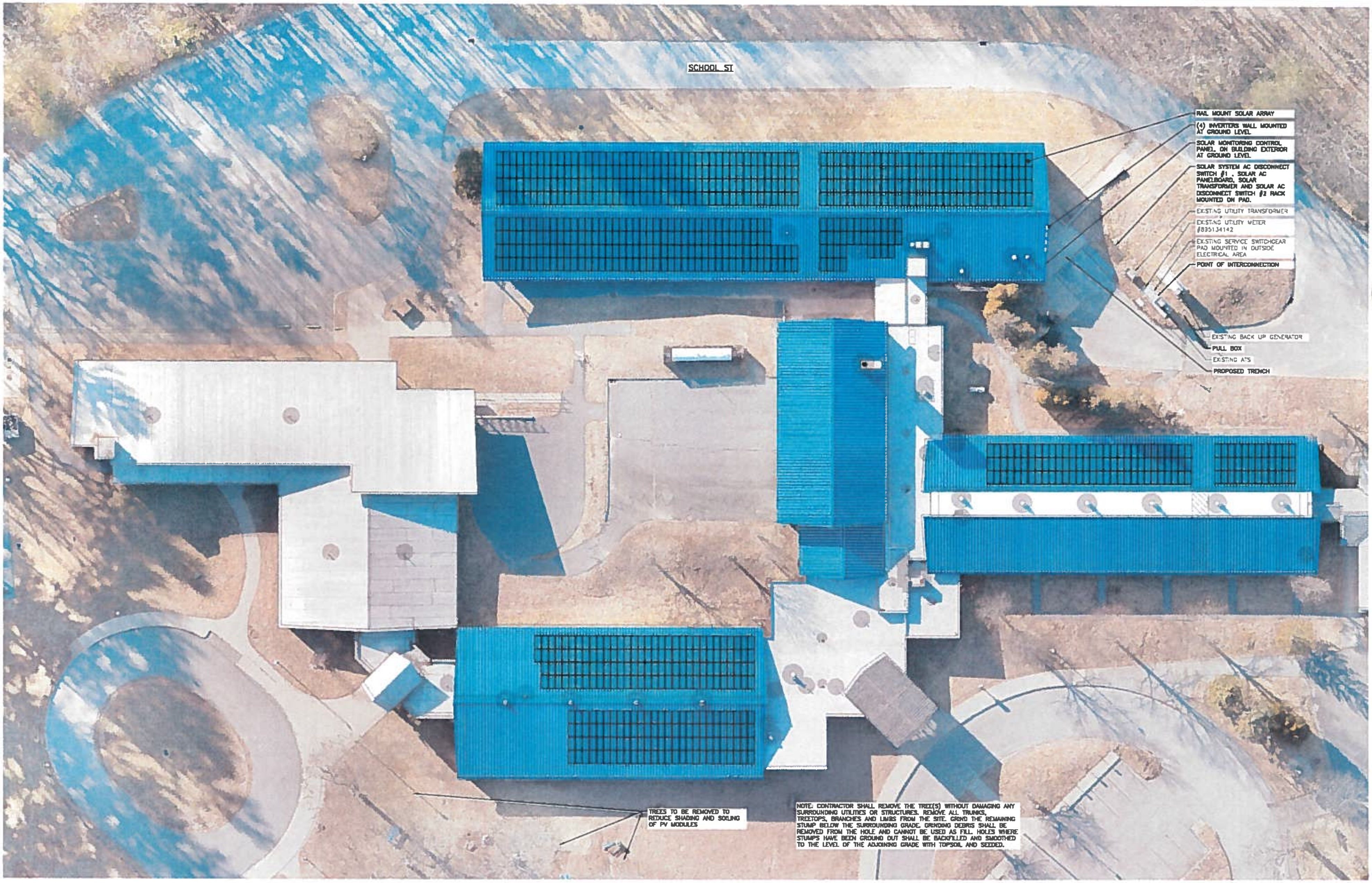
PAGE SIZE: 36" x 24"
PROJECT #

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385M–24/TH
MODULE QUANTITY: 864
ORIENTATION: 10° TILT –74°/106°

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN ELEMENTARY SCHOOL 119 GORMAN ROAD

DRAWING TITLE: TITLE SHEET

DRAWING #: G001



1 G100 SITE PLAN
SCALE: 1" = 20'-0"

DATE	REVISION DESCRIPTION	PM	CHD	CHK
04/24/2020	PERMIT SET (REV 1)	EH	SK	RI
03/24/2020	PERMIT SET	EH	PB	RI

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MIDDLETOWN, CT 06457
WWW.GREENSKIES.COM

PAGE SIZE: 36" x 24"
PROJECT #

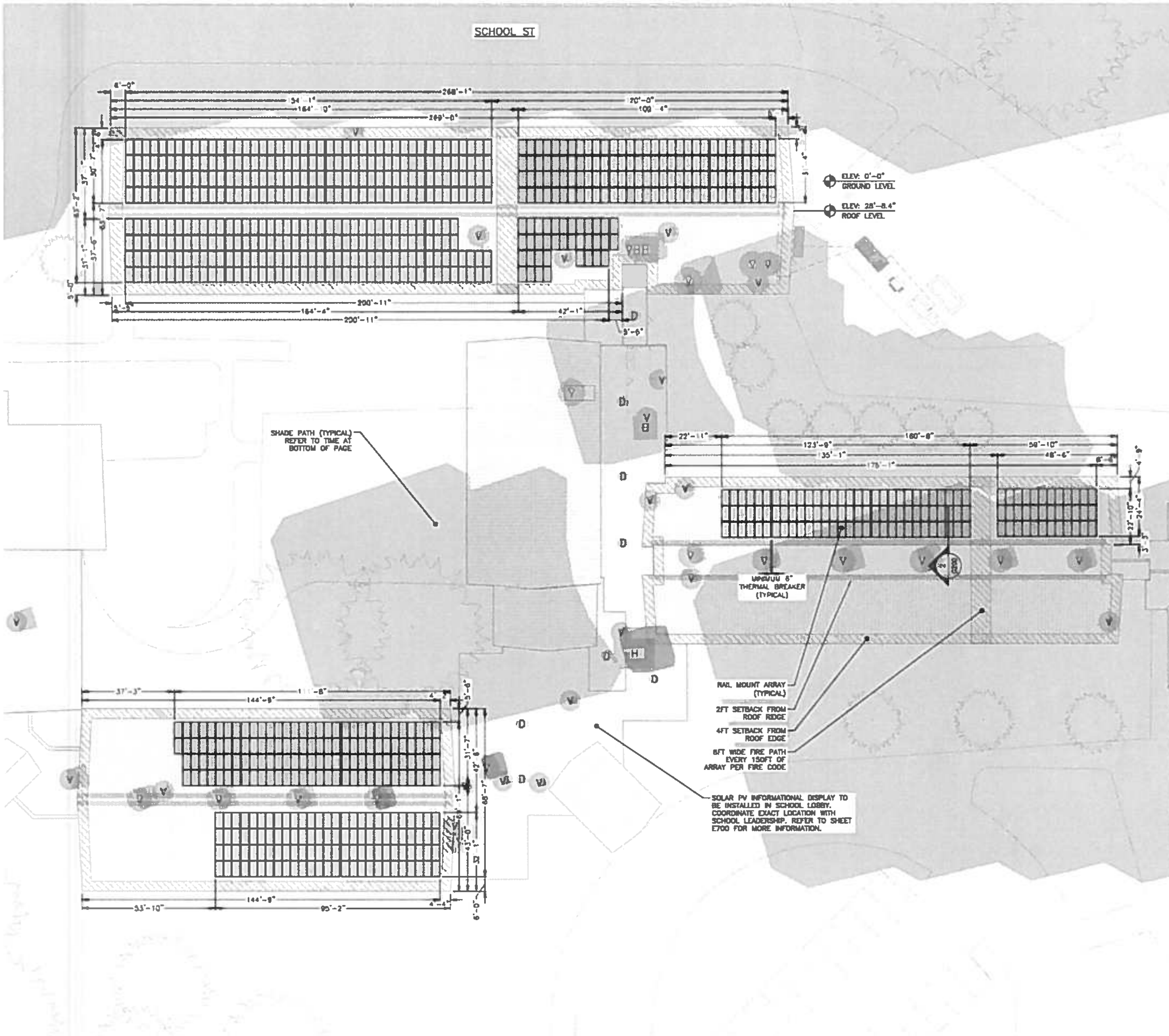
DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385M-24/TH
MODULE QUANTITY: 884
ORIENTATION:

PROJECT 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

DRAWING TITLE: SITE PLAN

DRAWING: G100

RULER IN INCHES



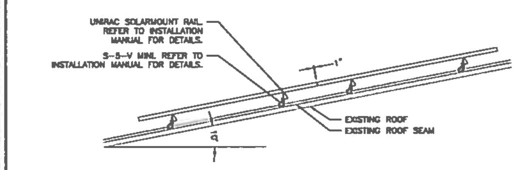
IMPORTANT:
DO NOT STEP OR KNEEL ON PV MODULES

1 G200 ARRAY PLAN – ROOF
SCALE: 1" = 80'-0"

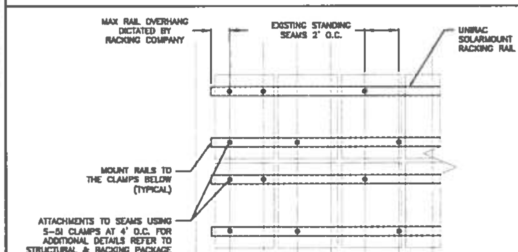
NOTE: DIMENSIONS ARE APPROXIMATE AND SHOWN TO RACKING RAILS.

SHADING ZONES:
WINTER: 10:00–2:00
SPRING: 9:00–3:00
SUMMER: 8:00–4:00

LEGEND (EXISTING ITEMS):
A ACCESS HATCH
D DRAIN
E EXPANSION JOINT
F FAN
G GAS PIPE
H HVAC
L SKYLIGHT
S SATELLITE DISH
V VENT



2 G200 RACKING DETAIL – STANDING SEAM
SCALE: NONE



3 G200 STANDING SEAM ATTACHMENT DETAIL
SCALE: NONE

DRAWING TITLE: OVERALL ARRAY PLAN

DRAWING #: G200

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385M-24/TH
MODULE QUANTITY: 864

PAGE SIZE: 36" x 24"

Greenskies

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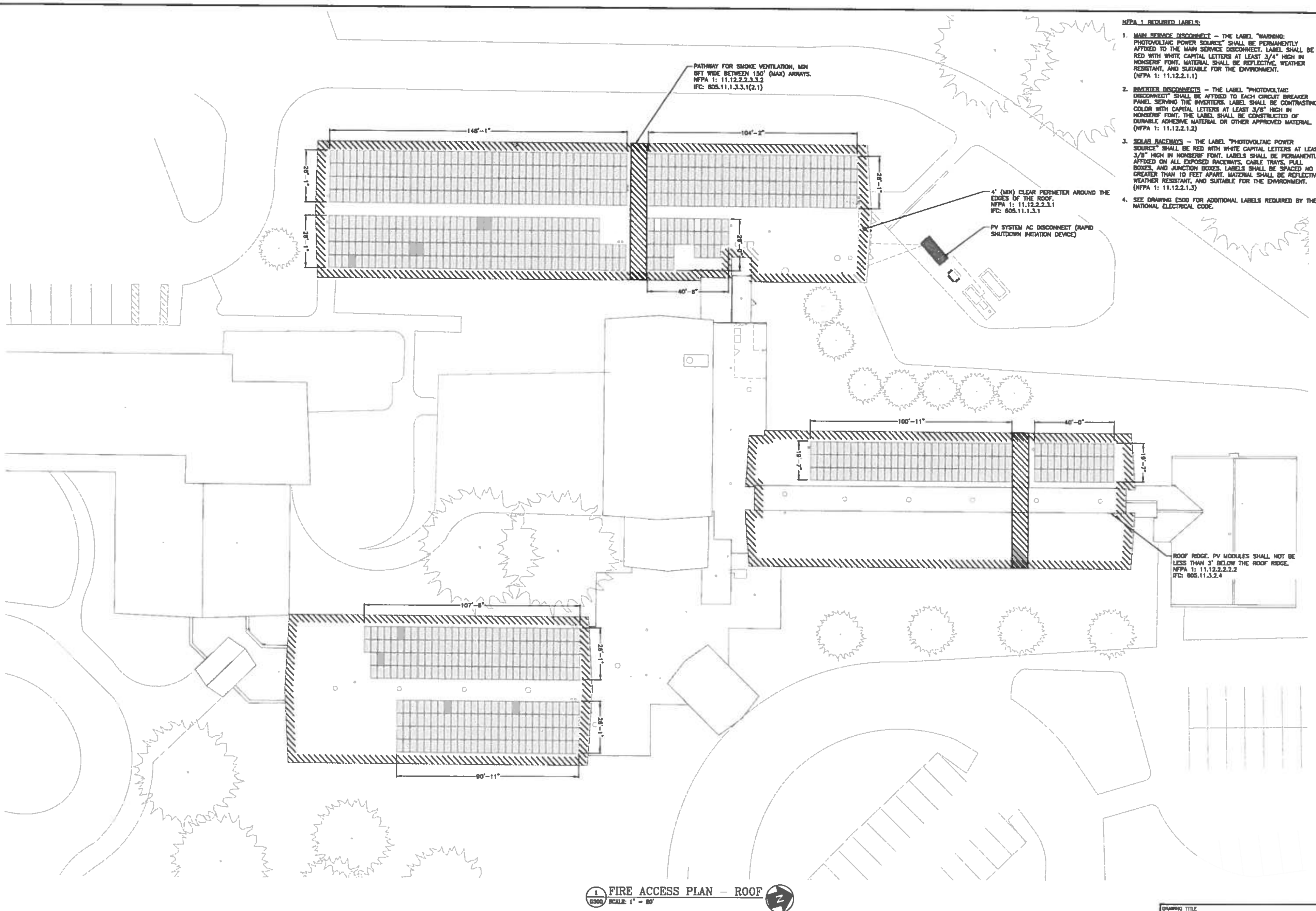
RICHARD A. MAYS

DATE	REVISION DESCRIPTION	PM	ENG	CHK
04/24/2020	PERMIT SET (REV 1)	BX	SK	RI

RULER IN INCHES:



1 FIRE ACCESS PLAN – ROOF
G300 SCALE: 1" = 80'

NFPA 1 REQUIRED LABELS:

1. MAIN SERVICE DISCONNECT – THE LABEL "WARNING: PHOTOVOLTAIC POWER SOURCE" SHALL BE PERMANENTLY AFFIXED TO THE MAIN SERVICE DISCONNECT. LABEL SHALL BE RED WITH WHITE CAPITAL LETTERS AT LEAST 3/4" HIGH IN NONSERIF FONT. MATERIAL SHALL BE REFLECTIVE, WEATHER RESISTANT, AND SUITABLE FOR THE ENVIRONMENT. (NFPA 1: 11.12.2.1.1)
2. INVERTER DISCONNECTS – THE LABEL "PHOTOVOLTAIC DISCONNECT" SHALL BE AFFIXED TO EACH CIRCUIT BREAKER PANEL SERVING THE INVERTERS. LABEL SHALL BE CONTRASTING COLOR WITH CAPITAL LETTERS AT LEAST 3/8" HIGH IN NONSERIF FONT. THE LABEL SHALL BE CONSTRUCTED OF DURABLE ADHESIVE MATERIAL OR OTHER APPROVED MATERIAL. (NFPA 1: 11.12.2.1.2)
3. SOLAR RACEWAYS – THE LABEL "PHOTOVOLTAIC POWER SOURCE" SHALL BE RED WITH WHITE CAPITAL LETTERS AT LEAST 3/8" HIGH IN NONSERIF FONT. LABELS SHALL BE PERMANENTLY AFFIXED ON ALL EXPOSED RACEWAYS, CABLE TRAYS, PULL BOXES, AND JUNCTION BOXES. LABELS SHALL BE SPACED NO GREATER THAN 10 FEET APART. MATERIAL SHALL BE REFLECTIVE, WEATHER RESISTANT, AND SUITABLE FOR THE ENVIRONMENT. (NFPA 1: 11.12.2.1.3)
4. SEE DRAWING E500 FOR ADDITIONAL LABELS REQUIRED BY THE NATIONAL ELECTRICAL CODE.

DATE	REVISION DESCRIPTION	PM	DWG	CHK
04/24/2020	PERMIT SET (REV 1)	BB	SK	RI

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MIDDLETOWN, CT 06457
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PAGE SIZE: 36" x 24"
PROJECT #

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385M-24/TH
MODULE QUANTITY: 864

PROJECT 332.640 KW SOLAR ROOFTOP SYSTEM AT
BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

DRAWING TITLE: FIRE ACCESS PLAN
DRAWING #: G300

SOLAR PV GENERAL NOTES

1. INSTALL A COMPLETE AND OPERATIONAL SOLAR PHOTOVOLTAIC SYSTEM INCLUDING THE RECONNECTION OF ANY EXISTING ELECTRICAL EQUIPMENT DISTURBED DURING SOLAR PHOTOVOLTAIC ARRAY INSTALLATION.
2. THESE DRAWINGS ARE DIAGRAMMATIC AND SHOW THE GENERAL LOCATION AND ARRANGEMENT OF THE SOLAR PV SYSTEM. THEY DO NOT SHOW ALL MATERIALS NEEDED. CONTRACTOR IS REQUIRED TO PROVIDE ANY AND ALL CONDUITS, CONNECTORS, SWEEPS, SUPPORTS, BENDS, FITTINGS, HANGERS, COVER PLATES, AND ADDITIONAL PULL AND JUNCTION BOXES WHICH THE CONTRACTOR MUST PROVIDE TO COMPLETE THE SOLAR PV SYSTEM IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC).
3. THE DEFINITION OF ELECTRICAL TERMS USED SHALL BE AS DEFINED STATES' ADOPTED EDITION OF THE NEC.
4. THE TERM "SIZE" SHALL MEAN ONE OR MORE OF THE FOLLOWING: "LENGTH, CURRENT AND VOLTAGE RATING, NUMBER OF POLES, NEMA SIZE, AND OTHER SIMILAR ELECTRICAL CHARACTERISTICS".
5. CONTRACTOR IS REQUIRED TO SURVEY AND INSPECT ALL AREAS PRIOR TO PERFORMING SERVICES TO ENSURE CLEARANCES CAN BE MET AND NO INTERFERENCES EXIST. NO CUTTING OR DRILLING IS TO BE PERFORMED PRIOR TO LOCATING EXISTING STRUCTURAL MEMBERS AND UTILITIES.
6. SERVICE ENTRANCE RATED EQUIPMENT, C/T CABINETS, AND METER SOCKETS ARE TO BE APPROVED FOR USE BY THE LOCAL UTILITY COMPANY.
7. ELECTRICAL EQUIPMENT INSTALLED MUST BE LABELED, UL LISTED, AND INSTALLED ACCORDINGLY.
8. REQUIRED PERMITS AND INSPECTIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR AND MUST BE COORDINATED WITH THE AUTHORITY HAVING JURISDICTION (AHJ).
9. ALL WORK IS TO BE PERFORMED BY LICENSED WORKMEN AND COMPLETED IN ACCORDANCE WITH THE STATES' ADOPTED NEC.
10. ALL PENETRATIONS THROUGH FIRE AND SMOKE RATED PARTITIONS MUST BE SEALED WITH A FIRE RATED MATERIAL EQUIVALENT IN RATING TO THE PARTITION PENETRATED.
11. THE SOLAR PV SYSTEM EQUIPMENT ON THE DC SIDE IS RATED FOR 1000V AND IS IN COMPLIANCE WITH NEC 690.60. THE INVERTERS, MODULES, STRING FEEDERS, AND RELATED COMPONENTS ARE ALL RATED AND LABELED AS 1000V.
12. EMT CONDUIT IS ALLOWED IN EXTERIOR LOCATIONS WHEN RAIN-TIGHT CONNECTORS AND FITTINGS ARE USED, AND THE CONDUIT IS NOT EXPOSED TO ANY POTENTIAL PHYSICAL DAMAGE. ALL SUPPORTS, BOLTS, STRAPS, AND SCREWS SHALL BE CORROSION RESISTANT.
13. ALL RACEWAYS ARE TO BE METALLIC UNLESS OTHERWISE NOTED. APPLY AN ADHESIVE LABEL ALONG ALL RACEWAYS CARRYING PV SYSTEM FEEDERS (AC AND DC) AS "WARNING: PHOTOVOLTAIC POWER SOURCE". REFER TO DETAIL 15 ON E500. LABEL SHALL BE APPLIED EVERY 10', AT EVERY TURN, AND ABOVE AND BELOW ALL PENETRATIONS.
14. ALL CONDUCTORS SHALL BE LISTED FOR USE IN APPROPRIATE RACEWAY.
15. ALL BREAKERS INSTALLED AS PART OF THE NEW SOLAR PV SYSTEM MUST BE RATED FOR REVERSE FEED.
16. COMMUNICATIONS CABLES INSTALLED BETWEEN MONITORING EQUIPMENT AND CLIENT NETWORK EQUIPMENT (SWITCHES, ROUTERS, SERVERS, ETC.) SHALL HAVE A GREEN OUTER JACKET. CABLES SHALL HAVE CABLE TAGS INSTALLED AT BOTH ENDS OF CABLE TO SHOW PROPER IDENTIFICATION.
17. CONTRACTOR SHALL TORQUE TEST ALL FIELD TERMINATED WIRES PER MANUFACTURER'S SPECS AND PROVIDE PERMANENT MARKINGS ACROSS THE BOLT AND WASHER INDICATING ACHIEVED TORQUE.
18. BARE COPPER GROUND CONDUCTORS SHALL BE SIZED PER NEC. EQUIPMENT GROUNDING CONDUCTORS (EGC) SHALL BE INSTALLED IN CONDUIT.
19. POLARIS SPLICES SHALL NOT BE USED ON THIS PROJECT IN ANY CAPACITY. ANY SPLICES SHALL BE APPROVED BY GREENSKIES AND THE ENGINEER OF RECORD.
20. CONTRACTOR SHALL SUBMIT A FORMAL RFI (REQUEST FOR INFORMATION) FOR ANY CONFUSION OR DISCREPANCY ON THE DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR ANY INSTALLATION DEVIATIONS WITHOUT APPROVAL FROM GREENSKIES OR THE ENGINEER OF RECORD.
21. MOGUL LB CONDUIT BODIES SHALL NOT BE USED ON THIS PROJECT.
22. TEMPERATURE RATINGS OF ALL CONDUCTORS, TERMINATIONS, BREAKERS, OR OTHER DEVICES ASSOCIATED WITH THE SOLAR PV SYSTEM SHALL BE RATED FOR AT LEAST 75 DEGREE C.
23. ALL METALLIC CONDUITS SHALL HAVE BOND BUSHINGS ON BOTH ENDS AND EQUIPMENT GROUNDING CONDUCTORS (EDC) ROUTED THROUGH CONDUIT.
24. CONTRACTOR SHALL PROVIDE A SPARE SET OF FUSES FOR THE SOLAR AC DISCONNECT SWITCH.

PV ARRAY WORK NOTES

1. WORK INCLUDES INSTALLING PROPOSED SOLAR PANEL ARRAY ON TOP OF EXISTING ROOFING SYSTEM PER THE MANUFACTURERS INSTALLATION PROCEDURES AND INSTRUCTIONS, ALONG WITH ASSOCIATED ELECTRICAL WIRING.
2. WORK AREAS SHALL BE MARKED, FENCED, AND OTHERWISE SECURED SO AS TO PROVIDE PROPER PROTECTION FOR THE PUBLIC AND AS REQUIRED BY THE BUILDING INSPECTOR.
3. DIMENSION OF EXISTING ELEMENTS SHOWN WERE DETERMINED THROUGH A COMBINATION OF EXISTING DRAWINGS AND FIELD INVESTIGATIONS, AND SHOULD BE USED FOR INFORMATIONAL PURPOSES ONLY. ALL EXISTING CONDITIONS AND DIMENSIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR.
4. EXISTING ROOF FRAMING HAS BEEN VERIFIED BY STRUCTURAL ANALYSIS TO SUPPORT THE SUPERIMPOSED DEAD LOAD DUE TO THE SOLAR PANEL INSTALLATION.
5. ARRAY LAYOUT IS BASED ON A COMBINATION OF SHADING, STRINGING, AND WIND ZONE PLACEMENT ON THE ROOF. THE CONTRACTOR SHALL NOT DEVIATE FROM THE LAYOUT SHOWN WITHOUT APPROVAL FROM THE ENGINEER.
6. ELECTRICAL RUNS SHOWN ON PLAN REPRESENT THE PROPOSED LAYOUT. THE CONTRACTOR SHALL NOT RELOCATE INVERTERS OR PANELBOARDS WITHOUT APPROVAL FROM THE ENGINEER.
7. THE INSTALLER SHALL VERIFY THE PROJECT SOUTH DIRECTION IN THE FIELD, AND INSTALL THE MODULES AS INDICATED ON THE PLANS. THE MODULES SHALL BE INSTALLED AS TILTED TOWARDS THE GENERAL DIRECTION OF PROJECT SOUTH.
8. THE CONTRACTOR IS RESPONSIBLE FOR THE VERIFICATION AND INSTALLATION OF PADS OR SLIP SHEETS UNDERNEATH ANY EQUIPMENT SUPPORTS NOT ADHERED TO THE ROOF. SLIP SHEETS FOR DURABLOCK, AND RACKING ARE PROVIDED BY GREENSKIES.
9. MAINTAIN A CLEARANCE BETWEEN INVERTERS AND ROOFTOP EQUIPMENT OF AT LEAST 5'-0".
10. THE FRONT OF THE INVERTER SHALL NOT FACE PROJECT SOUTH. ORIENT THE INVERTER SUCH THAT IT IS FACING NORTH WHEN POSSIBLE. IF SPACE IS A LIMITING FACTOR THEN THE INVERTER SHALL BE ALLOWED TO FACE PROJECT EAST OR WEST.
11. NO CONDUCTOR OR CONNECTOR SHALL BE EXPOSED TO THE ELEMENTS OUTSIDE OF THE BOUNDARIES OF EACH SUB-ARRAY.
12. CONDUIT BETWEEN SUB-ARRAYS SHALL ENTER UNDERNEATH RACKING OR PENETRATE WINDSCREENS, WHERE APPLICABLE, IN ORDER TO PROTECT CONDUCTORS.
13. CONDUIT BETWEEN SUB-ARRAYS SHALL BE SECURED TO THE RACKING SYSTEM VIA CONDUIT CLAMPS.
14. CONTRACTOR SHALL ENSURE DC, AC, AND COMMUNICATION WIRING IS SECURED UNDERNEATH THE ARRAY AND OFF THE ROOFTOP MEMBRANE.
15. CONTRACTOR SHALL UTILIZE PVC OR NON-FLAMMABLE COATED STAINLESS STEEL CABLE TIES FOR WIRE MANAGEMENT. STANDARD NYLON/PLASTIC CABLE TIES ARE NOT ACCEPTABLE.

INVERTER INFORMATION

MANUFACTURER				SOLECTRIA
MODEL				PVI-60TL
ARC FAULT CIRCUIT INTERRUPTOR				INTEGRAL
DC RATING				
V-MAX				1000V
I-MAX OPERATING				114A
AC RATING				
P-OUT				60.0kW
V-NOM				480V, 3Ø
I-OUT				79.4A
CONFIGURATION				WYE + N
DESIGN CRITERIA				
STRINGS PER INVERTER				12
MODULES PER STRING				18
MODULE WATTS				385
MODULE QUANTITY				216
INVERTER/COMBINER BOX WATTS (WDC)				83160
INVERTER/COMBINER BOX CURRENT (ADC)				151.2
INVERTER STRING FUSE SIZE (ADC)				20A
TRIP SETTINGS				
PROTECTIVE DEVICE		TRIP SETTING	VALUE	M
UNDER VOLTAGE - FAST	27-1	50%	240 V	0.16 SEC
UNDER VOLTAGE - SLOW	27-2	88%	422.4 V	2.0 SEC
OVER VOLTAGE - SLOW	59-1	110%	528 V	1.00 SEC
OVER VOLTAGE - FAST	59-2	120%	576 V	0.16 SEC
UNDER-FREQUENCY	81-U	57.0 Hz	57.0 Hz	0.16 SEC
OVER-FREQUENCY	81-O	60.5 Hz	60.5 Hz	0.16 SEC

LEGEND – GENERAL

- LIGHT LINE INDICATES EXISTING OR BEYOND THE SCOPE OF PROJECT
- DARK LINE INDICATES NEW OR WITHIN THE SCOPE OF PROJECT
- DASHED LINE INDICATES EQUIPMENT AT A DIFFERENT ELEVATION
- EXISTING TEXT — LIGHT TEXT INDICATES EXISTING OR BEYOND THE SCOPE OF PROJECT
- NEW TEXT — DARK TEXT INDICATES NEW OR WITHIN THE SCOPE OF PROJECT

LEGEND – PLAN SYMBOLS

- SOLAR MODULE
- RACEWAY TURNING UP OR TOWARDS OBSERVER
- RACEWAY TURNING DOWN OR AWAY FROM OBSERVER
- CABLE TRAY
- P OR P — PULLBOX
- J OR J — JUNCTION BOX
- PANEL BOARD
- LOCAL DISCONNECT SWITCH
- SIMPLEX RECEPTACLE, RATED: 125-VOLTS AC, 20A
- DUPLEX RECEPTACLE, RATED: 125-VOLTS AC, 20A
- W — WEATHERPROOF DUPLEX RECEPTACLE, RATED: 125-VOLTS AC, 20A
- GFCI — GROUND FAULT CIRCUIT INTERRUPTER DUPLEX RECEPTACLE, RATED: 125-VOLTS AC, 20A
- DOUBLE DUPLEX (QUAD) RECEPTACLE
- CEILING/PENDANT-MOUNT LIGHT, SEE FIXTURE SCHEDULE FOR TYPE
- WALL-MOUNT LIGHT, SEE FIXTURE SCHEDULE FOR TYPE
- GROUND ROD
- GROUND ROD W/ TEST WELL

LEGEND – ONE LINE DIAGRAM AND WIRING DIAGRAM SYMBOLS

- CIRCUIT BREAKER, FRAME SIZE AND TRIP SETTING AS NOTED
- DISCONNECT SWITCH
- INVERTER
- BUS CONNECTION POINT
- CROSSING POINT (NO CONNECTION)
- NORMALLY CLOSED – NORMALLY OPEN CONTACTS
- TRANSFORMER CONTROL/POWER, SIZE AND RATING AS NOTED
- CURRENT TRANSFORMER
- POTENTIAL TRANSFORMER
- FUSE, SIZE/RATING AS NOTED
- FUSED DISCONNECT SWITCH
- EARTH GROUND
- NO NC — PUSHBUTTON SWITCHES; NUMBER AND TYPE OF CONTACT BLOCKS MAY VARY
- NO NC — PUSHBUTTON SWITCHES MUSHROOM HEAD; NUMBER AND TYPE OF CONTACT BLOCKS MAY VARY
- K — KEYED INTERLOCK (KIRK KEY OR EQ.)
- ST — SHUNT TRIP COIL

ABBREVIATIONS

A	AMPERES
AF	AMPERE FRAME
A.F.F.	ABOVE FINISH FLOOR
A.F.G.	ABOVE FINISH GRADE
AFDI	ARC FAULT DETECTION & INTERRUPTER
AIC	AMPS INTERRUPTING CAPACITY
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BKR	CIRCUIT BREAKER
C	CONDUIT
CB	COMBINER BOX
CKT	CIRCUIT
CP	CONTROL PANEL
CU	COPPER
DISC	DISCONNECT
EGC	EQUIPMENT GROUNDING CONDUCTOR
ELEC	ELECTRIC, ELECTRICAL
EMERG	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
EQUIP	EQUIPMENT
EXIST	EXISTING
G, GND	GROUND
GEC	GROUNDING ELECTRODE CONDUCTOR
GFCI	GROUND-FAULT CIRCUIT INTERRUPTER
GFPE	GROUND-FAULT PROTECTION OF EQUIPMENT
HID	HIGH-INTENSITY DISCHARGE (LIGHTING)
HZ	HERTZ
IMC	INTERMEDIATE METALLIC CONDUIT
kAIC	1000 AMPS INTERRUPT CAPACITY
kCMIL	1000 CIRCULAR MILLS
kVA	KILO-VOLT AMPERE
kW	KILOWATT
LA	LIGHTNING & SURGE ARRESTOR
LED	LIGHT-EMITTING DIODE
LSIG	LONG, SHORT, INSTANTANEOUS, & GROUND FAULT
LTG	LIGHTING
MAX	MAXIMUM
MFG	MANUFACTURER
MLO	MAIN LUGS ONLY
MPPT	MAXIMUM POWER POINT TRACKING
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NTS	NOT TO SCALE
P	POLE
PF	POWER FACTOR
PLC	PROGRAMMABLE LOGIC CONTROLLER
POI	POINT OF INTERCONNECTION
PRI	PRIMARY
PVC	POLYVINYL CHLORIDE
PWR	POWER
RCPT	RECEPTACLE
RGS	RIGID GALVANIZED STEEL CONDUIT
RMC	RIGID METAL CONDUIT
SA	SURGE ARRESTOR
SEC	SECONDARY
SPD	SURGE PROTECTION DEVICE
SSBJ	SUPPLY SIDE BONDING JUMPER
ST	SHUNT TRIP
STP	SHIELDED TWISTED PAIR
SW	SWITCH
TBD	TO BE DETERMINED
TP	TWISTED PAIR
TYP	TYPICAL
V	VOLT
VA	VOLT-AMPERE
W	WATT
WP	WEATHERPROOF
XFMR	TRANSFORMER
ø	DIAMETER OR PHASE

NOTES SPECIFIC TO CONNECTICUT

ADOPTED NEC VERSION: 2017

UTILITY: EVERSOURCE

UTILITY DISCONNECT SWITCH REQUIREMENTS:
AN EXTERNAL DISCONNECT AT THE PCC OR AT ANOTHER MUTUALLY AGREEABLE POINT THAT IS ACCESSIBLE TO COMPANY PERSONNEL AT ALL HOURS OF ALL DAYS AND THAT CAN BE OPENED FOR ISOLATION IF REQUIRED. THE SWITCH SHALL BE GANG OPERATED, HAVE A VISIBLE AIR GAP BETWEEN SWITCH CONTACTS, BE RATED TO INTERRUPT THE MAXIMUM GENERATOR OUTPUT AND BE CAPABLE OF BEING LOCKED OPEN, TAGGED AND GROUNDED ON COMPANY SIDE BY COMPANY PERSONNEL. THIS DEVICE MAY BE OPERATED MANUALLY, REMOTELY OR THROUGH THE OPERATION OF A COMPANY TRANSFER TRIP SCHEME.

DRAWING TITLE: ELECTRICAL NOTES & SYMBOL LIST

DRAWING: E001

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN ELEMENTARY SCHOOL 119 GORMAN ROAD

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385M-24/TH
MODULE QUANTITY: 864
ORIENTATION: ...

PAGE SIZE: 36" x 24"
PROJECT #

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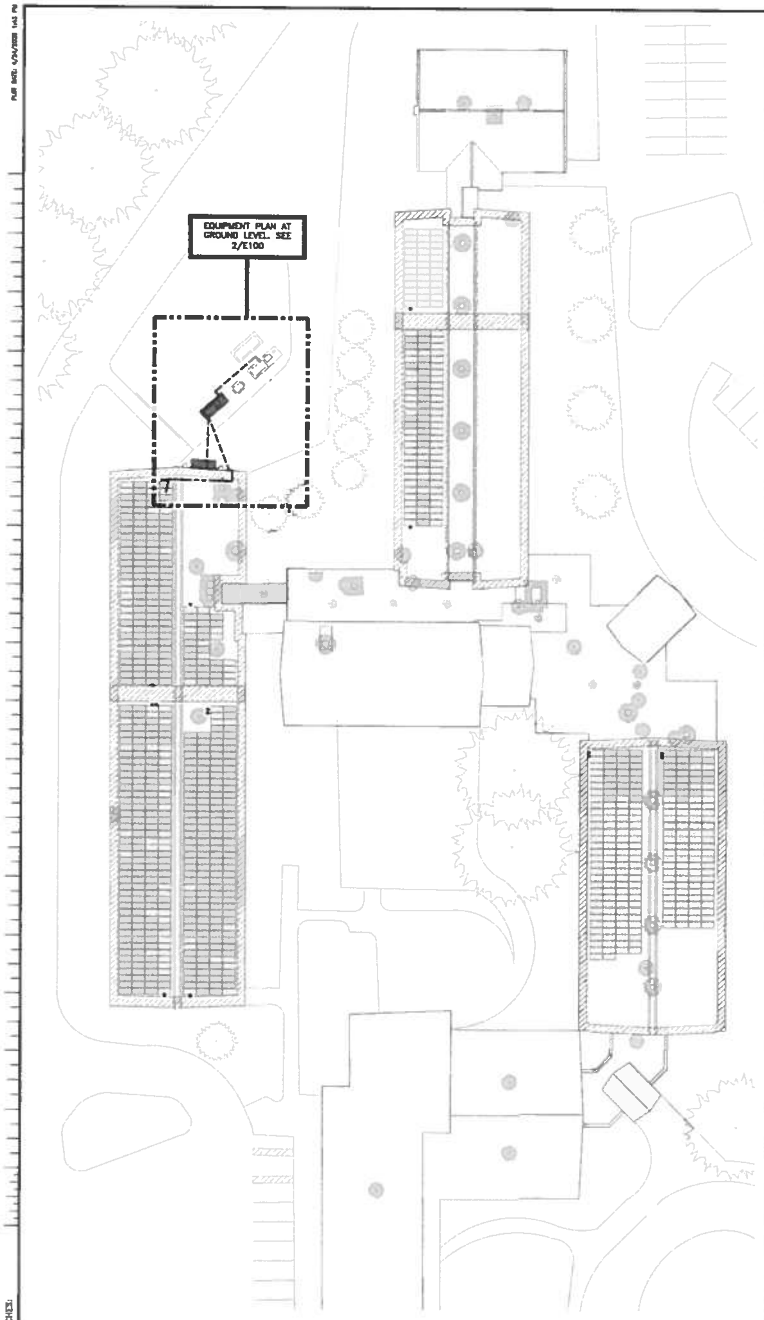
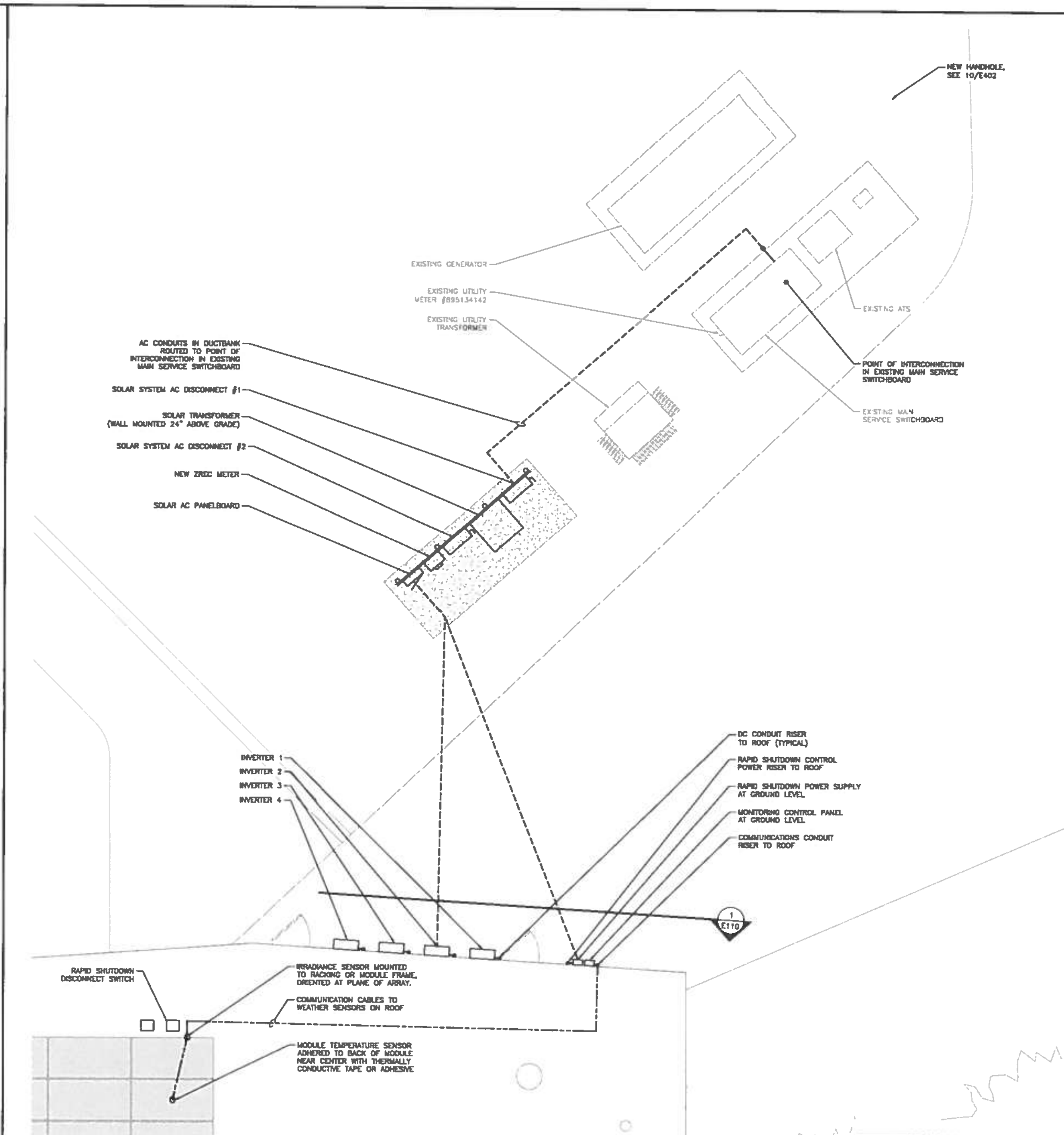
DATE	REVISION DESCRIPTION	PM	ENG	CHK

RULER IN INCHES:



1/E100 OVERALL AC ELECTRICAL PLAN
SCALE: 1" = 30'-0"



2/E100 EQUIPMENT PLAN AT GROUND LEVEL
SCALE: 3/8" = 1'-0"

DATE	REVISION DESCRIPTION	PM	ENG	CHK
04/24/2020	PERMIT SET (REV 1)	BB	SK	RI

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PAGE SIZE: 36" x 24"
PROJECT #

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385M-24/TH
MODULE QUANTITY: 864
ORIENTATION: 10° TILT ~74°/106°

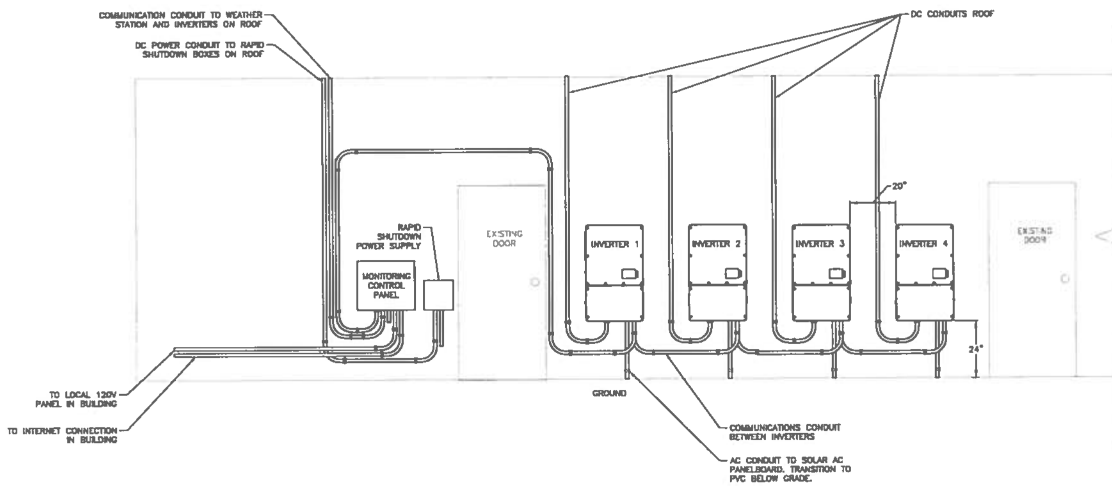
PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

DRAWING TITLE: AC ELECTRICAL PLAN

DRAWING #: E100

RULER IN INCHES:

NOTES:
1. ELECTRICAL EQUIPMENTS LOCATED OUTSIDE AND ON THE ROOF MUST NOT HAVE CONDUITS PENETRATING ON TOP OF THE EQUIPMENT.
2. CONDUITS SHALL NOT PROTRUDE MORE THAN 6" INTO WORKING SPACE OF EQUIPMENT.
3. MOUNT EQUIPMENT AS PER INSTALLATION MANUAL INSTRUCTION.
4. ELECTRICAL EQUIPMENT MOUNTED WITH UNISTRUT CHANNEL. USE FASTENER SPECIFICALLY INTENDED FOR THE WALL TYPE & CONSTRUCTION. MOUNT EQUIPMENT AS PER INSTALLATION MANUAL.
5. DECK MONITOR SHOULD NOT HAVE CONDUITS PENETRATING ON THE SIDES AND TOP. THIS RESULTS IN VOIDING THE WARRANTY.



1 / E110 EQUIPMENT AREA ELEVATION
SCALE: 1/8" = 1'-0"

DATE	REVISION DESCRIPTION	PM	ENG	CHK
04/24/2020	PERMIT SET (REV 1)		SX	RI

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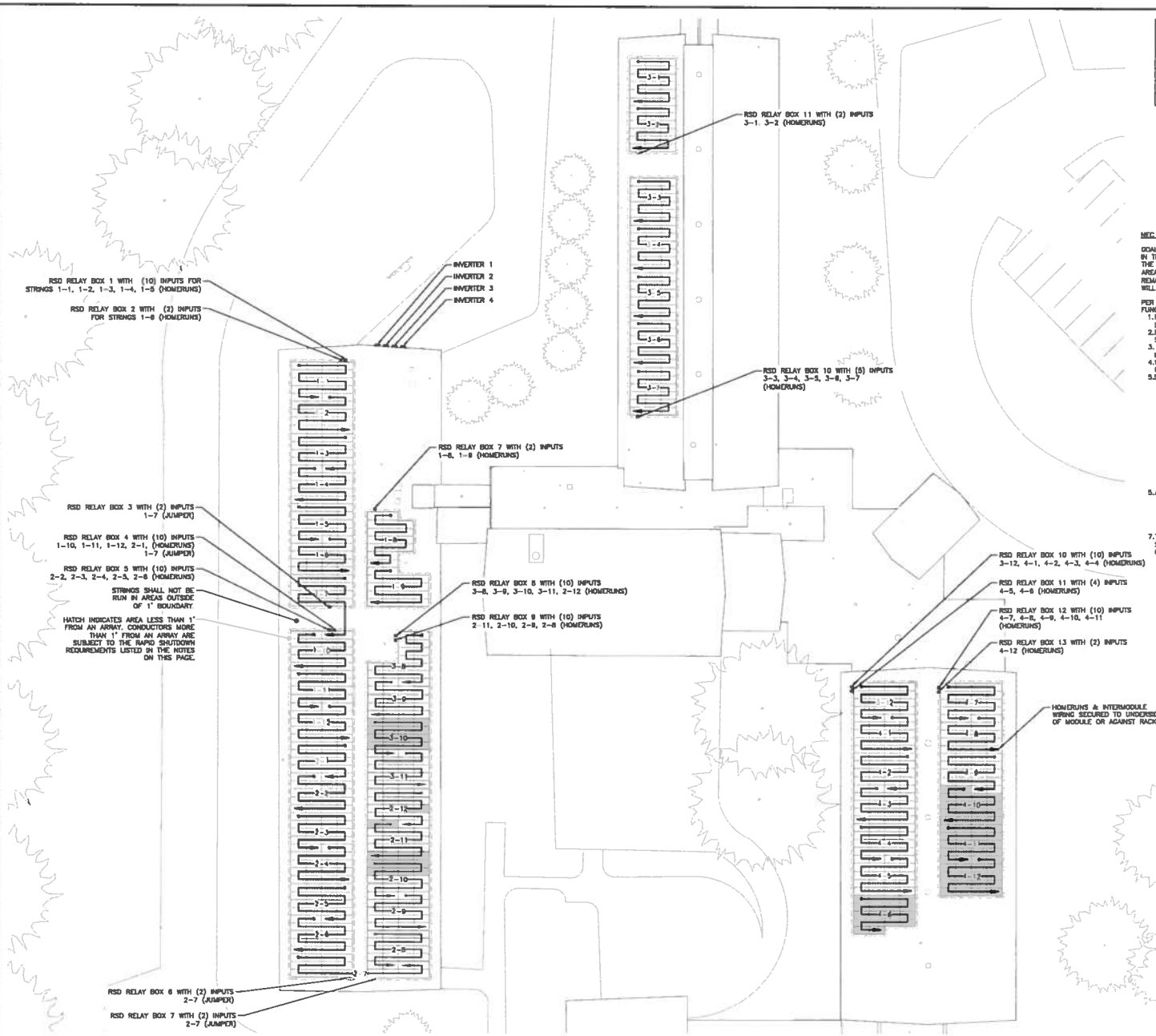
PAGE SIZE: 36" x 24"
PROJECT #

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385M-24/TH
MODULE QUANTITY: 864

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

DRAWING TITLE: ELECTRICAL & INVERTER AREA ELEVATION
DRAWING #: E110

RULER IN INCHES:



1 E200 DC ELECTRICAL PLAN – ROOF
SCALE: 1" = 20'-0"

STRING LABEL KEY
2-3
STRING #
INVERTER #

RAPID SHUTDOWN EQUIPMENT SUMMARY	
Type	Box Quantity
PV4X-U2S-RS	5
PV4X-U4S-RS	1
PV4X-U8S-RS	0
PV4X-U10S-RS	7

CONDUIT FILL TABLE		
MAXIMUM NUMBER OF CU #10 WIRES (PV WIRE + GROUND)		
CONDUIT TRADE SIZE	CONDUIT LENGTH 24" OR LESS (60% FILL)	CONDUIT LENTH OVER 24" (40% FILL)
3/4"	6	4
1"	9	6
1.25"	16	11
1.5"	23	15
2"	37	25
2.5"	40	40
3"	40	40
3.5"	40	40
4"	40	40
TABLE ASSUMING EMT CONDUIT AND CU #10 PV WIRE WITH 0.26in O.D., 0.96 TEMP. DERATE		
PV SOURCE CIRCUIT WITH 18.08A SHORT CIRCUIT CURRENT, 1 IN PARALLEL, AND 20A FUSES		

MEC 690.12 RAPID SHUTDOWN

GOAL OF "RAPID SHUTDOWN" OF PV SYSTEMS ON BUILDINGS:
IN THE EVENT OF AN EMERGENCY, THE EMERGENCY RESPONDERS CAN INITIATE THE RAPID SHUTDOWN DEVICE, THEN MOVE AROUND THE ROOF KNOWING ANY AREAS WITHIN 1' OF AN ARRAY MAY BE ENERGIZED, AND AS LONG AS THEY REMAIN GREATER THAN 1' FROM A PV ARRAY ANY CONDUCTORS THEY ENCOUNTER WILL BE DE-ENERGIZED.

PER NEC 690.12, PV SYSTEM CIRCUITS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH THE FOLLOWING:
1. RAPID SHUTDOWN INITIATION DEVICE IS THE AC "SOLAR SYSTEM AC DISCONNECT"
2. RAPID SHUTDOWN IS INITIATED BY MOVING THE HANDLE OF THE SOLAR SYSTEM AC DISCONNECT SWITCH TO THE 'OFF' POSITION.
3. "CONTROLLED CONDUCTORS" ARE AC & DC PV SYSTEM CONDUCTORS OF MORE THAN 1' FROM A PV ARRAY.
4. WITHIN 30 SECONDS OF RAPID SHUTDOWN INITIATION, "CONTROLLED CONDUCTORS" SHALL BE LIMITED TO NOT MORE THAN 30V.
5. DC CONTROLLED CONDUCTORS:
   a. STRING WIRING PLAN SHOWS THE BOUNDARY INDICATING ALL AREAS 1' OR LESS FROM A PV ARRAY.
   b. PER THE DEFINITION OF "ARRAY" IN 690.2, AN ARRAY IS A MECHANICALLY INTERGRATED ASSEMBLY OF PANELS, SUPPORT STRUCTURE, AND OTHER COMPONENTS REQUIRED TO FORM AN AC POWER PRODUCING UNIT. SPECIFICALLY, THIS INCLUDES MODULES, RACKING, BALLAST, INVERTERS AND RAPID SHUT DOWN DISCONNECTS.
   c. NO DC CONDUCTORS MAY EXTEND OUTSIDE THE 1' BOUNDARIES, UNLESS A RAPID SHUTDOWN COMBINER BOX IS USED (SEE DETAIL ON THIS PAGE)
   d. BY PLACING INVERTERS WITHIN 1' OF ARRAY, THE DC CONTROLLED CONDUCTORS WILL INHERENTLY NOT EXTEND BEYOND 1' FROM THE ARRAY.
   e. IF CONTRACTOR ENCOUNTERS A SITUATION WHERE THEY NEED TO RUN DC STRINGS MORE THAN 1' FROM A PV ARRAY, INSTALLER TO CONTACT PURE POWER ENGINEERING FOR GUIDANCE IN MAINTAINING CODE COMPLIANCE.
5. AC CONTROLLED CONDUCTORS
   a. BY MOVING THE SOLAR SYSTEM AC DISCONNECT SWITCH TO THE OFF POSITION, AC VOLTAGE AND CURRENT WILL BE REMOVED FROM THE CONDUCTORS.
   b. INVERTER MUST DISCHARGE AC LINE CAPACITORS WITHIN 30 SECONDS TO NOT MORE THAN 30V.
7. THE RAPID SHUTDOWN INITIATION DEVICE (SOLAR SYSTEM AC DISCONNECT) SHALL BE LABELED IN ACCORDANCE WITH 690.56(B). SEE THE E500 SERIES OF SHEETS IN THIS DRAWING PACKAGE FOR ADDITIONAL DETAILS ON LABELING.

STRING SUMMARY	
String #	Module Quantity
1-1	18
1-2	18
1-3	18
1-4	18
1-5	18
1-6	18
1-7	18
1-8	18
1-9	18
1-10	18
1-11	18
1-12	18
2-1	18
2-2	18
2-3	18
2-4	18
2-5	18
2-6	18
2-7	18
2-8	18
2-9	18
2-10	18
2-11	18
2-12	18
3-1	18
3-2	18
3-3	18
3-4	18
3-5	18
3-6	18
3-7	18
3-8	18
3-9	18
3-10	18
3-11	18
3-12	18
4-1	18
4-2	18
4-3	18
4-4	18
4-5	18
4-6	18
4-7	18
4-8	18
4-9	18
4-10	18
4-11	18
4-12	18

PROJECT 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

DC SYSTEM SIZE: 332.640 kW
MODULE TYPE: PANASONIC 24/7TH
MODULE QUANTITY: 864

PAGE SIZE 36" x 24"

DRAWING TITLE: DC ELECTRICAL PLAN

DRAWING # E200

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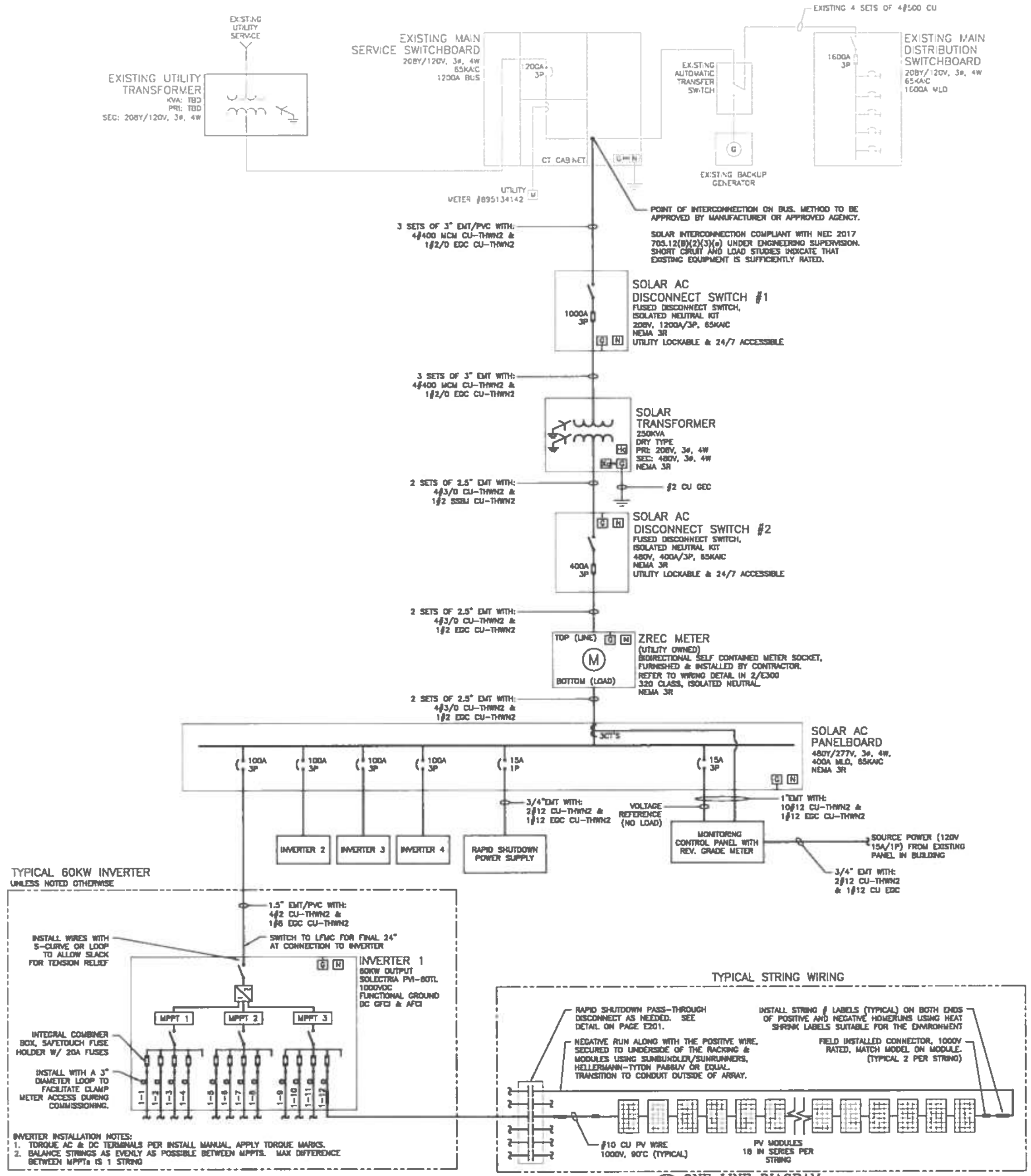
RULER IN INCHES:

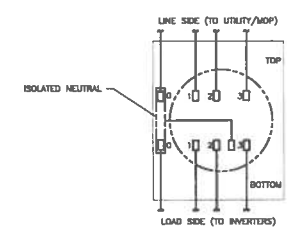


1 E300 ONE LINE DIAGRAM
SCALE: NONE

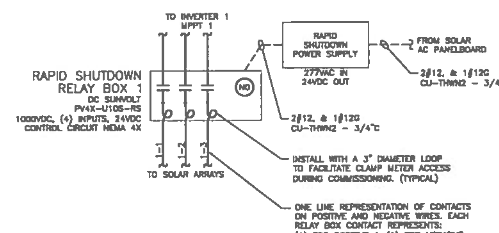
SYSTEM SUMMARY

SYSTEM SUMMARY	
DC SYSTEM SIZE	332.640 KW
AC SYSTEM SIZE	240.000 KW
MODULE	PS385M-24/TH
MODULE QTY	864
INVERTER	SOLECTRIA PVI-60TL
INVERTER QTY	4
AZIMUTH / TILT	-74°/106°/ 10°
UTILITY	EVERSOURCE

320 CLASS



2 E300 16S SOCKET WIRING DIAGRAM



3 E300 TYPICAL RAPID SHUTDOWN DETAIL
SCALE: NONE

REV	DATE	REVISION DESCRIPTION	PM	ENG	CHK
	04/24/2020	PERMIT SET (REV 1)	BX	SK	RI
	03/24/2020	PERMIT SET	BX	PB	RI

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PAGE SIZE: 36" x 24"

DC SYSTEM SIZE: 332.640 KW
AC SYSTEM SIZE: 240.000 KW
MODULE TYPE: PS385M-24/TH
MODULE QUANTITY: 864

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT
BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

DRAWING TITLE: ONE LINE DIAGRAM

DRAWING #: E300

AC FEEDER CALCULATIONS

EQUIPMENT SUPPLIED	FED FROM	VOLTAGE	FULL LOAD AMPS 'FLA'	FLA x 1.25	OCPD SIZE	GROUND SIZE	CONDUCTORS PER PHASE	CONDUCTOR SIZE	75° AMPACITY	C.O.U DERATE AMBIENT TEMP	C.O.U. DERATE CONDUIT FILL	90° AMPACITY WITH C.O.U.	FEEDER LENGTH (FEET)	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
SOLAR AC DISCONNECT SWITCH #1	POINT OF INTERCONNECTION	208	732.9	916.0	1000	CU #2/0	3	CU 400MCM	1005	0.96	1.00	1094.4	120	0.85%	0.85%
SOLAR TRANSFORMER	SOLAR AC DISCONNECT SWITCH #1	208	732.9	916.0	1000	CU #2/0	3	CU 400MCM	1005	0.96	1.00	1094.4	3	0.02%	0.88%
SOLAR AC DISCONNECT SWITCH #2	SOLAR TRANSFORMER	480	317.6	397.0	400	CU #2	2	CU #3/0	400	0.96	1.00	432.0	3	0.01%	0.89%
SOLAR AC PANELBOARD	SOLAR AC DISCONNECT SWITCH #2	480	317.6	397.0	400	CU #2	2	CU #3/0	400	0.96	1.00	432.0	5	0.02%	0.91%
INVERTER 1	SOLAR AC PANELBOARD	480	79.4	99.0	100	CU #8	1	CU #2	115	0.96	1.00	124.8	23	0.13%	1.04%
INVERTER 2	SOLAR AC PANELBOARD	480	79.4	99.0	100	CU #8	1	CU #2	115	0.96	1.00	124.8	20	0.11%	1.03%
INVERTER 3	SOLAR AC PANELBOARD	480	79.4	99.0	100	CU #8	1	CU #2	115	0.96	1.00	124.8	16	0.09%	1.00%
INVERTER 4	SOLAR AC PANELBOARD	480	79.4	99.0	100	CU #8	1	CU #2	115	0.96	1.00	124.8	13	0.07%	0.99%

AVERAGE AC VOLTAGE DROP FROM POI TO INVERTERS: 1.02%

NOTE: DISTANCES ARE ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS, CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

INVERTERS 1 THRU 4

STRING NUMBER	STRING TO INVERTER WIRE GAUGE	STRING TO INVERTER IMPEDANCE (Ω/ft)	STRING DISTANCE (FEET)	STRING VOLTAGE DROP
1-1	#10	0.00124	40	0.13%
1-2	#10	0.00124	56	0.18%
1-3	#10	0.00124	70	0.23%
1-4	#10	0.00124	85	0.27%
1-5	#10	0.00124	100	0.32%
1-6	#10	0.00124	115	0.37%
1-7	#10	0.00124	130	0.42%
1-8	#10	0.00124	95	0.31%
1-9	#10	0.00124	115	0.37%
1-10	#10	0.00124	155	0.50%
1-11	#10	0.00124	170	0.55%
1-12	#10	0.00124	185	0.59%
2-1	#10	0.00124	205	0.66%
2-2	#10	0.00124	215	0.69%
2-3	#10	0.00124	235	0.76%
2-4	#10	0.00124	245	0.79%
2-5	#10	0.00124	265	0.85%
2-6	#10	0.00124	275	0.88%
2-7	#10	0.00124	275	0.88%
2-8	#10	0.00124	270	0.87%
2-9	#10	0.00124	255	0.82%
2-10	#10	0.00124	240	0.77%
2-11	#10	0.00124	225	0.72%
2-12	#10	0.00124	210	0.68%
3-1	#10	0.00124	225	0.72%
3-2	#10	0.00124	205	0.66%
3-3	#10	0.00124	175	0.56%
3-4	#10	0.00124	156	0.50%
3-5	#10	0.00124	135	0.43%
3-6	#10	0.00124	120	0.39%
3-7	#10	0.00124	125	0.40%
3-8	#10	0.00124	145	0.47%
3-9	#10	0.00124	160	0.51%
3-10	#10	0.00124	175	0.56%
3-11	#10	0.00124	190	0.61%
3-12	#10	0.00124	360	1.16%
4-1	#10	0.00124	370	1.19%
4-2	#10	0.00124	385	1.24%
4-3	#10	0.00124	400	1.29%
4-4	#10	0.00124	420	1.35%
4-5	#10	0.00124	430	1.38%
4-6	#10	0.00124	450	1.45%
4-7	#10	0.00124	395	1.27%
4-8	#10	0.00124	405	1.30%
4-9	#10	0.00124	425	1.37%
4-10	#10	0.00124	440	1.41%
4-11	#10	0.00124	455	1.46%
4-12	#10	0.00124	470	1.51%
AVERAGE STRING VOLTAGE DROP				0.77%

SOLECTRIA PVI 60TL

INVERTER SPECIFICATIONS	
RATED AC OUTPUT POWER	60,000 W
NOMINAL AC OUTPUT VOLTAGE	480Y/277 V
MAX. AC OUTPUT CURRENT	79.4 A
INVERTER PROTECTIVE SETTINGS	
PARAMETERS	SET AT
AC FREQUENCY RANGE	57 Hz – 63 Hz (DEFAULT)
AC VOLTAGE RANGE	422.4 V – 528 V (DEFAULT)
POWER FACTOR	>0.99 (DEFAULT)
OVERFREQUENCY TRIP TIME	0.16S (DEFAULT)
UNDERFREQUENCY TRIP TIME	0.16S (DEFAULT)
OVERVOLTAGE TRIP TIME (FAST)	0.16S (DEFAULT)
OVERVOLTAGE TRIP TIME (SLOW)	1.0S (DEFAULT)
UNDERVOLTAGE TRIP TIME (FAST)	0.16S (DEFAULT)
UNDERVOLTAGE TRIP TIME (SLOW)	2.0S (DEFAULT)

DC STRING WIRING CALCULATION	
STRING ISC [AMPS]	10.08
MAXIMUM CIRCUIT CURRENT [AMPS]	12.60
1.25x MAX CIRCUIT CURRENT [AMPS]	15.75
MAX # OF WIRES PER CONDUIT	40
CONDUIT FILL DERATE	0.4
MAX AMBIENT TEMPERATURE	32
TEMPERATURE DERATE	0.96
WIRE GAUGE	CU #10
75DEG AMPACITY WITHOUT COU ADJUSTEMENT [AMPS]	35
IS 75 DEG AMPACITY WITHOUT COU ADJUSTEMENT >= 1.25x MAX CIRCUIT CURRENT?	YES. COMPLIES WITH 690.8(B)(1)
90DEG AMPACITY WITH COU ADJUSTMENT [AMPS]	15.36
IS 90DEG AMPACITY WITH COU ADJUSTMENT >= 1.0x MAX CIRCUIT CURRENT?	YES. COMPLIES WITH 690.8(B)(2)
PV SOURCE CIRCUIT FUSE RATING [AMPS]	20
AVAILABLE FAULT CURRENT FROM ALL PARALLEL SOURCES [AMPS]	12.6
IS FUSE RATING >= 1.25x MAX CIRCUIT CURRENT?	YES. COMPLIES WITH 690.9(B)

MODULE SPECIFICATIONS	
Make/Model	Phono Solar
Power [W]	335
Isc [A]	10.08
Imp [A]	9.58
Voc [V]	48.00
Vmp [V]	40.21
β Voc [%/degC]	-0.306%
SITE CLIMATE CRITERIA	
Ashrea High [deg C]	32
Ashrea Low [deg C]	-19
STRING SPECIFICATIONS AT STC	
Modules/String	18
Power [W]	6030
String Isc [A]	10.08
String Imp [A]	9.58
String Vmp [A]	723.78
STRING MAX VOLTAGE CALCULATION	
Voc Temp Adjustment @ -19 deg C	1.1346
Voc @ -19 deg C [V]	54.46
Max String Voc [V]	980.3

DATE	REVISION DESCRIPTION	PM	DNG	CHK

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PAGE SIZE: 36" x 24"
PROJECT #

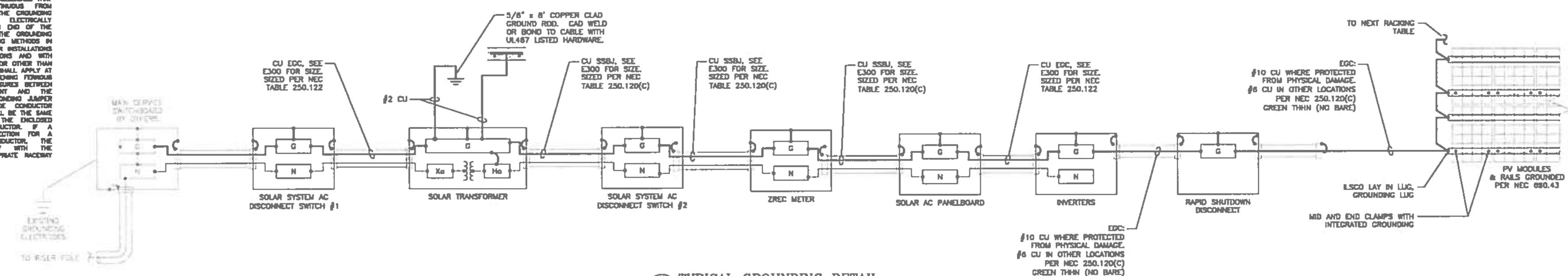
DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS335M-24/TH
MODULE QUANTITY: 864

PROJECT 332.640 KW SOLAR ROOFTOP SYSTEM AT
BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

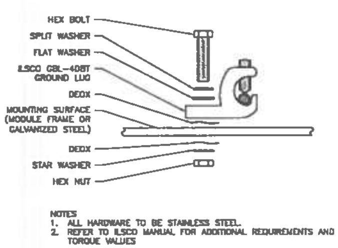
DRAWING TITLE: SCHEDULES & CALCULATIONS

DRAWING #: E310

NEC 250.64(E) – ENCLOSURES FOR GROUNDING ELECTRODE CONDUCTORS
FERROUS METAL ENCLOSURES FOR GROUNDING ELECTRODE CONDUCTORS SHALL BE ELECTRICALLY CONTINUOUS FROM THE POINT OF ATTACHMENT TO CABINETS OR EQUIPMENT TO THE GROUNDING ELECTRODE AND SHALL BE SECURELY FASTENED TO THE GROUND CLAMP OR FITTING. NONFERROUS METAL ENCLOSURES SHALL NOT BE REQUIRED TO BE ELECTRICALLY CONTINUOUS. FERROUS METAL ENCLOSURES THAT ARE NOT PHYSICALLY CONTINUOUS FROM CABINETS OR EQUIPMENT TO THE GROUNDING ELECTRODE SHALL BE MADE ELECTRICALLY CONTINUOUS BY BONDING EACH END OF THE RACEWAY OR ENCLOSURE TO THE GROUNDING ELECTRODE CONDUCTOR. BONDING METHODS IN COMPLIANCE WITH 250.92(B) FOR INSTALLATIONS AT SERVICE EQUIPMENT LOCATIONS AND WITH 250.92(B)(2) THROUGH (B)(4) FOR OTHER THAN SERVICE EQUIPMENT LOCATIONS SHALL APPLY AT EACH END AND TO ALL INTERVENING FERROUS RACEWAYS, BOXES, AND ENCLOSURES BETWEEN THE CABINETS OR EQUIPMENT AND THE GROUNDING ELECTRODE. THE BONDING JUMPER FOR A GROUNDING ELECTRODE CONDUCTOR RACEWAY OR CABLE ARMOR SHALL BE THE SAME SIZE AS, OR LARGER THAN, THE ENCLOSED GROUNDING ELECTRODE CONDUCTOR. IF A RACEWAY IS USED AS PROTECTION FOR A GROUNDING ELECTRODE CONDUCTOR, THE INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF THE APPROPRIATE RACEWAY ARTICLE.

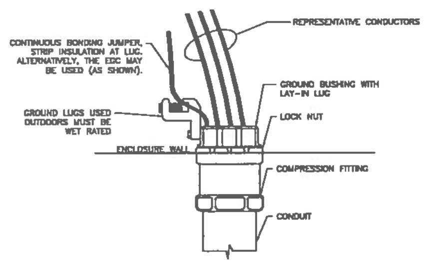


1 E401 TYPICAL GROUNDING DETAIL
SCALE: NONE

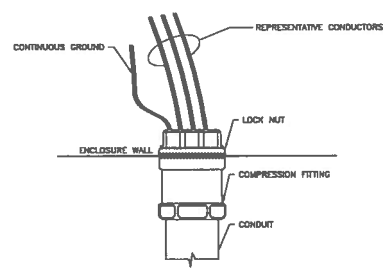


NOTES
1. ALL HARDWARE TO BE STAINLESS STEEL.
2. REFER TO ILSCO MANUAL FOR ADDITIONAL REQUIREMENTS AND TORQUE VALUES

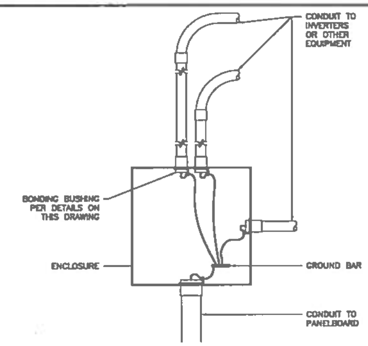
2 E401 GROUND LUG DETAIL – ILSCO
SCALE: NONE



3 E401 BONDING BUSHING GROUNDING DETAIL
SCALE: NONE



4 E401 MYER'S HUB GROUNDING DETAIL
SCALE: NONE



5 E401 PULL BOX/TROUGH GROUNDING DETAIL
SCALE: NONE

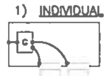
A) FOR CONCENTRIC KNOCKOUTS, USE BONDING JUMPERS AS FOLLOWS:

TABLE 250.122

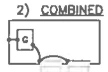
OVERCURRENT DEVICE CIRCUIT NOT EXCEEDING (AMPERES)	SIZE (AWG OR KCMIL)	
	COPPER	ALUMINUM
15	14	12
20	12	10
60	10	8
100	8	6
200	6	4
300	4	2
400	3	1
500	2	1/0
600	1	2/0
800	1/0	3/0
1000	2/0	4/0
1200	3/0	250
1600	4/0	350
2000	250	400
2500	350	600
3000	400	600
4000	500	750

FOR PARALLEL FEEDERS – NEC 250.102(D)
EQUIPMENT BONDING JUMPER IS SIZED PER TABLE 250.122, REGARDLESS IF COMBINED OR INDIVIDUAL BONDING JUMPERS ARE USED

1) INDIVIDUAL



2) COMBINED



B) FOR NON-CONCENTRIC KNOCKOUTS, THE FOLLOWING METHODS SHALL BE PERMITTED (PER NEC 250.97)
1) THREADLESS COUPLINGS AND CONNECTORS FOR CABLES WITH METAL SHEATS
2) TWO LOCKNUTS, ON RIGID METAL CONDUIT OR INTERMEDIATE METAL CONDUIT, ONE INSIDE AND ONE OUTSIDE OF BOXES AND CABINETS
3) FITTINGS WITH SHOULDERS THAT SEAT FIRMLY AGAINST THE BOX OR CABINET, SUCH AS ELECTRICAL METALLIC TUBING CONNECTORS, FLEXIBLE METAL CONDUIT CONNECTORS, AND CABLE CONNECTORS, WITH ON LOCKNUT ON THE INSIDE OF BOXES AND CABINETS
4) LISTED FITTINGS (SUCH AS MEYERS HUB)

6 E401 LOAD SIDE EQUIPMENT BONDING JUMPER
SCALE: NONE

DRAWING TITLE
GROUNDING DETAILS

DATE	REVISION DESCRIPTION	PM	ENG	CHK

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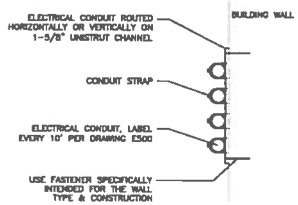
PAGE SIZE 36" x 24"
PROJECT #

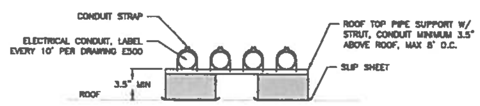
DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385M-24/TH
MODULE QUANTITY: 864

PROJECT 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

DRAWING # E401

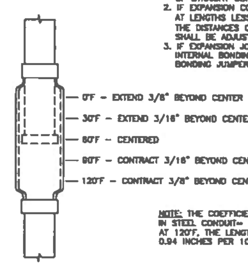


1 — CONDUIT WALL ANCHORING (E402) SCALE: NONE



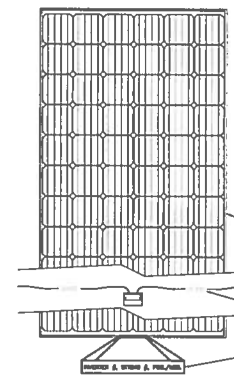
2 — FLAT ROOF CONDUIT SUPPORT (E402) SCALE: NONE

NOTES:
1. INSTALL EXPANSION COUPLING EVERY 100' OF STRAIGHT CONDUIT RUN.
2. IF EXPANSION COUPLINGS ARE INSTALLED AT LENGTHS LESS THAN 100', THE DISTANCES OF EXPANSION/CONTRACTION SHALL BE ADJUSTED PROPORTIONALLY.
3. IF EXPANSION JOINT IS NOT PROVIDED WITH INTERNAL BONDING JUMPER, AN EXTERNAL BONDING JUMPER MUST BE INSTALLED.



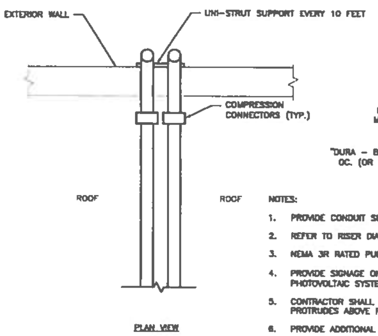
NOTE: THE COEFFICIENT OF THERMAL EXPANSION IN STEEL CONDUIT= 0.65 X 10^{-5} IN./IN./°F AT 120°F, THE LENGTH CHANGE IS 0.94 INCHES PER 100 FEET OF CONDUIT RUN.

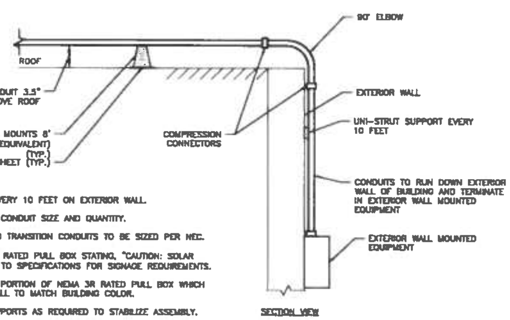
3 — EMT,IMC,RMC EXPANSION COUPLING DETAIL (E402) SCALE: NONE



NOTES:
1. INSTALL MANUFACTURED LABEL ON FRAME OF MODULE IDENTIFYING THE INVERTER AND STRING NUMBER. LABEL MUST HAVE RED BACKGROUND FOR POSITIVE OR BLACK BACKGROUND FOR NEGATIVE. TEXT SHALL BE WHITE WITH A HEIGHT THAT IS LEGIBLE AND FITS ON THE MODULE.
2. NO CROSS MATING OF CONNECTORS IS AUTHORIZED. BOTH MALE AND FEMALE CONNECTOR ENDS MUST BE OF THE SAME MANUFACTURER TO ENSURE UL COMPLIANCE. ACCEPTABLE MANUFACTURER INCLUDE AMPENOL, MC4 AND TYCO. THE MANUFACTURER SPECIFIC TOOL KIT MUST BE USED WHILE MAKING FIELD CONNECTIONS.
3. MOUNTING DETAIL APPLIES TO PITCHED ROOFTOP ARRAYS ONLY. CONTRACTOR SHALL ADJUST EXACT SIZE AND POSITION OF LABEL TO ENSURE LABELS ARE ADHERED PROPERLY AND LEGIBLE.

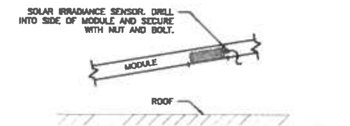
4 — STRING LABEL MOUNTING LOCATION – PITCHED ROOFTOP (E402) SCALE: NONE





NOTES:
1. PROVIDE CONDUIT SUPPORTS EVERY 10 FEET ON EXTERIOR WALL.
2. REFER TO RISER DIAGRAM FOR CONDUIT SIZE AND QUANTITY.
3. NEMA 3R RATED PULL BOX AND TRANSITION CONDUITS TO BE SIZED PER NEC.
4. PROVIDE SIGNAGE ON NEMA 3R RATED PULL BOX STATING, "CAUTION: SOLAR PHOTOVOLTAIC SYSTEM". REFER TO SPECIFICATIONS FOR SIGNAGE REQUIREMENTS.
5. CONTRACTOR SHALL PAINT ANY PORTION OF NEMA 3R RATED PULL BOX WHICH PROTRUDES ABOVE PARAPET WALL TO MATCH BUILDING COLOR.
6. PROVIDE ADDITIONAL STRUT SUPPORTS AS REQUIRED TO STABILIZE ASSEMBLY.

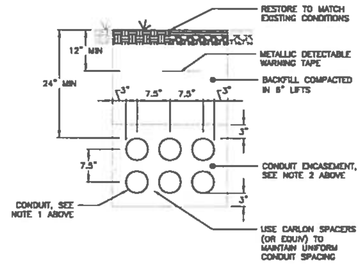
5 — TRANSITION FROM CONDUIT DOWN EXTERIOR WALL – WITHOUT PARAPET (E402) SCALE: NONE



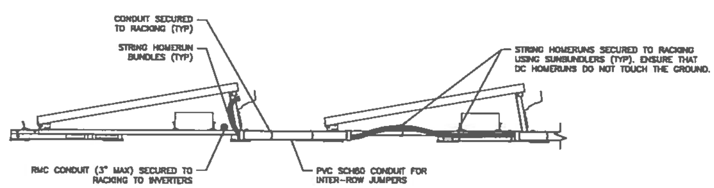
NOTES:
1. INSTALL THE WEATHER STATION AT A CENTRAL LOCATION WITHIN THE ARRAY USING THE MANUFACTURING SUPPLIED MOUNT.
2. THE IRRADIANCE SENSORS SHALL BE INSTALLED AT THE SAME TILT AS THE MODULES.
3. MOUNT THE CELL TEMPERATURE PROBE TO THE UNDERSIDE OF THE ADJACENT MODULE.
4. PROVIDE DC POWER SUPPLY TO THE WEATHER STATION FROM THE ALL-IN-ONE DECK IN ACCORDANCE TO MANUFACTURER SPECS.
5. PROVIDE DATA COMMUNICATION LINK FROM THE WEATHER STATION TO THE ALL-IN-ONE DECK WITH A TWISTED SHIELDED PAIR. REFER TO MANUFACTURER'S SPEC FOR ADDITIONAL INFORMATION.

6 — WEATHER STATION MOUNTING DETAIL (E402) SCALE: NONE

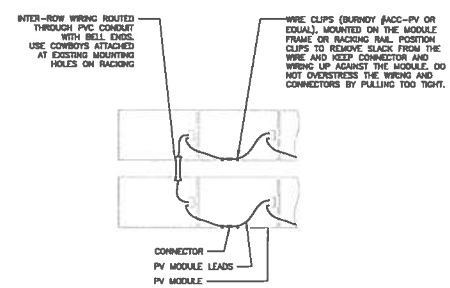
NOTES:
1. ALL UNDERGROUND CONDUIT SHALL BE PVC AND TRANSITION TO RMC FOR ELBOW. RMC ELBOW DOES NOT NEED TO BE BONDED IF ANY PART OF THE ELBOW IS 18" DEEP (NEC 250.86 EXCEPTION 3)
2. UNDER ROADS AND PARKING AREAS ENCASEMENT SHALL BE 3000 PSI CONCRETE. UNDER GRASSY AREAS ENCASEMENT SHALL BE SAND.
3. CALL BEFORE YOU DIG, DIAL 811 TO BE CONNECTED TO THE LOCAL ON-CALL CENTER. YOU MUST CALL AT LEAST 48 HOURS BEFORE EXCAVATING.



7 — TYPICAL DUCTBANK DETAIL (E402) SCALE: NONE

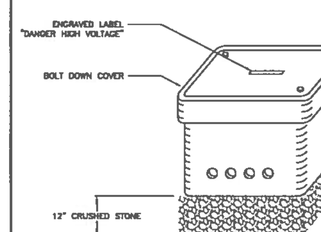


8 — STRING WIRING ELEVATION DETAIL – PANELCLAW FR5 (E402) SCALE: NONE



9 — STRING WIRING DETAIL – PANELCLAW (E402) SCALE: NONE

NOTES:
1. BOX SHALL BE RATED T8 FOR USE IN GRASSY AREAS NOT SUBJECT TO VEHICULAR TRAFFIC, OR RATED T22 FOR USE IN SIDEWALKS OR PARKING LOTS SUBJECT TO OCCASIONAL NON-DELIBERATE HEAVY VEHICULAR TRAFFIC. BOXES TO BE USED IN ROADWAYS OR AREAS FREQUENTLY SUBJECT HEAVY VEHICULAR TRAFFIC SHALL BE SUBMITTED TO EEOR FOR APPROVAL
2. CONDUITS SHALL ENTER ON SIDES. MINIMUM BURIAL DEPTHS OF CONDUITS IS 24" BELOW FINISHED GRADE.
3. CONDUIT KNOCKOUTS SHALL BE DRILLED OR PUNCHED ON SITE, QUANTITIES AND SIZES TO MATCH TRENCH PLAN AND COMBINER SCHEDULE.



10 — HANDHOLE DETAIL (E402) SCALE: NONE

DATE	REVISION DESCRIPTION	PM	DWG	CHK
04/24/2020	PERMIT SET (REV 1)	BK	SK	RI

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PAGE SIZE: 36" x 24"
PROJECT #

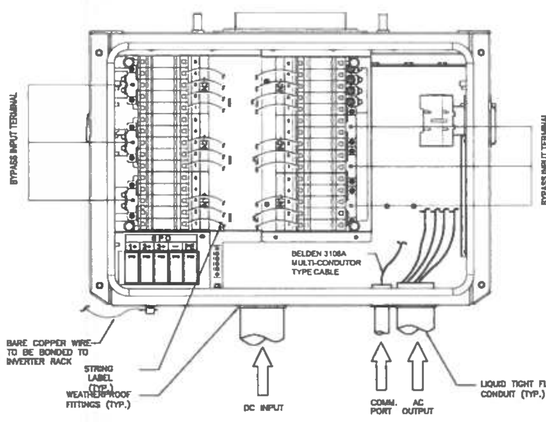
DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385M-24/TH
MODULE QUANTITY: 864

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

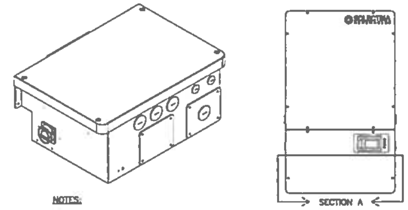
DRAWING TITLE: ELECTRICAL DETAILS

DRAWING #: E402

RULER IN INCHES:



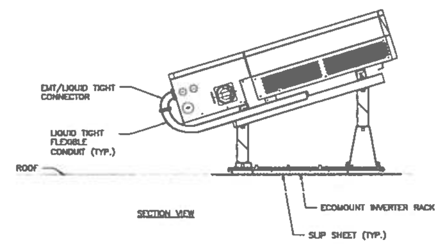
SECTION A – ENLARGED VIEW OF COMBINER BOX INPUT/OUTPUT TERMINATION POINTS.

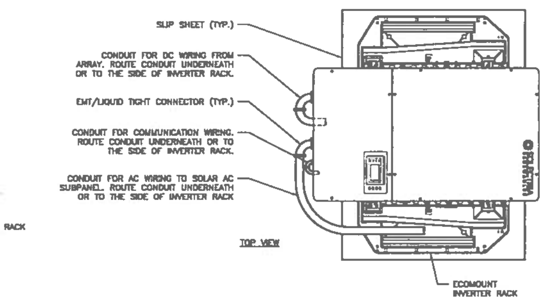


NOTES:

1. CONTRACTOR SHALL PROVIDE ENOUGH SLACK IN THE CONDUCTORS TO ALLOW FOR AMP-PROBE TESTING IN THE FUTURE. AVOID ADDING LOOPS IN THE CONDUCTORS PRIOR TO TERMINATION.
2. PROVIDE CONDUCTOR ID LABELS PER SPEC REQUIREMENTS.
3. REFER TO RISER DIAGRAM FOR CONDUCTOR SIZING.
4. CONDUIT SIZE AND QUANTITY PER NEC REQUIREMENTS. QUANTITY AND CONFIGURATION OF STRING CONDUITS SHOWN IS DIAGRAMMATICAL.

1 / E403 SOLECTRIA PVI 50/60TL – STANDARD COMBINER – THREE MPPTS (MAXIMUM POWER POINT TRACKER)
SCALE: NONE

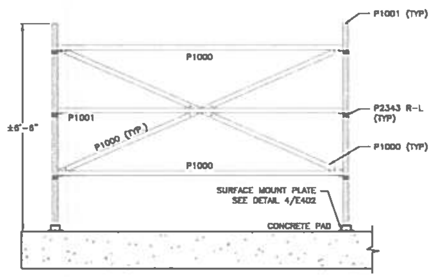




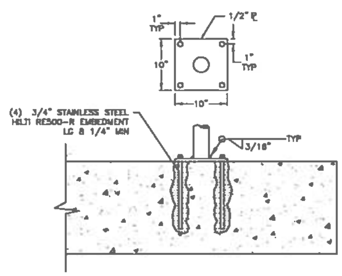
NOTES:

1. CONDUIT SHALL BE ROUTED AS TO PROVIDE AT LEAST 4'-0" WORKING CLEARANCE IN FRONT OF INVERTER.
2. BALLAST BLOCKS TO BE INSTALLED PER ECOMOUNT INVERTER RACK.

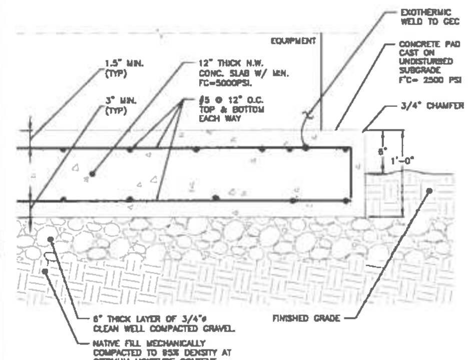
2 / E403 INSTALLATION OF INVERTER AC CONDUCTORS – SOLECTRIA
SCALE: NONE



3 / E403 TYPICAL EQUIPMENT RACK
SCALE: NONE



4 / E403 SURFACE MOUNT PLATE DETAIL
SCALE: NONE



5 / E403 CONCRETE PAD DETAIL
SCALE: NONE

DATE	REVISION DESCRIPTION	PV	ENG	CHK
04/24/2020	PERMIT SET (REV 1)	BX	SK	RI

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PAGE SIZE: 36" x 24"
PROJECT #

DC SYSTEM SIZE: 332.640 KW
AC SYSTEM SIZE: 240.000 KW
MODULE TYPE: PS335M-24/TH
MODULE QUANTITY: 864

PROJECT 332.640 KW SOLAR ROOFTOP SYSTEM AT
BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

DRAWING TITLE: ELECTRICAL DETAILS
DRAWING: E403

RULER IN INCHES:

GENERAL NOTES FOR LABELS:
1. LABEL SCALE 1:2 UNLESS NOTED
2. LETTERING ON SIGNS SHALL BE CAPITAL LETTERS
3. CLEARLY LABEL ALL CIRCUIT BREAKERS IN THE PANELBOARD(S). THE LABEL SHALL INDICATE THE NAME OF THE DEVICE IT SERVES.

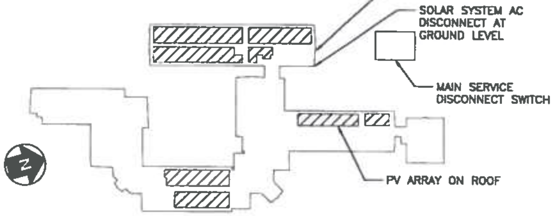
LABEL FORMAT NOTES:
1. FORMAT 1: ENGRAVED MELAMINE, WHITE TEXT ON RED BACKGROUND. TEXT HEIGHT: TITLES 3/8", ALL OTHER TEXT 5/32".
2. FORMAT 2: ENGRAVED MELAMINE, BLACK TEXT ON WHITE BACKGROUND. TEXT HEIGHT: 3/8".
3. FORMAT 3: REFLECTIVE UV RATED LABEL. RED BACKGROUND WITH WHITE CAPITAL LETTERS AT LEAST 3/8" TALL. LABELS SHALL BE SUITABLE FOR THE ENVIRONMENT IN WHICH THEY ARE INSTALLED.
4. FORMAT 4: ENGRAVED MELAMINE, WHITE TEXT ON RED BACKGROUND. TEXT HEIGHT: TITLES 5/32", ALL OTHER TEXT 3/32".

PER 2017 NEC 690.31(B)(1), PV SYSTEM CIRCUIT CONDUCTORS SHALL BE IDENTIFIED AT ALL ACCESSIBLE POINTS OF TERMINATION, CONNECTION, AND SPLICES.

1. STRING HOMERUNS AT ARRAY
2. DC INPUT TERMINALS OF COMBINER BOX
3. DC OUTPUT TERMINALS OF COMBINER BOX
4. DC INPUT TERMINALS OF INVERTER
5. AC OUTPUT TERMINALS OF INVERTER
6. AC INPUT & OUTPUT TERMINALS OF EACH SUCCESSIVE DEVICE (WHERE APPLICABLE)

(1) — 10"

WARNING:
MULTIPLE POWER SOURCE ARE CONNECTED TO THIS SERVICE WITH DISCONNECTS AS SHOWN:



NEC 705.10 & 690.56(B)
INSTALL AT MAIN DISCONNECT OF ALL POWER SOURCES. ENGRAVED MELAMINE, WHITE TEXT ON RED BACKGROUND, TITLE MIN. 1/2", DESCRIPTION 5/16", ALL OTHER TEXT 1/8"

(5) SOLAR MONITORING — 6" × 3/4"
FORMAT 2

(4) SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN — 6" × 4"
TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION, TO SHUTDOWN CONDUCTORS OUTSIDE OF THE ARRAY. CONDUCTORS WITHIN ARRAY REMAIN ENERGIZED IN SUNLIGHT

NEC 2017 690.56(C)(1)(b), HELLERMANNTYTON #: 596-00886 OR EQUAL. INSTALL ON OR WITHIN 3' OF RAPID SHUTDOWN INITIATION DEVICE AND SERVICE DISCONNECTING MEANS. FOR USE ON PV SYSTEMS THAT SHUTDOWN THE CONDUCTORS LEAVING THE ARRAY ONLY. TITLE TEXT SHALL BE 3/8" WHITE TEXT ON RED BACKGROUND. ALL OTHER TEXT SHALL BE 3/16" BLACK TEXT ON WHITE BACKGROUND.

NFPA1 11.12.2.1.5, INSTALL ON MAIN PV SYSTEM DISCONNECT, FORMAT 4 — 4"

⚠WARNING — 4" × 2"
ARC FLASH AND SHOCK HAZARD
Appropriate PPE and Tools Required when working on this equipment.

OUTDOOR RATED STICKER MOUNTED ON ALL EQUIPMENT

WARNING: PHOTOVOLTAIC POWER SOURCE — 6 1/2" × 1"
NEC 690.31(G)(3)(4), NFPA11.12.2.1.3.2, HELLERMANNTYTON #: 596-00206 OR EQUAL, FORMAT 3. SHALL BE PERMANENTLY AFFIXED ON ALL DC EXPOSED RACEWAYS, CABLE TRAYS, PULL BOXES, AND JUNCTION BOXES. LABELS LABELS SHALL BE SPACED NO GREATER THAN 10 FEET APART.

(2) RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM — 6 1/2" × 1"
NEC 2017 690.56(C)(3), HELLERMANNTYTON #: 596-00890 OR EQUAL, FORMAT 3. INSTALL ON RAPID SHUTDOWN INITIATION DEVICE.

(3) PV RAPID SHUTDOWN — 6" × 6"
PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN
TO START RAPID SHUTDOWN, TURN SWITCH TO OFF POSITION.
WHEN RAPID SHUTDOWN IS INITIATED, EMERGENCY RESPONDERS MAY MOVE AROUND THE ROOF UNDERSTANDING PV SYSTEM CONDUCTORS:
1. LESS THAN 1' FROM AN ARRAY MAY BE ENERGIZED – DO NOT TOUCH!
2. MORE THAN 1' FROM AN ARRAY ARE NOT ENERGIZED AND ARE SAFE TO CONTACT (IF NECESSARY)

NEC 2017 SUPPLEMENT, FORMAT 1

(6) SOLAR SYSTEM AC DISCONNECT 1 — 6" × 3"
WARNING: PHOTOVOLTAIC POWER SOURCE. DO NOT RELOCATE THIS OVERCURRENT DEVICE
OPERATING CURRENT: 732.8A
NOMINAL VOLTAGE: 208V
NEC 2017 690.54, 705.12(B)(2)(3)(b) NFPA 11.12.2.1.1, FORMAT 1

(7) SOLAR SYSTEM AC DISCONNECT 2 — 6" × 3"
WARNING: PHOTOVOLTAIC POWER SOURCE. DO NOT RELOCATE THIS OVERCURRENT DEVICE
OPERATING CURRENT: 317.6A
NOMINAL VOLTAGE: 480V
NEC 2017 690.54, 705.12(B)(2)(3)(b) NFPA 11.12.2.1.1, FORMAT 1

(8) SOLAR AC PANELBOARD — 5" × 3 1/4"
WARNING: SUPPLIED BY UTILITY & PV SOURCES.
OPERATING CURRENT: 317.6A
OPERATING VOLTAGE: 480V
DO NOT CONNECT NON-SOLAR LOADS TO THIS PANEL
NEC 2014 705.12(D)(3) & NEC 2017 705.12(B)(3), FORMAT 1

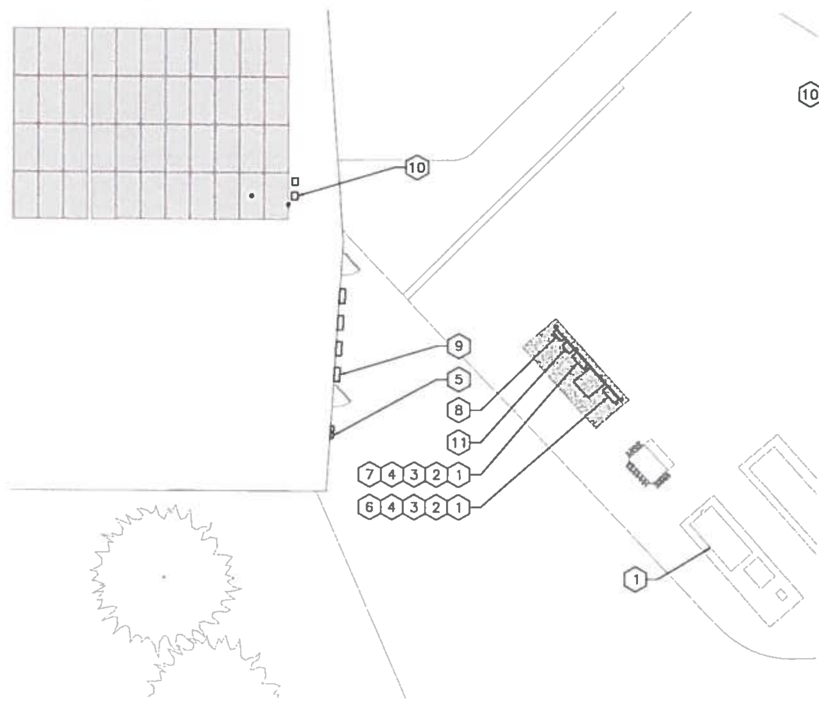
TYPICAL FOR INVERTER(S): 1–4 (12 STRINGS)

(9) INVERTER 1 — 6" × 3 1/4"
DC DISCONNECT
MAXIMUM CURRENT: 181.2A
MAXIMUM VOLTAGE: 880.3V
AC DISCONNECT
MAXIMUM AC OPERATING CURRENT: 79.4A
NOMINAL AC OPERATING VOLTAGE: 480V
NEC 2017 690.53, 690.54, NFPA 11.12.2.1.1 FORMAT 1

TYPICAL FOR RSD BOX(S): 1–11

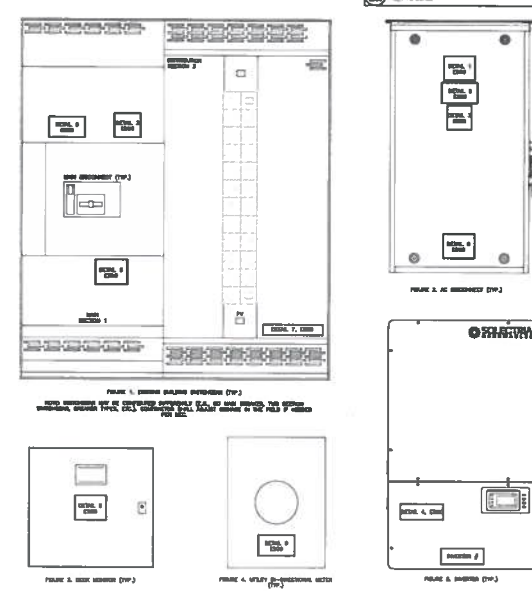
(10) RAPID SHUTDOWN BOX 1 — 6" × 3 1/2"
WARNING: ELECTRIC SHOCK HAZARD
DC DISCONNECT
MAXIMUM CURRENT: 20.40A
MAXIMUM VOLTAGE: 723.79V
FORMAT 1

(11) SOLAR ZREC METER — 6" × 3 1/2"
FORMAT 1



(1/E500) LABELS & SIGNAGE
SCALE: 1/8" = 10'-0"

THE MAIN SERVICE DISCONNECT IS LOCATED IN THE EXTERIOR MAIN SWITCHBOARD (1) MAIN SERVICE DISCONNECT SIGN	WARNING! ELECTRIC SHOCK HAZARD. TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION. (2) ELECTRIC SHOCK HAZARD SIGN	ALL UTILITY INTERACTIVE INVERTERS ARE WALL MOUNTED LOCATED AT GROUND LEVEL (3) INVERTER DIRECTORY SIGN
WARNING! ELECTRIC SHOCK HAZARD. TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION. DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT (4) ELECTRIC SHOCK HAZARD SIGN	INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED THE PHOTOVOLTAIC SYSTEM DISCONNECT IS LOCATED ON THE EXTERIOR OF THE BUILDING (5) PHOTOVOLTAIC DISCONNECT SIGN	PHONE NUMBER: EMAIL: (6) GREENSKIES EMERGENCY CONTACT INFORMATION
CAUTION! PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED (7) POWER SOURCE BACKFEED SIGN	CUSTOMER OWNED PRODUCTION METER 480Y/277V (8) DECK MONITORING/REC METER SIGN	WARNING! DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM (9) UTILITY BI-DIRECTIONAL METER SIGN
WARNING: SOLAR AC CIRCUIT 480Y/277V (10) AC RACEWAY LABEL	SOLAR PHOTOVOLTAIC POWER SOURCE LOCATED ON PREMISES (11) BUILDING FRONT SIGN	BROOKLYN ELEMENTARY SCHOOL (12) SIGN INSTALLED ON DRIVEWAY INTO SCHOOL



(2/E500) CLIENT REQUIRED LABELS
SCALE: NONE

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

DC SYSTEM SIZE:	332.640 kW
AC SYSTEM SIZE:	240.000 kW
MODULE TYPE:	PS385M-24/TH
MODULE QUANTITY:	864

PAGE SIZE 36" x 24"

GREENSKIES
180 JOHNSON STREET, MIDDLETOWN, CT 06457
WWW.GREENSKIES.COM

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5 MARINE VIEW PLAZA HOBOKEN, NJ
WWW.PUREPOWER.COM
RICHARD A. MAYS

DATE	REVISION DESCRIPTION	PM	DRG	CHK
04/24/2020	PERMIT SET (REV 1)	BK	SK	RB

DRAWING TITLE: LABELS & SIGNAGE
DRAWING #: E500

Phono Solar

TwinPlus Module

Perc/370-385W

Tier1 TOP

- PID Resistant
- Better shading tolerance
- More Reliable
- More Power

SINOMACH SUMEC
SUMEC GROUP CORPORATION

Phono Solar

YASKAWA

PVI 50TL & PVI 60TL

3-Ph Transformerless Commercial String Inverters

Features

Options

SOLECTRIA SOLAR

Specifications

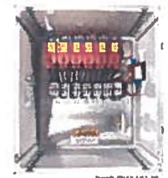
SOLECTRIA SOLAR

YASKAWA

DCSu-Volt Rapid Shutdown Solution

PRODUCT FEATURES

- Rated 600 VDC to 1,000 VDC
- 2 up to 12 Strings
- Load Break Contactors for Rapid Shutdown (NEC 690.12)
- Positive, and / or Negative Inputs
- Ground Strip included
- NEMA Type 3R or 4, 4X
- UL 508A Panels
- Control Circuit Lockout / Tag out
- Compatible with most Inverter Manufactures
- 24 VDC Control Circuit or 120 VAC
- Continuous Current Carry 80 Amps
- Make and Break, 20 Amps @ 1,000 VDC
- MC4 direct connector (option)
- Control Box with AC to DC Power Supply or DC to DC Power supply

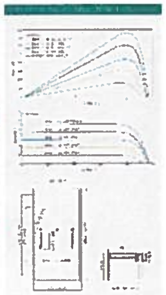


Product Part Number:	PV4X-U25-RS	PV4X-U45-RS	PV4X-U65-RS	PV4X-U85-RS	PV4X-U125-RS
Maximum Voltage:	1,000 VDC	1,000 VDC	1,000 VDC	1,000 VDC	1,000 VDC
Number of Input Circuits:	2	4	6	8	12
Number of Output Circuits:	2	4	6	8	12
Input Terminal Wire Size:	22 - 8 AWG	22 - 8 AWG	22 - 8 AWG	22 - 8 AWG	22 - 8 AWG
Output Terminal Wire Size:	22 - 8 AWG	22 - 8 AWG	22 - 8 AWG	22 - 8 AWG	22 - 8 AWG
Max Continuous Current:	50 AMPS	50 AMPS	50 AMPS	53 AMPS	53 AMPS
Enclosure Size:	12x10x6	12x10x6	14x12x8	16x14x8	N/A
Enclosure NEMA Type:	4X	4X	4X	4X	4X
Control Circuit Voltage:	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC

Remote Contactor Controller

Options:

- DC Main Power Disconnect
- Status Indicator Relays, DMS, LED's
- Contactor Common Buses
- Power Supply 120 – 240 VAC to 24 VDC
- Power Supply 48 VDC to 24 VDC



Phono Solar

DATE	REVISION DESCRIPTION	PM	ENG	CHK

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MIDDLETOWN, CT 06457
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PAGE SIZE 36" x 24"

PROJECT #

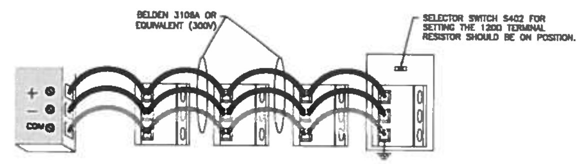
DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385M-24/TH
MODULE QUANTITY: 864

PROJECT 332.640 KW SOLAR ROOFTOP SYSTEM AT
BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

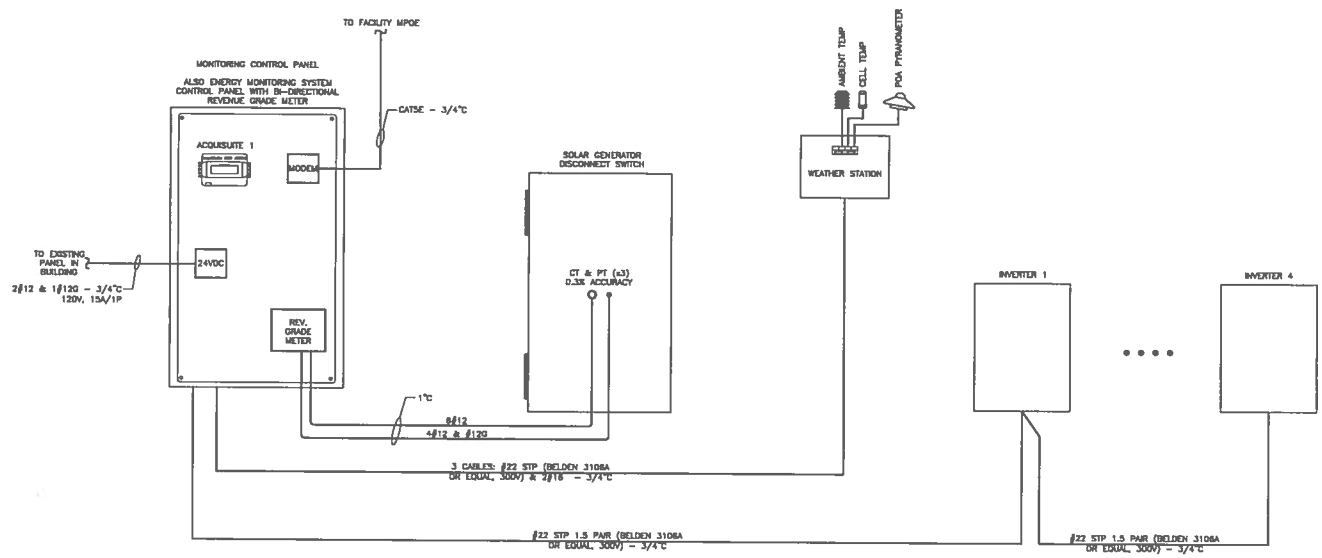
DRAWING TITLE
EQUIPMENT DATA SHEETS

DRAWING #
E600

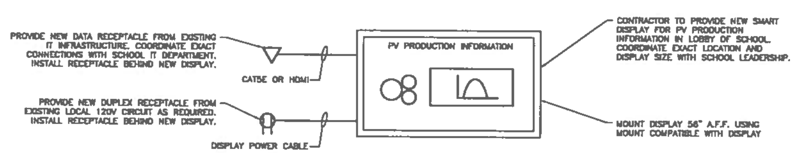
MONITORING NOTES:
1. REFER TO MONITORING SYSTEM INSTALLATION MANUAL FOR DETAILS ON TERMINAL BLOCKS, CABLE TERMINATIONS, AND SYSTEM CONFIGURATION.
3. PYRANOMETER MUST BE INSTALLED IN UNSHADED LOCATION.



8 MODBUS DETAIL
E700 SCALE: NONE



1 MONITORING SYSTEM
E700 SCALE: NONE



9 INFORMATIONAL DISPLAY
E700 SCALE: NONE

DATE	REVISION DESCRIPTION	PM	DWG	CHK
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Greenskies

PAGE SIZE: 36" x 24"
PROJECT #

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385M-24/TH
MODULE QUANTITY: 864
ORIENTATION: 10° TILT -74°/106°

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN ELEMENTARY SCHOOL
119 GORMAN ROAD

DRAWING TITLE: MONITORING SYSTEM WIRING DIAGRAM

DRAWING: E700

RULER IN INCHES:

PLOT DATE: 4/24/2020 1:43 PM

BROOKLYN MIDDLE SCHOOL

STATE PROJECT NUMBER 019-0032 PV

CONSTRUCTED IN PARTNERSHIP

STATE OF CONNECTICUT
NED LAMONT, GOVERNOR

DEPARTMENT OF ADMINISTRATIVE SERVICES
JOSH GEBALLE, COMMISSIONER

AND THE
BROOKLYN, CT
JOHN BERARD, BUILDING INSPECTOR
DOUGLAS KRAMER, FIRE MARSHALL
SUSAN STARKEY, HEALTH INSPECTOR
RICHARD IVES, ADA 504 COODINATOR

ENGINEER

PUREPOWER ENGINEERING
5 MARINE VIEW PLAZA, SUITE 301
HOBOKEN, NEW JERSEY, 07030

DEVELOPER

Greenskies
a Clean Focus company
180 JOHNSON STREET,
MIDDLETOWN, CT 06457

CONSTRUCTION MANAGER

Horton Electrical Services, LLC
CANTON BUSINESS PARK,
97 RIVER ROAD
CANTON, CT 06457

DRAWING TITLE: COVER SHEET

G00C

332.640 KW SOLAR ROOFTOP SYSTEM AT

BROOKLYN MIDDLE SCHOOL

019-0032 PV

119 GORMAN ROAD, BROOKLYN, CT 06234

LOCATION MAP
SCALE: 1" = 1000'-0"

SYSTEM PLAN
SCALE: 1" = 100'-0"

TOTAL SYSTEM SUMMARY:

TOTAL DC SYSTEM SIZE:	332.640 kWDC
AC SYSTEM SIZE:	240.000 kWAC
MODULE MANUFACTURER:	PHONO SOLAR
MODULE MODEL:	PS385MH-24/TH 385W
MODULES PER STRING:	18
MODULE QUANTITY:	864
STRING QUANTITY:	48
MODULE TILT:	5°
MODULE AZIMUTH:	18°
INVERTER MANUFACTURER:	SOLECTRIA RENEWABLES
INVERTER MODEL:	PVI-60TL
INVERTER QUANTITY:	4

SCOPE OF WORK SUMMARY

ROOFTOP PV ARRAY:
INSTALL SOLAR MODULES AND ROOFTOP BALLASTED RACKING SYSTEM ON TOP OF EXISTING BUILDING. INSTALL INVERTERS AND ELECTRICAL DISTRIBUTION EQUIPMENT AND INTERCONNECT AT EXISTING MAIN ELECTRICAL DISTRIBUTION EQUIPMENT.

SIGNATURES

JOHN BERARD, BUILDING INSPECTOR
860-779-3411 X18

DOUGLAS KRAMER, FIRE MARSHALL
860-779-3411 X32

SUSAN STARKEY, HEALTH INSPECTOR
860-774-7350

RICHARD IVES, ADA 504 COORDINATOR
860-779-3411 X11

DEVELOPER:

Greenskies
a Clean Focus company
180 JOHNSON STREET,
MIDDLETOWN, CT 06457

Horton Electrical Services, LLC
CANTON BUSINESS PARK,
97 RIVER ROAD
CANTON, CT 06457

ENGINEERED BY:

PUREPOWER ENGINEERING
5 MARINE VIEW PLAZA, SUITE 301
HOBOKEN, NEW JERSEY, 07030

DRAWING INDEX

		CONCEPTUAL DESIGN 03/13/2020	PERMIT SET 03/24/2020	PERMIT SET (REV 1) 04/24/2020		
GENERAL						
G000	COVER SHEET		●	○		
G001	TITLE SHEET	●	●	●		
G100	SITE PLAN	●	●	○		
G200	ARRAY PLAN		●	●		
G300	FIRE ACCESS PLAN		●	○		
ELECTRICAL						
E001	ELECTRICAL NOTES & SYMBOL LIST		●	○		
E100	OVERALL AC ELECTRICAL PLAN		●	○		
E200	DC ELECTRICAL PLAN		●	○		
E300	ONE LINE DIAGRAM	●	●	●		
E310	SCHEDULES & CALCULATIONS		●	○		
E401	GROUNDING DETAILS		●	○		
E402	ELECTRICAL DETAILS		●	○		
E403	ELECTRICAL DETAILS		●	○		
E500	LABELS & SIGNAGE		●	○		
E600	EQUIPMENT DATA SHEETS		●	○		
E700	MONITORING SYSTEM		●	●		

LEGEND:

UPDATED DRAWING ISSUED	●
UNCHANGED, PREVIOUSLY ISSUED DRAWING STILL CURRENT	○
DRAWING REMOVED FROM SET	X

DATE	REVISION DESCRIPTION	PM	ENG	CHK
04/24/2020	PERMIT SET (REV 1)	SK	SK	RI
03/24/2020	PERMIT SET	SK	PM	RI

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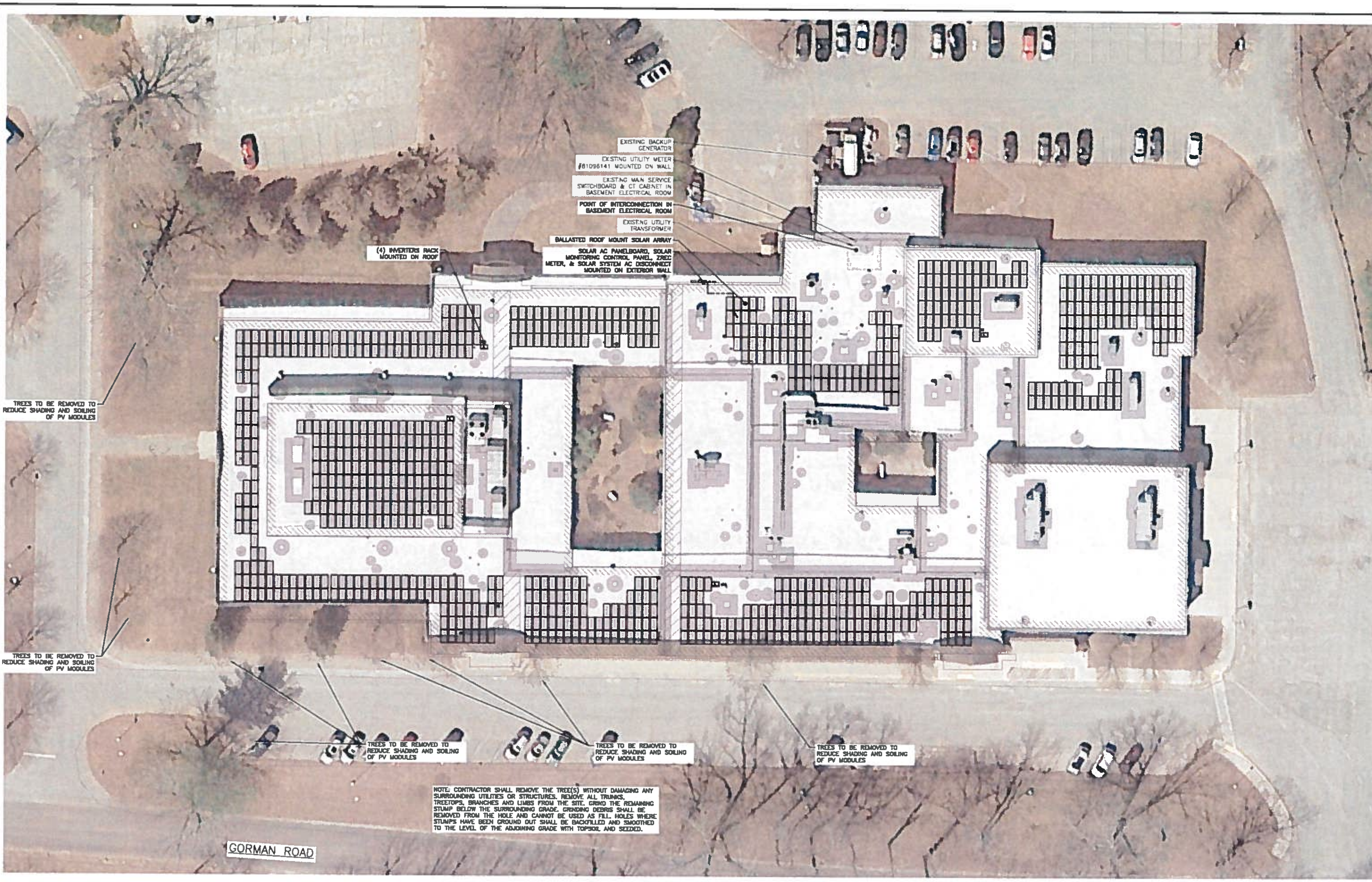
PAGE SIZE: 36" x 24"

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385MH-24/TH
MODULE QUANTITY: 864
ORIENTATION: 5° TILT 18° AZIMUTH

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL 119 GORMAN ROAD

DRAWING TITLE: TITLE SHEET

DRAWING #: G001



1 G100 SITE PLAN
SCALE: 1" = 30'-0"

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL
119 GORMAN ROAD

DC SYSTEM SIZE:	332.640 kW
AC SYSTEM SIZE:	240.000 kW
MODULE TYPE:	PS385MH-24/TH
MODULE QUANTITY:	864
ORIENTATION:	5° TILT 1R AZIMUTH

PAGE SIZE: 36" x 24"

PROJECT #

Greenskies

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DATE	REVISION DESCRIPTION	PM	ENG	CHK
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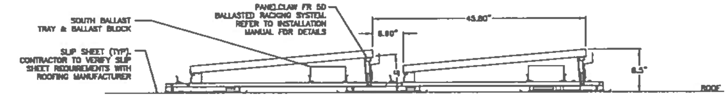
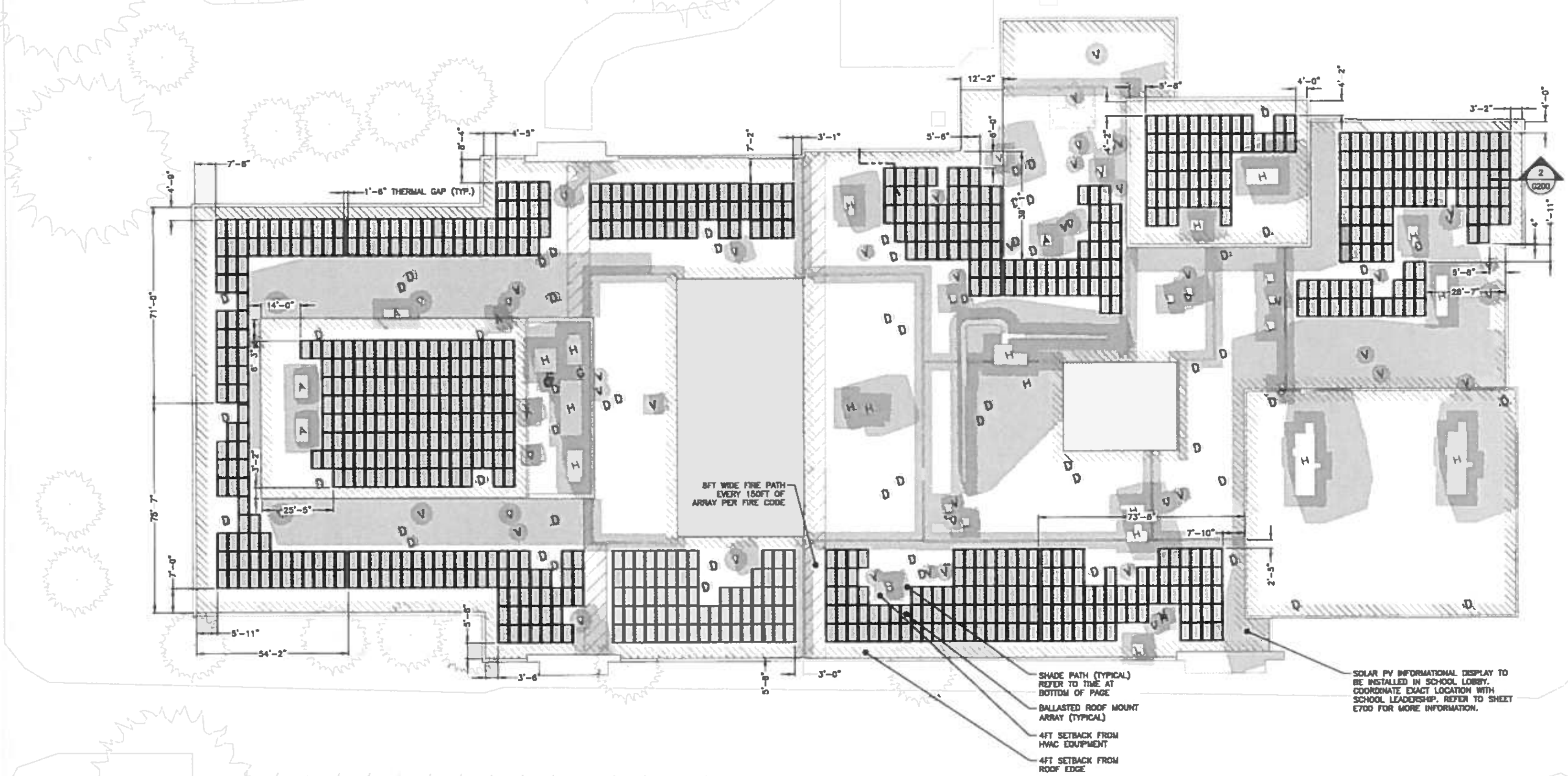
DRAWING TITLE: SITE PLAN

DRAWING #: G10C



2 RACKING DETAIL
G200 SCALE: NONE



IMPORTANT:
DO NOT STEP OR KNEEL ON PV MODULES

1 OVERALL ARRAY PLAN
G200 SCALE: 1" = 30'-0"

NOTE: DIMENSIONS ARE APPROXIMATE AND SHOWN TO RACKING RAILS.

SHADING ZONES:
WINTER: 10:00–2:00
SPRING: 9:00–3:00
SUMMER: 8:00–4:00

LEGEND (EXISTING ITEMS):
A ACCESS HATCH
D DRAIN
E EXPANSION JOINT
F FAN
G GAS PIPE
H HVAC
L SKYLIGHT
S SATELLITE DISH
V VENT

DATE	REVISION DESCRIPTION	PM	ENG	CHK
04/24/2020	PERMIT SET (REV 1)	SK	SK	RI

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WWW.GREENSKIES.COM

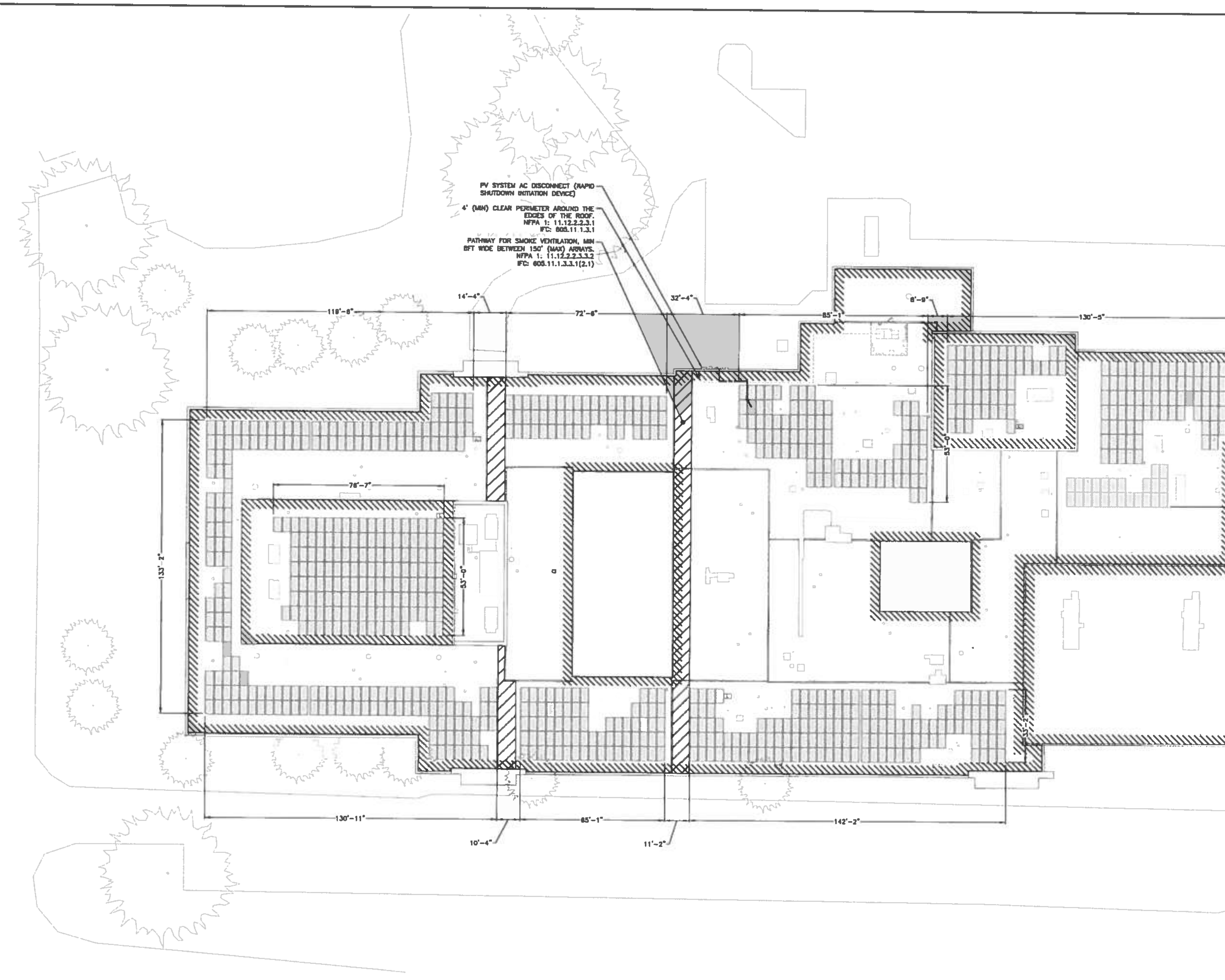
PAGE SIZE: 36" x 24"

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385MH 24/TH
MODULE QUANTITY: 864

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL
119 GORMAN ROAD

DRAWING TITLE: OVERALL ARRAY PLAN

DRAWING #: G200



1 G300 FIRE ACCESS PLAN – ROOF
SCALE: 1" = 30'-0"

NFPA 1 REQUIRED LABELS:

1. MAIN SERVICE DISCONNECT – THE LABEL "WARNING: PHOTOVOLTAIC POWER SOURCE" SHALL BE PERMANENTLY AFFIXED TO THE MAIN SERVICE DISCONNECT. LABEL SHALL BE RED WITH WHITE CAPITAL LETTERS AT LEAST 3/4" HIGH IN NONSERIF FONT. MATERIAL SHALL BE REFLECTIVE, WEATHER RESISTANT, AND SUITABLE FOR THE ENVIRONMENT. (NFPA 1: 11.12.2.1.1)
2. INVERTER DISCONNECTS – THE LABEL "PHOTOVOLTAIC DISCONNECT" SHALL BE AFFIXED TO EACH CIRCUIT BREAKER PANEL SERVING THE INVERTERS. LABEL SHALL BE CONTRASTING COLOR WITH CAPITAL LETTERS AT LEAST 3/8" HIGH IN NONSERIF FONT. THE LABEL SHALL BE CONSTRUCTED OF DURABLE ADHESIVE MATERIAL OR OTHER APPROVED MATERIAL. (NFPA 1: 11.12.2.1.2)
3. SOLAR RACEWAYS – THE LABEL "PHOTOVOLTAIC POWER SOURCE" SHALL BE RED WITH WHITE CAPITAL LETTERS AT LEAST 3/8" HIGH IN NONSERIF FONT. LABELS SHALL BE PERMANENTLY AFFIXED ON ALL EXPOSED RACEWAYS, CABLE TRAYS, PULL BOXES, AND JUNCTION BOXES. LABELS SHALL BE SPACED NO GREATER THAN 10 FEET APART. MATERIAL SHALL BE REFLECTIVE, WEATHER RESISTANT, AND SUITABLE FOR THE ENVIRONMENT. (NFPA 1: 11.12.2.1.3)
4. SEE DRAWING E500 FOR ADDITIONAL LABELS REQUIRED BY THE NATIONAL ELECTRICAL CODE.

DATE	REVISION DESCRIPTION	PM	DWG	CHK

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DEVELOPER: Greenskies

PAGE SIZE: 36" x 24"
PROJECT #

DC SYSTEM SIZE: 332.640 KW
AC SYSTEM SIZE: 240.000 KW
MODULE TYPE: PS355NH-24/TH
MODULE QUANTITY: 864
ORIENTATION: 5° TILT 18° AZIMUTH

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL
119 GORMAN ROAD

DRAWING TITLE: FIRE ACCESS PLAN

DRAWING #: G300

SOLAR PV GENERAL NOTES

1. INSTALL A COMPLETE AND OPERATIONAL SOLAR PHOTOVOLTAIC SYSTEM INCLUDING THE RECONNECTION OF ANY EXISTING ELECTRICAL EQUIPMENT DISTURBED DURING SOLAR PHOTOVOLTAIC ARRAY INSTALLATION.
2. THESE DRAWINGS ARE DIAGRAMMATIC AND SHOW THE GENERAL LOCATION AND ARRANGEMENT OF THE SOLAR PV SYSTEM. THEY DO NOT SHOW ALL MATERIALS NEEDED. CONTRACTOR IS REQUIRED TO PROVIDE ANY AND ALL CONDUITS, CONNECTORS, SWEEPS, SUPPORTS, BENDS, FITTINGS, HANGERS, COVER PLATES, AND ADDITIONAL PULL AND JUNCTION BOXES WHICH THE CONTRACTOR MUST PROVIDE TO COMPLETE THE SOLAR PV SYSTEM IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC).
3. THE DEFINITION OF ELECTRICAL TERMS USED SHALL BE AS DEFINED STATES' ADOPTED EDITION OF THE NEC.
4. THE TERM "SIZE" SHALL MEAN ONE OR MORE OF THE FOLLOWING: "LENGTH, CURRENT AND VOLTAGE RATING, NUMBER OF POLES, NEMA SIZE, AND OTHER SIMILAR ELECTRICAL CHARACTERISTICS".
5. CONTRACTOR IS REQUIRED TO SURVEY AND INSPECT ALL AREAS PRIOR TO PERFORMING SERVICES TO ENSURE CLEARANCES CAN BE MET AND NO INTERFERENCES EXIST. NO CUTTING OR DRILLING IS TO BE PERFORMED PRIOR TO LOCATING EXISTING STRUCTURAL MEMBERS AND UTILITIES.
6. SERVICE ENTRANCE RATED EQUIPMENT, C/T CABINETS, AND METER SOCKETS ARE TO BE APPROVED FOR USE BY THE LOCAL UTILITY COMPANY.
7. ELECTRICAL EQUIPMENT INSTALLED MUST BE LABELED, UL LISTED, AND INSTALLED ACCORDINGLY.
8. REQUIRED PERMITS AND INSPECTIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR AND MUST BE COORDINATED WITH THE AUTHORITY HAVING JURISDICTION (AHJ).
9. ALL WORK IS TO BE PERFORMED BY LICENSED WORKMEN AND COMPLETED IN ACCORDANCE WITH THE STATES' ADOPTED NEC.
10. ALL PENETRATIONS THROUGH FIRE AND SMOKE RATED PARTITIONS MUST BE SEALED WITH A FIRE RATED MATERIAL EQUIVALENT IN RATING TO THE PARTITION PENETRATED.
11. THE SOLAR PV SYSTEM EQUIPMENT ON THE DC SIDE IS RATED FOR 1000V AND IS IN COMPLIANCE WITH NEC 690.80. THE INVERTERS, MODULES, STRING FEEDERS, AND RELATED COMPONENTS ARE ALL RATED AND LABELED AS 1000V.
12. EMT CONDUIT IS ALLOWED IN EXTERIOR LOCATIONS WHEN RAIN-TIGHT CONNECTORS AND FITTINGS ARE USED, AND THE CONDUIT IS NOT EXPOSED TO ANY POTENTIAL PHYSICAL DAMAGE. ALL SUPPORTS, BOLTS, STRAPS, AND SCREWS SHALL BE CORROSION RESISTANT.
13. ALL RACEWAYS ARE TO BE METALLIC UNLESS OTHERWISE NOTED. APPLY AN ADHESIVE LABEL ALONG ALL RACEWAYS CARRYING PV SYSTEM FEEDERS (AC AND DC) AS "WARNING: PHOTOVOLTAIC POWER SOURCE". REFER TO DETAIL 15 ON E500. LABEL SHALL BE APPLIED EVERY 10', AT EVERY TURN, AND ABOVE AND BELOW ALL PENETRATIONS.
14. ALL CONDUCTORS SHALL BE LISTED FOR USE IN APPROPRIATE RACEWAY.
15. ALL BREAKERS INSTALLED AS PART OF THE NEW SOLAR PV SYSTEM MUST BE RATED FOR REVERSE FEED.
16. COMMUNICATIONS CABLES INSTALLED BETWEEN MONITORING EQUIPMENT AND CLIENT NETWORK EQUIPMENT (SWITCHES, ROUTERS, SERVERS, ETC.) SHALL HAVE A GREEN OUTER JACKET. CABLES SHALL HAVE CABLE TAGS INSTALLED AT BOTH ENDS OF CABLE TO SHOW PROPER IDENTIFICATION.
17. CONTRACTOR SHALL TORQUE TEST ALL FIELD TERMINATED WIRES PER MANUFACTURER'S SPECS AND PROVIDE PERMANENT MARKINGS ACROSS THE BOLT AND WASHER INDICATING ACHIEVED TORQUE.
18. BARE COPPER GROUND CONDUCTORS SHALL BE SIZED PER NEC. EQUIPMENT GROUNDING CONDUCTORS (EGC) SHALL BE INSTALLED IN CONDUIT.
19. POLARIS SPLICES SHALL NOT BE USED ON THIS PROJECT IN ANY CAPACITY. ANY SPLICES SHALL BE APPROVED BY GREENSKIES AND THE ENGINEER OF RECORD.
20. CONTRACTOR SHALL SUBMIT A FORMAL RFI (REQUEST FOR INFORMATION) FOR ANY CONFUSION OR DISCREPANCY ON THE DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR ANY INSTALLATION DEVIATIONS WITHOUT APPROVAL FROM GREENSKIES OR THE ENGINEER OF RECORD.
21. MOGUL LB CONDUIT BODIES SHALL NOT BE USED ON THIS PROJECT.
22. TEMPERATURE RATINGS OF ALL CONDUCTORS, TERMINATIONS, BREAKERS, OR OTHER DEVICES ASSOCIATED WITH THE SOLAR PV SYSTEM SHALL BE RATED FOR AT LEAST 75 DEGREE C.
23. ALL METALLIC CONDUITS SHALL HAVE BOND BUSHINGS ON BOTH ENDS AND EQUIPMENT GROUNDING CONDUCTORS (EGC) ROUTED THROUGH CONDUIT.
24. CONTRACTOR SHALL PROVIDE A SPARE SET OF FUSES FOR THE SOLAR AC DISCONNECT SWITCH.

PV ARRAY WORK NOTES

1. WORK INCLUDES INSTALLING PROPOSED SOLAR PANEL ARRAY ON TOP OF EXISTING ROOFING SYSTEM PER THE MANUFACTURERS INSTALLATION PROCEDURES AND INSTRUCTIONS, ALONG WITH ASSOCIATED ELECTRICAL WIRING.
2. WORK AREAS SHALL BE MARKED, FENCED, AND OTHERWISE SECURED SO AS TO PROVIDE PROPER PROTECTION FOR THE PUBLIC AND AS REQUIRED BY THE BUILDING INSPECTOR.
3. DIMENSION OF EXISTING ELEMENTS SHOWN WERE DETERMINED THROUGH A COMBINATION OF EXISTING DRAWINGS AND FIELD INVESTIGATIONS, AND SHOULD BE USED FOR INFORMATIONAL PURPOSES ONLY. ALL EXISTING CONDITIONS AND DIMENSIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR.
4. EXISTING ROOF FRAMING HAS BEEN VERIFIED BY STRUCTURAL ANALYSIS TO SUPPORT THE SUPERIMPOSED DEAD LOAD DUE TO THE SOLAR PANEL INSTALLATION.
5. ARRAY LAYOUT IS BASED ON A COMBINATION OF SHADING, STRINGING, AND WIND ZONE PLACEMENT ON THE ROOF. THE CONTRACTOR SHALL NOT DEVIATE FROM THE LAYOUT SHOWN WITHOUT APPROVAL FROM THE ENGINEER.
6. ELECTRICAL RUNS SHOWN ON PLAN REPRESENT THE PROPOSED LAYOUT. THE CONTRACTOR SHALL NOT RELOCATE INVERTERS OR PANELBOARDS WITHOUT APPROVAL FROM THE ENGINEER.
7. THE INSTALLER SHALL VERIFY THE PROJECT SOUTH DIRECTION IN THE FIELD, AND INSTALL THE MODULES AS INDICATED ON THE PLANS. THE MODULES SHALL BE INSTALLED AS TILTED TOWARDS THE GENERAL DIRECTION OF PROJECT SOUTH.
8. THE CONTRACTOR IS RESPONSIBLE FOR THE VERIFICATION AND INSTALLATION OF PADS OR SLIP SHEETS UNDERNEATH ANY EQUIPMENT SUPPORTS NOT ADHERED TO THE ROOF. SLIP SHEETS FOR DURABLOCK, AND RACKING ARE PROVIDED BY GREENSKIES.
9. MAINTAIN A CLEARANCE BETWEEN INVERTERS AND ROOFTOP EQUIPMENT OF AT LEAST 5'-0".
10. THE FRONT OF THE INVERTER SHALL NOT FACE PROJECT SOUTH. ORIENT THE INVERTER SUCH THAT IT IS FACING NORTH WHEN POSSIBLE. IF SPACE IS A LIMITING FACTOR THEN THE INVERTER SHALL BE ALLOWED TO FACE PROJECT EAST OR WEST.
11. NO CONDUCTOR OR CONNECTOR SHALL BE EXPOSED TO THE ELEMENTS OUTSIDE OF THE BOUNDARIES OF EACH SUB-ARRAY.
12. CONDUIT BETWEEN SUB-ARRAYS SHALL ENTER UNDERNEATH RACKING OR PENETRATE WINDSCREENS, WHERE APPLICABLE, IN ORDER TO PROTECT CONDUCTORS.
13. CONDUIT BETWEEN SUB-ARRAYS SHALL BE SECURED TO THE RACKING SYSTEM VIA CONDUIT CLAMPS.
14. CONTRACTOR SHALL ENSURE DC, AC, AND COMMUNICATION WIRING IS SECURED UNDERNEATH THE ARRAY AND OFF THE ROOFTOP MEMBRANE.
15. CONTRACTOR SHALL UTILIZE PVC OR NON-FLAMMABLE COATED STAINLESS STEEL CABLE TIES FOR WIRE MANAGEMENT. STANDARD NYLON/PLASTIC CABLE TIES ARE NOT ACCEPTABLE.

INVERTER INFORMATION

MANUFACTURER			SOLECTRIA	
MODEL			PVI 60TL	
ARC FAULT CIRCUIT INTERRUPTOR			INTEGRAL	
DC RATING				
V-MAX			1000V	
I-MAX OPERATING			114A	
AC RATING				
P-OUT			60.0kW	
V-NOM			480V 3PH	
I-OUT			79.4A	
CONFIGURATION			WYE + N	
DESIGN CRITERIA				
STRINGS PER INVERTER			12	
MODULES PER STRING			18	
MODULE WATTS			385	
MODULE QUANTITY			216	
INVERTER/COMBINER BOX WATTS (WDC)			83160	
INVERTER/COMBINER BOX CURRENT (ADC)			151.20	
INVERTER STRING FUSE SIZE (ADC)			20	
TRIP SETTINGS				
PROTECTIVE DEVICE		TRIP SETTING	VALUE	M
UNDER VOLTAGE - FAST	27-1	50%	240 V	0.16 SEC
UNDER VOLTAGE - SLOW	27-2	88%	422.4 V	2.0 SEC.
OVER VOLTAGE - SLOW	59-1	110%	528 V	1.00 SEC
OVER VOLTAGE - FAST	59-2	120%	576 V	0.16 SEC
UNDER-FREQUENCY	81-U	57.0 Hz	57.0 Hz	0.16 SEC
OVER-FREQUENCY	81-O	60.5 Hz	60.5 Hz	0.16 SEC

LEGEND – GENERAL

- LIGHT LINE INDICATES EXISTING OR BEYOND THE SCOPE OF PROJECT
- DARK LINE INDICATES NEW OR WITHIN THE SCOPE OF PROJECT
- DASHED LINE INDICATES EQUIPMENT AT A DIFFERENT ELEVATION
- EXISTING TEXT — LIGHT TEXT INDICATES EXISTING OR BEYOND THE SCOPE OF PROJECT
- NEW TEXT — DARK TEXT INDICATES NEW OR WITHIN THE SCOPE OF PROJECT

LEGEND – PLAN SYMBOLS

- SOLAR MODULE
- RACEWAY TURNING UP OR TOWARDS OBSERVER
- RACEWAY TURNING DOWN OR AWAY FROM OBSERVER
- CABLE TRAY
- P OR P — PULLBOX
- J OR J — JUNCTION BOX
- PANEL BOARD
- LOCAL DISCONNECT SWITCH
- SIMPLEX RECEPTACLE, RATED: 125-VOLTS AC, 20A
- DUPLEX RECEPTACLE, RATED: 125-VOLTS AC, 20A
- W — WEATHERPROOF DUPLEX RECEPTACLE, RATED: 125-VOLTS AC, 20A
- GFCI — GROUND FAULT CIRCUIT INTERRUPTER DUPLEX RECEPTACLE, RATED: 125-VOLTS AC, 20A
- DOUBLE DUPLEX (QUAD) RECEPTACLE
- CEILING/PENDANT-MOUNT LIGHT, SEE FIXTURE SCHEDULE FOR TYPE
- WALL-MOUNT LIGHT, SEE FIXTURE SCHEDULE FOR TYPE
- GROUND ROD
- GROUND ROD W/ TEST WELL

LEGEND – ONE LINE DIAGRAM AND WIRING DIAGRAM SYMBOLS

- CIRCUIT BREAKER, FRAME SIZE AND TRIP SETTING AS NOTED
- DISCONNECT SWITCH
- INVERTER
- BUS CONNECTION POINT
- CROSSING POINT (NO CONNECTION)
- NORMALLY CLOSED – NORMALLY OPEN CONTACTS
- TRANSFORMER CONTROL/POWER, SIZE AND RATING AS NOTED
- CURRENT TRANSFORMER
- POTENTIAL TRANSFORMER
- FUSE, SIZE/RATING AS NOTED
- FUSED DISCONNECT SWITCH
- EARTH GROUND
- NO NO — PUSHBUTTON SWITCHES; NUMBER AND TYPE OF CONTACT BLOCKS MAY VARY
- NO NC — PUSHBUTTON SWITCHES MUSHROOM HEAD; NUMBER AND TYPE OF CONTACT BLOCKS MAY VARY
- K — KEYED INTERLOCK (KIRK KEY OR EQ.)
- ST — SHUNT TRIP COIL

ABBREVIATIONS

A	AMPERES
AF	AMPERE FRAME
A.F.F.	ABOVE FINISH FLOOR
A.F.G.	ABOVE FINISH GRADE
AFDI	ARC FAULT DETECTION & INTERRUPTER
AIC	AMPS INTERRUPTING CAPACITY
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BKR	CIRCUIT BREAKER
C	CONDUIT
CB	COMBINER BOX
CKT	CIRCUIT
CP	CONTROL PANEL
CU	COPPER
DISC	DISCONNECT
EGC	EQUIPMENT GROUNDING CONDUCTOR
ELEC	ELECTRIC, ELECTRICAL
EMERG	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
EQUIP	EQUIPMENT
EXIST	EXISTING
G, GND	GROUND
GEC	GROUNDING ELECTRODE CONDUCTOR
GFCI	GROUND-FAULT CIRCUIT INTERRUPTER
GFPE	GROUND-FAULT PROTECTION OF EQUIPMENT
HID	HIGH-INTENSITY DISCHARGE (LIGHTING)
HZ	HERTZ
IMC	INTERMEDIATE METALLIC CONDUIT
kAIC	1000 AMPS INTERRUPT CAPACITY
kCMIL	1000 CIRCULAR MILLS
kVA	KILO-VOLT AMPERE
kW	KILOWATT
LA	LIGHTNING & SURGE ARRESTOR
LED	LIGHT-EMITTING DIODE
LSIG	LONG, SHORT, INSTANTANEOUS, & GROUND FAULT
LTG	LIGHTING
MAX	MAXIMUM
MFG	MANUFACTURER
MLO	MAIN LUGS ONLY
MPPT	MAXIMUM POWER POINT TRACKING
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NTS	NOT TO SCALE
P	POLE
PF	POWER FACTOR
PLC	PROGRAMMABLE LOGIC CONTROLLER
POI	POINT OF INTERCONNECTION
PRI	PRIMARY
PVC	POLYVINYL CHLORIDE
PWR	POWER
RCPT	RECEPTACLE
RGS	RIGID GALVANIZED STEEL CONDUIT
RMC	RIGID METAL CONDUIT
SA	SURGE ARRESTOR
SEC	SECONDARY
SPD	SURGE PROTECTION DEVICE
SSBJ	SUPPLY SIDE BONDING JUMPER
ST	SHUNT TRIP
STP	SHIELDED TWISTED PAIR
SW	SWITCH
TBD	TO BE DETERMINED
TP	TWISTED PAIR
TYP	TYPICAL
V	VOLT
VA	VOLT-AMPERE
W	WATT
WP	WEATHERPROOF
XFMR	TRANSFORMER
ø	DIAMETER OR PHASE

NOTES SPECIFIC TO CONNECTICUT

ADOPTED NEC VERSION: 2017

UTILITY: EVERSOURCE

UTILITY DISCONNECT SWITCH REQUIREMENTS:
AN EXTERNAL DISCONNECT AT THE PCC OR AT ANOTHER MUTUALLY AGREEABLE POINT THAT IS ACCESSIBLE TO COMPANY PERSONNEL AT ALL HOURS OF ALL DAYS AND THAT CAN BE OPENED FOR ISOLATION IF REQUIRED. THE SWITCH SHALL BE GANG OPERATED, HAVE A VISIBLE AIR GAP BETWEEN SWITCH CONTACTS, BE RATED TO INTERRUPT THE MAXIMUM GENERATOR OUTPUT AND BE CAPABLE OF BEING LOCKED OPEN, TAGGED AND GROUNDED ON COMPANY SIDE BY COMPANY PERSONNEL. THIS DEVICE MAY BE OPERATED MANUALLY, REMOTELY OR THROUGH THE OPERATION OF A COMPANY TRANSFER TRIP SCHEME.

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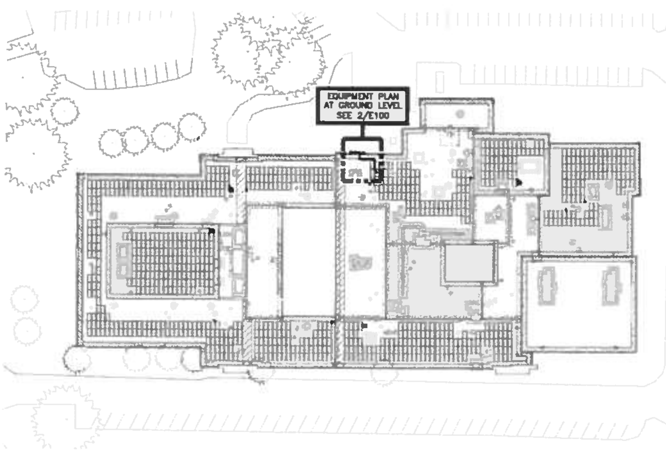
DEVELOPER: Greenskies

DATE	REVISION DESCRIPTION / PM / ENG / CHK
PAGE SIZE	36" x 24"
PROJECT #	
DC SYSTEM SIZE:	332.640 kW
AC SYSTEM SIZE:	240.000 kW
MODULE TYPE:	PS385MH-24/TH
MODULE QUANTITY:	864
ORIENTATION:	5° TILT 1?° AZIMUTH

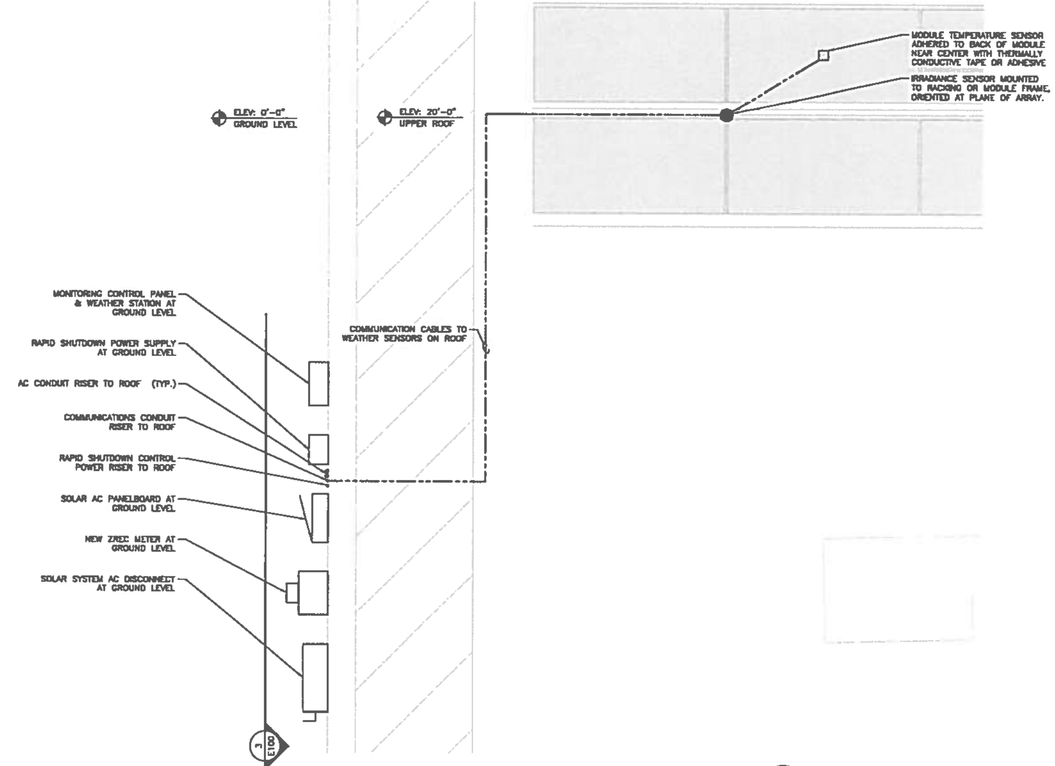
PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL
119 GORMAN ROAD

DRAWING TITLE: ELECTRICAL NOTES & SYMBOL LIST

DRAWING #: E001

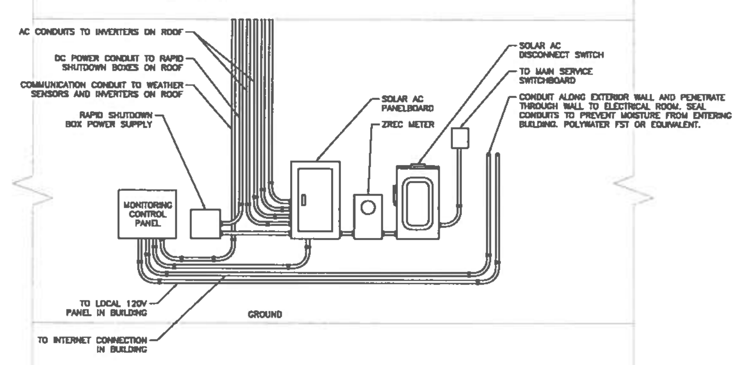


1 E100 OVERALL AC ELECTRICAL PLAN
SCALE: 1" = 60'-0"



2 E100 EQUIPMENT PLAN AT GROUND LEVEL
SCALE: 1/2" = 1'-0"

NOTES:
1. ELECTRICAL EQUIPMENTS LOCATED OUTSIDE AND ON THE ROOF MUST NOT HAVE CONDUITS PENETRATING ON TOP OF THE EQUIPMENT.
2. CONDUITS SHALL NOT PROTRUDE MORE THAN 6" INTO WORKING SPACE OF EQUIPMENT.
3. MOUNT EQUIPMENT AS PER INSTALLATION MANUAL INSTRUCTION.
4. ELECTRICAL EQUIPMENT MOUNTED WITH UNISTRUT CHANNEL. USE FASTENER SPECIFICALLY INTENDED FOR THE WALL TYPE & CONSTRUCTION. MOUNT EQUIPMENT AS PER INSTALLATION MANUAL.
5. DECK MONITOR SHOULD NOT HAVE CONDUITS PENETRATING ON THE SIDES AND TOP. THIS RESULTS IN VOIDING THE WARRANTY.



3 E100 ELECTRICAL AREA ELEVATION
SCALE: 1/2" = 1'-0"

DATE	REVISION DESCRIPTION	PM	DWG	CHK

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DEVELOPER: Greenskies

PAGE SIZE: 36" x 24"

PROJECT #

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385MH-24/TH
MODULE QUANTITY: 864
ORIENTATION: 5° TILT 18° AZIMUTH

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL
119 GORMAN ROAD

DRAWING TITLE: AC ELECTRICAL PLAN

DRAWING #: E100

RULER IN INCHES:

PLOT DATE: 4/28/2020 11:14 AM

NEC 690.12 RAPID SHUTDOWN

GOAL OF "RAPID SHUTDOWN" OF PV SYSTEMS ON BUILDINGS:
IN THE EVENT OF AN EMERGENCY, THE EMERGENCY RESPONDERS CAN INITIATE THE RAPID SHUTDOWN DEVICE, THEN MOVE AROUND THE ROOF KNOWING ANY AREAS WITHIN 1' OF AN ARRAY MAY BE ENERGIZED, AND AS LONG AS THEY REMAIN GREATER THAN 1' FROM A PV ARRAY ANY CONDUCTORS THEY ENCOUNTER WILL BE DE-ENERGIZED.

PER NEC 690.12, PV SYSTEM CIRCUITS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH THE FOLLOWING:

1. RAPID SHUTDOWN INITIATION DEVICE IS THE AC "SOLAR SYSTEM AC DISCONNECT"
2. RAPID SHUTDOWN IS INITIATED BY MOVING THE HANDLE OF THE SOLAR SYSTEM AC DISCONNECT SWITCH TO THE OFF POSITION.
3. "CONTROLLED CONDUCTORS" ARE AC & DC PV SYSTEM CONDUCTORS OF MORE THAN 1' FROM A PV ARRAY.
4. WITHIN 30 SECONDS OF RAPID SHUTDOWN INITIATION, "CONTROLLED CONDUCTORS" SHALL BE LIMITED TO NOT MORE THAN 30V.
5. DC CONTROLLED CONDUCTORS:
   - a. STRING WIRING PLAN SHOWS THE BOUNDARY INDICATING ALL AREAS 1' OR LESS FROM A PV ARRAY.
   - b. PER THE DEFINITION OF "ARRAY" IN 690.2, AN ARRAY IS A MECHANICALLY INTERGRATED ASSEMBLY OF PANELS, SUPPORT STRUCTURE, AND OTHER COMPONENTS REQUIRED TO FORM AN AC POWER PRODUCING UNIT. SPECIFICALLY, THIS INCLUDES MODULES, RACKING, BALLAST, INVERTERS AND RAPID SHUT DOWN DISCONNECTS.
   - c. NO DC CONDUCTORS MAY EXTEND OUTSIDE THE 1' BOUNDARIES, UNLESS A RAPID SHUTDOWN COMBINER BOX IS USED (SEE DETAIL ON THIS PAGE)
   - d. BY PLACING INVERTERS WITHIN 1' OF ARRAY, THE DC CONTROLLED CONDUCTORS WILL INHERENTLY NOT EXTEND BEYOND 1' FROM THE ARRAY.
   - e. IF CONTRACTOR ENCOUNTERS A SITUATION WHERE THEY NEED TO RUN DC STRINGS MORE THAN 1' FROM A PV ARRAY, INSTALLER TO CONTACT PURE POWER ENGINEERING FOR GUIDANCE IN MAINTAINING CODE COMPLIANCE.
5. AC CONTROLLED CONDUCTORS
   - a. BY MOVING THE SOLAR SYSTEM AC DISCONNECT SWITCH TO THE OFF POSITION, AC VOLTAGE AND CURRENT WILL BE REMOVED FROM THE CONDUCTORS.
   - b. INVERTER MUST DISCHARGE AC LINE CAPACITORS WITHIN 30 SECONDS TO NOT MORE THAN 30V.
7. THE RAPID SHUTDOWN INITIATION DEVICE (SOLAR SYSTEM AC DISCONNECT) SHALL BE LABELED IN ACCORDANCE WITH 690.56(B). SEE THE E500 SERIES OF SHEETS IN THIS DRAWING PACKAGE FOR ADDITIONAL DETAILS ON LABELING.

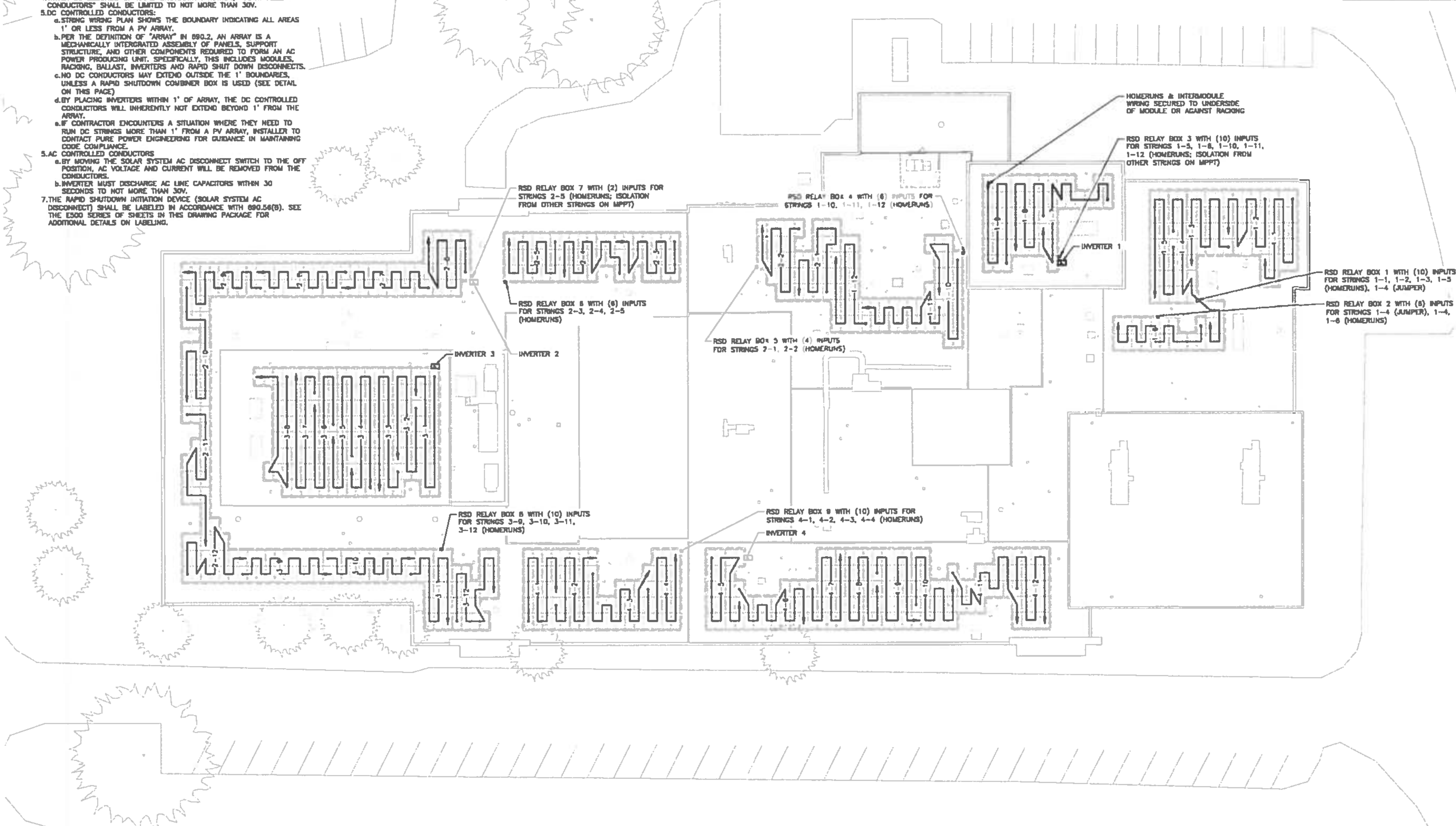
RAPID SHUTDOWN EQUIPMENT SUMMARY

Type	Box Quantity
PV4X-U2S-RS	0
PV4X-U4S-RS	2
PV4X-U8S-RS	3
PV4X-U10S-RS	4

CONDUIT FILL TABLE		
MAXIMUM NUMBER OF CU #10 WIRES (PV WIRE + GROUND)		
CONDUIT TRADE SIZE	CONDUIT LENGTH 24" OR LESS (60% FILL)	CONDUIT LENTH OVER 24" (40% FILL)
3/4"	6	4
1"	9	6
1.25"	16	11
1.5"	23	15
2"	37	25
2.5"	40	40
3"	40	40
3.5"	40	40
4"	40	40
TABLE ASSUMING EMT CONDUIT AND CU #10 PV WIRE WITH 0.26in O.D., 0.96 TEMP. DERATE		
PV SOURCE CIRCUIT WITH 10.08A SHORT CIRCUIT CURRENT, 1 IN PARALLEL, AND 20A FUSES		

STRING SUMMARY

String #	Module Quantity
1-1	18
1-2	18
1-3	18
1-4	18
1-5	18
1-6	18
1-7	18
1-8	18
1-9	18
1-10	18
1-11	18
1-12	18
2-1	18
2-2	18
2-3	18
2-4	18
2-5	18
2-6	18
2-7	18
2-8	18
2-9	18
2-10	18
2-11	18
2-12	18
3-1	18
3-2	18
3-3	18
3-4	18
3-5	18
3-6	18
3-7	18
3-8	18
3-9	18
3-10	18
3-11	18
3-12	18
4-1	18
4-2	18
4-3	18
4-4	18
4-5	18
4-6	18
4-7	18
4-8	18
4-9	18
4-10	18
4-11	18
4-12	18



IMPORTANT
CONTRACTOR MUST REDLINE DRAWINGS TO REFLECT EXACT AS-BUILT STRINGING AND RETURN TO PURE POWER.

1 / E200 DC ELECTRICAL PLAN - ROOF
SCALE: 1" = 80'-0"

STRING LABEL KEY
2-3
STRING #
INVERTER #

DATE	REVISION DESCRIPTION	PV	ENG	CHK

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PAGE SIZE: 36" x 24"
PROJECT #

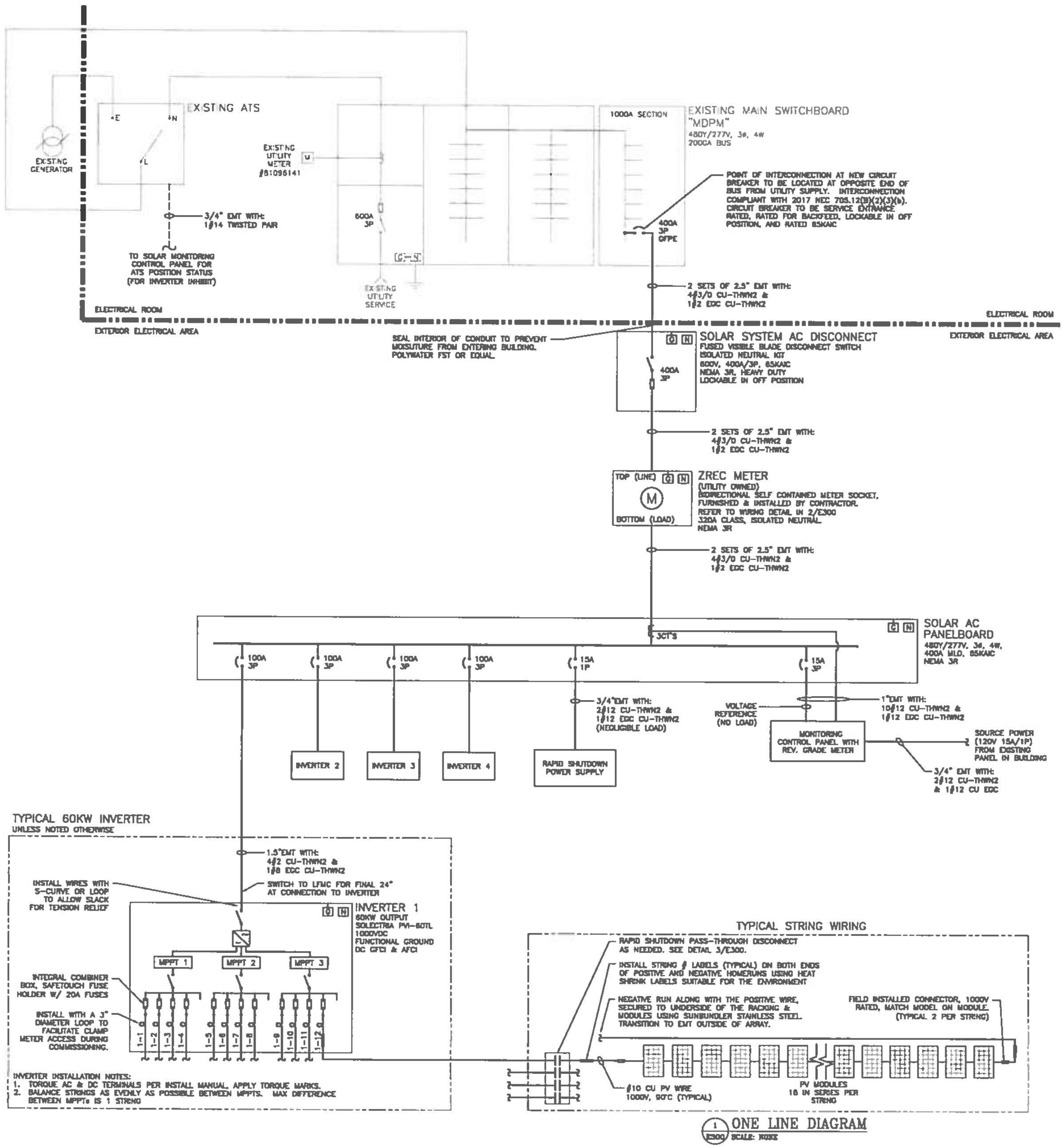
DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385MH-24/TH
MODULE QUANTITY: 864
ORIENTATION:

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL
119 GORMAN ROAD

DRAWING TITLE: DC ELECTRICAL PLAN

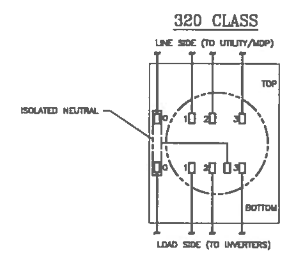
DRAWING #: E200

RULER IN INCHES:

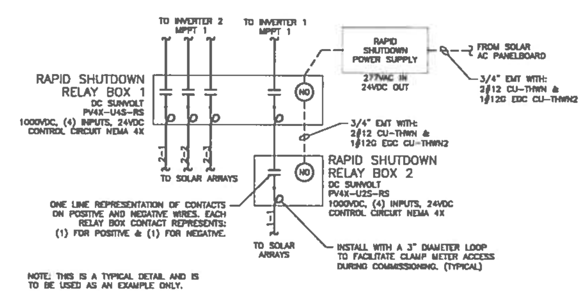


1/E300 ONE LINE DIAGRAM
SCALE: NONE

SYSTEM SUMMARY	
DC SYSTEM SIZE	332.64 KW
AC SYSTEM SIZE	240.00 KW
MODULE	PS385MH-24/TH
MODULE QTY	864
INVERTER	SOLECTRIA PVI-60TL
INVERTER QTY	4
AZIMUTH / TILT	18° / 5°
UTILITY	EVERSOURCE



2/E300 16S SOCKET WIRING DIAGRAM



NOTE: THIS IS A TYPICAL DETAIL AND IS TO BE USED AS AN EXAMPLE ONLY.

3/E300 TYPICAL RAPID SHUTDOWN DETAIL
SCALE: NONE

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL
119 GORMAN ROAD

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385MH-24/TH
MODULE QUANTITY: 864
ORIENTATION: 5° TILT 18° AZIMUTH

PAGE SIZE: 36" x 24"

DEVELOPER: Greenskies
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DATE	REVISION DESCRIPTION	PW	CHD	CHK
04/24/2020	PERMIT SET (REV 1)	SK	SK	RI
03/24/2020	PERMIT SET	SK	PW	RI

DRAWING TITLE: ONE LINE DIAGRAM

DRAWING: E300

RULER IN INCHES:

AC FEEDER CALCULATIONS

EQUIPMENT SUPPLIED	FED FROM	VOLTAGE	FULL LOAD AMPS "FLA"	FLA x 1.25	OCPD SIZE	GROUND SIZE	CONDUCTORS PER PHASE	CONDUCTOR SIZE	75° AMPACITY	C.O.U DERATE AMBIENT TEMP	C.O.U. DERATE CONDUIT FILL	90° AMPACITY WITH C.O.U.	FEEDER LENGTH (FEET)	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
SOLAR AC DISCONNECT SWITCH	POINT OF INTERCONNECTION	480	317.6	397.0	400	CU #2	2	CU #3/0	400	0.96	1.00	432.0	120	0.54%	0.54%
ZREC METER	SOLAR AC DISCONNECT SWITCH	480	317.6	397.0	400	CU #2	2	CU #3/0	400	0.96	1.00	432.0	10	0.05%	0.59%
SOLAR AC PANELBOARD	ZREC METER	480	317.6	397.0	400	CU #2	2	CU #3/0	400	0.96	1.00	432.0	10	0.05%	0.63%
INVERTER 1	SOLAR AC PANELBOARD	480	79.4	99.3	100	CU #6	1	CU #2	115	0.96	1.00	124.8	205	1.27%	1.81%
INVERTER 2	SOLAR AC PANELBOARD	480	79.4	99.3	100	CU #6	1	CU #2	115	0.96	1.00	124.8	175	1.00%	1.64%
INVERTER 3	SOLAR AC PANELBOARD	480	79.4	99.3	100	CU #6	1	CU #2	115	0.96	1.00	124.8	250	1.43%	1.87%
INVERTER 4	SOLAR AC PANELBOARD	480	79.4	99.3	100	CU #6	1	CU #2	115	0.96	1.00	124.8	180	1.03%	1.67%

AVERAGE AC VOLTAGE DROP FROM POI TO INVERTERS: 1.78%

INVERTERS 1 THRU 4

STRING NUMBER	STRING TO INVERTER WIRE GAUGE	STRING TO INVERTER IMPEDANCE (Ω/ft)	STRING DISTANCE (FEET)	STRING VOLTAGE DROP
1-1	#10	0.00124	365	1.17%
1-2	#10	0.00124	355	1.17%
1-3	#10	0.00124	325	1.07%
1-4	#10	0.00124	315	1.03%
1-5	#10	0.00124	305	1.00%
1-6	#10	0.00124	265	0.87%
1-7	#10	0.00124	275	0.90%
1-8	#10	0.00124	260	0.85%
1-9	#10	0.00124	245	0.80%
1-10	#10	0.00124	200	0.66%
1-11	#10	0.00124	185	0.61%
1-12	#10	0.00124	160	0.53%
2-1	#10	0.00124	365	1.20%
2-2	#10	0.00124	350	1.15%
2-3	#10	0.00124	300	0.98%
2-4	#10	0.00124	265	0.87%
2-5	#10	0.00124	250	0.82%
2-6	#10	0.00124	210	0.69%
2-7	#10	0.00124	175	0.57%
2-8	#10	0.00124	140	0.46%
2-9	#10	0.00124	115	0.38%
2-10	#10	0.00124	90	0.30%
2-11	#10	0.00124	55	0.18%
2-12	#10	0.00124	15	0.05%
3-1	#10	0.00124	210	0.69%
3-2	#10	0.00124	215	0.71%
3-3	#10	0.00124	225	0.74%
3-4	#10	0.00124	235	0.77%
3-5	#10	0.00124	245	0.80%
3-6	#10	0.00124	250	0.82%
3-7	#10	0.00124	260	0.85%
3-8	#10	0.00124	265	0.87%
3-9	#10	0.00124	325	1.07%
3-10	#10	0.00124	295	0.97%
3-11	#10	0.00124	270	0.89%
3-12	#10	0.00124	265	0.87%
4-1	#10	0.00124	355	1.17%
4-2	#10	0.00124	340	1.12%
4-3	#10	0.00124	325	1.07%
4-4	#10	0.00124	305	1.00%
4-5	#10	0.00124	280	0.82%
4-6	#10	0.00124	260	0.85%
4-7	#10	0.00124	235	0.77%
4-8	#10	0.00124	225	0.74%
4-9	#10	0.00124	205	0.67%
4-10	#10	0.00124	195	0.64%
4-11	#10	0.00124	175	0.57%
4-12	#10	0.00124	150	0.48%
AVERAGE STRING VOLTAGE DROP				0.80%

SOLECTRIA PVI 60TL

INVERTER SPECIFICATIONS	
RATED AC OUTPUT POWER	60,000 W
NOMINAL AC OUTPUT VOLTAGE	480Y/277 V
MAX. AC OUTPUT CURRENT	79.4 A
INVERTER PROTECTIVE SETTINGS	
PARAMETERS	SET AT
AC FREQUENCY RANGE	57 Hz – 63 Hz (DEFAULT)
AC VOLTAGE RANGE	422.4 V – 528 V (DEFAULT)
POWER FACTOR	>0.99 (DEFAULT)
OVERFREQUENCY TRIP TIME	0.16S (DEFAULT)
UNDERFREQUENCY TRIP TIME	0.16S (DEFAULT)
OVERVOLTAGE TRIP TIME (FAST)	0.16S (DEFAULT)
OVERVOLTAGE TRIP TIME (SLOW)	1.0S (DEFAULT)
UNDERVOLTAGE TRIP TIME (FAST)	0.16S (DEFAULT)
UNDERVOLTAGE TRIP TIME (SLOW)	2.0S (DEFAULT)

DC STRING WIRING CALCULATION	
STRING ISC (AMPS)	10.08
MAXIMUM CIRCUIT CURRENT (AMPS)	12.60
1.25x MAX CIRCUIT CURRENT (AMPS)	15.75
MAX # OF WIRES PER CONDUIT	40
CONDUIT FILL DERATE	0.4
MAX AMBIENT TEMPERATURE	32
TEMPERATURE DERATE	0.96
WIRE GAUGE	CU #10
75DEG AMPACITY WITHOUT COU ADJUSTEMENT (AMPS)	35
IS 75 DEG AMPACITY WITHOUT COU ADJUSTEMENT >= 1.25x MAX CIRCUIT CURRENT?	YES. COMPLIES WITH 690.8(B)(1)
90DEG AMPACITY WITH COU ADJUSTMENT (AMPS)	15.36
IS 90DEG AMPACITY WITH COU ADJUSTMENT >= 1.0x MAX CIRCUIT CURRENT?	YES. COMPLIES WITH 690.8(B)(2)
PV SOURCE CIRCUIT FUSE RATING (AMPS)	20
AVAILABLE FAULT CURRENT FROM ALL PARALLEL SOURCES (AMPS)	12.6
IS FUSE RATING >= 1.25x MAX CIRCUIT CURRENT?	YES. COMPLIES WITH 690.9(B)

NOTE: DISTANCES ARE ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS, CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

MODULE SPECIFICATIONS	
Make/Model	PS385MH-25/TH
Power [W]	385
Isc [A]	10.08
Imp [A]	9.58
Voc [V]	48.00
Vmp [V]	40.21
β Voc [%/degC]	-0.306%
SITE CLIMATE CRITERIA	
Ashrae High [deg C]	32
Ashrae Low [deg C]	-19
STRING SPECIFICATIONS AT STC	
Modules/String	18
Power [W]	6930
String Isc [A]	10.08
String Imp [A]	9.58
String Vmp [A]	723.78
STRING MAX VOLTAGE CALCULATION	
Voc Temp Adjustment @ -19 deg C	1.1346
Voc @ -19 deg C [V]	54.46
Max String Voc [V]	980.3

DATE	REVISION DESCRIPTION	PM	ENG	CHK

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PAGE SIZE: 36" x 24"

PROJECT #

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385MH-24/TH
MODULE QUANTITY: 864

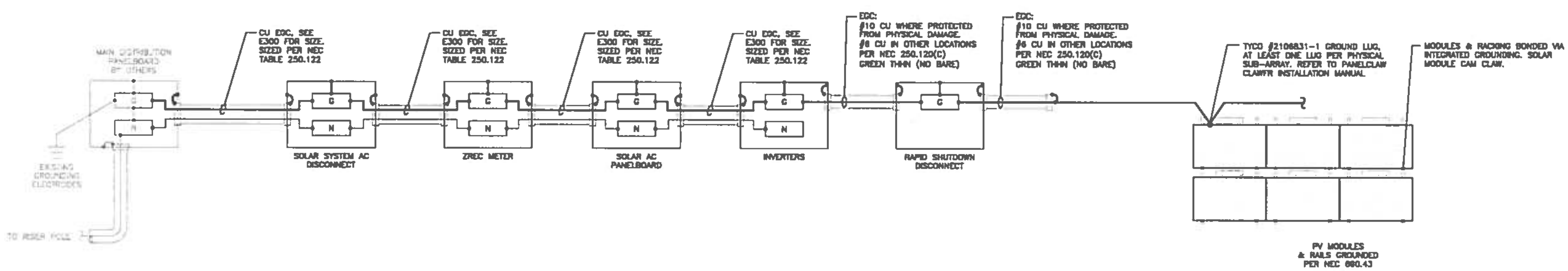
PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL
119 GORMAN ROAD

DRAWING TITLE: SCHEDULES & CALCULATIONS

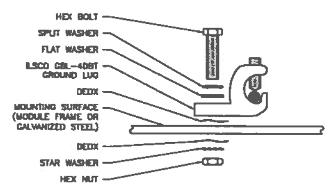
DRAWING: E310

RULER IN INCHES:

NEC 250.64(E) – ENCLOSURES FOR GROUNDING ELECTRODE CONDUCTORS
FERROUS METAL ENCLOSURES FOR GROUNDING ELECTRODE CONDUCTORS SHALL BE ELECTRICALLY CONTINUOUS FROM THE POINT OF ATTACHMENT TO CABINETS OR EQUIPMENT TO THE GROUNDING ELECTRODE AND SHALL BE SECURELY FASTENED TO THE GROUND CLAMP OR FITTING. NONFERROUS METAL ENCLOSURES SHALL NOT BE REQUIRED TO BE ELECTRICALLY CONTINUOUS. FERROUS METAL ENCLOSURES THAT ARE NOT PHYSICALLY CONTINUOUS FROM CABINETS OR EQUIPMENT TO THE GROUNDING ELECTRODE SHALL BE MADE ELECTRICALLY CONTINUOUS BY BONDING EACH END OF THE RACEWAY OR ENCLOSURE TO THE GROUNDING ELECTRODE CONDUCTOR. BONDING METHODS IN COMPLIANCE WITH 250.92(B) FOR INSTALLATIONS AT SERVICE EQUIPMENT LOCATIONS AND WITH 250.92(B)(2) THROUGH (B)(4) FOR OTHER THAN SERVICE EQUIPMENT LOCATIONS SHALL APPLY AT EACH END AND TO ALL INTERVENING FERROUS RACEWAYS, BOXES, AND ENCLOSURES BETWEEN THE CABINETS OR EQUIPMENT AND THE GROUNDING ELECTRODE. THE BONDING JUMPER FOR A GROUNDING ELECTRODE CONDUCTOR RACEWAY OR CABLE ARMOR SHALL BE THE SAME SIZE AS, OR LARGER THAN, THE ENCLOSED GROUNDING ELECTRODE CONDUCTOR. IF A RACEWAY IS USED AS PROTECTION FOR A GROUNDING ELECTRODE CONDUCTOR, THE INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF THE APPROPRIATE RACEWAY ARTICLE.

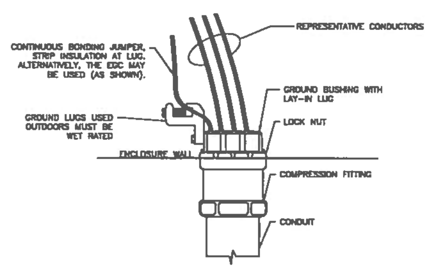


1 / E401 TYPICAL GROUNDING DETAIL
SCALE: NONE

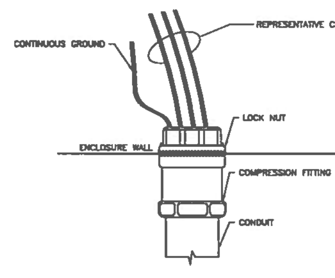


NOTES
1. ALL HARDWARE TO BE STAINLESS STEEL.
2. REFER TO ILSCO MANUAL FOR ADDITIONAL REQUIREMENTS AND TORQUE VALUES

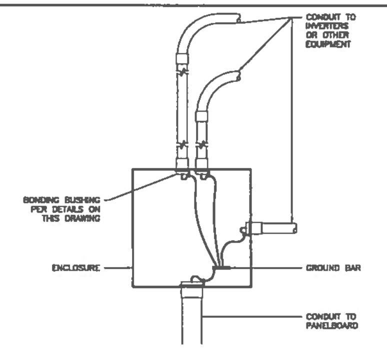
2 / E401 GROUND LUG DETAIL – ILSCO
SCALE: NONE



3 / E401 BONDING BUSHING GROUNDING DETAIL
SCALE: NONE



4 / E401 MYER'S HUB GROUNDING DETAIL
SCALE: NONE



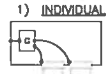
5 / E401 PULL BOX/TROUGH GROUNDING DETAIL
SCALE: NONE

A) FOR CONCENTRIC KNOCKOUTS, USE BONDING JUMPERS AS FOLLOWS:

TABLE 250.122		
OVERCURRENT DEVICE CIRCUIT NOT EXCEEDING (AMPERES)	SIZE (AWG OR KCMIL)	
	COPPER	ALUMINUM
15	14	12
20	12	10
60	10	8
100	8	6
200	6	4
300	4	2
400	3	1
500	2	1/0
600	1	2/0
800	1/0	3/0
1000	2/0	4/0
1200	3/0	250
1600	4/0	350
2000	250	400
2500	350	600
3000	400	600
4000	500	750

FOR PARALLEL FEEDERS – NEC 250.102(D)
EQUIPMENT BONDING JUMPER IS SIZED PER TABLE 250.122, REGARDLESS IF COMBINED OR INDIVIDUAL BONDING JUMPERS ARE USED

1) INDIVIDUAL



2) COMBINED

B) FOR NON-CONCENTRIC KNOCKOUTS, THE FOLLOWING METHODS SHALL BE PERMITTED (PER NEC 250.97)
1) THREADLESS COUPLINGS AND CONNECTORS FOR CABLES WITH METAL SHEATS
2) TWO LOCKNUTS, ON RIGID METAL CONDUIT OR INTERMEDIATE METAL CONDUIT, ONE INSIDE AND ONE OUTSIDE OF BOXES AND CABINETS
3) FITTINGS WITH SHOULDERS THAT SEAT FIRMLY AGAINST THE BOX OR CABINET, SUCH AS ELECTRICAL METALLIC TUBING CONNECTORS, FLEXIBLE METAL CONDUIT CONNECTORS, AND CABLE CONNECTORS, WITH ON LOCKNUT ON THE INSIDE OF BOXES AND CABINETS
4) LISTED FITTINGS (SUCH AS MEYERS HUB)

6 / E401 LOAD SIDE EQUIPMENT BONDING JUMPER
SCALE: NONE

DRAWING TITLE
GROUNDING DETAILS

DATE	REVISION DESCRIPTION	PM	ENG	CHK

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PAGE SIZE 36" x 24"
PROJECT #

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
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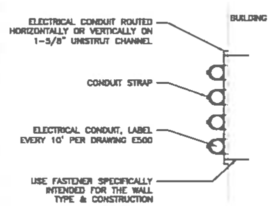
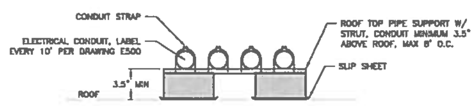
ORIENTATION: 5° TILT 1° AZIMUTH

PROJECT 332.640 KW SOLAR ROOFTOP SYSTEM AT
BROOKLYN MIDDLE SCHOOL
119 GORMAN ROAD

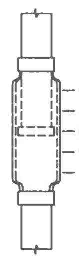
DRAWING #
E401



(1/E402) CONDUIT WALL ANCHORING
SCALE: NONE



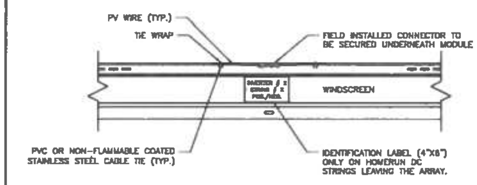
(2/E402) FLAT ROOF CONDUIT SUPPORT
SCALE: NONE



NOTES:
1. INSTALL EXPANSION COUPLING EVERY 100' OF STRAIGHT CONDUIT RUN.
2. IF EXPANSION COUPLINGS ARE INSTALLED AT LENGTHS LESS THAN 100', THE DISTANCES OF EXPANSION/CONTRACTION SHALL BE ADJUSTED PROPORTIONALLY.
3. IF EXPANSION JOINT IS NOT PROVIDED WITH INTERNAL BONDING JUMPER, AN EXTERNAL BONDING JUMPER MUST BE INSTALLED.

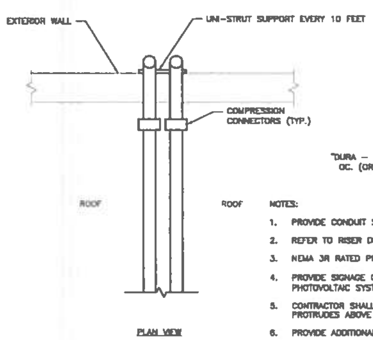
NOTE: THE COEFFICIENT OF THERMAL EXPANSION IN STEEL CONDUIT= 0.65 X 10^{-5}IN./IN./°F AT 120°F, THE LENGTH CHANGE IS 0.94 INCHES PER 100 FEET OF CONDUIT RUN.

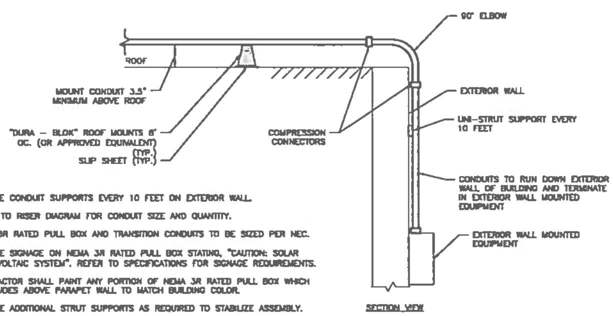
(3/E402) EMT,IMC,RMC EXPANSION COUPLING DETAIL
SCALE: NONE



NOTES:
1. INSTALL MANUFACTURED LABEL ADJACENT TO THE CONNECTOR IDENTIFYING THE INVERTER AND STRING NUMBER. LABEL MUST HAVE RED BACKGROUND FOR POSITIVE OR BLACK BACKGROUND FOR NEGATIVE. TEXT SHALL BE WHITE WITH A HEIGHT OF 3/4".
2. NO CROSS MATING OF CONNECTORS IS AUTHORIZED. BOTH MALE AND FEMALE CONNECTOR ENDS MUST BE OF THE SAME MANUFACTURER TO ENSURE UL COMPLIANCE. ACCEPTABLE MANUFACTURER INCLUDE AMPENOL, MC4 AND TYCO. THE MANUFACTURER SPECIFIC TOOL KIT MUST BE USED WHILE MAKING FIELD CONNECTIONS.
3. MOUNTING DETAIL APPLIES TO ALL ROOFTOP RACKING PRODUCTS. CONTRACTOR SHALL ADJUST EXACT SIZE AND POSITION OF LABEL BASED ON RACKING PRODUCT.

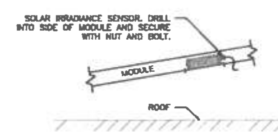
(4/E402) STRING LABEL MOUNTING LOCATION – ROOFTOP
SCALE: NONE





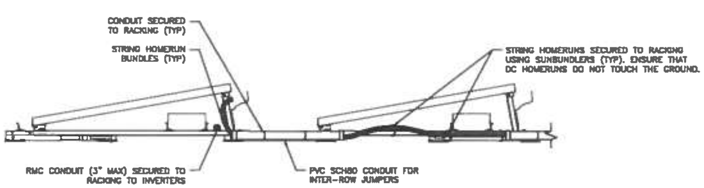
NOTES:
1. PROVIDE CONDUIT SUPPORTS EVERY 10 FEET ON EXTERIOR WALL.
2. REFER TO RISER DIAGRAM FOR CONDUIT SIZE AND QUANTITY.
3. NEMA 3R RATED PULL BOX AND TRANSITION CONDUITS TO BE SIZED PER NEC.
4. PROVIDE SIGNAGE ON NEMA 3R RATED PULL BOX STATING, "CAUTION: SOLAR PHOTOVOLTAIC SYSTEM". REFER TO SPECIFICATIONS FOR SIGNAGE REQUIREMENTS.
5. CONTRACTOR SHALL PAINT ANY PORTION OF NEMA 3R RATED PULL BOX WHICH PROTRUDES ABOVE PARAPET WALL TO MATCH BUILDING COLOR.
6. PROVIDE ADDITIONAL STRUT SUPPORTS AS REQUIRED TO STABILIZE ASSEMBLY.

(5/E402) TRANSITION FROM CONDUIT DOWN EXTERIOR WALL – WITHOUT PARAPET
SCALE: NONE

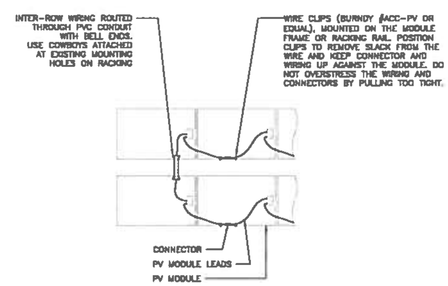


NOTES:
1. INSTALL THE WEATHER STATION AT A CENTRAL LOCATION WITHIN THE ARRAY USING THE MANUFACTURING SUPPLIED MOUNT.
2. THE IRRADIANCE SENSORS SHALL BE INSTALLED AT THE SAME TILT AS THE MODULES.
3. MOUNT THE CELL TEMPERATURE PROBE TO THE UNDERSIDE OF THE ADJACENT MODULE.
4. PROVIDE DC POWER SUPPLY TO THE WEATHER STATION FROM THE ALL-IN-ONE DECK IN ACCORDANCE TO MANUFACTURER SPECS.
5. PROVIDE DATA COMMUNICATION LINK FROM THE WEATHER STATION TO THE ALL-IN-ONE DECK WITH A TWISTED SHIELDED PAIR. REFER TO MANUFACTURER'S SPEC FOR ADDITIONAL INFORMATION.

(6/E402) WEATHER STATION MOUNTING DETAIL
SCALE: NONE



(7/E402) STRING WIRING ELEVATION DETAIL – PANELCLAW FR5
SCALE: NONE



(8/E402) STRING WIRING DETAIL – PANELCLAW
SCALE: NONE

DATE	REVISION DESCRIPTION	PM	DWG	CHK

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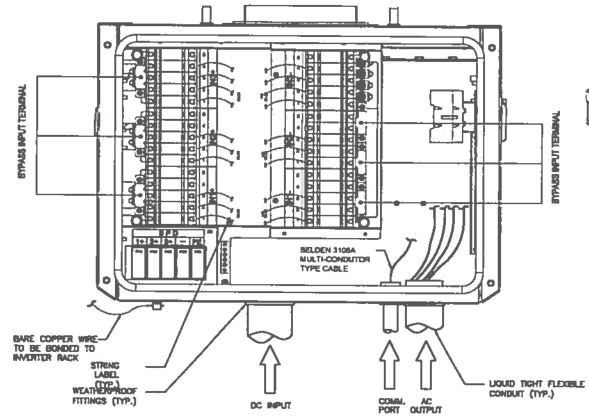
PAGE SIZE: 36" x 24"
PROJECT #:

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385MH-24/TH
MODULE QUANTITY: 864
ORIENTATION: 5° TILT 1?° AZIMUTH

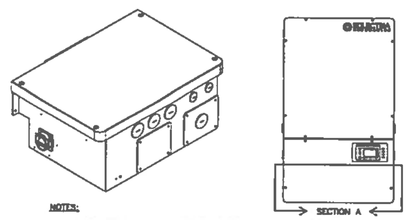
PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL
119 GORMAN ROAD

DRAWING TITLE: ELECTRICAL DETAILS
DRAWING: E402

PLOT DATE: 4/28/2020 11:14 AM
RULER IN INCHES:



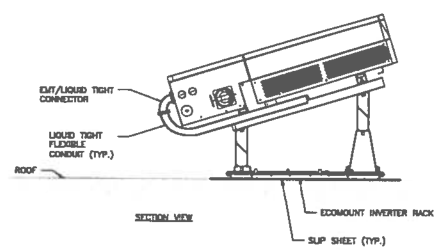
SECTION A - ENLARGED VIEW OF COMBINER BOX INPUT/OUTPUT TERMINATION POINTS.



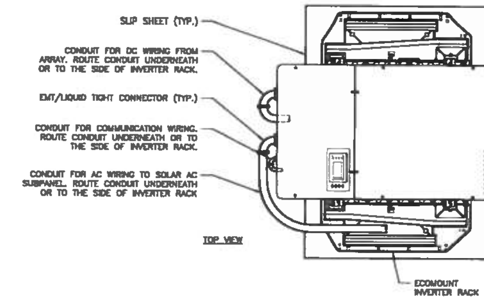
NOTES:

1. CONTRACTOR SHALL PROVIDE ENOUGH SLACK IN THE CONDUCTORS TO ALLOW FOR AMP-PROBE TESTING IN THE FUTURE. AVOID ADDING LOOPS IN THE CONDUCTORS PRIOR TO TERMINATION.
2. PROVIDE CONDUCTOR ID LABELS PER SPEC REQUIREMENTS.
3. REFER TO RISER DIAGRAM FOR CONDUCTOR SIZING.
4. CONDUIT SIZE AND QUANTITY PER NEC REQUIREMENTS. QUANTITY AND CONFIGURATION OF STRING CONDUITS SHOWN IS DIAGRAMMATICAL.

(1 / E403) SOLECTRIA PVI 50/60TL - STANDARD COMBINER - THREE MPPTS (MAXIMUM POWER POINT TRACKER)
SCALE: NONE



SECTION VIEW



TOP VIEW

NOTES:

1. CONDUIT SHALL BE ROUTED AS TO PROVIDE AT LEAST 4'-0" WORKING CLEARANCE IN FRONT OF INVERTER.
2. BALLAST BLOCKS TO BE INSTALLED PER ECOMOUNT INVERTER RACK.

(2 / E403) INSTALLATION OF INVERTER AC CONDUCTORS - SOLECTRIA
SCALE: NONE

DATE	REVISION DESCRIPTION	PM	CHKD	DWN

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PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL
119 GORMAN ROAD

DRAWING TITLE: ELECTRICAL DETAILS

DRAWING #: E403

RULER IN INCHES:

GENERAL NOTES FOR LABELS:
1. LABEL SCALE 1:2 UNLESS NOTED
2. LETTERING ON SIGNS SHALL BE CAPITAL LETTERS
3. CLEARLY LABEL ALL CIRCUIT BREAKERS IN THE PANELBOARD(S). THE LABEL SHALL INDICATE THE NAME OF THE DEVICE IT SERVES.

LABEL FORMAT NOTES:
1. FORMAT 1: ENGRAVED MELAMINE, WHITE TEXT ON RED BACKGROUND. TEXT HEIGHT: TITLES 3/8", ALL OTHER TEXT 5/32".
2. FORMAT 2: ENGRAVED MELAMINE, BLACK TEXT ON WHITE BACKGROUND. TEXT HEIGHT: 3/8".
3. FORMAT 3: REFLECTIVE UV RATED LABEL, RED BACKGROUND WITH WHITE CAPITAL LETTERS AT LEAST 3/8" TALL. LABELS SHALL BE SUITABLE FOR THE ENVIRONMENT IN WHICH THEY ARE INSTALLED.
4. FORMAT 4: ENGRAVED MELAMINE, WHITE TEXT ON RED BACKGROUND. TEXT HEIGHT: TITLES 5/32", ALL OTHER TEXT 3/32".

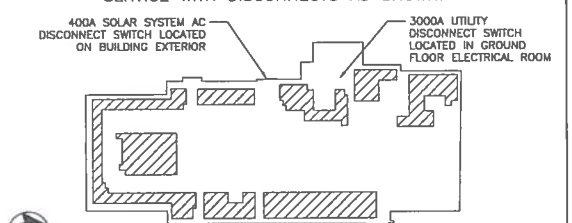
PER 2017 NEC 690.31(B)(1), PV SYSTEM CIRCUIT CONDUCTORS SHALL BE IDENTIFIED AT ALL ACCESSIBLE POINTS OF TERMINATION, CONNECTION, AND SPLICES.

1. STRING HOMERUNS AT ARRAY
2. DC INPUT TERMINALS OF COMBINER BOX
3. DC OUTPUT TERMINALS OF COMBINER BOX
4. DC INPUT TERMINALS OF INVERTER
5. AC OUTPUT TERMINALS OF INVERTER
6. AC INPUT & OUTPUT TERMINALS OF EACH SUCCESSIVE DEVICE (WHERE APPLICABLE)

(1) 10"

WARNING:

MULTIPLE POWER SOURCE ARE CONNECTED TO THIS SERVICE WITH DISCONNECTS AS SHOWN:



NEC 705.10 & 690.56(B)
INSTALL AT MAIN DISCONNECT OF ALL POWER SOURCES. ENGRAVED MELAMINE, WHITE TEXT ON RED BACKGROUND, TITLE MIN. 1/2", DESCRIPTION 5/16", ALL OTHER TEXT 1/8"

PV SYSTEM INSTALLER INFORMATION
NFPA1 11.12.2.1.5, INSTALL ON MAIN PV SYSTEM DISCONNECT, FORMAT 4

⚠WARNING
ARC FLASH AND SHOCK HAZARD
OUTDOOR RATED STICKER MOUNTED ON ALL EQUIPMENT

8 1/2"
WARNING: PHOTOVOLTAIC POWER SOURCE
NEC 690.31(G)(3)(4), NFPA11.12.2.1.3.2, HELLERMANNTYTON #: 596-00205 OR EQUAL, FORMAT 3. SHALL BE PERMANENTLY AFFIXED ON ALL DC EXPOSED RACEWAYS, CABLE TRAYS, PULL BOXES, AND JUNCTION BOXES. LABELS LABELS SHALL BE SPACED NO GREATER THAN 10 FEET APART.

(2) RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM
NEC 2017 690.56(C)(3), HELLERMANNTYTON#: 596-00890 OR EQUAL, FORMAT 3. INSTALL ON RAPID SHUTDOWN INITIATION DEVICE.

(3) PV RAPID SHUTDOWN
PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN
TO START RAPID SHUTDOWN, TURN SWITCH TO OFF POSITION.
WHEN RAPID SHUTDOWN IS INITIATED, EMERGENCY RESPONDERS MAY MOVE AROUND THE ROOF UNDERSTANDING PV SYSTEM CONDUCTORS:
1. LESS THAN 1' FROM AN ARRAY MAY BE ENERGIZED – DO NOT TOUCH
2. MORE THAN 1' FROM AN ARRAY ARE NOT ENERGIZED AND ARE SAFE TO CONTACT (IF NECESSARY)
NEC 2017 SUPPLEMENT, FORMAT 1

(4) SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN
TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUTDOWN CONDUCTORS OUTSIDE OF THE ARRAY. CONDUCTORS WITHIN ARRAY REMAIN ENERGIZED IN SUNLIGHT
NEC 2017 690.56(C)(1)(a), HELLERMANNTYTON #: 596-00066 OR EQUAL, INSTALL ON OR WITHIN 3' OF RAPID SHUTDOWN INITIATION DEVICE AND SERVICE DISCONNECTING MEANS. FOR USE ON PV SYSTEMS THAT SHUTDOWN THE CONDUCTORS LEAVING THE ARRAY ONLY. TITLE TEXT SHALL BE 3/8" WHITE TEXT ON RED BACKGROUND. ALL OTHER TEXT SHALL BE 3/16" BLACK TEXT ON WHITE BACKGROUND.

(5) SOLAR MONITORING
FORMAT 2

(6) SOLAR SYSTEM AC DISCONNECT SWITCH
WARNING: PHOTOVOLTAIC POWER SOURCE. DO NOT RELOCATE THIS OVERCURRENT DEVICE
OPERATING CURRENT: 317.8A
NOMINAL VOLTAGE: 480V
NEC 2017 690.54, 705.12(B)(2)(3)(b) NFPA 11.12.2.1.1, FORMAT 1

(7) SOLAR ZREC METER
FORMAT 1

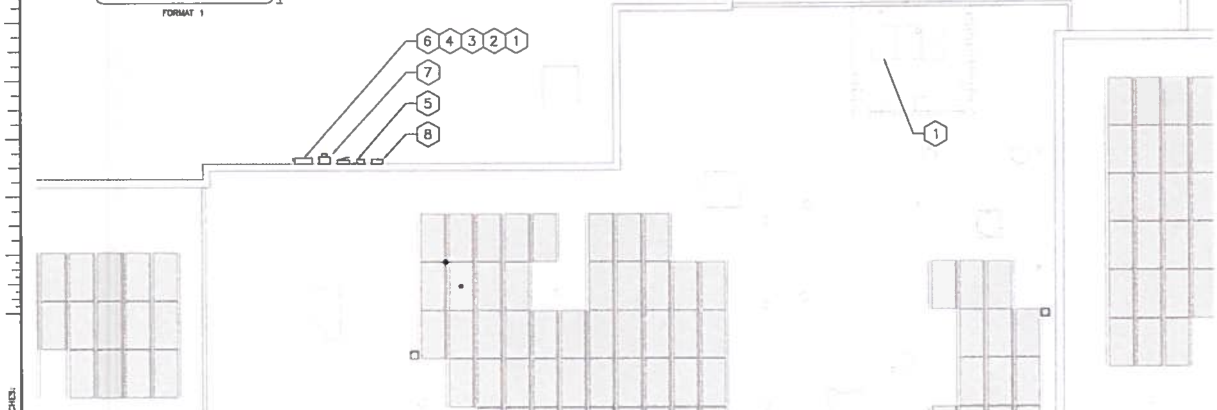
TYPICAL FOR INVERTER(S): 1 – 4

(8) SOLAR AC PANELBOARD
WARNING: SUPPLIED BY UTILITY & PV SOURCES.
OPERATING CURRENT: 317.8A
OPERATING VOLTAGE: 480V
DO NOT CONNECT NON-SOLAR LOADS TO THIS PANEL
NEC 2014 705.12(D)(3) & NEC 2017 705.12(B)(3), FORMAT 1

(9) INVERTER 1
DC DISCONNECT
MAXIMUM CURRENT: 124.30A
MAXIMUM VOLTAGE: 876.60V
AC DISCONNECT
MAXIMUM AC OPERATING CURRENT: 78.4A
NOMINAL AC OPERATING VOLTAGE: 480V
NEC 2017 690.53, 690.54, NFPA 11.12.2.1.1 FORMAT 1

TYPICAL FOR RSD BOX(S): 1 – 7

(10) RAPID SHUTDOWN BOX 1
WARNING: ELECTRIC SHOCK HAZARD
DC DISCONNECT
MAXIMUM CURRENT: 80.40A
MAXIMUM VOLTAGE: 723.78V
FORMAT 1



(1/E500) LABELS & SIGNAGE
SCALE: 1/8" = 1'-0"

THE MAIN SERVICE DISCONNECT IS LOCATED IN THE ELECTRIC ROOM (1/E500) MAIN SERVICE DISCONNECT SIGN – NOT TO SCALE	WARNING! ELECTRIC SHOCK HAZARD. TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION. NOTES: 1. LABEL REQUIRED PER NEC 690.13(B). (2/E500) ELECTRIC SHOCK HAZARD SIGN – NOT TO SCALE	ALL UTILITY INTERACTIVE INVERTERS ARE RACK MOUNTED LOCATED AT ROOF LEVEL (3/E500) INVERTER DIRECTORY SIGN – NOT TO SCALE
WARNING! ELECTRIC SHOCK HAZARD. TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION. DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT NOTES: 1. LABEL REQUIRED PER NEC 690.13(B). (4/E500) ELECTRIC SHOCK HAZARD SIGN – NOT TO SCALE	INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED THE PHOTOVOLTAIC SYSTEM DISCONNECT IS LOCATED AT THE WEST SIDE OF THE BUILDING (5/E500) PHOTOVOLTAIC DISCONNECT SIGN – NOT TO SCALE	PHONE NUMBER: 860-598-4890 EMAIL: Om_office@greenskies.com (6/E500) GREENSKIES EMERGENCY CONTACT INFORMATION – NOT TO SCALE
CAUTION! PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED NOTES: 1. LABEL REQUIRED PER NEC 690.59, 705.12(B)(3), AND 705.12(B)(4). 2. LABEL SHALL BE APPLIED TO EXISTING SWITCHBOARD AND AC COMBINER PANELBOARD(S). (7/E500) POWER SOURCE BACKFEED SIGN – NOT TO SCALE	CUSTOMER OWNED PRODUCTION METER 480Y/277V NOTES: 1. LABEL SHALL BE APPLIED TO DECK MONITOR ENCLOSURE AND CUSTOMER OWNED REC METER. (8/E500) DECK MONITORING/REC METER SIGN – NOT TO SCALE	WARNING! DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM NOTES: 1. LABEL REQUIRED PER NEC 690.59. (9/E500) UTILITY BI-DIRECTIONAL METER SIGN – NOT TO SCALE
WARNING: SOLAR AC CIRCUIT 480Y/277V NOTES: 1. LABELS SHALL BE REFLECTIVE, WITH LETTERS CAPITALIZED AND A MINIMUM HEIGHT OF 3/8" IN BLACK ON A YELLOW BACKGROUND. 2. CONTRACTOR TO INSTALL ONE LABEL PER INVERTER AC OUTPUT CONDUIT, WITHIN 10 FEET OF INVERTER. (10/E500) AC RACEWAY LABEL – NOT TO SCALE	SOLAR PHOTOVOLTAIC POWER SOURCE LOCATED ON PREMISES NOTES: 1. LABEL SHALL BE REFLECTIVE, WITH LETTERS CAPITALIZED AND A MINIMUM HEIGHT OF 3/4" IN BLACK ON A YELLOW BACKGROUND. 2. LOCATE SIGN ADJACENT TO FIRE ALARM CONTROL PANEL OR OTHER LOCATION ACCEPTABLE TO BUILDING OWNER. (11/E500) BUILDING FRONT SIGN – NOT TO SCALE	BROOKLYN MIDDLE SCHOOL STATE PROJECT NUMBER 019-0038 PV CONSTRUCTED IN PARTNERSHIP STATE OF CONNECTICUT NED LAMONT, GOVERNOR DEPARTMENT OF ADMINISTRATIVE SERVICES AND THE BROOKLYN, CT ARCHITECT / PROJECT MANAGER / CONSTRUCTION MANAGER NOTES: 1. 3/4" MDO-EXT-APA PLYWOOD SUPPORTED WITH (2) 4X4 TREATED WOOD COLUMNS AND SECURED 4' INTO GRADE. TOP OF SIGN AT 6'-0" ABOVE GRADE. 2. ALL LETTERS AND SYMBOLS ARE TO BE ROYAL BLUE. THE BACKGROUND WILL BE WHITE ENAMEL. BACK OF PLYWOOD AND SUPPORT STRUCTURE SHALL BE PAINTED MATTE BLACK. 3. FONT SHALL BE HELVETICA MEDIUM. 4. SIGN MUST BE LOCATE TO BE CLEARLY VISIBLE TO THE PUBLIC. 5. INSTALL SIGN AT THE START OF CONSTRUCTION AND REMOVE AT CONSTRUCTION COMPLETION. (12/E500) SIGN INSTALLED ON DRIVEWAY INTO SCHOOL – NOT TO SCALE

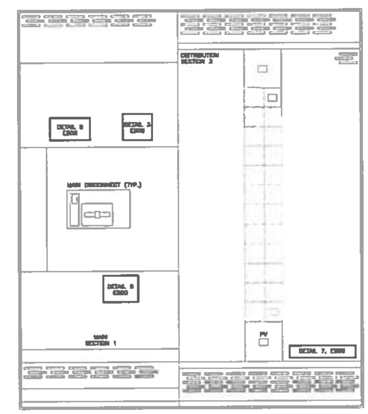


FIGURE 1. EXISTING BUILDING SWITCHGEAR (TYP.)

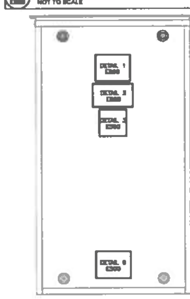


FIGURE 2. AC DISCONNECT (TYP.)

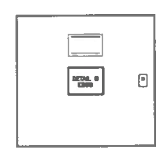


FIGURE 3. DECK MONITOR (TYP.)

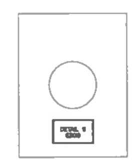


FIGURE 4. UTILITY BI-DIRECTIONAL METER (TYP.)

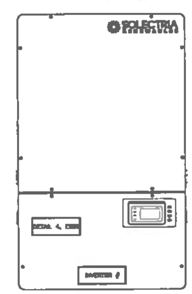


FIGURE 5. INVERTER (TYP.)

(2/E500) CLIENT REQUIRED LABELS
SCALE: NONE

PROJECT	332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL, 119 GORMAN ROAD
DC SYSTEM SIZE:	332.640 kW
AC SYSTEM SIZE:	240.000 kW
MODULE TYPE:	PS385MH-24/TH
MODULE QUANTITY:	864
ORIENTATION:	5° TILT 1° AZIMUTH
PAGE SIZE	36" x 24"
DEVELOPER	GREENSKIES, 180 JOHNSON STREET, MIDDLETOWN, CT 06457, WWW.GREENSKIES.COM
ENGINEER	PUREPOWER ENGINEERING, 5 MARINE VIEW PLAZA HOBOKEN, NJ, WWW.PUREPOWER.COM, RICHARD A. MAYS
DRAWING TITLE	LABELS & SIGNAGE
DRAWING #	E500

DATE	REVISION DESCRIPTION	PM	ENG	CHK

RULER IN INCHES:

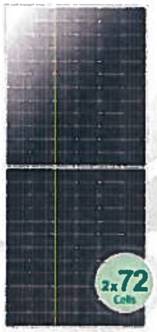
PLOT DATE: 4/28/2020 11:14 AM

Phono Solar

TwinPlus Module

Perc/370-385W

Tier1 TOP



- PID Resistant
- Better shading tolerance
- More Reliable
- More Power

SINOMACH SUMEC
SUMEC GROUP CORPORATION

YASKAWA

PVI 50TL & PVI 60TL

3-Ph Transformerless Commercial String Inverters

Features

Options

SOLECTRIA SOLAR

clawFR® 5°

Flat Roof Racking Specialists

PanelClaw® is the only major racking provider in North America focused exclusively on flat roof racking. Our 11+ years of focus on flat roof result in a competitive advantage for our partners. No one knows more about flat roof racking than PanelClaw; no one delivers a more thoroughly tested and reliable platform; and no one matches our level of service. Our mission is to accelerate the deployment of flat roof PV and the best way to do this is to continue to lower its life-cycle cost while maintaining the highest levels of reliability. The clawFR platform is the result of this experience and commitment to flat roof.

Engineered for Speed

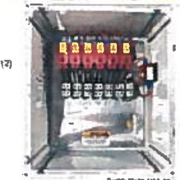
- Single M8 bolt hardware kit
- No tool module attachment method
- 90 degree single-module flip-up feature
- Flexible order of operations installation process allows for optimized coordination of building trades on the roof
- Integrated roof protection pads
- 6.9" between modules
- Only 1 ground lug required per array

PANELCLAW

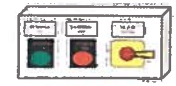
DCSurVolt Rapid Shutdown Solution

PRODUCT FEATURES

- Rated 600 VDC to 1,000 VDC
- 2 up to 10 Strings
- Load Break Contactors for Rapid Shutdown (NEC 690.12)
- Positive and / or Negative inputs
- Ground Strip Included
- NEMA Type 3R or 4, 4X
- UL 508A Panels
- Control Circuit Lockout / Tag Out
- Compatible with most Inverter Manufactures
- 24 VDC Control Circuit @ 120 VAC
- Continuous Current Carry 50 Amps
- Make and Break, 20 Amps @ 1,000 VDC
- MC4 direct connector (option)
- Control Box with AC to DC Power Supply or DC to DC Power supply



Product Part Number:	PV4X-U25-RS	PV4X-U45-RS	PV4X-U65-RS	PV4X-U85-RS	PV4X-U105-RS
Maximum Voltage:	1,000 VDC	1,000 VDC	1,000 VDC	1,000 VDC	1,000 VDC
Number of Input Circuits:	2	4	6	8	10
Number of Output Circuits:	2	4	6	8	10
Input Terminal Wire Size:	22 - 8 AWG	22 - 8 AWG	22 - 8 AWG	22 - 8 AWG	22 - 8 AWG
Output Terminal Wire Size:	22 - 8 AWG	22 - 8 AWG	22 - 8 AWG	22 - 8 AWG	22 - 8 AWG
Max Continuous Current:	50 AMPS	50 AMPS	50 AMPS	50 AMPS	50 AMPS
Enclosure Size:	12x10x6	12x10x6	14x12x6	16x14x8	N/A
Enclosure NEMA Type:	4X	4X	4X	4X	4X
Control Circuit Voltage:	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC



Remote Contactor Controller

Options:

- DC Main Power Disconnect
- Status Indicator Relays, BMS, LED's
- Contactor Combiner Boxes
- Power Supply 120 – 240 VAC to 24 VDC
- Power Supply 48 VDC to 24 VDC

Phono Solar

PVI 50TL & PVI 60TL

Specifications

SOLECTRIA SOLAR

YASKAWA

SYSTEM COMPONENTS

Module Connector

Intelligent Component Design

- A single Ballast Rail part number covers all compatible 60 and 72 cell modules
- The Base does not change with module changes
- The wind deflector has 2 part numbers that cover all 72 cell module lengths
- The Module Connector and Deflector each have 2 part numbers that cover all compatible 72 cell modules

Safety and Reliability

clawFR has been tested well beyond code requirements in the US. In addition to wind tunnel testing and ANSI/UL 2703-2015 listing, we have completed a battery of reliability and performance tests which can all be found at panelclaw.com.

PANELCLAW

panelclaw.com

O&M Features

clawFR® 5°

DATE	REVISION DESCRIPTION	PM	DRG	CHK

PUREPOWER ENGINEERING
5 MARINE VIEW PLAZA HOBOKEN, NJ
WWW.PUREPOWER.COM
RICHARD A. WAIS

GREENSKIES
180 JOHNSON STREET,
MIDDLETOWN, CT 06457
WWW.GREENSKIES.COM

Greenskies

PAGE SIZE: 36" x 24"

PROJECT #

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385MH-24/TH
MODULE QUANTITY: 864
ORIENTATION: 5° TILT 1° AZIMUTH

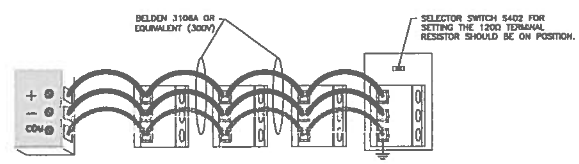
PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL
119 GORMAN ROAD

DRAWING TITLE: EQUIPMENT DATA SHEETS

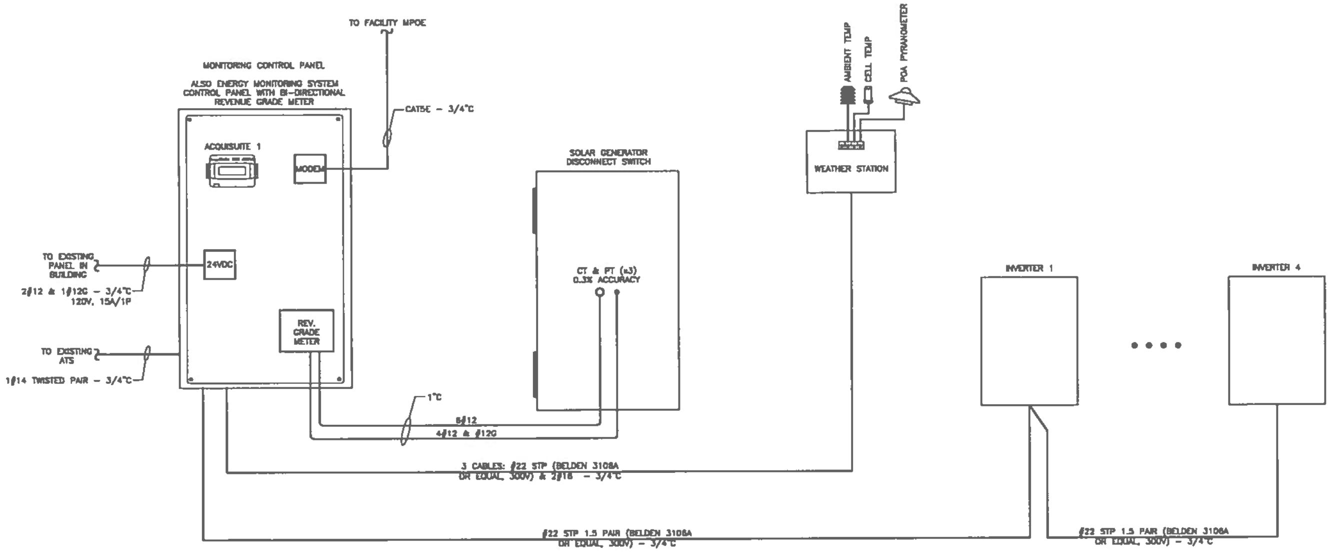
DRAWING #: E600

RULER IN INCHES

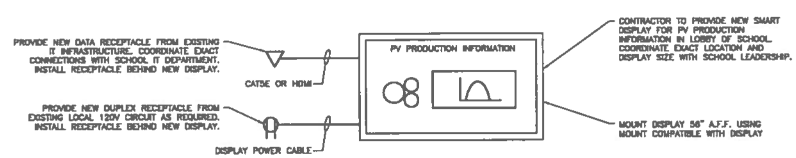
MONITORING NOTES:
1. REFER TO MONITORING SYSTEM INSTALLATION MANUAL FOR DETAILS ON TERMINAL BLOCKS, CABLE TERMINATIONS, AND SYSTEM CONFIGURATION.
3. PYRANOMETER MUST BE INSTALLED IN UNSHADED LOCATION.



MODBUS DETAIL
SCALE: NONE



MONITORING SYSTEM
SCALE: NONE



INFORMATIONAL DISPLAY
SCALE: NONE

DATE	REVISION DESCRIPTION	PM	ENG	CHK
04/21/2020	PERMIT SET (REV 1)	SK	SK	RI

PUREPOWER ENGINEERING
5 MARINE VIEW PLAZA HOBOKEN, NJ
WWW.PUREPOWER.COM
RICHARD A. MAYS

GREENSKIES
180 JOHNSON STREET, MIDDLETOWN, CT 06457
WWW.GREENSKIES.COM

PAGE SIZE: 36" x 24"

DC SYSTEM SIZE: 332.640 kW
AC SYSTEM SIZE: 240.000 kW
MODULE TYPE: PS385MH-24/TH
MODULE QUANTITY: 864

PROJECT: 332.640 KW SOLAR ROOFTOP SYSTEM AT BROOKLYN MIDDLE SCHOOL
119 GORMAN ROAD

DRAWING TITLE: MONITORING SYSTEM WIRING DIAGRAM

DRAWING #: E700