HARVARD HISTORICAL COMMISSION
13 AYER ROAD • HARVARD, MASSACHUSETTS 01451

APPLICATION FOR CERTIFICATE

Please read attached instructions and contact a member of the Harvard Historical Commission* before *you complete this form.

CERTIFICATE OF: ☒ **APPROPRIATENESS** ☐ **NON-APPLICABILITY** ☐ **HARDSHIP**

CONTACT INFORMATION:

Property Address	27 Mass Avenue, Harvard, MA 01451
Property Owner Name	Town of Harvard (Timothy Bragan)
Applicant Name	Solect Energy (Brendan Fallon)
Applicant Address	89 Hayden Rowe St, Hopkinton, MA 01748
Telephone	850-450-5528
E-Mail Address	bfallon@solect.com

DESCRIPTION OF WORK PROPOSED: *(You may attach additional pages to describe your proposed work)*

Installation of solar panels and related electrical equipment on rooftop of new Hildreth Elementary School building.

Site plan/drawing (last page) notes:
Array zones 2, 3, 7, 8 are flush to pitched roof angle (approx. 37 degrees), and therefore are visible from the street.
All other arrays are on flat roofs, panels pitched at 10 degrees-- these arrays are not visible from the street.

Renderings of building with solar panels visible on pitched roofs at https://sites.google.com/psharvard.org/hesbuildingproject/home

LIST OF ATTACHMENTS: *(Please check off the listed items when attached)*

Site Plan (showing changes)	x	Construction Drawings	
Photos taken from street		Building material samples	
Photos of areas to be worked			

APPLICANT SIGNATURE *(Sign to submit application)*	**DATE**
Brendan Fallon	7/21/2021

GRANT OF EXTENSION. *(With the following signature, the applicant grants permission to the Commission to review the application at its next scheduled monthly meeting in lieu of holding a Special meeting.)*

Brendan Fallon	7/21/2021

Solar Panel Installation Proposal Hildreth Elementary School – Harvard, MA

HARVARD HILDRETH ELEMENTARY SCHOOL - 2343
260.1kW DC / 200kW AC
ROOF MOUNTED SOLAR ARRAY

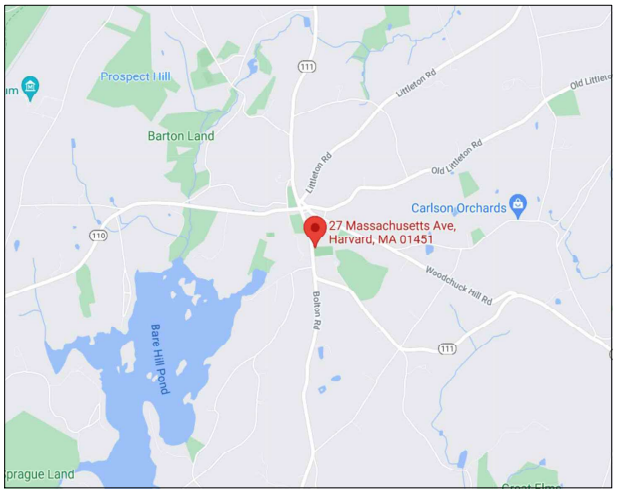
27 MASSACHUSETTS AVE HARVARD MA 01451

AERIAL VIEW

PROPOSED ROOF MOUNTED SOLAR DESIGN	
MODULE COUNT:	612 MODULES
MODULE MODEL:	HANWHA Q CELLS QPEAK DUO L-G6.2
MODULE WATTAGE:	425 W
SYSTEM AS DESIGNED:	260.1 kW DC / 200 kW AC
MOUNTING SYSTEM:	ECOLIBRIUM
ARRAY TILT:	5/37 ±
AZIMUTH:	166/173/180 ±
INVERTERS:	(2) SOLAREDGE 100K
RSD DEVICE:	(379) SOLAREDGE P960
SYSTEM VOLTAGE:	3P, 480V
SERVICE VOLTAGE:	3P, 208V
ROOF ATTACHMENT:	(-) -
MONITORING:	(1/1) SOLAREDGE/POWERDASH GATEWAY

CONSTRUCTION SET PLAN NOMENCLATURE	
ISSUED FOR PERMIT	PERMIT SUBMITTAL
ISSUED FOR BID	BID AND COST DETERMINATION (CARPORTS AND GMs ONLY)
ISSUED FOR REVIEW	PRE-EC/PM WALKTHROUGH AND INTERNAL REVIEW
ISSUED FOR CONSTRUCTION	POST INTERNAL REVIEW AND PRE-CON
ISSUED FOR AS BUILT	POST CONSTRCUTION AND REDLINE UPDATES

DRAWING LIST	
PVT	PHOTOVOLTAIC TITLE SHEET
PVGN	GENERAL NOTES
PV-1	SITE PLAN, ARRAY SPECIFICATIONS AND PROPOSED ROOF
PV-1.1	ARRAY SPECIFICATIONS
PV-2	PROPOSED PV STRINGING DIAGRAM
PV-2.1	PROPOSED PV CONDUIT PLAN
PV-2.2	PROPOSED UTILITY MV PLAN (2)
PV-3	GROUNDING DIAGRAM AND EQUIPMENT LIST
PV-4	PV MISCELLANEOUS DETAILS
PV-5	DAS DETAIL
PV-E	ELECTRICAL ONELINE



LOCUS MAP

REVISIONS			
NO.	DATE	DESCRIPTION	BY
01	04/07/21	IFR	DS
02	05/11/21	LAYOUT & HW COMMENTS	DS
03	06/29/21	HW COMMENTS	DS

ISSUED FOR PERMIT

solectenergy
Smart Solar. Smart Business.
89 Hayden Rowe Street, Suite E
Hopkinton, MA 01748 - (508) 598-3511

N

PROPOSED ROOF MOUNTED SOLAR PV SYSTEM

HARVARD HILDRETH ELEMENTARY SCHOOL - 2343
27 MASSACHUSETTS AVE
HARVARD MA 01451

MATTHEW W. BAILEY
ELECTRICAL
No. 53073
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by Matthew W Bailey
Date: 2021.07.15 10:12:19 -06'00'

SCALE	AS NOTED
DATE	7/12/21
DRAWN BY	CS
CHECKED BY	
SHEET	PVT

HARVARD HILDRETH ELEMENTARY SCHOOL - 2343

GENERAL NOTES

260.1 kW DC / 200 kW AC

PROCEDURAL NOTES:

1. PRIOR TO COMMENCEMENT OF ANY WORK THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF RECORD OF ANY DISCREPANCIES NOTED TO EXISTING CONDITIONS, STRUCTURE, ELECTRICAL RUNS (SPECIFY EXISTING ITEMS), WALLS, PARAPETS, FLASHINGS, ETC. AMONG SITE CONDITIONS, MANUFACTURER RECOMMENDATIONS OR CODES, REGULATIONS OR RULES OF JURISDICTIONS HAVING AUTHORITY.
2. ALL DIMENSIONS OF EXISTING CONDITIONS MUST BE VERIFIED PRIOR TO COMMENCING WORK.
3. CONTRACTOR INITIATED CHANGES SHALL BE SUBMITTED TO THE PROJECT MANAGER OF RECORD VIA AN RFI FOR APPROVAL PRIOR TO MAKING ANY CHANGES.
4. APPROVED CHANGES SHALL REQUIRE A DRAWING REVISION TO MAINTAIN CONTROL OVER THE ENGINEER APPROVED DESIGN. DEVIATION FROM THESE PLANS PRIOR TO ENGINEER APPROVAL PLACES ALL LIABILITY ON THE CONTRACTOR
5. DRAWINGS ARE NECESSARILY DIAGRAMMATIC BY THEIR NATURE AND ARE NOT INTENDED TO SHOW EVERY PIECE OF EQUIPMENT, CONNECTION IN DETAIL OR EVERY PIPE OR CONDUIT IN ITS EXACT LOCATION. CONTRACTOR TO CAREFULLY INVESTIGATE STRUCTURAL AND FINISH CONDITIONS AND COORDINATE WORK APPROPRIATELY.
6. COORDINATE THE SCHEDULING OF ALL WORK REQUIRING ELECTRICAL SHUTDOWNS WITH THE OWNER. THIS MAY REQUIRE PERFORMING THE WORK OUTSIDE OF NORMAL WORKING HOURS, OR PROVIDING TEMPORARY POWER WITH A PORTABLE GENERATOR OR BY OTHER APPROVED MEANS.

GENERAL NOTES:

1. STRUCTURAL AND GEOTECHNICAL FIELD CONDITIONS ARE TO BE DETERMINED BY OTHERS, AND PLANS ARE TO BE MODIFIED AS NEEDED/IF APPROPRIATE. DEFICIENCIES SHOULD BE NOTED AND CORRECTED PRIOR TO THE START OF CONSTRUCTION.
2. THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL EQUIPMENT AND FOLLOWING ALL MANUFACTURER'S AND/OR ENGINEER'S DIRECTIONS AND INSTRUCTIONS SHOWN ON CONSTRUCTION DOCUMENTS.
3. THE ELECTRICAL CONTRACTOR IS ADVISED THAT ALL DRAWINGS, COMPONENT MANUALS, ESPECIALLY THE INVERTER MANUALS, ARE TO BE READ AND UNDERSTOOD PRIOR TO INSTALLATION OR ENERGIZING OF ANY EQUIPMENT. CLARIFICATIONS SHALL BE DONE WITH AN RFI.
4. THE CONTRACTOR IS DIRECTED TO HAVE ALL COMPONENTS & SWITCHES IN THE OFF (OPEN) POSITION AND FUSES REMOVED PRIOR TO INSTALLATION OF FUSE-BEARING EQUIPMENT.
5. THIS PHOTOVOLTAIC SYSTEM IS TO BE INSTALLED FOLLOWING THE CONVENTIONS OF THE LATEST ADOPTED VERSION OF THE NATIONAL ELECTRIC CODE, MASSACHUSETTS ELECTRICAL CODE AND ANY LOCAL CODE WHICH MAY SUPERCEDE THE NEC SHALL GOVERN.
6. ALL COMPONENTS TO BE INSTALLED WITH THIS SYSTEM ARE TO BE UL LISTED OR LISTED BY A THIRD-PARTY TESTING AGENCY (CARPORTS ETC.). EQUIPMENT SHALL BE NEMA 3R OUTDOOR RATED OR BETTER, UNLESS LOCATED INDOORS OR OTHERWISE DIRECTED ON THE DESIGN DRAWINGS.
7. DC VOLTAGE FROM THE ARRAY IS ALWAYS PRESENT AT THE DC DISCONNECT ENCLOSURE AND THE DC TERMINALS OF THE INVERTER DURING DAYLIGHT HOURS. ALL PERSONS WORKING ON OR INVOLVED WITH THIS PHOTOVOLTAIC SYSTEM MUST BE AWARE OF VOLTAGE HAZARDS WHILE SOLAR DISCONNECTS ARE IN THE OFF (OPEN) POSITION. ALL DISCONNECT SWITCHES ARE TO BE LABELED TO COMPLY WITH ARTICLE 690.17 OF THE NEC REFLECTING THE HAZARDS PRESENT.
8. ALL PORTIONS OF THIS SOLAR ELECTRIC SYSTEM SHALL BE CLEARLY LABELED/MARKED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE ARTICLE 690.
9. THE ELECTRICAL CONTRACTOR SHALL PERFORM INITIAL HARDWARE CHECKS AND PV WIRING CONDUCTIVITY CHECKS PRIOR TO TERMINATING ANY WIRES. ALL AC AND DC WIRE RUNS SHALL BE MEGGER TESTED AT 600V/1000V D.C. TO DEMONSTRATE A MINIMUM OF 250 MEGAOHMS RESISTANCE TO GROUND.
10. DO NOT MEGGER THE SOLAR MODULES, AS THIS WILL LIKELY DAMAGE THEIR INTERNAL DIODES. MEGGERING IS INTENDED FOR ALL CONDUCTORS INSTALLED BY THE ELECTRICAL CONTRACTOR WHILE UNTERMINATED.. RESTRICT MEGGER TO THE NOMINAL VOLTAGE RATING OF THE INVERTER.
11. FOR PROPER MAINTENANCE AND ISOLATION OF INVERTERS, REFER TO ISOLATION PROCEDURE IN INVERTER OPERATION MANUAL. CONDUCTORS INSTALLED BY THE ELECTRICAL CONTRACTOR. RESTRICT MEGGER TO 600V/1000V AS APPROPRIATE BASED ON INVERTER SPEC.
12. THIS PHOTOVOLTAIC'S SYSTEM UTILITY INTERCONNECTION POINT SHALL MEET THE SPECIFIC REQUIREMENTS OF ARTICLE 690 AND 705, NATIONAL ELECTRIC CODE. PLEASE FOLLOW THE SPECIFIC INSTRUCTIONS IN THIS DRAWING SET TO MEET THIS CODE REQUIREMENT.
13. THE GROUNDING OF THE PHOTOVOLTAIC SYSTEM SHALL COMPLY WITH NEC 690 AS PER THE DESIGN DRAWINGS... ANY CHANGES NEED TO BE COMMUNICATED TO THE ENGINEER OF RECORD VIA RFI, REVIEWED AND DEEMED ACCEPTABLE BY THE ENGINEER, MANUFACTURER, AND LISTING AGENCY FOR PRODUCT SAFETY.
14. THE ELECTRICAL CONTRACTOR IS NOT TO START OR COMMISSION THE PV OR INVERTER SYSTEM AT ANY TIME, UNLESS NOTIFIED OTHERWISE IN WRITING..
15. THE CONTRACTOR IS RESPONSIBLE FOR MOUNTING ALL EQUIPMENT PER THE DESIGN DRAWINGS OR MANUFACTURER'S SPECIFICATIONS. IF SPECIFICATIONS ARE NOT APPARENT, THE CONTRACTOR SHALL COMMUNICATE WITH THE PROJECT MANAGER OF RECORD OR ENGINEER OF RECORD VIA RFI PRIOR TO CONTINUING WORK..
16. ANY METAL SHAVINGS RESULTING FROM SITE WORK SHALL BE CLEANED FROM ENCLOSURE INTERIORS, TOP SURFACES OF ENCLOSURES, ROOF SURFACE, GROUND SURFACE AND ANY ADDITIONAL AREAS WHERE OXIDIZED OR CONDUCTIVE METAL SHAVINGS MAY CAUSE RUST, ELECTRICAL SHORT CIRCUITS, OR OTHER DAMAGE.
17. ALL EQUIPMENT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER, SQUARETO TO BUILDING OR STRUCTURE.
18. ALL COMPONENTS SHOWN ON THE RISER DIAGRAM, BUT NOT ON THE PLAN (OR VICE VERSA), SHALL BE INCLUDED AS IF SHOWN ON BOTH. NOTABLE OMISSIONS SHALL BE COMMUNICATED VIA RFI.
19. CONTRACTOR SHALL REVIEW TRADES' CONTRACT DOCUMENTS TO DETERMINE SPECIFIC MOUNTING LOCATIONS FOR ELECTRICAL EQUIPMENT AND COORDINATE EXACT MOUNTING LOCATIONS WITH THE PROJECT MANAGER OF RECORD
20. THE CONTRACTOR SHALL REVIEW THE ARCHITECTURAL AND MECHANICAL DRAWINGS AND COORDINATE THE ELECTRICAL WORK WITH THE OTHER CONTRACTORS. SHOULD CONFLICTS, DISCREPANCIES OR DEFICIENCIES ARISE WHICH REQUIRE CHANGES IN THE DOCUMENTS, IMMEDIATELY NOTIFY THE ENGINEER OF RECORD VIA RFI.. OBTAIN WRITTEN DIRECTION ON NECESSARY ADJUSTMENTS BEFORE THE INSTALLATION IS MODIFIED FROM ORIGINAL DESIGN DRAWINGS..
21. THE DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF NEW CIRCUITS, LOCATIONS OF OUTLETS, AND THE INTERCONNECTION. THE CONTRACTOR MAY MODIFY THE RACEWAY ARRANGEMENT TO ACCOMMODATE FIELD CONDITIONS. CONDUIT RUNS THAT EXTEND 40' BEYOND THOSE ESTIMATES SHOWN ON DRAWINGS SHALL BE CLARIFIED WITH SOLECT VIA RFI.
22. ALL ELECTRICAL WORK SHALL BE ACCURATELY RECORDED BY THE CONTRACTOR TO BE INCORPORATED IN TO A RECORD SET OF AS-BUILT DRAWINGS ISSUED UPON COMPLETION OF INSTALLATION PRIOR TO START UP.
23. PROVIDE COMPLETE, ACCURATE, AND TYPED PANELBOARD CIRCUIT DIRECTORIES AT THE COMPLETION OF WORK FOR ALL PANELS IN THIS PROJECT.
24. LAYOUT ALL WORK IN ADVANCE. WHERE CUTTING, CHANNELING, CHASING, OR DRILLING OF FLOORS, WALL PARTITIONS, CEILINGS OR OTHER SURFACES IS NECESSARY FOR SUPPORT OR ANCHORAGE OF RACEWAYS, OUTLETS OR ELECTRICAL EQUIPMENT, THIS WORK SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR. ANY DAMAGE TO BUILDING, PIPING, EQUIPMENT OR DEFACED FINISH, PLASTER, WOODWORK, OR METAL WORK SHALL BE REPARED BY SKILLED CRAFTSMEN OF TRADES INVOLVED AT NO ADDITIONAL COST TO THE OWNER. DO NO CUTTING, CHANNELING, DRILLING, WELDING OF STRUCTURAL MEMBERS OF THE BUILDING WITHOUT OBTAINING APPROVAL FROM THE ENGINEER, ARCHITECT AND/OR OWNERVIA RFI.
25. PLUGS, SWITCHES, AND LIGHTS SHALL BE MARKED AND IDENTIFIED WITH E-Z MARKERS OR DYMOTAPED AND PEN-MARKED (WITH PERMANENT MARKER) INSIDE COVER TO SHOW PANEL AND CIRCUIT BREAKER NUMBER. WIRES SHALL BE MARKED WITH CIRCUIT NUMBERS USING BRADY MARKERS (OR EQUAL) AT PANEL.
26. WHERE WIRING, CONDUIT, AND OTHER ELECTRICAL ITEMS PASS THROUGH INACCESSIBLE AREAS, ACCESS, WHERE REQUIRED, SHALL BE PROVIDED VIA ACCESS PANELS, WHETHER ON THE DRAWING OR NOT. SPACING AND DIMENSIONS OF PANELS SHALL BE VERIFIED BY THE CONTRACTOR AND APPROVED BY THE ARCHITECT AND/OR ENGINEER PRIOR TO CONSTRUCTION VIA RFI..
27. MINIMUM SIZE CONDUIT SHALL BE 3/4 INCH. NO ½" OR 2.5" CONDUIT SIZES SHALL BE USED.
28. PROVIDE INSULATED EGC WIRE (THHN/THWN) FOR ALL BRANCH CIRCUITS AND FEEDER CIRCUITS AS DIRECTED ON DESIGN DRAWINGS. EXPOSED GEC CONNECTIONS, WHERE APPLICABLE, TO GROUNDING ELECTRODE SYSTEM SHALL BE BARE, VISIBLE AND INSPECTABLE.
29. NOT USED.
30. PROVIDE CIRCUIT NUMBER IDENTIFICATION LABELS ON ALL CONDUCTORS, NEUTRALS AND GROUNDS IN ALL PANELBOARDS, BOXES, AND OUTLETS.
31. THE CONTRACTOR SHALL INFORM THE ENGINEER OF RECORD VIA RFI OF ALL DISCREPANCIES BETWEEN DRAWINGS OF DIFFERENT TRADES PRIOR TO INITIATION OF ANY WORK.
32. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ON-SITE SAFETY OF THE SITE WORKERS AND THE PUBLIC DURING CONSTRUCTION. CONTRACTOR IS REQUIRED TO FOLLOW THE GUIDANCE OF NFPA 70E FOR WORKPLACE SAFETY.
33. THE CONTRACTOR WILL FURNISH AND INSTALL ALL ANCHOR BOLTS, NUTS, WASHERS, GROUT, CONCRETE PADS, AND REINFORCING CONSTRUCTION AS NEEDED
34. ALL CONTRACTORS ARE REQUIRED TO EXAMINE THE DRAWINGS AND SPECIFICATIONS CAREFULLY, TO VISIT THE SITE AND FULLY INFORM THEMSELVES AS TO ALL EXISTING CONDITIONS, HAZARDS AND LIMITATIONS PRIOR TO SUBMITTING THE PROPOSAL. FAILURE TO VISIT THE SITE AND FAMILIARIZE THEMSELVES WITH EXISTING CONDITIONS, HAZARDS AND LIMITATIONS WILL IN NO WAY RELIEVE THE CONTRACTOR FROM FURNISHING ANY MATERIALS OR PERFORMING ANY WORK IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS. NO ADDITIONAL COST SHALL BE PASSED ON TO THE OWNER FOR FAILURE TO COMPLY WITH THIS REQUIREMENT.
35. BUILDING OWNER SHALL BE RESPONSIBLE FOR VALIDATION OF ROOF WARRANTY PRIOR TO COMMENCEMENT OF SOLAR INSTALLATION AND HOSTING ANY POST INSTALLATION INSPECTIONS REQUIRED BY ROOFING MANUFACTURER.

ELECTRICAL NOTES:

1. IN EVERY PULL BOX, TERMINAL BOX, AND AT ALL PLACES WHERE WIRES MAY NOT BE READILY IDENTIFIED BY NAMEPLATE MARKINGS ON THE EQUIPMENT TO WHICH THEY CONNECT, IDENTIFY EACH CIRCUIT WITH A PLASTIC LABEL OR TAG FOR NUMBER, POLARITY, OR PHASE.
2. THE LAYOUT OF CONDUIT SHOWN IN THESE PLANS IS A SCHEMATIC REPRESENTATION ONLY. CONTRACTOR SHALL FIELD FIT, ROUTE AND LOCATE THE CONDUITS TO SUIT SITE CONDITIONS BUT SHALL NOT EXCEED THE MAXIMUM CONDUCTOR LENGTHS IDENTIFIED ON THE WIRE SCHEDULE BEYOND 40' WITHOUT RFI APPROVAL. CONTRACTOR WILL COORDINATE ALL CHANGES IN WIRING AND CONDUIT WITH THE ENGINEER VIA RFI.
3. WHERE WIRE AND CABLE ROUTING IS NOT SHOWN AND DESTINATION ONLY IS INDICATED, CONTRACTOR SHALL DETERMINE EXACT ROUTING AND LENGTHS REQUIRED. A SHOP DRAWING AND RFI OF PROPOSED INSTALLATION SHALL BE SUPPLIED TO ENGINEER OF RECORD PRIOR TO INSTALLATION.
4. BENDS SHALL NOT DAMAGE THE RACEWAY OR SIGNIFICANTLY CHANGE THE INTERNAL DIAMETER OF RACEWAYS (NO KINKS).
5. SUPPORT CONDUCTORS IN VERTICAL CONDUITS IN ACCORDANCE WITH REQUIREMENTS OF THENEC.
6. INSTALL ALL WIRING MATERIALS IN A NEAT WORKMANLIKE MANNER, USE GOOD TRADE PRACTICES AS REQUIRED BY THE NEC. ALL EXPOSED CABLES, SUCH AS MODULE LEADS, TO BE SECURED WITH UV RATED MECHANICAL OR OTHER APPROVED MEANS WITH A 25 YEAR LIFE.
7. INSTALL CONDUIT TO MAINTAIN PROPER CLEARANCES AND IN A NEAT, INCONSPICUOUS MANNER, RUN PARALLEL AND AT RIGHT ANGLES TO STRUCTURAL MEMBERS OR OTHER CONDUITS. PROVIDE BOXES, FITTINGS, AND BENDS FOR CHANGES IN DIRECTION. FASTEN CONDUIT SECURELY IN PLACE. SUPPORT CONDUIT USING STEEL PIPE STRAPS OAE, LAY-IN ADJUSTABLE HANGERS, CLEVIS HANGERS OR SPLIT-HANGERS. HANGER SPACING SHALL BE INSTALLED PER NEC REQUIREMENTS FOR THE TYPE OF CONDUIT BEING INSTALLED. USE APPROVED BEAM CLAMPS FOR CONNECTION TO STRUCTURAL MEMBERS.
8. PROVIDE PULL, JUNCTION OR CHRISTY BOXES WHERE REQUIRED TO FACILITATE THE INSTALLATION OF WIRING IN ADDITION TO THOSE SHOWN ON THE DRAWINGS. BENDS IN THE CONDUITS BETWEEN PULL BOXES SHALL NOT EXCEED THE EQUIVALENT OF FOUR 90 DEGREE BENDS PER NEC.
9. WHEN FIELD CUTTING IS REQUIRED, THE CONDUIT SHALL BE CUT SQUARE AND DEBURRED.
10. CONDUIT SIZES NOT SPECIFIED SHOULD CONFORM TO NEC SPECIFICATIONS TO INCLUDE FILL FACTOR AND DERATING FOR NUMBER OF CONDUCTORS WITH A MINIMUM CONDUIT SIZE BEING 3/4".
11. CONFORMANCE WITH NFPA 70E AND OTHER SAFETY REGULATIONS (LOCK OUT-TAG OUT OSHA, ETC.) IS THE FULL RESPONSIBILITY OF THE CONTRACTOR DURING CONSTRUCTION.
12. THE WIRING SIZE IS BASED ON THE ESTIMATED CONDUIT ROUTING AS SHOWN IN THIS DRAWING PACKAGE. SHOULD THE CONDUIT'S LENGTH INCREASE DUE TO RELOCATION OF SOURCE AND/OR ROUTING, THE CONDUITS AND THE CONDUCTORS MAY NEED TO BE RESIZED. PLEASE CONTACT THE ENGINEER VIA RFI PRIOR TO MAKING ANY FIELD CHANGES BEYOND 40' DIFFERENCE FROM DESIGN DRAWINGS..
13. ALL WIRING IN CONDUIT SHALL BE THWN-2 FOR 90 C APPLICATIONS. USE PV 1K2K INSULATED #6 GREEN WIRE FOR GROUND FOR ALL EXTERNAL GROUNDING. USE-2 OR APPROVED EQUIVALENT SHALL BE USED FOR ALL EXPOSED OR PV JUMPER HOMERUN WIRING.
14. ALL CONDUITS SHALL BE FREE OF ANY OBSTRUCTIONS AND PROPERLY SECURED BEFORE WIRE IS PULLED.
15. ELECTRICAL CONTRACTOR TO PROVIDE SIGNAGE TO ALL ELECTRICAL BOXES, JUNCTION BOXES, PULL BOXES, DC DISCONNECTS, CONDUIT RUNS, AC DISCONNECTS, SUB PANELS AND MAIN SERVICES PER NEC ARTICLE 690.
16. MEGGER TESTING: MEGGER (INSULATION) TEST ALL CONDUCTORS AT 600V/1000V TO 250 MEGOHMS MINIMUM BETWEEN THE CONDUCTOR UNDER TEST AND GROUND WIRE. CONDUCT TEST AFTER WIRE IS PULLED THROUGH THE CONDUIT BUT BEFORE TERMINATING TO THE MODULES, COMBINERS, DISCONNECTS OR INVERTERS. DO NOT MEGGER TEST THE MODULES AS THAT MAY DAMAGE THE DEVICE.
17. ALL FASTENERS SHALL BE STAINLESS STEEL, UNLESS OTHERWISE NOTED ON DESIGN DRAWINGS
18. CIRCUIT NUMBERS ARE DIAGRAMMATIC. THE EXACT NUMBERS SHALL BE DETERMINED IN THE FIELD AND REFLECTED ON AS-BUILT DOCUMENTATION BY THE ELECTRICAL CONTRACTOR. THE ASSOCIATED CIRCUIT NUMBERS THAT ARE APPLIED TO EACH DEVICE AND PIECE OF EQUIPMENT INFERS INTERCONNECTING BRANCH CIRCUITRY. INTERCONNECTING BRANCH WIRING SHALL BE SIZED EQUAL TO THE HOME RUN UNLESS NOTED OTHERWISE ON DESIGN DRAWINGS.
19. VOLTAGE DROP HAS BEEN CONSIDERED UP TO 60' NOMINAL IN THE DESIGN OF ALL BRANCH CIRCUITRY AND FEEDER SIZES BASED UPON THE ILLUSTRATED EQUIPMENT LAYOUTS AND SHORTEST CONDUCTOR/RACEWAY ROUTING. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR DEVIATIONS TAKEN THAT WILL INCREASE CONDUCTOR/RACEWAY ROUTING LENGTHS BEYOND 40' OF INCREASED LENGTH.. BRANCH CIRCUITS LONGER THAN 75' SHALL BE INSTALLED WITH EXPANSION FITTINGS FOR ANY CONDUIT TYPE USED.
20. NOT USED
21. NEW CIRCUIT BREAKERS ADDED TO EXISTING PANELS SHALL MATCH EXISTING FRAME AND AIC RATING.
22. SWITCHBOARDS, PANELBOARDS, METER SOCKET ENCLOSURES AND MOTOR CONTROL CENTERS SHALL BE FIELD MARKED TO WARN QUALIFIED PERSONS OF POTENTIAL ELECTRIC ARC FLASH HAZARDS. THE MARKING SHALL BE LOCATED TO BE CLEARLY VISIBLE TO QUALIFIED PERSONS BEFORE EXAMINATION, ADJUSTMENT, SERVICING, OR MAINTENANCE OF THE EQUIPMENT.

MODULE INSTALLATION NOTES:

1. REFER TO THE MODULE MANUAL FOR MORE SPECIFIC DETAILS ON RIGGING, UNPACKING, HANDLING, PLANNING, INSTALLATION, AND TORQUE SPECIFICATION.
2. THE MODULES MAY BE SHIPPED WITH SEVERAL MODULES PER BOX. TAKE CARE WHEN OPENING THE BOX TO ENSURE THAT ALL MODULES ARE SECURELY HANDLED.
3. NEVER LEAVE A MODULE UNSUPPORTED OR UNSECURED. CONTRACTOR IS RESPONSIBLE FOR ALL MATERIAL HANDLING ON THE JOB SITE.
4. DAMAGED MODULES SHALL BE REPLACED PROMPTLY AND CONTRACTOR SHALL MAINTAIN INVENTORY OF SPARE MODULES ANTICIPATING BREAKAGE DURING INSTALLATION AND ARRAY START UP.

ELECTRICAL NOTES FOR NEW PHOTOVOLTAIC SYSTEM:

1. THIS PHOTOVOLTAIC POWER PRODUCTION SYSTEM IS INTENDED TO OPERATE IN PARALLEL WITH THE UTILITY SERVICE PROVIDER.
2. THE PHOTOVOLTAIC SOURCE CIRCUITS AND PHOTOVOLTAIC OUTPUT CIRCUITS OF THIS PROPOSED SOLAR SYSTEM SHALL NOT BE CONTAINED IN THE SAME RACEWAY CABLE TRAY, CABLE OUTLET BOX, JUNCTION BOX OR SIMILAR FITTING AS FEEDERS OR BRANCH CIRCUITS OF OTHER SYSTEMS UNLESS A PARTITION OR SEPARATES THE CONDUCTORS OF THE DIFFERENT SYSTEMS ARE CONNECTED.
3. THE CONNECTION TO THE MODULE OR PANEL OF THIS PROPOSED SOLAR ELECTRIC SYSTEM SHALL BE SO ARRANGED THAT REMOVAL OF A MODULE OR A PANEL FROM THE PHOTOVOLTAIC SOURCE CIRCUIT DOES NOT INTERRUPT A GROUNDED CONDUCTOR TO ANOTHER PHOTOVOLTAIC SOURCE CIRCUIT..
4. THE INVERTER FOR THE PROPOSED SOLAR ELECTRIC SYSTEM SHALL BE IDENTIFIED FOR USE IN PHOTOVOLTAIC SYSTEMS. ALL EQUIPMENT SHALL BE UL APPROVED PER UL 1741.
5. THIS SYSTEM IS INTENDED TO CONNECT TO THE EXISTING FACILITY POWER SYSTEM AT ONE POINT. THIS CONNECTION SHALL BE IN COMPLIANCE WITH THE NEC.
6. ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION FOR TESTING AND ISOLATION. ALL COMBINER BOXES SHALL HAVE DISCONNECTION MEANS AT THE INVERTER FOR ISOLATION AND TESTING (MAINTENANCE DC DISCONNECTS).
7. ALL DISCONNECTS AND COMBINERS SHALL BE SECURED FROM UNAUTHORIZED AND UNQUALIFIED PERSONNEL BY LOCK OR LOCATION.
8. ALL EXPOSED CABLES SUCH AS MODULE LEADS SHALL BE SECURED WITH MECHANICAL OR OTHER SUNLIGHT RESISTANT MEANS.
9. MECHANICAL AND ELECTRICAL SUPPORT COMPONENTS, INCLUDING STRUT, SHALL HAVE GALVANIZED FINISH SUITABLE FOR THE ENVIRONMENT BEING INSTALLED AND A 25 YEAR SERVICE LIFE OF THE ARRAY FIELD.
10. DRAINAGE AND CONDUIT SEALING SHALL BE PROVIDED AS NECESSARY FOR ALL EXTERIOR EQUIPMENT ENCLOSURES.
11. DAMAGE TO EXISTING FINISHES SHALL BE PROPERLY RESTORED BY CONTRACTOR.

WIRING AND WIRING METHODS:

1. EXPOSED PV MODULE WIRING WILL BE USE-2 OR PV WIRE, UV RESISTANT, 90 DEGREES CELSIUS, WET RATED.
2. WIRING NOT EXPOSED TO SUNLIGHT WILL BE THWN-2, 90 DEGREES CELSIUS, WET RATED.
3. ALL GROUNDED CONDUCTORS ARE WHITE AND EQUIPMENT GROUNDING CONDUCTORS ARE GREEN OR BARE PER NEC.
4. ALL D.C. FIELD WIRING SHALL BE TAGGED AT BOTH ENDS WITH PERMANENT WIRE MARKERS.
5. LIQUID TIGHT FLEXIBLE METAL CONDUIT IS GENERALLY SUITABLE FOR INSTALLATION IN WET AND DRY LOCATIONS WHERE NOT SUBJECT TO PHYSICAL DAMAGE.. SHOULD IT BE EMPLOYED, SUPPORTS WILL BE NO MORE THAN 12 INCHES FROM BOXES (JUNCTION BOX, CABINETS, OR CONDUIT FITTING) AND NO MORE THAN 54 INCHES APART PER NEC.
6. USE ONLY COPPER CONDUCTORS FOR D.C. AND AC WIRING.
7. LONG STRAIGHT EXPOSED CONDUIT RUNS, 75 FEET OR MORE, SHALL HAVE EXPANSION FITTINGS AND ARRANGED WITH SLACK AT TERMINATION ALLOWING FOR MOVEMENT. LONGER DISTANCES WILL BE APPROVED BY ENGINEER WHERE CONTRACTOR SUBMITS EXPANSION CALCULATIONS.
8. UNDERGROUND CONDUIT SHALL BE SUITABLE FOR DIRECT BURIAL OR CONCRETE ENCASED INSTALLATION.

GROUNDING:

1. ONLY ONE CONNECTION TO DC CIRCUITS (GEC) AND ONE CONNECTION TO AC CIRCUITS WILL BE USED FOR SYSTEM GROUNDING (NEC 250-21) REFERENCED TO THE SAME POINT.
2. EGC'S AND GEC'S WILL HAVE AS SHORT A DISTANCE TO GROUND AS POSSIBLE AND A MINIMUM NUMBER OF BENDS.
3. NORMALLY NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER GROUNDING; NOTING THAT TERMINAL LUGS BOLTED ON AN ENCLOSURE'S FINISHED SURFACE MAY BE INSULATED BECAUSE OF PAINT/FINISH. PAINT/FINISH AT POINT OF CONTACT SHALL BE PROPERLY REMOVED.
4. MODULES SHALL BE GROUNDED WITH GEC/EGC USING THE LISTED GROUNDING POINT AND MATERIAL FIT FOR THIS PURPOSE, GROUND LUGS SHALL BE RATED FOR OUTDOOR USE.
5. LISTED UNDERGROUND FITTINGS AND BUSHINGS INSTALLED ON ALL METAL RACEWAYS AND ALL METAL ENCLOSURES TO BE PHYSICALLY GROUNDED OR BONDED TO EGC WITHIN.
6. GROUNDING INSTALLATION SHALL BE IN ACCORDANCE WITH THE LATEST NATIONAL ELECTRIC CODE SECTION 250 AND 690.
7. BOND GEC CONDUCTORS, WHERE APPLICABLE, TO REBAR IN CONCRETE STRUCTURES USING A CROSBY CLAMP OR APPROVED EQUIVALENT NO CAD-WELD OF COLUMN ANCHOR BOLTS OR FOUNDATION REBARS SHALL BE ALLOWED. ALL WELDED CONNECTIONS SHALL BE MADE USING SEPARATE GROUNDING RODS AND BOLTS TO FACILITATE WELDING, GROUNDING BOLTS OR RODS EXPOSED TO THE WEATHER SHALL BE GALVANIZED.
8. GROUND RESISTANCE SHALL BE TESTED, WHERE REQUIRED, BY THE FALL OF THE POTENTIAL METHOD. THE CONTRACTOR SHALL BE REQUIRED TO FURNISH WRITTEN CERTIFICATION OF THE TEST.

DISCONNECTING MEANS:

1. MEANS SHALL BE PROVIDED TO DISCONNECT ALL CURRENT CARRYING CONDUCTORS OF THE PHOTOVOLTAIC POWER SOURCE FROM ALL OTHER CONDUCTORS IN THE BUILDING.
2. THE GROUNDED CONDUCTOR MAY HAVE A BOLTED OR TERMINAL DISCONNECTING MEANS TO ALLOW MAINTENANCE OR TROUBLE SHOOTING BY QUALIFIED PERSONNEL.
3. THE DISCONNECTING MEANS SHALL BE REQUIRED TO BE SUITABLE AS SERVICE EQUIPMENT FOR STANDALONE SYSTEMS, AND LINE SIDE TAPS AND SHALL BE RATED IN ACCORDANCE WITH NEC.
4. EQUIPMENT SUCH AS PHOTOVOLTAIC SOURCE CIRCUITS, OVERCURRENT DEVICES, AND BLOCKING DIODES SHALL BE PERMITTED ON THE DC PHOTOVOLTAIC SIDE OF THE PHOTOVOLTAIC DISCONNECTING MEANS.
5. AS REQUIRED BY THE NEC, ALL D.C. COMBINER BOXES SHALL BE EQUIPPED WITH DC CONTACTORS PERMITTING REMOTE SHUTDOWN OF THE COMBINER BOX FROM THE GROUND LEVEL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION OF ALL EQUIPMENT RELATED TO THE CONTACTORS.

DISCONNECTION OF PHOTOVOLTAIC EQUIPMENT:

1. MEANS SHALL BE PROVIDED TO DISCONNECT EQUIPMENT SUCH AS INVERTERS, AND THE LIKE FROM ALL UNGROUNDED CONDUCTORS OF ALL SOURCES. IF THE EQUIPMENT IS ENERGIZED FROM MORE THAN ONE SOURCE, THE DISCONNECTING MEANS SHALL BE GROUPED AND IDENTIFIED.
2. DISCONNECTING MEANS SHALL BE PROVIDED TO DISCONNECT A FUSE FROM ALL SOURCES OF SUPPLY IF THE FUSE IS ENERGIZED FROM BOTH DIRECTIONS AND IS ACCESSIBLE TO OTHER THAN QUALIFIED PERSONNEL. SUCH A FUSE IN A PHOTOVOLTAIC SOURCE CIRCUIT SHALL BE CAPABLE OF BEING DISCONNECTED INDEPENDENTLY OF FUSES IN OTHER PHOTOVOLTAIC SOURCE CIRCUITS.
3. ALL DISCONNECTS AND COMBINERS SHALL BE SECURED FROM UNAUTHORIZED AND UNQUALIFIED PERSONNEL BY EITHER LOCK OR LOCATION.

MARKINGS:

1. ALL INTERACTIVE SYSTEM POINTS OF INTERCONNECTION WITH OTHER SOURCES SHALL BE MARKED AT AN ACCESSIBLE LOCATION AT THE DISCONNECTION MEANS.
2. A PERMANENT PLAQUE OR DIRECTORY SHALL BE PROVIDED IDENTIFYING THE LOCATION OF THE SERVICE DISCONNECTION MEANS AND PHOTOVOLTAIC SYSTEM DISCONNECTION MEANS,
3. PHOTOVOLTAIC MODULES SHALL BE MARKED TO IDENTIFY LEAD POLARITY, DEVICE RATINGS, AND SPECIFICATIONS FOR VOLTAGES, CURRENTS, AND POWER.
4. ARC FLASH WARNINGS SHALL BE PROVIDED PER NEC AND NFPA 70E
5. ALL DISCONNECTS OR "SOURCES" TO BE LABELED APPROPRIATELY PER NEC.
6. ALL OCPDs TO HAVE APPROPRIATE AMPACITY AND VOLTAGE RATINGS AS SHOWN ON DESIGN DRAWINGS.

GENERAL NOTES FOR GRID TIE PHOTOVOLTAIC INVERTERS:

1. SYSTEM GROUNDING MEANS: INVERTERS SHALL BE INSTALLED AS PART OF A PERMANENTLY GROUNDED ELECTRICAL SYSTEM PER THE NEC.
2. CONDUITS AND CONDUCTORS: ALL INTERCONNECT WIRING AND POWER CONDUCTORS INTERFACING SHALL BE IN ACCORDANCE WITH THE NEC AND ANY APPLICABLE LOCAL CODES. LARGE GAUGE WIRE MUST CONFORM TO THE MINIMUM BEND RADIUS SPECIFIED IN THE NEC. KEEP ALL WIRE WIRE BUNDLES AWAY FROM ANY SHARP EDGES TO AVOID DAMAGE TO WIRE INSULATION. ALL CONDUCTORS SHOULD BE RATED FOR 90 DEGREE C MINIMUM. FOR OUTDOOR INSTALLATIONS, ALL INTERCONNECT CONDUITS AND FITTINGS MUST BE A NEMA-4 RATED AS REQUIRED BY THE NEC. FOR WIRE GAUGE, BOLT SIZE AND TORQUE VALUES, CONSULT THE INVERTER INSTALLATION MANUAL.
3. INVERTER ENCLOSURE: INVERTERS SHALL BE INDOOR/OUTDOOR RATED, IEC GRADE, NEMA 3R, ALUMINUM CONSTRUCTION WITH POWDER COATING. ALL SURFACES ARE TREATED WITH A ZINC RICH PRIMER AND THEN POWDER COATED TO INHIBIT CORROSION.
4. OPERATOR INTERFACE CONTROLS: OPERATOR INTERFACE CONTROLS SHALL BE LOCATED ON THE FRONT OF THE MAIN INVERTER ENCLOSURE, CONSULT THE OPERATIONS AND MAINTENANCE MANUAL FOR INSTRUCTIONS AND CODE REFERENCES.
5. THE INVERTERS SHALL AUTOMATICALLY SHUT DOWN WHEN THE LOSS OF GRID POWER IS DETECTED.
6. PV PROTECTION DEVICE: THE INVERTER SHALL BE EQUIPPED WITH UL1741 APPROVED GROUND FAULT DETECTION INTERRUPTER "GFDI" AND ARC FLASH DETECTION INTERRUPTER "AFDI"
7. EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED PER NEC TABLE 250.122 .

* CONSTRUCTION DOCS NOTES R2.0

REVISIONS

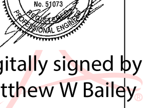
NO.	DATE	DESCRIPTION	BY
01	04/07/21	IFR	DS
02	05/11/21	LAYOUT & HW COMMENTS	DS
03	06/29/21	HW COMMENTS	DS

ISSUED FOR PERMIT

solectenergy™
Smart Solar. Smart Business.
89 Hayden Rowe Street, Suite E
Hopkinton, MA 01748 - (508) 598-3511

PROPOSED ROOF MOUNTED SOLAR PV SYSTEM

HARVARD HILDRETH ELEMENTARY SCHOOL - 2343
27 MASSACHUSETTS AVE
HARVARD MA 01451



Digitally signed by Matthew W Bailey
Date: 2021.07.15 10:13:03 -06'00'

SCALE	AS NOTED
DATE	7/12/21
DRAWN BY	CS
CHECKED BY	

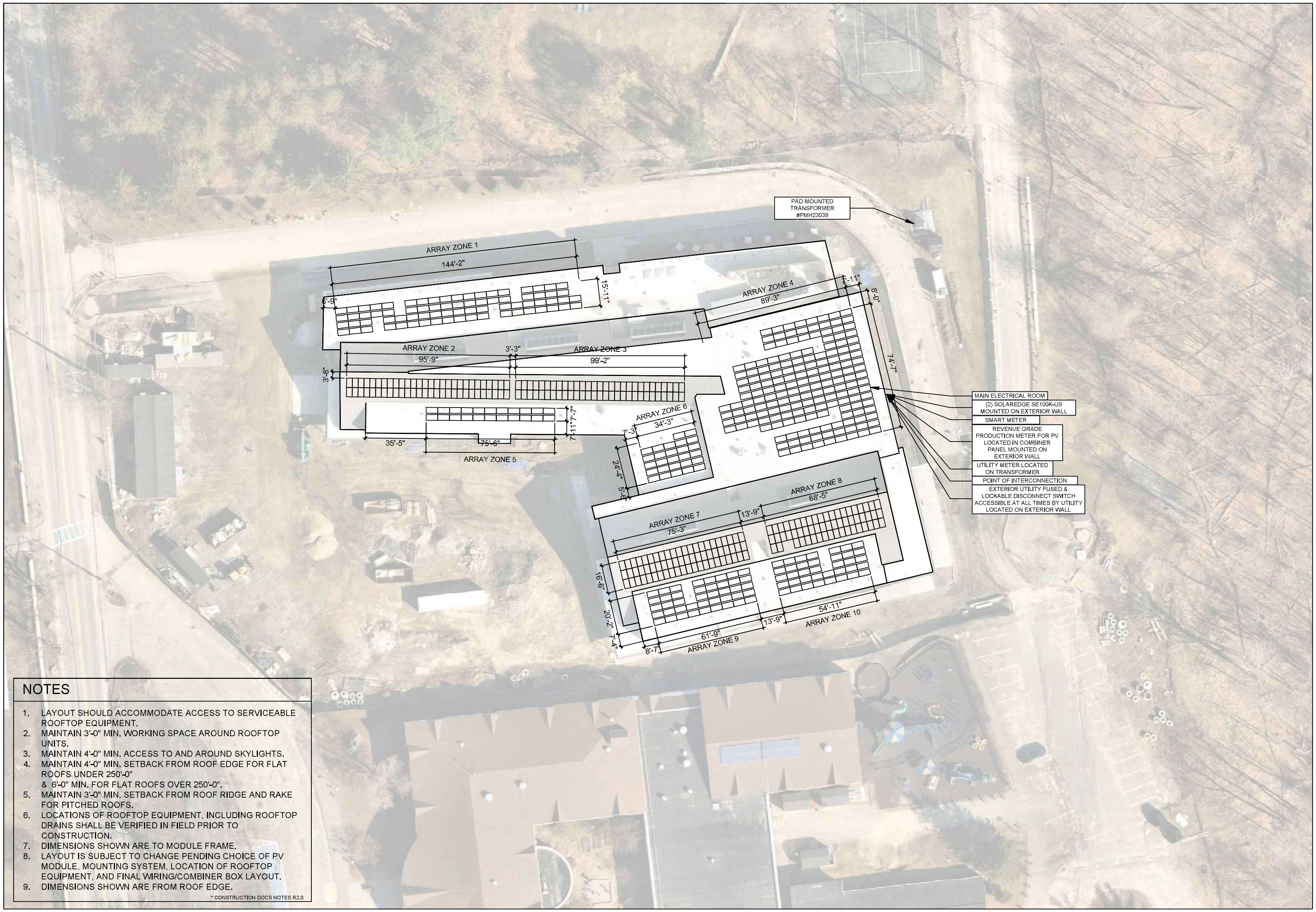
SHEET

PVGN

HARVARD HILDRETH ELEMENTARY SCHOOL - 2343 SITE PLAN, ARRAY SPECIFICATIONS AND PROPOSED ROOF

260.1 kW DC / 200 kW AC

SCALE: 1" = 20'-0"


PAD MOUNTED TRANSFORMER #PMH23039
ARRAY ZONE 1
144'-2"
15'-11"
ARRAY ZONE 4
89'-3"
ARRAY ZONE 2
95'-9"
3'-3"
ARRAY ZONE 3
99'-2"
74'-7"
8'-0"
ARRAY ZONE 5
35'-5"
75'-6"
ARRAY ZONE 6
34'-3"
24'-4"
ARRAY ZONE 7
75'-3"
13'-9"
ARRAY ZONE 8
68'-5"
16'-6"
20'-2"
ARRAY ZONE 9
61'-9"
13'-9"
54'-11"
ARRAY ZONE 10
8'-7"
MAIN ELECTRICAL ROOM
(2) SOLAREDGE SE100K-US MOUNTED ON EXTERIOR WALL
SMART METER
REVENUE GRADE PRODUCTION METER FOR PV LOCATED IN COMBINER PANEL MOUNTED ON EXTERIOR WALL
UTILITY METER LOCATED ON TRANSFORMER
POINT OF INTERCONNECTION
EXTERIOR UTILITY FUSED & LOCKABLE DISCONNECT SWITCH ACCESSIBLE AT ALL TIMES BY UTILITY LOCATED ON EXTERIOR WALL

NOTES

1. LAYOUT SHOULD ACCOMMODATE ACCESS TO SERVICEABLE ROOFTOP EQUIPMENT.
2. MAINTAIN 3'-0" MIN. WORKING SPACE AROUND ROOFTOP UNITS.
3. MAINTAIN 4'-0" MIN. ACCESS TO AND AROUND SKYLIGHTS.
4. MAINTAIN 4'-0" MIN. SETBACK FROM ROOF EDGE FOR FLAT ROOFS UNDER 250'-0" & 6'-0" MIN. FOR FLAT ROOFS OVER 250'-0".
5. MAINTAIN 3'-0" MIN. SETBACK FROM ROOF RIDGE AND RAKE FOR PITCHED ROOFS.
6. LOCATIONS OF ROOFTOP EQUIPMENT, INCLUDING ROOFTOP DRAINS SHALL BE VERIFIED IN FIELD PRIOR TO CONSTRUCTION.
7. DIMENSIONS SHOWN ARE TO MODULE FRAME.
8. LAYOUT IS SUBJECT TO CHANGE PENDING CHOICE OF PV MODULE, MOUNTING SYSTEM, LOCATION OF ROOFTOP EQUIPMENT, AND FINAL WIRING/COMBINER BOX LAYOUT.
9. DIMENSIONS SHOWN ARE FROM ROOF EDGE.

* CONSTRUCTION DOCS NOTES R2.0

REVISIONS

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PROPOSED ROOF MOUNTED SOLAR PV SYSTEM

HARVARD HILDRETH ELEMENTARY SCHOOL - 2343
27 MASSACHUSETTS AVE
HARVARD MA 01451

COMMONWEALTH OF MASSACHUSETTS
MATTHEW W. BAILEY
ELECTRICAL
No. 51073
PROFESSIONAL ENGINEER

Digitally signed by Matthew W Bailey
Date: 2021.07.15 10:13:17 -06'00'

SCALE	AS NOTED
DATE	7/12/21
DRAWN BY	CS
CHECKED BY	
SHEET	PV-1