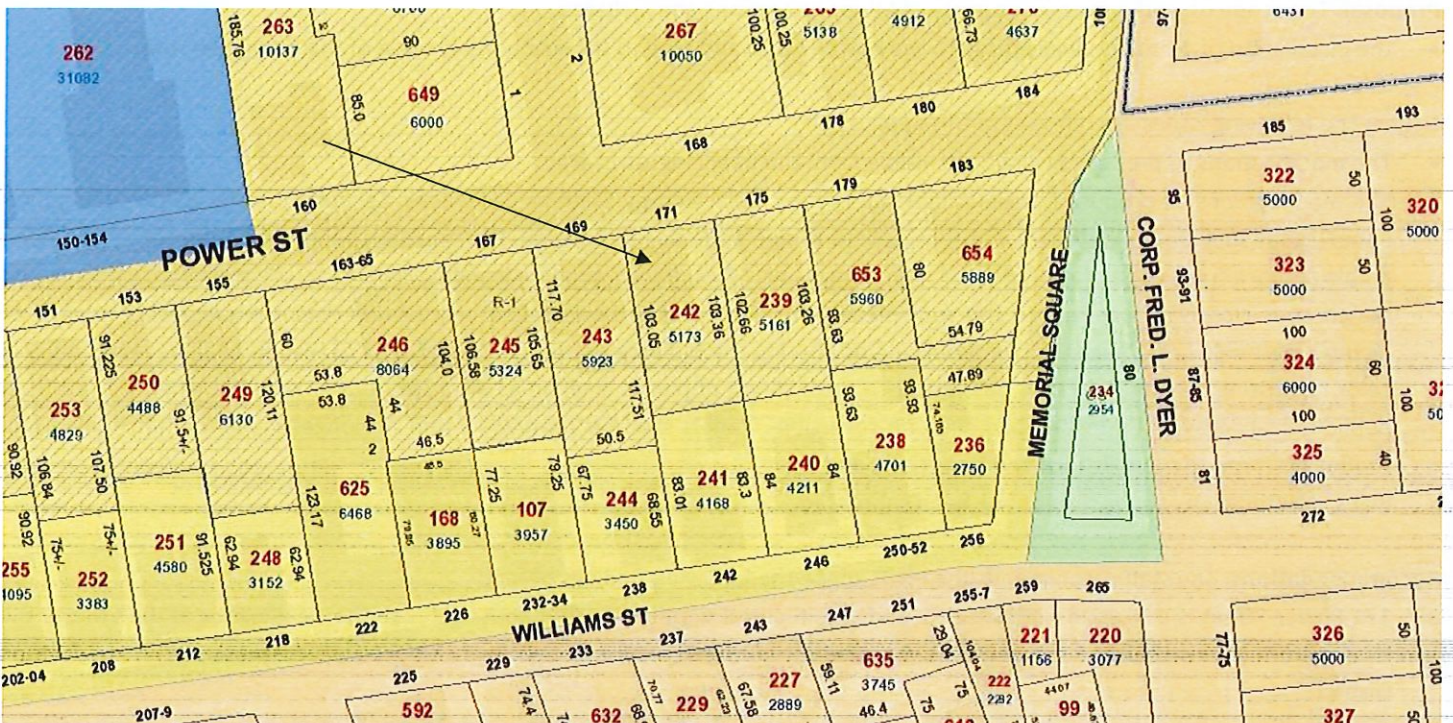
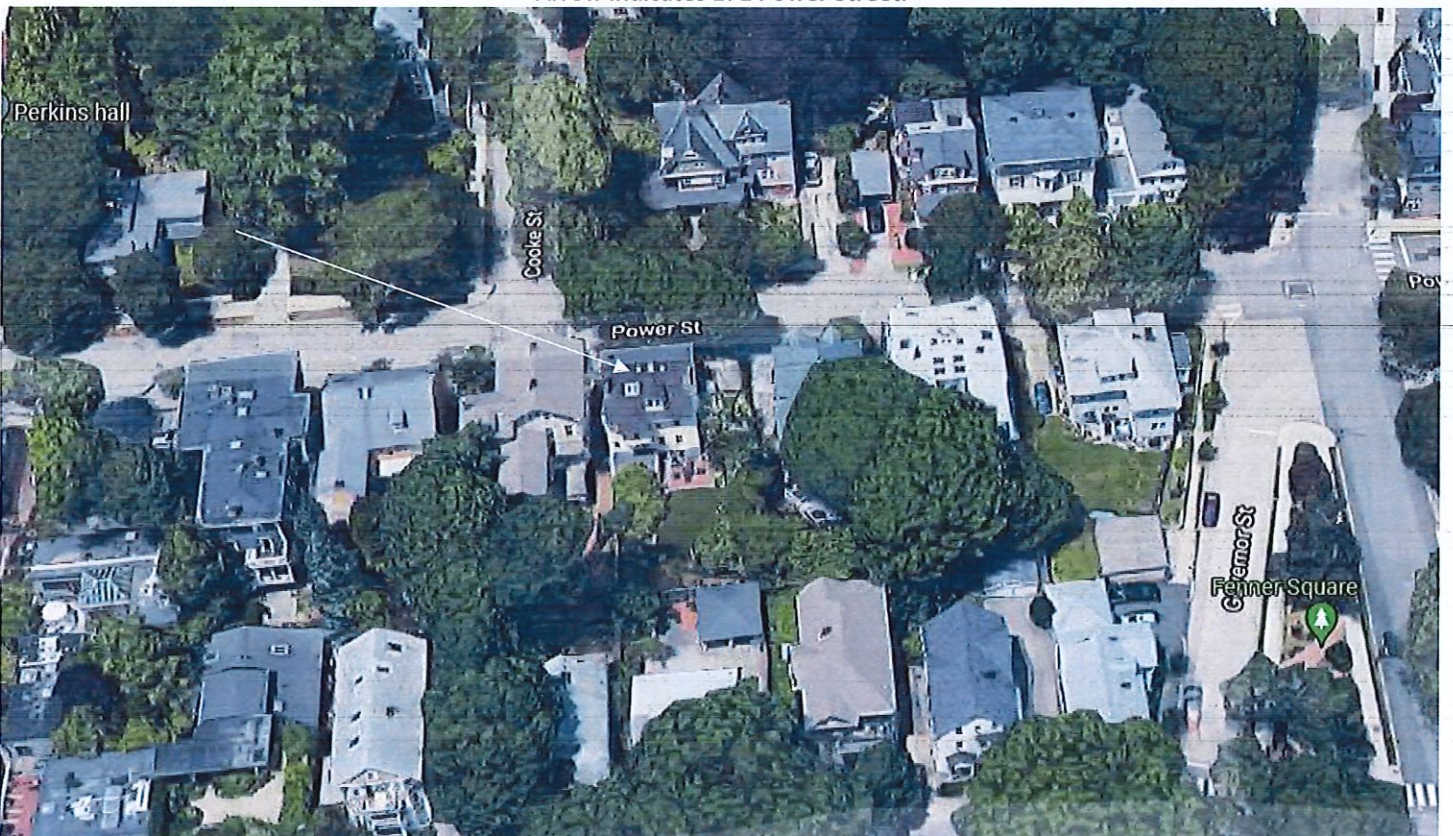


- 5. CASE 22. 040, 171 POWER STREET, Gerald A. Samuel House, 1828 (COLLEGE HILL)
2 ½ stories, Federal style, clapboarded, four bays wide with columned entrance porch.
CONTRIBUTING



Arrow indicates 171 Power Street.



Arrow indicates project location, looking north.

Applicant/Contractor: Naudy Vasquez, Smart Green Solar, 33 Broad Street, Ste 300, Providence, RI 02903

Owner: Peter Kramer, 171 Power Street, Providence, RI 02906

Proposal: The scope of work proposed consists of Minor Alterations and includes:

- the installation of 12 solar panels, three to the north (front) and nine to the south (rear) slope of the side gable roof.

Issues: The following issues are relevant to this application:

- The modifications as proposed will be not visible from the public rights-of-way;
- The modifications as proposed meets Minor Alterations: Solar Energy Systems Guidelines, Section 2, in the following manner: Panel layout shall be sympathetic or appropriate to design and scale of building. Rectangular configurations are preferred, with ample setback from edge of roof, dormers, chimneys, etc. (2.A); Panels shall be installed parallel to the existing roof slope and matched as closely as possible to the roof plane (2.B); Panels shall be installed without destroying or replacing original or historic materials or significantly compromising or altering the building's structural integrity (2.C); Panels shall be compatible in color to existing roofing insofar as possible (2.D); Installation of panels shall be as inconspicuous as possible when viewed from public right-of-way (2.E); Installation shall be reversible. Panels shall be removed when no longer viable or functioning and roofing restored to pre-existing conditions (2.F); and,
- Plans, specifications and pictures have been submitted.

Recommendations: The staff recommends the PHDC make the following findings of fact:

- a) 171 Power Street is a structure of historical and architectural significance that contributes to the significance of the College Hill local historic district having been recognized as a contributing structure to the Power-Cooke Streets National Register Historic District;
- b) The modifications as proposed meets Minor Alterations: Solar Energy Systems Guidelines, Section 2, and the application is considered complete; and,
- c) The work as proposed is in accord with PHDC Standards 8 & 9 as follows: 8) the work will be done so that it does not destroy the historic character of the property or the district as they will be minimally-to-not visible from the public rights-of-way; and, 9) Whenever possible... alterations to structures shall be done in such a manner that if removed in the future, the essential form and integrity of the structure and the site will be unimpaired.

Staff recommends a motion be made stating that: The application is considered complete. 171 Power Street is a structure of historical and architectural significance that contributes to the significance of the College Hill local historic district having been recognized as a contributing structure to the Power-Cooke Streets National Register Historic District. The Commission grants Final Approval of the proposal as submitted as the proposed alteration is appropriate having determined that the proposed alteration does not destroy the historic character of the property or the district and are historically and architecturally compatible with the property and district as the proposed alteration meets Minor Alterations: Solar Energy Systems Guidelines, Section 2, is reversible and will not have an adverse effect on the property or district as they will be minimally-to-not visible from the public rights-of-way (Standards 8 & 9), and the recommendations in the staff report, with staff to review any additional required details.



SCOPE OF WORK:
 TO INSTALL A ROOF MOUNTED SOLAR PHOTOVOLTAIC SYSTEM AT THE OWNER RESIDENCE LOCATED AT 171 POWER ST., PROVIDENCE, RI 02906.
 (LATITUDE & LONGITUDE : 41.823289, -71.985032)
 THE POWER GENERATED BY THE PV SYSTEM WILL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ELECTRICAL SERVICE EQUIPMENT.
 THE PV SYSTEM DOES NOT INCLUDE STORAGE BATTERIES

EQUIPMENT SUMMARY

12 HANWHA OCELLS Q-PEAK DUO BLK ML-G10+ 400W MODULES
12 ENPHASE IQ7 PLUS-72-2-US (240V) MICROINVERTERS

GENERAL NOTES:

- THESE CONSTRUCTION DOCUMENTS HAVE BEEN BASED ON FIELD INSPECTIONS AND OTHER INFORMATION AVAILABLE AT THE TIME. ACTUAL FIELD CONDITIONS MAY REQUIRE MODIFICATIONS IN CONSTRUCTION DETAILS.
- ARCHITECT HAS NOT BEEN RETAINED TO SUPERVISE ANY CONSTRUCTION OR INSTALLATION OF ANY EQUIPMENT AT SITE
- CONTRACTOR SHALL FURNISH ALL LABOR, MATERIAL, EQUIPMENT, TOOLS, OBTAINS ALL PERMITS, LICENSES AND PAY ALL REQUIRED FEES AND COMPLETE INSTALLATION.
- CONTRACTOR HAS THE FULL RESPONSIBILITY TO CHECK AND VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK. ANY WORK STARTED BEFORE CONSULTATION AND ACCEPTANCE BY THE ENGINEER SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE SUBJECT TO CORRECTION BY THEM WITHOUT ADDITIONAL COMPENSATION.
- DAMAGE CAUSED TO THE EXISTING STRUCTURE, PIPES, DUCTS, WINDOWS, WALL, FLOORS, ETC. SHALL BE REPAIRED TO THE ORIGINAL CONDITION OR REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST.
- THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR THE PROPER INSTALLATION AND COMPLETION OF THE WORK WITH APPROVED MATERIALS.
- NO CHANGES ARE TO BE MADE WITHOUT THE CONSULTATION AND APPROVAL OF THE ARCHITECT.
- CONTRACTOR SHALL OBTAIN BUILDING PERMIT. NO WORK TO START UNLESS BUILDING PERMIT IS PROPERLY DISPLAYED.
- ALL WORKMANSHIP AND MATERIALS SHALL BE OF FIRST QUALITY AND IN COMPLIANCE WITH THE REQUIREMENTS OF THE RI BUILDING CODE, THE DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ALL PERTINENT AGENCIES.
- IT IS ESSENTIAL THAT ALL WORK PROCEED WITH THE MAXIMUM COOPERATION OF ALL PARTIES AND WITH MINIMUM INTERFERENCE TO THE OCCUPANTS WITHIN THE BUILDING. THE OWNER'S DIRECTIONS IN THIS REGARD SHALL BE FULLY COMPLIED WITH.
- ALL EXPOSED PLUMBING, HVAC, ELECTRICAL DUCTWORK, PIPING AND CONDUITS ARE TO BE PAINTED BY GENERAL CONTRACTOR.
- THE CONTRACTOR SHALL PERFORM THE WORK IN STRICT CONFORMANCE WITH THE LOCAL LAWS, REGULATIONS AND THE NATIONAL ELECTRIC CODE.
- THE CONTRACTOR SHALL OBTAIN ALL PERMITS, APPROVALS, AFFIDAVITS, CERTIFICATIONS, ETC. AND PAY ALL FEES AS REQUIRED BY THE LOCAL AUTHORITIES.
- CONTRACTORS SHALL OBTAIN FIRE CERTIF. UPON COMPLETION OF WORK.

ELECTRICAL NOTES:

- THE EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE INSTALLED ONLY BY QUALIFIED PERSONS ONE WHO HAS SKILLS AND KNOWLEDGE RELATED TO THE CONSTRUCTION AND OPERATION OF THE ELECTRICAL EQUIPMENT AND INSTALLATIONS AND HAS RECEIVED SAFETY TRAINING TO RECOGNIZE AND AVOID THE HAZARDS INVOLVED. (NEC 690.4(E) AND 705.6)
- LOCAL UTILITY PROVIDER SHALL BE NOTIFIED PRIOR TO USE AND ACTIVATION OF ANY SOLAR PHOTOVOLTAIC INSTALLATION. FOR A LINE SIDE TAP CONNECTION, UTILITY NEEDS TO BE NOTIFIED WELL IN ADVANCE TO COORDINATE BUILDING ELECTRICAL SHUT OFF.
- NEW CONDUIT ROUTING SHOWN IS ESSENTIALLY SCHEMATIC. SUBCONTRACTOR SHALL LAY OUT RUNS TO SUIT FIELD CONDITIONS AND THE COORDINATION REQUIREMENTS OF OTHER TRADES.
- ARRAY WIRING SHOULD NOT BE READILY ACCESSIBLE EXCEPT TO QUALIFIED PERSONNEL.
- ALL EXTERIOR CONDUIT, FITTINGS, AND BOXES SHALL BE WATERIGHT AND APPROVED FOR USE IN WET LOCATIONS. (NEC 314.15A).
- WIRING METHODS FOR PV SYSTEM CONDUCTORS AREN'T PERMITTED WITHIN 10 IN. OF THE ROOF DECKING OR SHEATHING EXCEPT WHERE LOCATED DIRECTLY BELOW THE ROOF SURFACE THATS COVERED BY PV MODULES AND ASSOCIATED EQUIPMENT WIRING
- BACK-FED BREAKER MUST BE AT THE OPPOSITE END OF BUS BAR FROM THE MAIN BREAKER OR MAIN LUG SUPPLYING CURRENT FROM THE UTILITIES.
- ALL CONDUCTORS AND WIRE TIES EXPOSED TO SUNLIGHT ARE LISTED AS UV-RESISTANT.
- CONTRACTOR SHALL FOLLOW ALL ELECTRICAL EQUIPMENT LABELING REQUIREMENTS IN NEC 690 AND IFC 2015
- PV SOURCE, OUTPUT AND INVERTER CIRCUITS SHALL BE IDENTIFIED AT ALL POINTS OF TERMINATION, CONNECTION, AND SPLICES. THE MEANS OF ID CAN BE SEPARATE COLOR CODING, MARKING TAPE, TAGGING ETC. (NEC 690.4).
- MEASURE THE LINE-TO-LINE AND LINE-TO-NEUTRAL VOLTAGE OF ALL SERVICE ENTRANCE CONDUCTORS PRIOR TO INSTALLING ANY SOLAR EQUIPMENT. THE VOLTAGES FOR THE 240VAC RATED.

GOVERNING CODES

2018 INTERNATIONAL RESIDENTIAL CODE
2018 INTERNATIONAL FIRE CODE
2020 NATIONAL ELECTRICAL CODE
2019 INTERNATIONAL BUILDING CODE
2019 RHODE ISLAND STATE BUILDING CODE

WIRING AND CONDUIT NOTES:

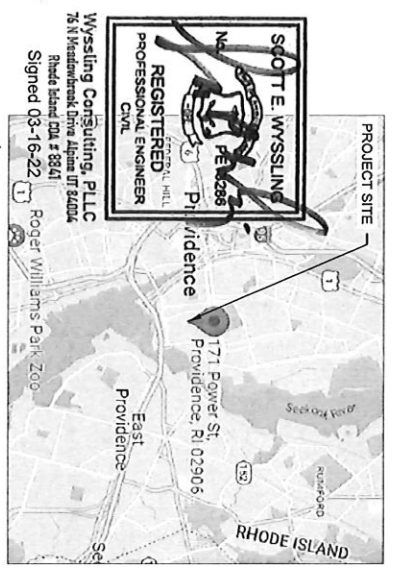
- ALL CONDUIT SIZES AND TYPES, SHALL BE LISTED FOR ITS PURPOSE AND APPROVED FOR THE SITE APPLICATIONS.
- ALL PV CABLES AND HOMERUN WIRES BE #10AWG -USE 2, PV WIRE, OR PROPRIETARY SOLAR CABLING SPECIFIED BY MFR, OR EQUIVALENT. ROUTED TO SOURCE CIRCUIT COMBINER BOXES AS REQUIRED
- ALL CONDUCTORS AND OCCP SIZES AND TYPES SPECIFIED ACCORDING TO NEC 690.8 (A)(1) & (B)(1)(1). [NEC 240] [NEC 690.7] FOR MULTIPLE CONDUCTORS
- ALL PV DC CONDUCTORS IN CONDUIT EXPOSED TO SUNLIGHT SHALL BE DERATED ACCORDING TO [NEC TABLE 310.15 (B)(2)(C)] BLACK ONLY**
- EXPOSED ROOF PV DC CONDUCTORS SHALL BE USE-2, 90°C RATED, WET AND UV RESISTANT, AND UL LISTED RATED FOR 600V, UV RATED SPIRAL WRAP SHALL BE USED TO PROTECT WIRE FROM SHARP EDGES
- PHASE AND NEUTRAL CONDUCTORS SHALL BE DUAL RATED THHN/THWN-2 INSULATED, 90°C RATED, WET AND UV RESISTANT, RATED FOR 600V PER NEC 2008 OR 1000V PER NEC 2011
- 4-WIRE DELTA CONNECTED SYSTEMS HAVE THE PHASE WITH THE HIGHER VOLTAGE TO GROUND MARKED ORANGE OR IDENTIFIED BY OTHER EFFECTIVE MEANS
- ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION
- VOLTAGE DROP LIMITED TO 2%
- AC CONDUCTORS ->AWG COLOR CODED OR MARKED: PHASE A OR L1- BLACK, PHASE B OR L2- RED, PHASE C OR L3- BLUE, NEUTRAL- WHITE/GRAY

SYSTEM RATING

4.80 KWDC
3.48 KWAC

SHEET INDEX

PV-0	COVER PAGE
PV-1	SITE PLAN
PV-2	ROOF PLAN & MODULES
PV-2A	STRING LAYOUT & BOM
PV-3	ATTACHMENT DETAIL
PV-4	ELECTRICAL LINE DIAGRAM & CALCS.
PV-4A	SPECIFICATIONS & CALCULATION
PV-5	SIGNAGE
PV-6+	EQUIPMENT SPECIFICATIONS



1 VICINITY MAP

SCALE: 1/4" = 100'

PROJECT SITE

1 HOUSE PHOTO

SCALE: 1/4" = 100'

171 Power St
 Providence, RI 02906

REGISTERED PROFESSIONAL ENGINEER

3/16/2022

No. 14252

GREGORY THOMAS ELVESTAD

Wysling Consulting, PLLC
 76 W Westdownpark Drive Alpine UT 84003
 Rhode Island 0341

RACHEL SCHWARTZ
 RESIDENCE
 171 POWER ST
 PROVIDENCE, RI 02906
 PH.# : (401) 578-8949
 Email: jak10@brown.edu

DATE: 03/15/2022

SHEET NAME

COVER PAGE

SHEET SIZE

ANSI B
 11" X 17"

SHEET NUMBER

PV-0

SmartGreenSolar

SMART GREEN, INC.
 33 BROAD STREET, STE 300,
 PROVIDENCE, RI 02903
 (401) 375-5949
 CONTRACTOR LIC #: 45612

SYSTEM INFO

(12) HANWHA OCELLS Q-PEAK DUO
 BLK ML-G10+ 400W

(12) ENPHASE IQ7 PLUS-72-2-US (240V)
 DC SYSTEM SIZE: 4.80 KWDC

AC SYSTEM SIZE: 3.48 KWAC

REVISIONS

DESCRIPTION	DATE	REV

YOUNG ORCHARD AVE

I-2

HD

R-1

COCKE ST

MEMORIAL ST

CORP FRED L DYER

R-3

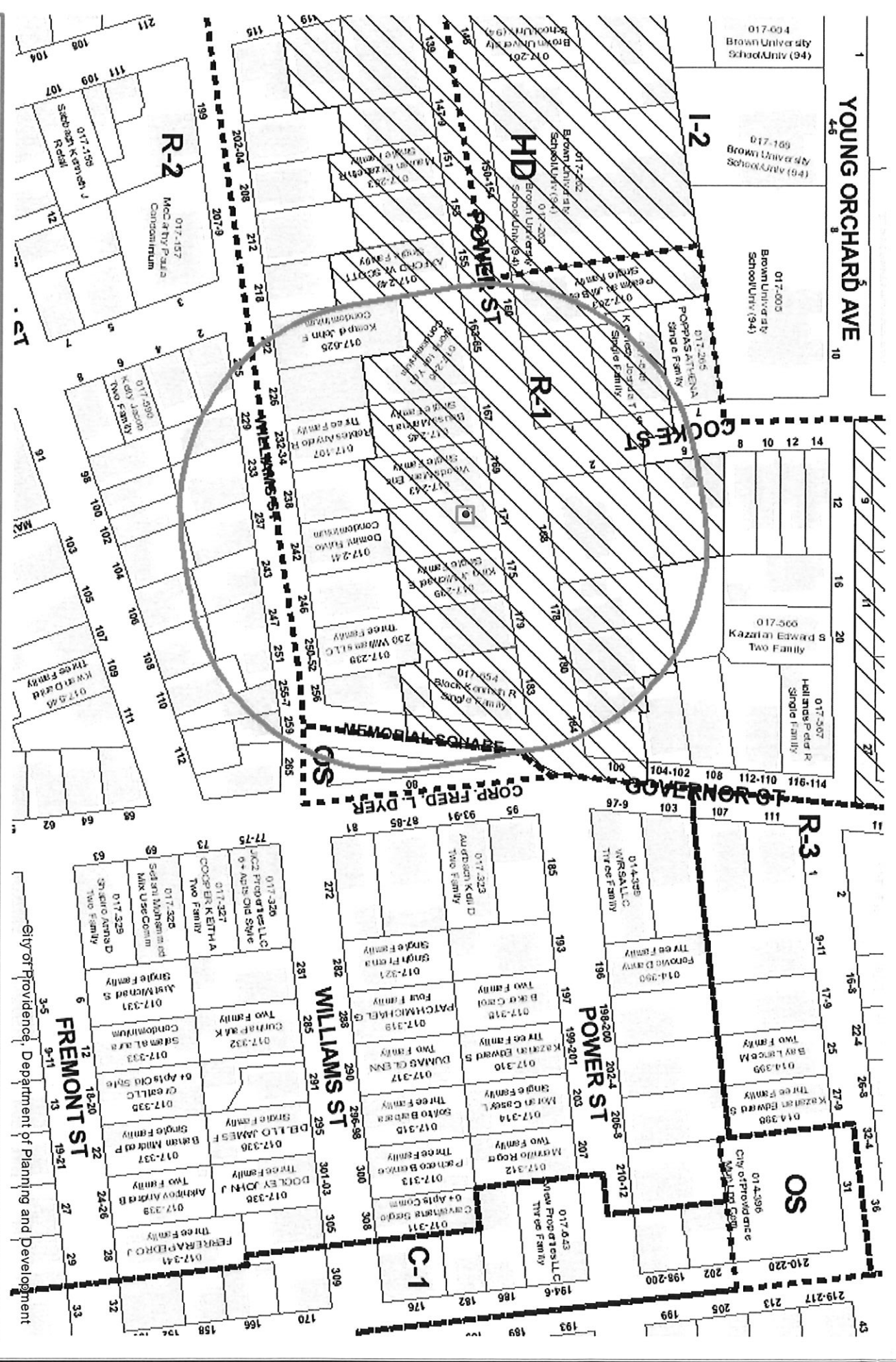
POWER ST

OS

WILLIAMS ST

C-1

FREMONT ST



The information depicted on this map is preliminary and for informational purposes only. It is not intended to be used as a legal document. It is subject to change without notice. Prepared by the Providence Planning and Development Department, 100 N. Main Street, Providence, RI 02903. Date: 10/20/2023. Providence City Clerk's Office.



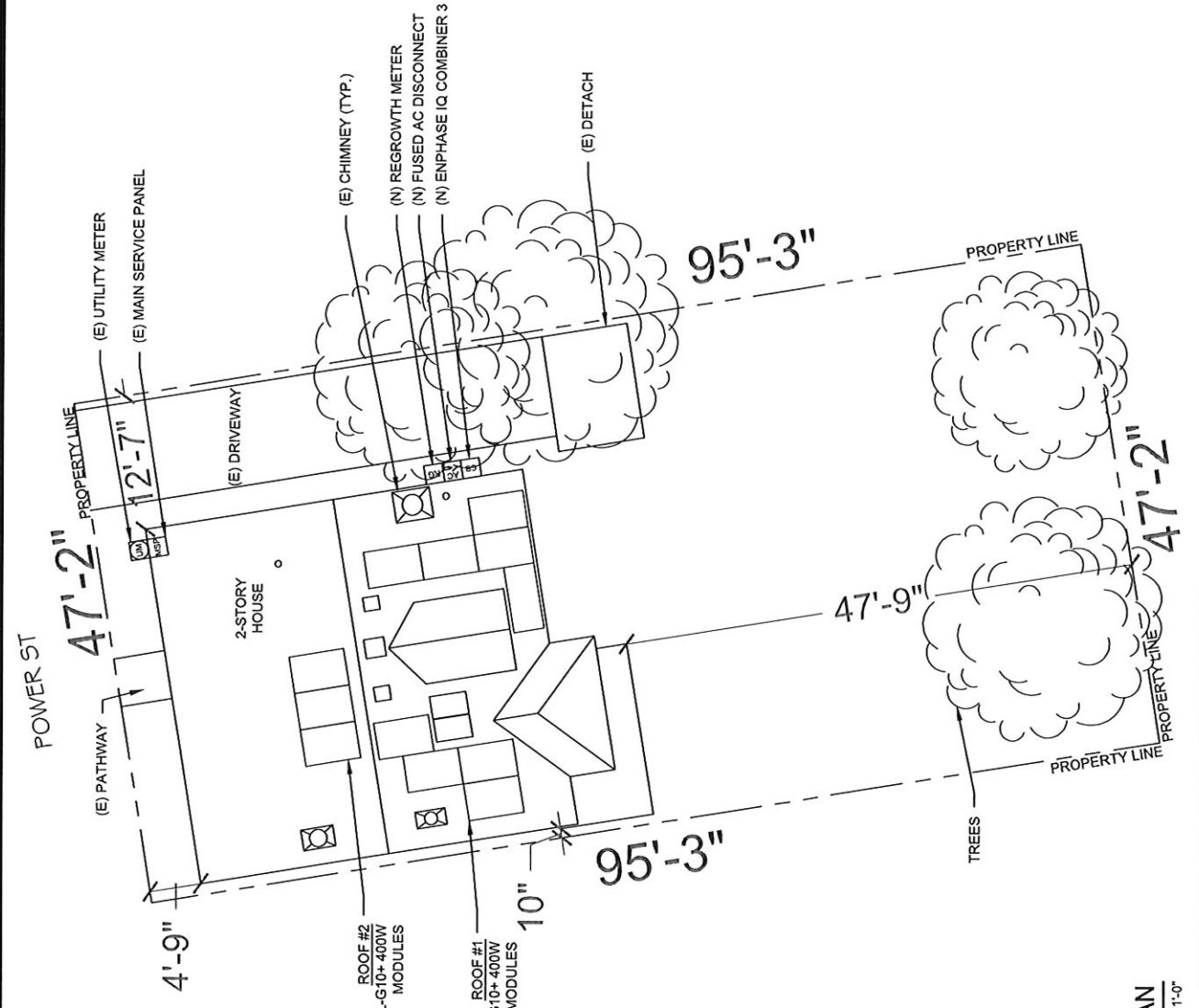
PROVIDENCE, RHODE ISLAND

PROVIDENCE THE CREATIVE CAPITAL
DEPARTMENT OF PLANNING AND DEVELOPMENT
100 N. MAIN STREET, PROVIDENCE, RHODE ISLAND 02903

City of Providence, Department of Planning and Development

SITE NOTES

- A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
- THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS AN UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.
- THE SOLAR PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
- PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION [NEC 110.26]



1 | PLOT PLAN WITH ROOF PLAN
SCALE: 3/32" = 1'-0"

SMART GREEN, INC.
33 BROAD STREET, STE 300,
PROVIDENCE, RI 02903
PH: (401) 376-5949
CONTRACTOR LIC#: 45612

SYSTEM INFO	
(12) HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+400W	
(13) ENPHASE IQ7 PLUS-72-2-US (240V)	
DC SYSTEM SIZE: 4.80 KWDC	
AC SYSTEM SIZE: 3.68 KWAC	

REVISIONS	
DESCRIPTION	DATE

Signature with Seal
GREGORY THOMAS ELVESTAD
No. 14252
3/16/2022
REGISTERED PROFESSIONAL ENGINEER
IN THE STATE OF RHODE ISLAND

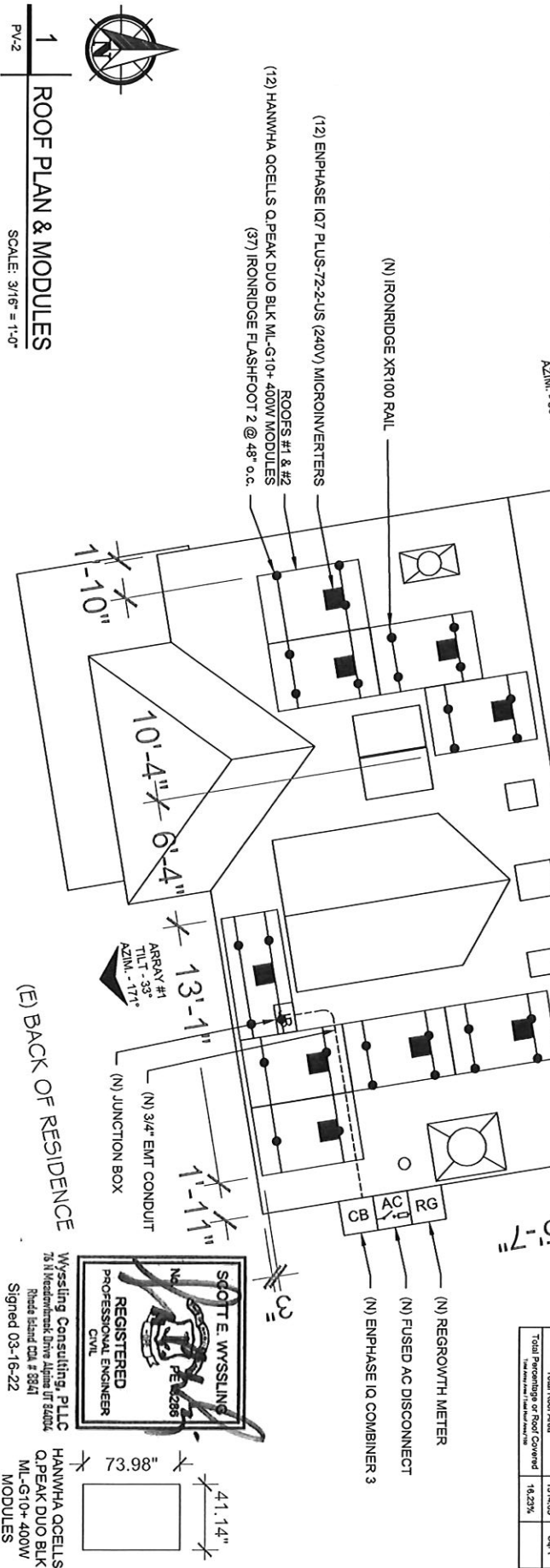
Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
RACHEL SCHWARTZ
RESIDENCE
171 POWER ST
PROVIDENCE, RI 02906
PH.#: (401) 578-8949
Email: jak10@brown.edu

DATE: 03/15/2022
SHEET NAME
SITE PLAN
SHEET SIZE
ANSI B 11" X 17"
SHEET NUMBER
PV-1

MODULE TYPE, DIMENSIONS & WEIGHT	
NUMBER OF MODULES:	12 MODULES
MODULE TYPE:	HANWHA OCELLS Q.PEAK DUO BLK ML-G10+400W
MODULE WEIGHT:	48.50 LBS
MODULE DIMENSIONS:	73.98" x 41.14" = 21.14SF
UNIT WEIGHT OF AREA:	2.29 PSF

DESIGN SPECIFICATION	
RISK CATEGORY:	II
CONSTRUCTION:	SFD
ZONING:	RESIDENTIAL
SNOW LOAD (ASCE 7-16):	30 PSF
EXPOSURE CATEGORY:	B
WIND SPEED (ASCE 7-16):	125 MPH

LEGEND	
JB	(N) JUNCTION BOX
UM	(E) UTILITY METER
MSP	(E) MAIN SERVICE PANEL (MSP)
RG	(N) REGROWTH METER
AC	(N) AC DISCONNECT
CB	(N) ENPHASE IQ COMBINER 3
○	- VENT, ATTIC FAN, ROOF OBSTRUCTION)
○	- ROOF ATTACHMENT CONDUIT



ROOF DESCRIPTION				
ROOF TILT	AZIMUTH	RAFTER SIZE	RAFTER SPACING	ROOF MATERIAL
#1	33°	2"x6"	24" o.c.	ASPHALT SHINGLES
#2	33°	2"x6"	24" o.c.	ASPHALT SHINGLES

ARRAY AREA & ROOF AREA CALCCS			
ROOF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	160.07	557.79	29
#2	53.39	597.66	9

MODULE ARRAY WEIGHT (LOAD CALCCS)	
Number of Module	12
Module Weight	48.50 LBS
Total Module (Array) Weight	582.00 LBS
Number of Attachment Point	37
Mounting System Weight	8.11 LBS
Total Mounting System Weight	300.07 LBS
No. of Racking	7.00
Racking system Weight	84.86 LBS
Total Racking system Weight	84.86 LBS
Total System Weight	966.92 LBS
Weight at Each Attachment Point	15.72 LBS
Module Area (73.98" x 41.14")	21.14 SqFt
Total Array Area	213.46 SqFt
Distributed Load	4.44 Pw/SqFt
Total Roof Area	1314.85 SqFt
Total Percentage of Roof Covered	16.29%

SCOTT E. WYSSLING
REGISTERED PROFESSIONAL ENGINEER
PE # 2866
Wysling Consulting, PLLC
75 N Westdownpark Drive Alpha UT 82404
Rhode Island EdL # 8841
Signed 03-16-22

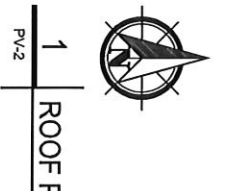
HANWHA OCELLS
Q.PEAK DUO BLK
ML-G10+400W
MODULES

RACHEL SCHWARTZ
RESIDENCE
171 POWER ST
PROVIDENCE, RI 02906
PH.# : (401) 578-8949
Email: jak10@brown.edu

PROJECT NAME & ADDRESS

SmartGreenSolar
SMART GREEN, INC.
33 BROAD STREET, STE 300
PROVIDENCE, RI 02903
(401) 375-5949
CONTRACTOR LIC# : 45612

SYSTEM INFO
(12) HANWHA OCELLS Q.PEAK DUO BLK ML-G10+400W
DC SYSTEM SIZE: 4.48 KWAC
AC SYSTEM SIZE: 3.44 KWAC
REVISIONS
DESCRIPTION DATE REV
Signature with Seal



1 ROOF PLAN & MODULES
SCALE: 3/16" = 1'-0"

ARRAY #2
TILT - 33°
AZIM. - 351°

ARRAY #1
TILT - 33°
AZIM. - 171°

ROOF #1 & #2
(12) HANWHA OCELLS Q.PEAK DUO BLK ML-G10+400W MODULES
(37) IRONRIDGE FLASHFOOT 2 @ 48" o.c.

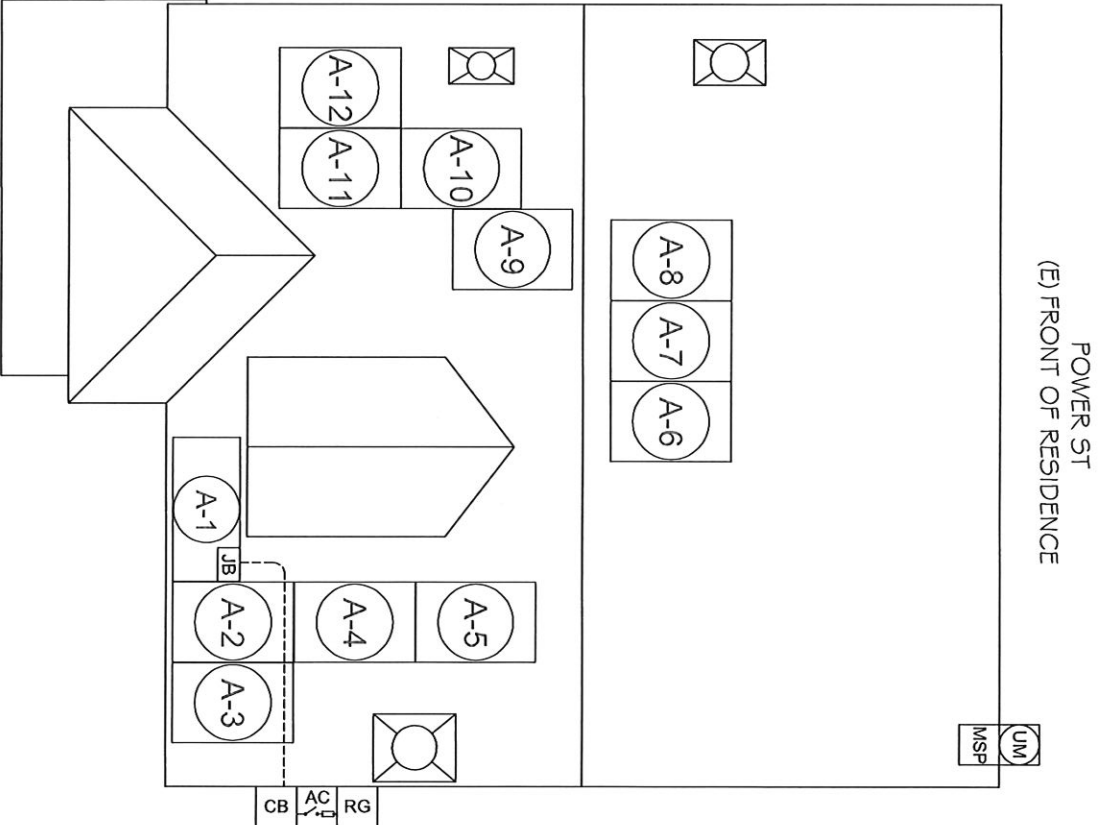
(N) IRONRIDGE XR100 RAIL
(N) ENPHASE IQ7 PLUS-72-2-US (240V) MICROINVERTERS

(N) JUNCTION BOX
(N) 3/4" EMT CONDUIT
(N) REGROWTH METER
(N) FUSED AC DISCONNECT
(N) ENPHASE IQ COMBINER 3

DATE: 03/15/2022
SHEET NAME: ROOF PLAN & MODULES
SHEET SIZE: 11" X 17"
ANSI B
SHEET NUMBER: PV-2

BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	12	HANWHA QCELLS Q.PEAK DUO BLK ML-G10+ 400W
MICROINVERTER	12	ENPHASE IQ7 PLUS-72-US (240V)
COMBINER BOX	1	ENPHASE IQ COMBINER 3 W/ IQ ENVOY (X-IQ-AM1-240-3)
AC DISCONNECT	1	60A FUSED AC DISCONNECT (2) 20A FUSES 240V NEMA 3R, UL LISTED
JUNCTION BOX	1	JUNCTION BOX, NEMA 3R, UL LISTED
PRODUCTION METER	1	REGROWTH METER, NEMA 3R, UL 414 LISTED
ATTACHMENT	37	BOLT LAG 5/16 X 4.75"
ATTACHMENT	37	ASSY. FLASHING
ATTACHMENT	37	ASSY. CARFOOT
ATTACHMENT	37	WASHER, EPDM BACKED
ENPHASE Q CABLE	23	ENPHASE Q CABLE 240V (PER CONNECTOR)
BRANCH TERMINATOR	1	BRANCH TERMINATOR
IQ WATER TIGHT CAP	11	IQ WATER TIGHT CAP
RAILS	7	IRONRIDGE XR100 RAIL-14 FEET (168")
SPLICE	0	RAIL SPLICE
CLAMPS	40	UNIVERSAL FASTENING OBJECT(UFO)
CLAMPS	32	STOPPER SLEEVES
GROUNDING LUG	8	GROUNDING LUG

A - MODULE STRINGING



POWER ST
(E) FRONT OF RESIDENCE

(E) BACK OF RESIDENCE

1 ROOF PLAN WITH STRING LAYOUT & BOM
SCALE: 3/16" = 1'-0"



SmartGreenSolar

SMART GREEN, INC.
33 BROAD STREET, STE 300,
PROVIDENCE, RI 02903
(401) 375-5949
CONTRACTOR LIC# : 45612

SYSTEM INFO.

(12) HANWHA QCELLS Q.PEAK DUO
BLK ML-G10+ 400W
(12) ENPHASE IQ7 PLUS-72-US (240V)
DC SYSTEM SIZE: 4.80 KWDC
AC SYSTEM SIZE: 3.48 KWAC

REVISIONS

DESCRIPTION	DATE	REV

GREGORY HOWES REGISTERED PROFESSIONAL ENGINEER

No. 14252
3/16/2022
PROVIDENCE, RI 02903

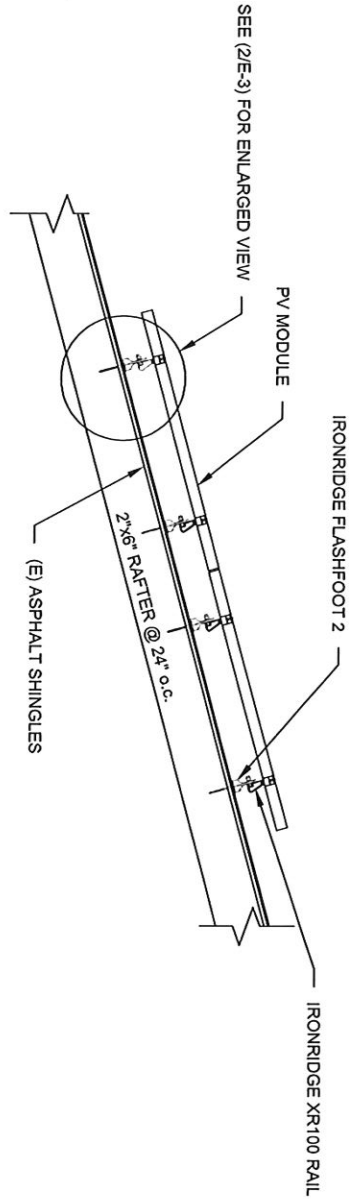
RACHEL SCHWARTZ RESIDENCE
171 POWER ST
PROVIDENCE, RI 02906
PH.# : (401) 578-8949
Email: jak10@brown.edu

Wysysing Consulting, PLLC
76 N Redwoodbank Drive Alpine UT 84004
Provo Island COA # 8841

DATE: 03/15/2022
SHEET NAME: STRING LAYOUT & BOM
SHEET SIZE: ANSI B 11" X 17"
SHEET NUMBER: PV-2A

1 ATTACHMENT DETAILS

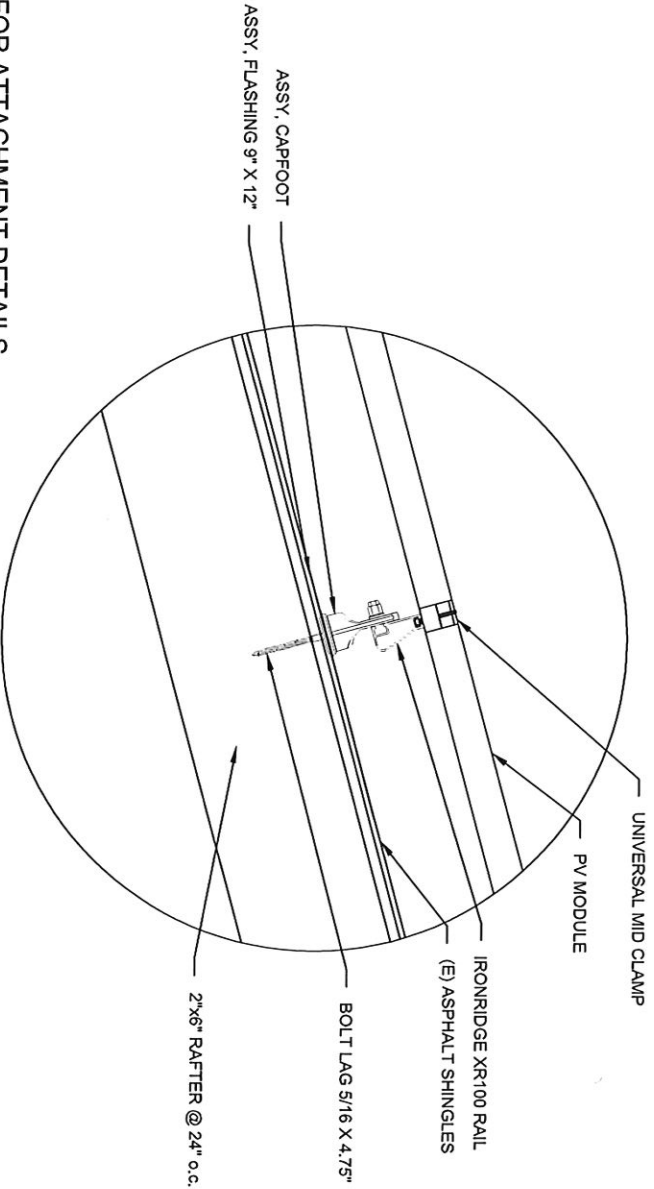
PV-3



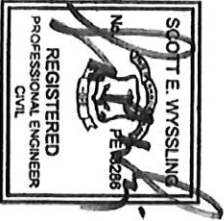
2 ENLARGED VIEW FOR ATTACHMENT DETAILS

PV-3

SCALE: NTS



Wysling Consulting, PLLC
76 1/2 Meadowbrook Drive, Suite 107, 61004
Riverside, CT 06481
Signed 03-16-22



SMART GREEN, INC.
33 BROAD STREET, STE 300,
PROVIDENCE, RI 02903
(401) 375-5949
CONTRACTOR LIC#: 45612

SYSTEM INFO

(1) HANWHA OCELS Q/PEAK DUO
BLK (6x6) 405W

(2) LAMPAR IQ P/MS/75-2-05 (20W)

DC SYSTEM SIZE: 4.88 KWDC

AC SYSTEM SIZE: 3.48 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

RACHEL SCHWARTZ
RESIDENCE
171 POWER ST
PROVIDENCE, RI 02906
PH.# : (401) 578-8949
Email: jak10@brown.edu

DATE: 03/15/2022

SHEET NAME
ATTACHMENT
DETAIL

SHEET SIZE

ANSI B
11" X 17"

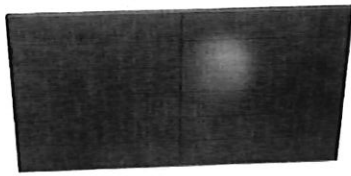
SHEET NUMBER

PV-3

Q.PEAK DUO BLK ML-G10+

385-410

ENDURING HIGH PERFORMANCE



- BREAKING THE 20% EFFICIENCY BARRIER
QANTUM DUO Z technology with zero gap cell layout boasts module efficiency up to 21.1%.
- THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY
Q CELLS is the first solar module manufacturer to pass the most comprehensive quality programme in the industry. The new 'Quality Controlled PV' offers independent certification include TÜV Rheinland.
- INNOVATIVE ALL-WEATHER TECHNOLOGY
Optimal yields, whatever the weather with excellent low-light and temperature behaviour.
- ENDURING HIGH PERFORMANCE
Long-term yield security with Anti-LID Technology, Hot-Spot Protect and Traceable Quality Track™.
- EXTREME WEATHER RATING
High-tech silicon alloy frame, certified for high snow (5400 Nj) and wind loads (4000 Fj).
- A RELIABLE INVESTMENT
Inclusive 25-year product warranty and 25-year linear performance warranty.

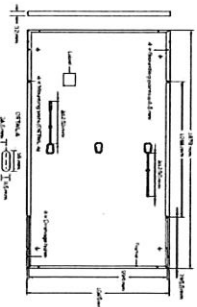
Q CELLS

Engineered in Germany

THE IDEAL SOLUTION FOR:
Rooftop arrays on residential buildings

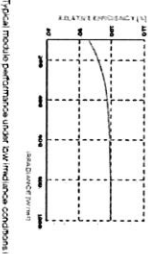
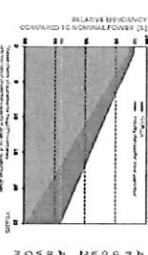
MECHANICAL SPECIFICATION

Serial	385/390/395/400/405/410
Weight	22.0kg
Front Cover	3.2mm thermally processed glass with anti-reflection coating
Back Cover	Composite aluminium
Frame	Black anodized aluminium
Cell	6 x 24 monocrystalline QANTUM solar half-cells
Cell Junction bar	5x5.54mm x 240mm with 254mm
Cell	5x5.54mm x 240mm with 254mm
Diode	40V Schottky diode, 1x 250mm (1) 250mm
Connector	Standard MC4, P68



ELECTRICAL CHARACTERISTICS

POWER CLASS	385	390	395	400	405	410
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS (STC) POWER TOLERANCE: +5%/ -0%						
Power at MPP	P _{MPP} [W]	395	390	395	400	405
Short Circuit Current	I _{sc} [A]	11.04	11.07	11.10	11.14	11.17
Open Circuit Voltage	V _{oc} [V]	45.19	45.23	45.27	45.30	45.34
Current at MPP	I _{MPP} [A]	10.89	10.65	10.71	10.77	10.83
Voltage at MPP	V _{MPP} [V]	36.02	36.02	36.02	36.02	36.02
Efficiency	η [%]	20.6	20.6	20.6	20.6	20.6
MINIMUM PERFORMANCE AT NOMINAL OPERATING CONDITIONS (NOCT)						
Power at MPP	P _{MPP} [W]	292.9	292.9	292.9	292.9	292.9
Short Circuit Current	I _{sc} [A]	9.90	9.92	9.95	9.97	9.99
Open Circuit Voltage	V _{oc} [V]	42.02	42.05	42.08	42.12	42.16
Current at MPP	I _{MPP} [A]	8.35	8.42	8.46	8.51	8.57
Voltage at MPP	V _{MPP} [V]	34.69	34.81	34.93	35.05	35.16
Maximum Power Point P _{MPP} = 1% (I _{sc} , V _{oc} = 5% at STC, 1000W/m², 25°C, AM 1.5 according to IEC 60904-3-1000W/m², MPPOT condition AM 1.5						
Q CELLS PERFORMANCE WARRANTY						
PERFORMANCE AT LOW IRRADIANCE						



TEMPERATURE COEFFICIENTS		α [1/K]	β [1/K²]	γ [1/K³]	δ [1/K⁴]
Temperature Coefficient of I _{sc}	α [1/K]	-0.14	-	-	-
Temperature Coefficient of V _{oc}	β [1/K²]	-0.24	-	-	-
Temperature Coefficient of P _{MPP}	γ [1/K³]	-0.24	-	-	-
Temperature Coefficient of P _{NOCT}	δ [1/K⁴]	-	-	-	-

PROPERTIES FOR SYSTEM DESIGN		Value	Unit
Maximum System Voltage	V _{max}	1000	Pyv module classification
Maximum Reverse Current	I _r	20	Per Rating based on ANSI/UL 61720
Max. Design Load, Snow/Fall	P _{max}	2000/2600	Printed Module Temperature on Certification Day
Max. Test Load, Snow/Fall	P _{test}	5200/4200	

QUALIFICATIONS AND CERTIFICATES

Q CELLS is a member of the Q GROUP, a leading manufacturer of solar modules and solar inverters. Q CELLS is a member of the Q GROUP, a leading manufacturer of solar modules and solar inverters.

PACKAGING INFORMATION

Horizontal: 2400mm 1200mm 1200mm 765kg 28 pallets 24 pallets 24 pallets

Vertical: 2400mm 1200mm 1200mm 765kg 28 pallets 24 pallets 24 pallets

CE

Horizontal: 2400mm 1200mm 1200mm 765kg 28 pallets 24 pallets 24 pallets

Vertical: 2400mm 1200mm 1200mm 765kg 28 pallets 24 pallets 24 pallets

Q CELLS

PROJECT NAME & ADDRESS

RACHEL SCHWARTZ
RESIDENCE
171 POWER ST
PROVIDENCE, RI 02906
PH.# : (401) 578-8949
Email: jak10@brown.edu

SYSTEM INFO

(1) HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400W
(2) INVAHER ICD7705/75-2305 (280V)
AC SYSTEM SIZE: 3.48 kWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

SMART GREEN, INC.
33 BROAD STREET, STE 300,
PROVIDENCE, RI 02903
(401) 375-5949
CONTRACTOR LIC#: 45612

SHEET NAME

EQUIPMENT SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-6

DATE 03/15/2022

DATE 03/15/2022