ADDRESS: 310 SPRUCE ST
Proposal: Install solar panels
Review Requested: Final Approval
Owner: James Bannerman
Applicant: James Bannerman
History: 1980; Cypress Court; H2L2 Architects
Individual Designation: None
District Designation: Society Hill Historic District, Contributing, 3/10/1999
Staff Contact: Dan Shachar-Krasnoff, daniel.shachar-Krasnoff@phila.gov

OVERVIEW: This application proposes installing solar panels on the street facing and rear roof slopes of a 1980 rowhouse. The height of the flush-mounted panels is 6 inches above the asphalt-shingled roof surface. The panels will be visible directly across Spruce Street, further east and west on Spruce Street, and from Bell's Court to the north. The rear roof slope is not visible from St. Peters Way, on the west side of the house, but is visible from the 300 block of Cypress Street, through the rear parking lot. Solar panel systems were available at the time the 300-310 Spruce Street row houses were constructed.

The most recent National Parks Service (NPS) guidance (2022) is that solar panels are appropriate when the building's historic character is not diminished. NPS Sustainability Guidelines recommend solar panel installation when it does not:

> "…damage historic roofing material or negatively impact the building's historic character and is reversible."

The installation of street-visible solar panels will not adversely impact the Society Hill Historic District.

SCOPE OF WORK:

- Install solar panels on the front and rear slopes of a side gable roof

STANDARDS FOR REVIEW:
The Secretary of the Interior's Standards for the Treatment of Historic Properties and Guidelines include:

- *Standard 9: New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.*
- *Roof Guideline l Recommended: Designing rooftop additions, elevator or stair towers, decks or terraces dormers or skylights when required by a new or continuing use so that they are inconspicuous and minimally visible on the site and from the public right-of-way and do not damage or obscure character-defining historic features.*
  - The solar panels will not damage historic roofing material or diminish the building's historic character.
  - The solar panels will not adversely impact the Society Hill Historic District.

STAFF RECOMMENDATION: The staff recommends approval, pursuant to Standard 9.

Figure 1. Location of subject property in Society Hill Historic District.

Figure 2. 310 Spruce St. roof configuration

Figure 3. 310 Spruce St. front (north) facade

Figure 4.310 Spruce Street west facade

Figure 5. 310 Spruce St. from east on Spruce St.

Figure 6. 310 Spruce St. winter view from east on S. 3rd St.
Source: Cyclomedia

Figure 7. 310 Spruce St winter view from west on Spruce St.
Source: Cyclomedia

Figure 8. 310 Spruce St, rear, from south on Cypress St.
Source: Cyclomedia

Figure 9. 310 Spruce St, rear, winter view, from south on Cypress St.
Source: Cyclomedia

Outlook

James Bannerman Historic District Application | 310 Spruce St

From Permits Mona Lee <permits@monalee.co>
Date Wed 7/9/2025 1:46 PM
To preservation <preservation@Phila.gov>

4 attachments (10 MB)

James Bannerman Photos.pdf; James Bannerman Engineering Letter.pdf; James Bannerman Historic Application.pdf; James Bannerman Construction Plans.pdf;

Hello,

Please find attached the required documents to be added to the historical district meeting to discuss the proposed roof-mounted solar panel installation at the referenced address. I understand that this is a day late, but we would love to be added to the July meeting instead of having to wait until August, but if that's not an option we understand.

Thank you,

Jimmy Poplin
Permit & Licensing Department
permits@monalee.co
(530) 457-4160

DO NOT MAIL THIS APPLICATION

Department of
Licenses and Inspections
CITY OF PHILADELPHIA

Job Number: (for office use only) _____

Construction Permit Application

Use this application to obtain permits for a residential or commercial construction proposal and/or excavation projects.
Mechanical / Fuel Gas, Electrical, Plumbing, and Fire Suppression trade details are found on page 2.

1 Property Information

Identify the location of work for the permit(s).

If the activity will take place in a specific building, tenant space, floor level, or suite, note that detail in the 'Specific Location' field. If applicable, list PR#.

Parcel Address: 310 Spruce St, Philadelphia, PA 19106

Specific Location: 310 Spruce St, Philadelphia, PA 19106

☐ Check box if this application is part of a project and provide the project number: **PR-20**___-_____

2 Applicant Information

Identify how you are associated with the property.

Licensed professionals include design professionals, attorneys, and expediters. A tradesperson must have an active Philadelphia license for their trade or hold a PA Home Improvement Contractor Registration.

I am the: ☒ Property Owner ☐ Tenant ☐ Equitable Owner ☐ Licensed Professional or Tradesperson

Name: James Bannerman Company: N/A

Address: 310 Spruce St, Philadelphia, PA 19106

Email: michaelbannerman24@hotmail.com Phone No.: +1 215-582-9214

3 Property owner Information

Identify the deeded property owner.

If there was a recent change of ownership, documentation such as a deed or settlement sheet is required.

*If the property owner is a 'company', identify the contact information for any natural person with more than 49% equity interest in the property. If no individual has such an interest, provide contact information of at least two (2) natural persons with the largest equity interest in the property.

The property owner is a/an: ☒ Individual ☐ Company*

Owner (1)

Name: James Bannerman ☐ Check box if new owner is being listed

Address: 310 Spruce St, Philadelphia, PA 19106

Owner (2)

Name: _____

Address: _____

4 Design Professional in Responsible Charge

Identify the PA-licensed design professional who is legally responsible.

Name: _____ Firm: _____

PA License No.:_____ Phila. Commercial Activity License No.:_____

Email: _____ Phone No.: _____

5 Project Scope

Use this section to provide project details; all fields are mandatory.

(a) Choose the proposed occupancy of the entire building. If not one-or-two-family, provide a description of group(s) per code.

(b) Identify if the project will be new construction, an addition, interior/exterior alterations, excavation or shell.

(c) List the site area that will be disturbed by construction, if any. Enter 'zero' if no disturbance.

(d) Note the new floor area created, including basements, cellars, and occupiable roofs. Where existing areas will be altered, list those areas separately.

(e) State the number of new or affected stories.

(f) Provide a detailed description of the work proposed (use separate sheet if needed).

(g) Select all conditions that apply to this project (if any).

* Provide the associated Streets Review number if "Project Impacts Streets / Right-of-Way" is selected.

** If 'Yes' is selected, an Owners' Acknowledgement of Receipt form must be provided for each affected property.

(a) Occupancy ☒ Single-Family ☐ Two-Family ☐ Other, please describe: _____

(b) Scope of Work ☐ New Construction ☐ Excavation ☒ Addition / Alteration ☐ Shell (No Fit Out) - *Option for Commercial Permits Only*

(c) Earth Disturbance Area of Earth Disturbance: _____ (Sq. Ft.)

(d) Building Floor Areas New Floor Area:_____ (Sq. Ft.) Existing Altered Area: _____ (Sq.Ft.)

(e) Number of Stories _____

(f) Description of Work Installation of (27) solar panels on existing residential roof. 12.015kW

(g) Project Conditions

☐ New High Rise ☐ Green Roof Included ☐ Initial Fit-out of Newly Constructed Space
☐ Modular Construction ☐ Façade Work ☐ Project Impacts Streets/Right-of-Way*
☐ Project Impacts Adjacent Property**

* Provide the associated **Streets Review** number for this project, if applicable: **SR-20**_____

** This project includes work described below: ☒ Yes ☐ No

- *Excavation work more than 5 feet below adjacent grade and within 10 feet of an adjacent building or structure.*
- *Excavation or construction work where historic structure is within 90 feet on the same or adjacent parcel.*
- *Structural alterations of a historic structure (excluding one-or-two family dwelling).*
- *Modifications to a party wall, including joist replacement, and additions.*
- *Severing of structural roof or wall covering spanning properties.*

DO NOT MAIL THIS APPLICATION

Department of
Licenses and Inspections
CITY OF PHILADELPHIA

Job Number: (for office use only) _____

Project Details, Other Permits & Contractor Information

Use this section to provide project details, pre-requisite approvals and applicable contractor information.

(a) Choose all disciplines of work for which permits are being requested.
- If 'Building' is not requested, provide the number of the associated permit that was previously issued (where applicable).
- If a Zoning Permit was issued for this work, provide the related Zoning Permit number.

(b) Identify the general contractor and estimated cost of building construction.

(c) Identify the licensed excavation contractor and estimated cost of excavation work.

(d) Identify the mechanical contractor, estimated cost of mechanical work, equipment type, and quantity as:
- Number of registers/diffusers (separate new / relocated)
- Number of appliances
- Number of Type I / Type II kitchen hoods

Where fuel gas work is included, note the estimated cost of fuel gas work.

(e) Identify the licensed electrical contractor, estimated cost of electrical work, and a registered third-party electrical inspection agency.

(f) Identify the registered master plumber, estimated cost of plumbing work, number of fixtures, and check location of work as:
- Interior
- Exterior Drainage and/or Water Distribution

(g) Identify the licensed fire suppression contractor, estimated cost of fire suppression work, and number of devices:
- Sprinkler Heads (separate new / relocated quantities)
- Standpipes
- Fire Pumps
- Stand-alone Backflow Prevention Devices
- Kitchen Extinguishing Systems
- Hydrants

***ROUGH-IN NOTICE:** If you are seeking a rough-in permit, an application for plan review must be submitted already.

(h) Provide the total improvement cost for residential (including multi-family) alterations and additions. Check the box if your project is excluded from real estate tax exemption and exempt from Development Impact Tax.

6

(a) Check all that apply:

☒ Building ☐ Excavation ☐ Mechanical & Fuel Gas ☒ Electrical ☐ Plumbing ☐ Fire Suppression

Provide the associated Construction Permit number, if applicable: **RP or CP – 20** _____-_____

Provide the associated Zoning Permit number for this construction, if applicable: **ZP – 20** ____ - _____

***Note**: Trades listed below (d, e, f , and g) are mandatory for all residential new construction jobs.*

(b) General Building Construction Contractor Information

Name: _____ Cost of Building Work: **$**_____

License Number: _____ Phone: _____

(c) Excavation Work & Contractor Information

Name: _____ Cost of Excavation Work: $ _____

License Number: _____ Phone: _____

(d) Mechanical / Fuel Gas Work & Contractor Information

Name: _____ Cost of Mechanical Work: **$**_____

License Number: _____ Cost of Fuel Gas Work: **$**_____

Equipment Types: ☐ Registers / Diffusers ☐ Appliances ☐ Hoods Phone:_____

Equipment Details & Quantities: _____

(e) Electrical Work & Contractor Information ☐ **New Installation** ☒ **Alteration** ☐ ***Rough-In**

Name: Bruce Trupo Cost of Electrical Work: **$** 78,197

License Number: 061447 Phone: 8563646129

Third Party Inspection Agency Name: United

(f) Plumbing Work & Contractor Information ☐ **New Installation** ☐ **Alteration** ☐ ***Rough-In**

Name: _____ Cost of Plumbing Work: **$**_____

License Number: _____ Phone:_____

Number of Fixtures: _____

Check one: ☐ Interior Work ☐ Exterior Building Drainage ☐ Exterior Water Distribution: **line size**:_____ (in.)

(g) Fire Suppression Work & Contractor Information ☐ **New Installation** ☐ **Alteration** ☐ ***Rough-In**

Name: _____ Cost of Fire Supp. Work: **$**_____

License Number: _____ Phone:_____

Sprinkler Heads: _____ Standpipes: _____ Fire Pumps:_____

Commercial Kitchen Systems: _____ Backflow Devices: _____ Hydrants: _____

(h) Total Improvement Cost: $ 78,197.00 *(The total improvement cost must also include the cost of all electrical, plumbing, mechanical, fire suppression systems work, and interior finishes)*

☐ ***Check box if your project is excluded from real estate tax exemption and exempt from Development Impact Tax*** *(Review OPA's website for tax abatement information at: https://www.phila.gov/services/property-lots- housing/property-taxes/get-real-estate-tax-relief/get-a-property-tax-abatement/*

Declaration & Signature

All provisions of the Philadelphia Code and other City ordinances will be complied with, whether specified herein or not. Plans approved by the Department form a part of this application. I hereby certify that the statements contained herein are true and correct to the best of my knowledge and belief. I further certify that I am authorized by the ownerto make the foregoing application, and that, before I accept my permit for which this application is made, the owner shall be made aware of all conditions of the permit. I understand that if I knowingly make any false statements herein, I am subject to such penalties as may be prescribed by law or ordinance, inclusive of the penalties contained in 18 Pa. C.S. § 4904.

Applicant Signature: James Poplin **Date:** 07 /09 /2025

PHOTOVOLTAIC ROOF MOUNT SYSTEM

27 MODULES-ROOF MOUNTED - 12.015 KW DC, 12.600 KW AC

310 SPRUCE ST, PHILADELPHIA, PA 19106

PROJECT DATA

PROJECT ADDRESS	310 SPRUCE ST, PHILADELPHIA, PA 19106
OWNER:	MICHAEL BANNERMAN
PARCEL ID:	051147530
DESIGNER:	ESR
SCOPE:	12.015 KW DC ROOF MOUNT SOLAR PV SYSTEM WITH 27 URECO SOLAR FBM445M7G-BB 445W MONO MODULES WITH 10 TESLA: RSD MCI-2 WITH 01 TESLA: 1538000-XX-Y 5.0 kW (240V) INVERTER 01 TESLA: 1538000-XX-Y 7.6 kW (240V) INVERTER 01 FRANKLIN AGATE 01 FRANKLIN WH 13.6 kWh BATTERY

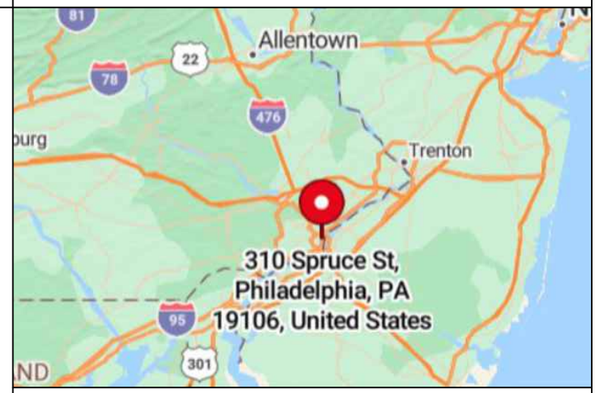
AUTHORITIES HAVING JURISDICTION:
BUILDING: CITY OF PHILADELPHIA
ZONING: CITY OF PHILADELPHIA
UTILITY: PECO ENERGY

SHEET INDEX

GENERAL NOTES

1. ALL COMPONENTS ARE UL LISTED AND NEC CERTIFIED, WHERE WARRANTED.
2. THE SOLAR PV SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH ARTICLE 690 OF THE NEC 2020.
3. THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION.
4. ALL CONDUCTORS OF A CIRCUIT, INCLUDING THE EGC, MUST BE INSTALLED IN THE SAME RACEWAY, OR CABLE, OR OTHERWISE RUN WITH THE PV ARRAY CIRCUIT CONDUCTORS WHEN THEY LEAVE THE VICINITY OF THE PV ARRAY.
5. WHERE METALLIC CONDUIT CONTAINING DC CONDUCTORS IS USED INSIDE THE BUILDING, IT SHALL BE IDENTIFIED AS "CAUTION: SOLAR CIRCUIT" EVERY 10FT.
6. HEIGHT OF THE AC DISCONNECT SHALL NOT EXCEED 6'-7" PER NEC CODE 240.24.
7. A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH NEC 2020 690.47 AND 250.50 THROUGH 60 AND 250-166 SHALL BE PROVIDED. PER NEC GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE OR INADEQUATE A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT. GROUND ROD WITH ACORN CLAMP. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #8 AWG AND NO LARGER THAN #6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.
8. PHOTOVOLTAIC MODULES ARE TO BE CONSIDERED NON-COMBUSTIBLE.
9. PHOTOVOLTAIC INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
10. ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE. WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF THE ROOF SURFACE.
11. ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.
12. INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE UL 1741 LISTED.
13. THE INSTALLATION OF EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE PERFORMED ONLY BY QUALIFIED PERSONS [NEC 690.4(C)]
14. ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED (OR BETTER), INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES.
15. ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250.
16. SYSTEM GROUNDING SHALL BE IN ACCORDANCE WITH NEC 690.41.
17. PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH NEC 690.12
18. DISCONNECTING MEANS SHALL BE LOCATED IN A VISIBLE, READILY ACCESSIBLE LOCATION WITHIN THE PV SYSTEM EQUIPMENT OR A MAXIMUM OF 10 FEET AWAY FROM THE SYSTEM [NEC 690.13(A)]
19. ALL WIRING METHODS SHALL BE IN ACCORDANCE WITH NEC 690.31
20. WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER NEC 110.26(A)(1), 110.26(A)(2) AND 110.26(A)(3).
21. ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED & IDENTIFIED IN ACCORDANCE WITH UL1703
22. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.
23. IN ACCORDANCE WITH 2021 IFC 1205.5, 2018 IFC 1204.4, AND 2015 IFC 605.11.2 A CLEAR, BRUSH-FREE AREA OF 10 FEET(3048 MM) SHALL BE REQUIRED FOR GROUND-MOUNTED PHOTOVOLTAIC ARRAYS.
24. PANEL LAYOUT ORIENTATION IS SUBJECT TO CHANGE ON DESIGNED MOUNTING PLANES.

VICINITY MAP



HOUSE PHOTO

CODE REFERENCES

PROJECT TO COMPLY WITH THE FOLLOWING:

2020 NATIONAL ELECTRICAL CODE (NEC)
2018 INTERNATIONAL FIRE CODE (IFC)
2018 INTERNATIONAL BUILDING CODE (IBC)
2018 INTERNATIONAL RESIDENTIAL CODE (IRC)

mona lee
MONA LEE SOLAR

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C HERNANDEZ
ENGINEER
PE087541
Exp. 09/30/25
02/05/25

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	11/04/2024	
REVISION	02-05-2025	A

DATE:11/04/2024

PROJECT NAME & ADDRESS
MICHAEL BANNERMAN RESIDENCE
310 SPRUCE ST,
PHILADELPHIA, PA 19106

DRAWN BY
ESR

SHEET NAME
COVER SHEET

SHEET SIZE
ANSI B
11" X 17"

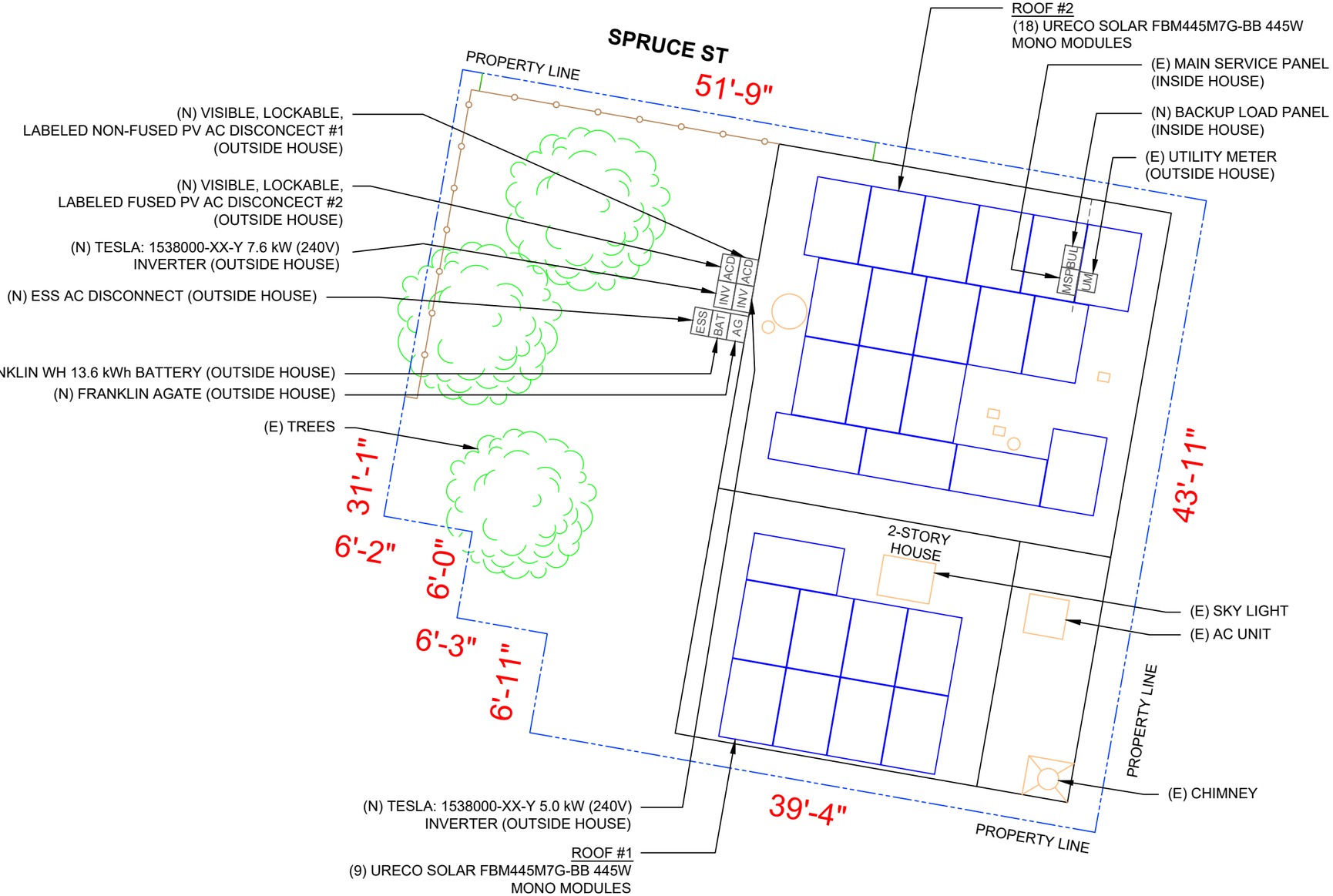
SHEET NUMBER
PV-1

PROJECT DESCRIPTION:

27 X URECO SOLAR FBM445M7G-BB 445W MONO MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES
DC SYSTEM SIZE: 12.015 KW DC
AC SYSTEM SIZE: 12.600 KW AC

EQUIPMENT SUMMARY
27 URECO SOLAR FBM445M7G-BB 445W MONO MODULES
10 TESLA: RSD MCI-2 WITH
01 TESLA: 1538000-XX-Y 5.0 kW (240V) INVERTER
01 TESLA: 1538000-XX-Y 7.6 kW (240V) INVERTER
01 FRANKLIN AGATE
01 FRANKLIN WH 13.6 kWh BATTERY

ROOF ARRAY AREA #1:- 209.61 SQ FT.
ROOF ARRAY AREA #2:- 419.22 SQ FT.



1 PLOT PLAN WITH ROOF PLAN
PV-2 SCALE: 1/8" = 1'-0"

mona lee
MONA LEE SOLAR

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C HERNANDEZ
ENGINEER
PE087541
Exp. 09/30/25
02/05/25

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	11/04/2024	
REVISION	02-05-2025	A

DATE:11/04/2024

PROJECT NAME & ADDRESS
MICHAEL BANNERMAN RESIDENCE
310 SPRUCE ST, PHILADELPHIA, PA 19106

DRAWN BY
ESR

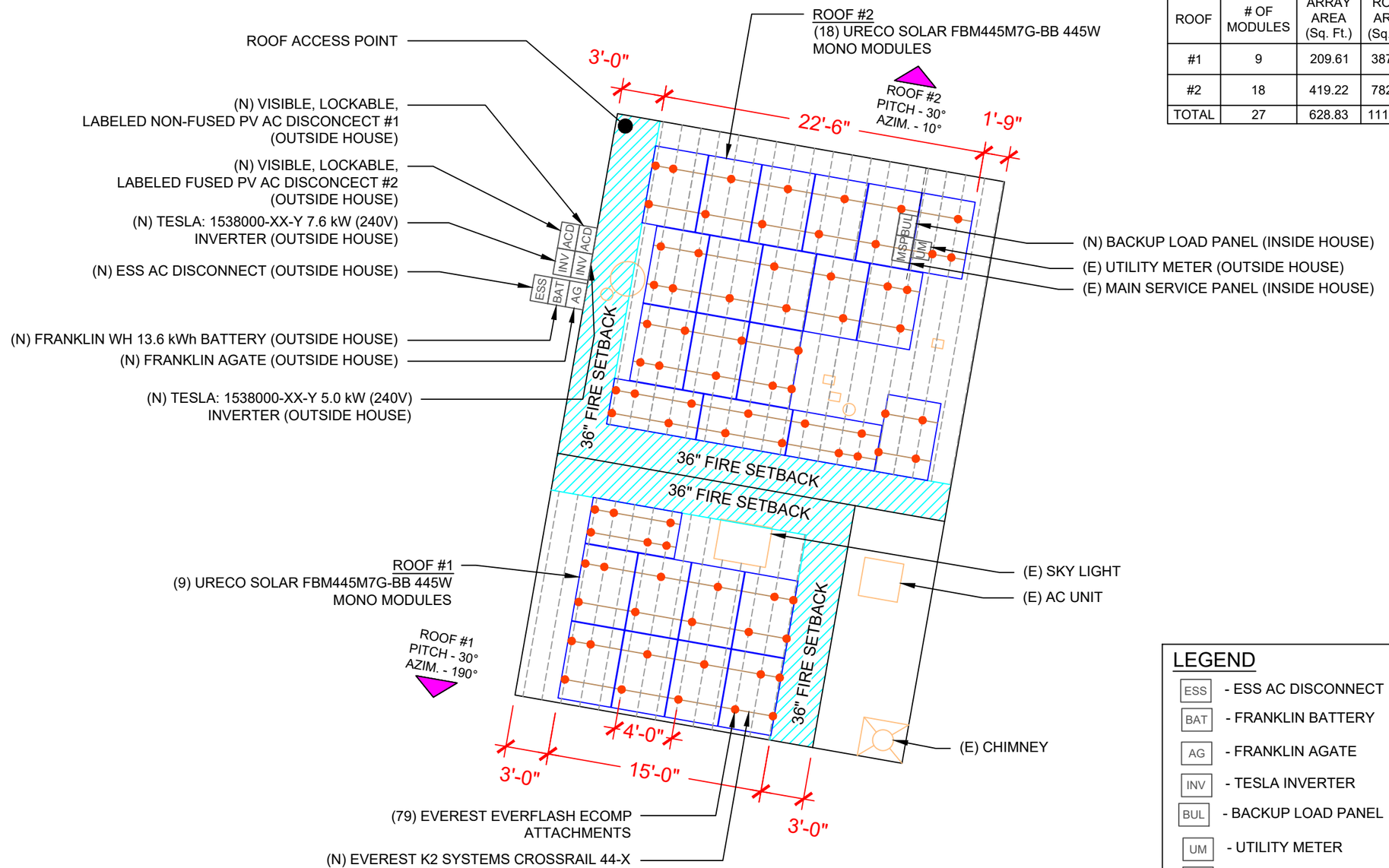
SHEET NAME
PLOT PLAN WITH ROOF PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-2

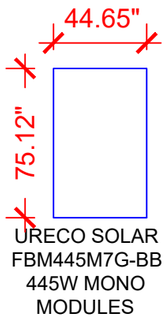
MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 27 MODULES
MODULE TYPE = URECO SOLAR FBM445M7G-BB 445W MONO MODULES
MODULE WEIGHT = 53.35 LBS / 24.2 KG.
MODULE DIMENSIONS = 75.12" x 44.65" = 23.29 SF



ROOF DESCRIPTION				
ROOF TYPE			COMP. SHINGLE	
ROOF	ROOF PITCH	AZIMUTH	RAFTER SIZE	RAFTER SPACING
#1	30°	190°	2"X8"	16"
#2	30°	10°	2"X8"	16"

ARRAY AREA & ROOF AREA CALC'S				
ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	9	209.61	387.90	54
#2	18	419.22	782.40	54
TOTAL	27	628.83	1119.02	56



LEGEND

- ESS - ESS AC DISCONNECT
- BAT - FRANKLIN BATTERY
- AG - FRANKLIN AGATE
- INV - TESLA INVERTER
- BUL - BACKUP LOAD PANEL
- UM - UTILITY METER
- ACD - PV AC DISCONNECT
- MSP - MAIN SERVICE PANEL
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- TRUSS

1 ROOF PLAN & MODULES
PV-3 SCALE: 1/8" = 1'-0"

mona lee
MONA LEE SOLAR

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
DAVID C HERNANDEZ
PE087541
Exp. 09/30/25
02/05/25

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	11/04/2024	
REVISION	02-05-2025	A

DATE:11/04/2024

PROJECT NAME & ADDRESS
MICHAEL BANNERMAN RESIDENCE
310 SPRUCE ST, PHILADELPHIA, PA 19106

DRAWN BY
ESR

SHEET NAME
ROOF PLAN & MODULES

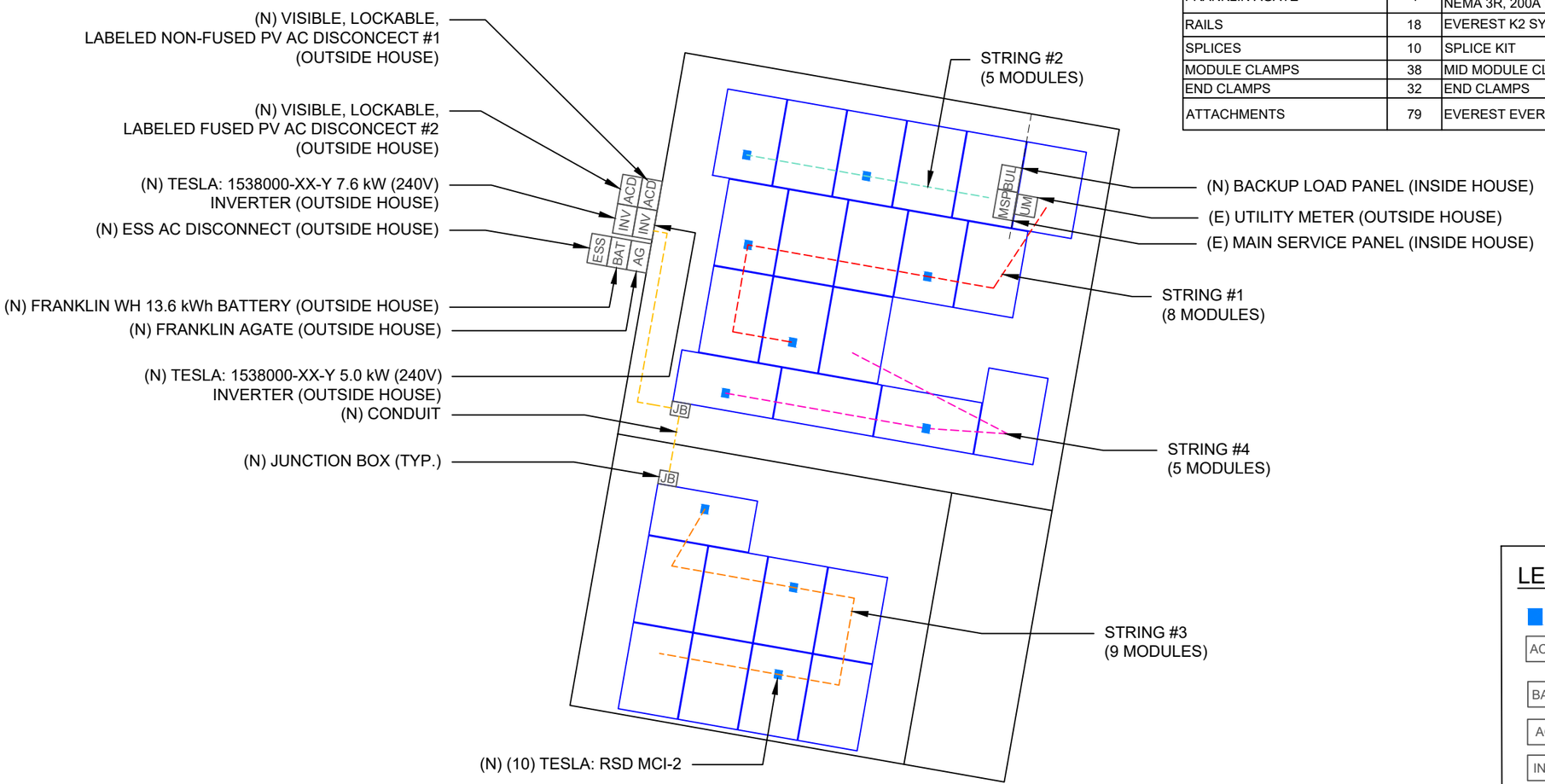
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-3

STRING LEGENDS

- STRING #1
- STRING #2
- STRING #3
- STRING #4

BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULES	27	URECO SOLAR FBM445M7G-BB 445W MONO MODULES
INVERTER	01	TESLA: 1538000-XX-Y 5.7 kW (240V) INVERTER
INVERTER	01	TESLA: 1538000-XX-Y 7.6 kW (240V) INVERTER
BATTERY	1	FRANKLIN WH 13.6 kWh BATTERY
TESLA RSD	10	TESLA: RSD MCI-2
JUNCTION BOX	2	6"X6"X4" UL LISTED, STEEL WATER TIGHT NEMA TYPE 3R, UL LISTED
FRANKLIN AGATE	1	FRANKLIN aGATE, X [CRD-PCS NEM] NEMA 3R, 200A RATED,120/240V
RAILS	18	EVEREST K2 SYSTEMS CROSSRAIL 44-X, 166"
SPLICES	10	SPLICE KIT
MODULE CLAMPS	38	MID MODULE CLAMPS
END CLAMPS	32	END CLAMPS
ATTACHMENTS	79	EVEREST EVERFLASH ECOMP ATTACHMENTS



LEGEND

- TESLA: RSD MCI-2
- ACD - PV AC DISCONNECT
- BAT - FRANKLIN BATTERY
- AG - FRANKLIN AGATE
- INV - TESLA INVERTER
- BUL - BACKUP LOAD PANEL
- JB - JUNCTION BOX
- ESS - ESS AC DISCONNECT
- UM - UTILITY METER
- MSP - MAIN SERVICE PANEL
- CONDUIT

1 ELECTRICAL PLAN

PV-4 SCALE: 1/8" = 1'-0"

mona lee

MONA LEE SOLAR

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	11/04/2024	
REVISION	02-05-2025	A

DATE:11/04/2024

PROJECT NAME & ADDRESS

MICHAEL BANNERMAN RESIDENCE

310 SPRUCE ST, PHILADELPHIA, PA 19106

DRAWN BY

ESR

SHEET NAME

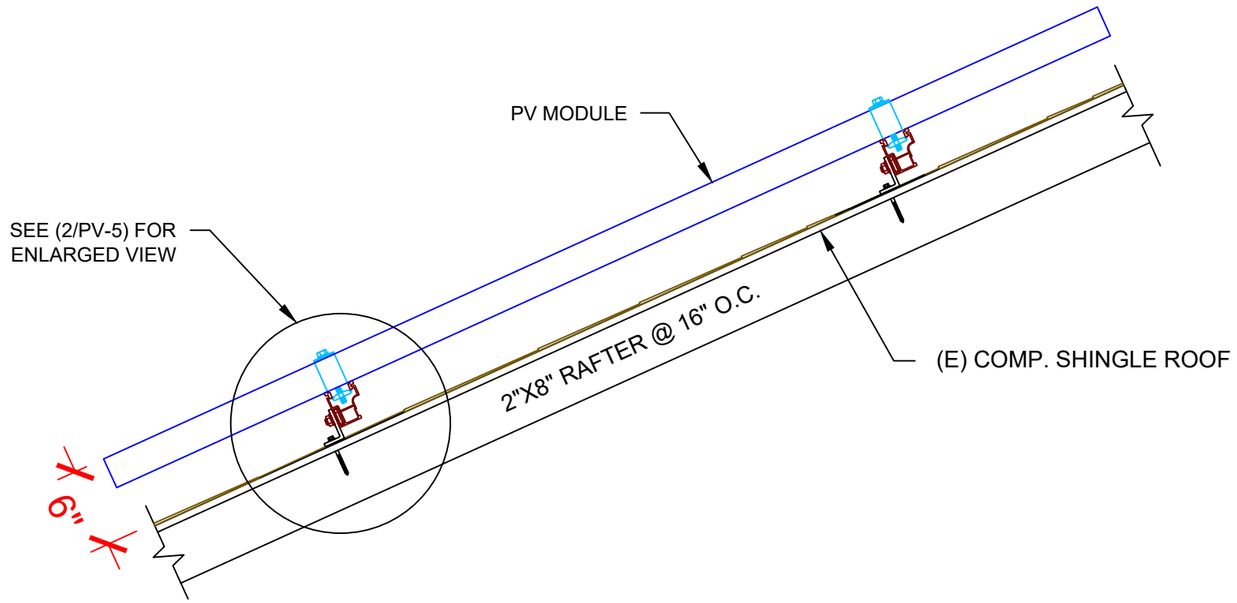
ELECTRICAL PLAN

SHEET SIZE

ANSI B 11" X 17"

SHEET NUMBER

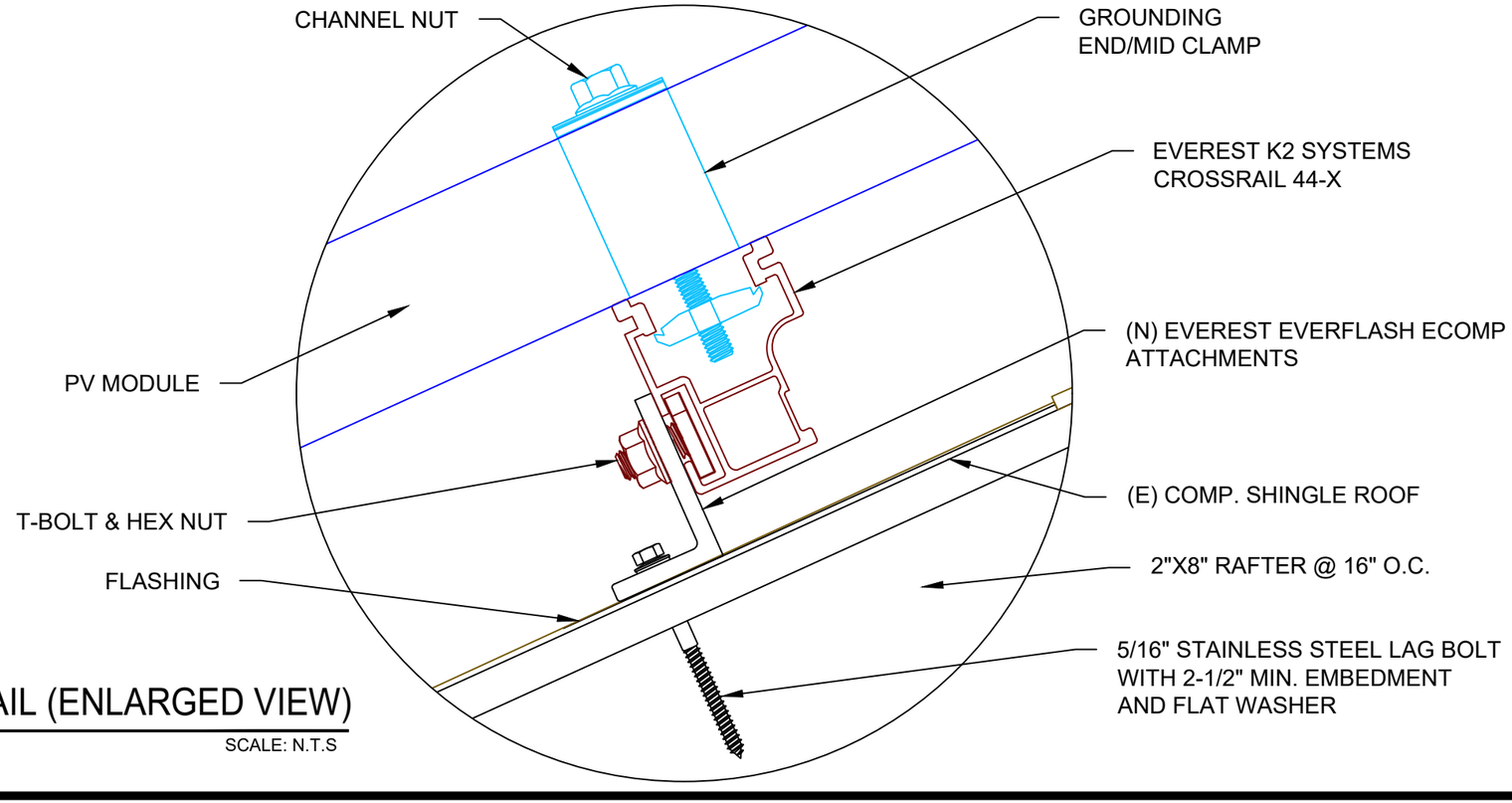
PV-4



1 | STRUCTURAL ATTACMENT (SIDE VIEW)

PV-5

SCALE: N.T.S



2 | ATTACHMENT DETAIL (ENLARGED VIEW)

PV-5

SCALE: N.T.S

mona lee

MONA LEE SOLAR

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C HERNANDEZ
ENGINEER
PE087541
Exp. 09/30/25
02/05/25

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	11/04/2024	
REVISION	02-05-2025	A

DATE:11/04/2024

PROJECT NAME & ADDRESS

MICHAEL BANNERMAN RESIDENCE

310 SPRUCE ST,
PHILADELPHIA, PA 19106

DRAWN BY

ESR

SHEET NAME

ATTACHMENT DETAIL

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-5

DC SYSTEM SIZE: 12.015 kW DC
AC SYSTEM SIZE: 12.600 kW AC

(27) URECO SOLAR FBM445M7G-BB 445W MONO MODULES WITH (10) TESLA: RSD MCI-2
(1) TESLA: 1538000-XX-Y 5.0 kW (240V) INVERTER
(1) TESLA: 1538000-XX-Y 7.6 kW (240V) INVERTER
(1) FRANKLIN AGATE
(1) FRANKLIN WH 13.6 kWh BATTERY

(2) STRINGS OF 05 MODULES
(1) STRING OF 09 MODULES
(1) STRING OF 08 MODULES ARE CONNECTED IN SERIES

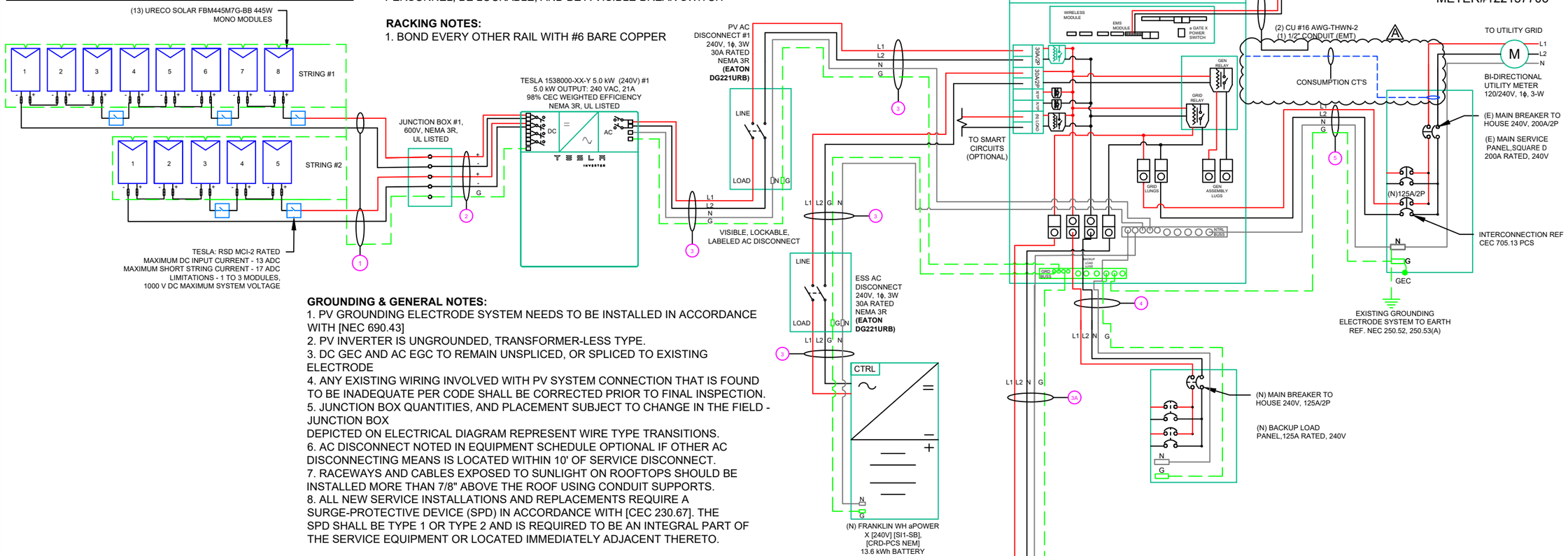
INTERCONNECTION NOTES:
1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12], AND [NEC 690.59].
2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95]
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

DISCONNECT NOTES:
1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED “LINE SIDE” (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH

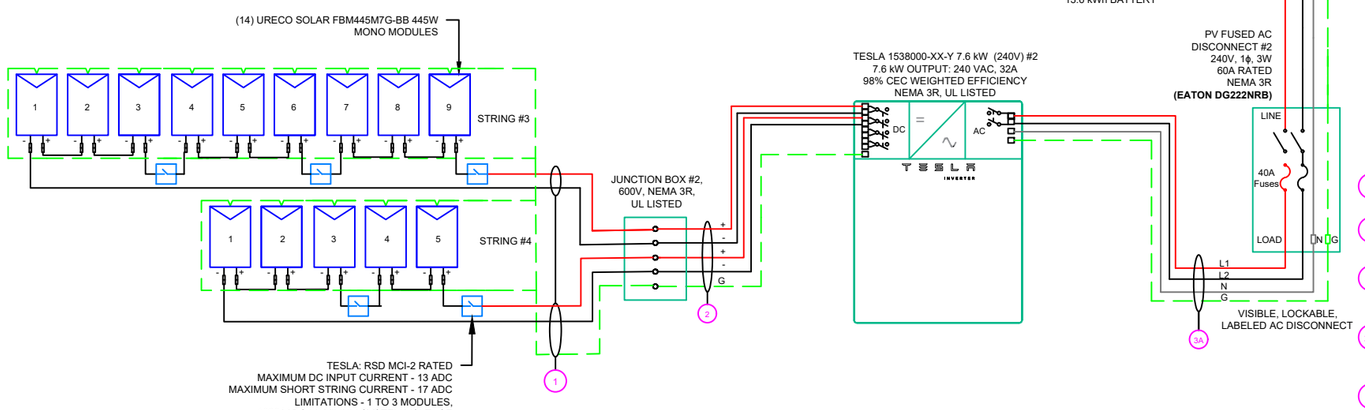
RACKING NOTES:
1. BOND EVERY OTHER RAIL WITH #6 BARE COPPER

NOTE: THE RELAY WILL NEED TO BE PROGRAMMED AT THE MOST SENSITIVE SETTINGS/TOLERANCES TO TRIP THE ASSOCIATED BREAKER AS SOON AS FEASIBLY POSSIBLE TO ALLOW CLOSE 0 KW POWER FLOW FROM THE PROPERTY

NOTE:
SET THE AGATE TO ZERO EXPORT



GROUNDING & GENERAL NOTES:
1. PV GROUNDING ELECTRODE SYSTEM NEEDS TO BE INSTALLED IN ACCORDANCE WITH [NEC 690.43]
2. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
3. DC GEC AND AC EGC TO REMAIN UNSPLICED, OR SPLICED TO EXISTING ELECTRODE
4. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
5. JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOX
DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
6. AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.
7. RACEWAYS AND CABLES EXPOSED TO SUNLIGHT ON ROOFTOPS SHOULD BE INSTALLED MORE THAN 7/8" ABOVE THE ROOF USING CONDUIT SUPPORTS.
8. ALL NEW SERVICE INSTALLATIONS AND REPLACEMENTS REQUIRE A SURGE-PROTECTIVE DEVICE (SPD) IN ACCORDANCE WITH [CEC 230.67]. THE SPD SHALL BE TYPE 1 OR TYPE 2 AND IS REQUIRED TO BE AN INTEGRAL PART OF THE SERVICE EQUIPMENT OR LOCATED IMMEDIATELY ADJACENT THERETO.



QTY	CONDUCTOR INFORMATION		CONDUIT TYPE	CONDUIT SIZE
(4)	#10AWG -	PV WIRE/USE-2	N/A	N/A
(1)	#6AWG -	BARE COPPER IN FREE AIR		
(4)	#10AWG -	CU,THWN-2	EMT,LFMC OR PVC	3/4"
(1)	#10AWG -	CU,THWN-2 GND		
(2)	#10AWG -	CU,THWN-2	EMT,LFMC OR PVC	3/4"
(1)	#10AWG -	CU,THWN-2 N		
(1)	#10AWG -	CU,THWN-2 GND		
(2)	#8AWG -	CU,THWN-2	EMT,LFMC OR PVC	3/4"
(1)	#8AWG -	CU,THWN-2 N		
(1)	#10AWG -	CU,THWN-2 GND		
(2)	#1AWG -	CU,THWN-2	EMT,LFMC OR PVC	1 1/2"
(1)	#1AWG -	CU,THWN-2 N		
(1)	#6AWG -	CU,THWN-2 GND		
(2)	#1AWG -	CU,THWN-2	EMT,LFMC OR PVC	1 1/2"
(1)	#1AWG -	CU,THWN-2 N		
(1)	#6AWG -	CU,THWN-2 GND		

1 ELECTRICAL LINE DIAGRAM
PV-6 SCALE: NTS

mona lee
MONA LEE SOLAR

REVISIONS		
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REVISION	02-05-2025	A

DATE:11/04/2024

PROJECT NAME & ADDRESS
MICHAEL BANNERMAN RESIDENCE
310 SPRUCE ST, PHILADELPHIA, PA 19106

DRAWN BY
ESR

SHEET NAME
ELECTRICAL LINE DIAGRAM

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-6

DC SYSTEM SIZE: 12.015 kW DC
AC SYSTEM SIZE: 12.600 kW AC

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(1) FRANKLIN AGATE
(1) FRANKLIN WH 13.6 kWh BATTERY

(2) STRINGS OF 05 MODULES
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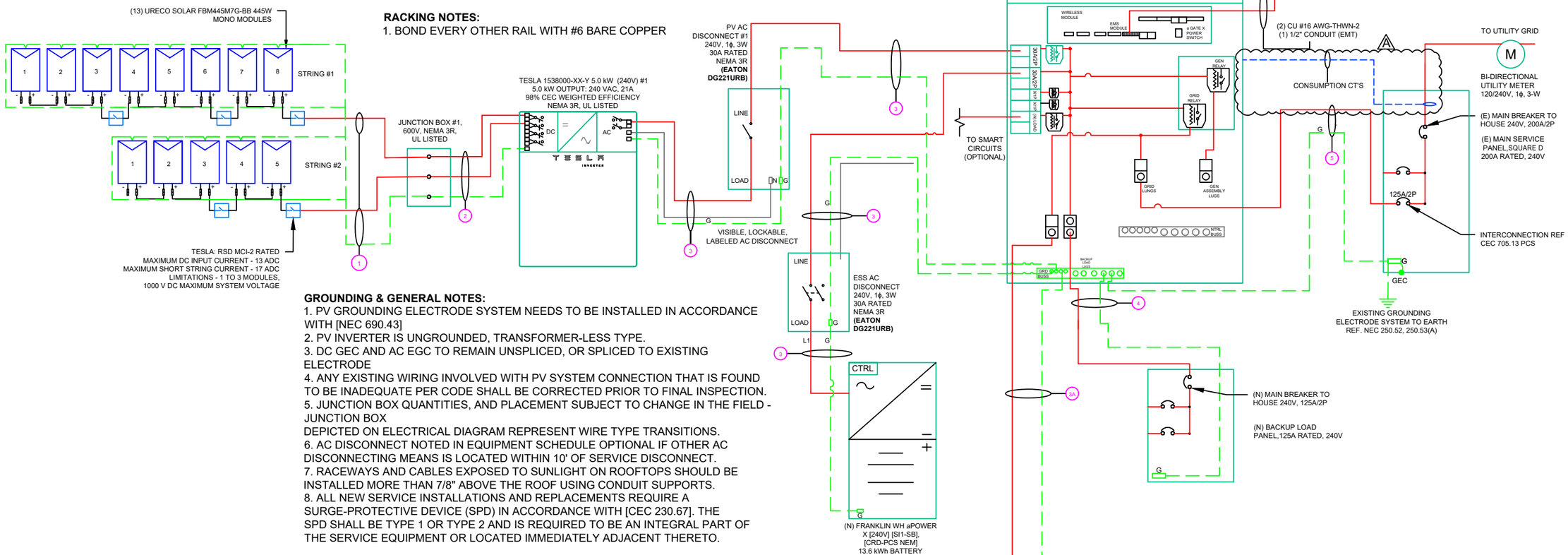

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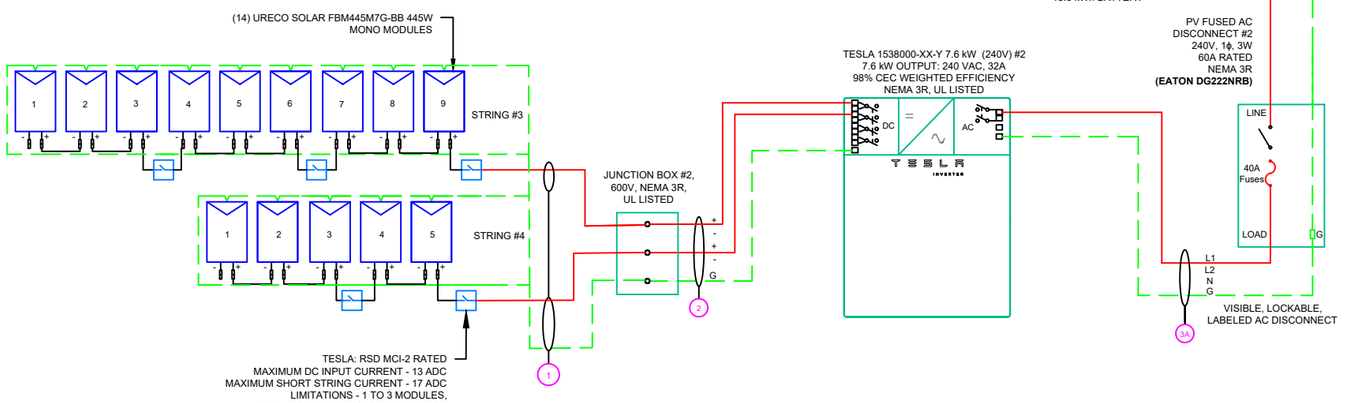

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(2)	#10AWG -	CU,THWN-2	EMT,LFMC OR PVC	3/4"
(1)	#10AWG -	CU,THWN-2 N		
(1)	#10AWG -	CU,THWN-2 GND		
(2)	#8AWG -	CU,THWN-2	EMT,LFMC OR PVC	3/4"
(1)	#8AWG -	CU,THWN-2 N		
(1)	#10AWG -	CU,THWN-2 GND		
(2)	#1AWG -	CU,THWN-2	EMT,LFMC OR PVC	1 1/2"
(1)	#1AWG -	CU,THWN-2 N		
(1)	#6AWG -	CU,THWN-2 GND		
(2)	#1AWG -	CU,THWN-2	EMT,LFMC OR PVC	1 1/2"
(1)	#1AWG -	CU,THWN-2 N		
(1)	#6AWG -	CU,THWN-2 GND		

1 ELECTRICAL LINE DIAGRAM
PV-6A SCALE: NTS

mona lee
MONA LEE SOLAR

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	11/04/2024	
REVISION	02-05-2025	A

DATE:11/04/2024

PROJECT NAME & ADDRESS
MICHAEL BANNERMAN RESIDENCE
310 SPRUCE ST,
PHILADELPHIA, PA 19106

DRAWN BY
ESR

SHEET NAME
SINGLE LINE DIAGRAM

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-6A

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	URECO SOLAR FBM445M7G-BB 445W PV MODULES
VMP	34.80V
IMP	12.79A
VOC	41.90V
ISC	13.48A
TEMP. COEFF. VOC	-0.27%/°C
MODULE DIMENSION	75.12"L x 44.65"W x 1.38"D (In Inch)

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	TESLA: 1538000-XX-Y 5.0 KW (240V) INVERTER
NOMINAL AC POWER	12.600 kW
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	21A

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
.80	4-6
.70	7-9
.50	10-20

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-13°
AMBIENT TEMP (HIGH TEMP 2%)	38°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.27%/°C

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	TESLA: 1538000-XX-Y 7.6 KW (240V) INVERTER
NOMINAL AC POWER	12.600 kW
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	32A

DC FEEDER CALCULATIONS

CIRCUIT ORIGIN	CIRCIUT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE CEC 310.15(B)(1)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY CEC 310.15(C)(1)	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
STRING 1	JUNCTION BOX#1	600	13.00	16.25	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	31	1.24	0.167	N/A	#N/A
STRING 2	JUNCTION BOX#1	600	13.00	16.25	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	16	1.24	0.086	N/A	#N/A
STRING 3	JUNCTION BOX#2	600	13.00	16.25	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	32	1.24	0.172	N/A	#N/A
STRING 4	JUNCTION BOX#2	600	13.00	16.25	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	28	1.24	0.150	N/A	#N/A
JUNCTION BOX#1	INVERTER#1	600	13.00	16.25	20	CU #10 AWG	CU #10 AWG	35	PASS	38	4	40	0.91	0.8	29.12	PASS	35	1.24	0.188	3/4" EMT	19.79362101
JUNCTION BOX#2	INVERTER#2	600	13.00	16.25	20	CU #10 AWG	CU #10 AWG	35	PASS	38	4	40	0.91	0.8	29.12	PASS	35	1.24	0.188	3/4" EMT	19.79362101

String 1 Voltage Drop	0.355
String 2 Voltage Drop	0.274
String 3 Voltage Drop	0.360
String 4 Voltage Drop	0.339

AC FEEDER CALCULATIONS

CIRCUIT ORIGIN	CIRCIUT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE CEC 310.15(B)(1)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY CEC 310.15(C)(1)	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
INVERTER#1	PV AC DISCONNECT#1	240	21	26.25	30	CU #10 AWG	CU #10 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.109	3/4" EMT	15.8349
PV AC DISCONNECT#1	FRANKLIN aGATE	240	21	26.25	30	CU #10 AWG	CU #10 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.109	3/4" EMT	15.8349
FRANKLIN aPOWER	ESS AC DISCONNECT	240	20.83	26.04	30	CU #10 AWG	CU #10 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.108	3/4" EMT	15.8349
ESS AC DISCONNECT	FRANKLIN aGATE	240	20.83	26.04	30	CU #10 AWG	CU #10 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.108	3/4" EMT	15.8349
INVERTER#2	PV AC DISCONNECT#2	240	32	40.00	40	CU #8 AWG	CU #10 AWG	CU #8 AWG	50	PASS	38	2	55	0.91	1	50.05	PASS	5	0.778	0.104	3/4" EMT	24.5591
PV AC DISCONNECT#2	FRANKLIN aGATE	240	32	40.00	40	CU #8 AWG	CU #10 AWG	CU #8 AWG	50	PASS	38	2	55	0.91	1	50.05	PASS	5	0.778	0.104	3/4" EMT	24.5591
FRANKLIN aGATE	BACKUP LOAD PANEL	240	100	125.00	125	CU #1/0 AWG	CU #6 AWG	CU #1/0 AWG	150	PASS	38	2	170	0.91	1	154.7	PASS	10	0.122	0.102	1 1/2" EMT	29.8232
FRANKLIN aGATE	MAIN SERVICE PANEL	240	100	125.00	125	CU #1/0 AWG	CU #6 AWG	CU #1/0 AWG	150	PASS	38	2	170	0.91	1	154.7	PASS	12	0.122	0.122	1 1/2" EMT	29.8232

CUMULATIVE VOLTAGE DROP INV#1	0.656
CUMULATIVE VOLTAGE DROP INV#2	0.431

ELECTRICAL NOTES

1. ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
2. ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
3. WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
4. WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH CEC 110.26.
5. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
6. WHERE SIZES OF JUNCTION BOX, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
7. ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
8. MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
9. MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
10. 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.

mona lee
MONA LEE SOLAR

REVISIONS

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PROJECT NAME & ADDRESS

MICHAEL BANNERMAN RESIDENCE
310 SPRUCE ST,
PHILADELPHIA, PA 19106

DRAWN BY
ESR

SHEET NAME
WIRING CALCULATIONS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-7

⚠ WARNING

ELECTRIC SHOCK HAZARD

TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL- 1:
LABEL LOCATION:
AC DISCONNECT
COMBINER
CODE REF: CEC 690.13(B)

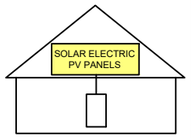
⚠ WARNING

POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL- 2:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: CEC 705.12(B)(3)(2)

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY



LABEL- 3:
LABEL LOCATION:
MAIN SERVICE PANEL
CODE REF: CFC 2022 1205.4.1(1) & CEC 690.56(C)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL- 4:
LABEL LOCATION:
AC DISCONNECT
CODE REF: CEC 690.56(C)(2)

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL- 5:
LABEL LOCATION:
RACEWAYS, JUNCTION BOXES, AC COMBINER PANEL
CODE REF: CEC 690.31(D)(2)

ESS AC DISCONNECT

NOMINAL OPERATING AC VOLATGE	240 V
RATED AC OUTPUT CURRENT	20.83 A

LABEL- 6:
LABEL LOCATION:
INVERTER
CODE REF: CEC 690.54

MAXIMUM VOLTAGE	1000.0 V
MAXIMUM CIRCUIT CURRENT	17.0 A
MAXIMUM RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-SC CONVERTER (IF INSTALLED)	

LABEL- 7:
LABEL LOCATION:
INVERTER
CODE REF: CEC 690.53

⚠WARNING TRI POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM THIRD SOURCE IS BATTERY SYSTEM

LABEL- 8:
LABEL LOCATION:
PRODUCTION METER
UTILITY METER
MAIN SERVICE PANEL
SUBPANEL
CODE REF: CEC 705.12(C) & NEC 690.59

ENERGY STORAGE SYSTEM DISCONNECT

LABEL- 9:
LABEL LOCATION:
ESS AC DISCONNECT
CODE REF: CEC 706.15(C)

⚠ WARNING

THIS EQUIPMENT FED BY MULTIPLE SOURCE.TOTAL RATING OF ALL OVERCURRENT DEVICE, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR.

LABEL- 10:
LABEL LOCATION:
MAIN SERVICE PANEL
CODE REF: 705.12(B)(3)(3)

PHOTOVOLTAIC AC DISCONNECT

NOMINAL OPERATING AC VOLATGE	240 V
RATED AC OUTPUT CURRENT	21.0 A

LABEL- 11:
LABEL LOCATION:
INVERTER#1
CODE REF: CEC 690.54

PHOTOVOLTAIC AC DISCONNECT

NOMINAL OPERATING AC VOLATGE	240 V
RATED AC OUTPUT CURRENT	32.0 A

LABEL- 12:
LABEL LOCATION:
INVERTER#2

WARNING: THIS SENSOR IS PART OF A POWER CONTROL SYSTEM. DO NOT REMOVE. REPLACE ONLY WITH THE SAME TYPE AND RATING.

LABEL- 13:
LABEL LOCATION:
AROUND THE CT WIRE BY CLAMP
CODE REF: UL 1741, SECTION 206.3

mona lee

MONA LEE SOLAR

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MICHAEL BANNERMAN RESIDENCE

310 SPRUCE ST, PHILADELPHIA, PA 19106

DRAWN BY

ESR

SHEET NAME

LABELS

SHEET SIZE

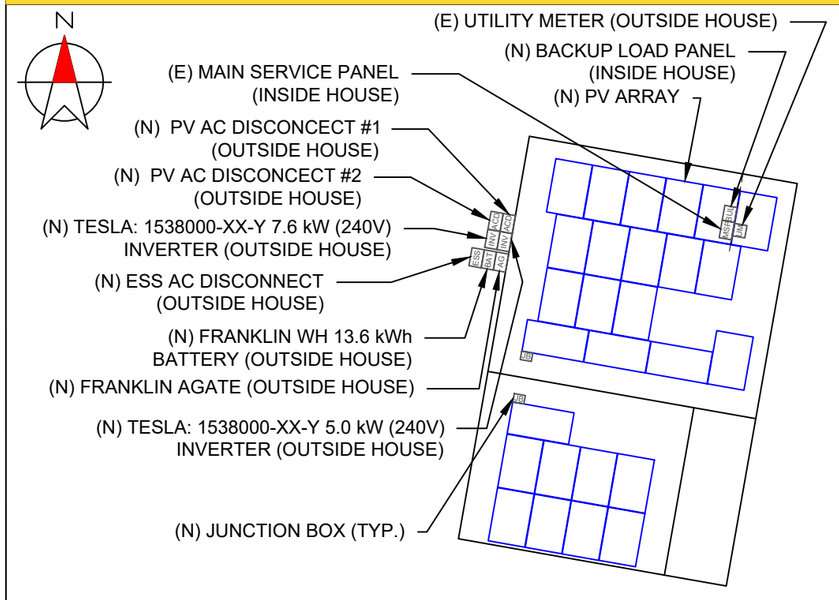
ANSI B
11" X 17"

SHEET NUMBER

PV-8

CAUTION:

MULTIPLE SOURCES OF POWER



310 SPRUCE ST, PHILADELPHIA, PA 19106

DIRECTORY

PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM.

(ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN: NEC 690.56(A)(B), [NEC 705.10])

LABELING NOTES:

1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2020 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145(f)(7), ANSI Z535.4-2011
3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21(B)(1)]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [IFC 605.11.1.3]

mona lee

MONA LEE SOLAR

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	11/04/2024	
REVISION	02-05-2025	A

DATE:11/04/2024

PROJECT NAME & ADDRESS

MICHAEL BANNERMAN RESIDENCE

310 SPRUCE ST, PHILADELPHIA, PA 19106

DRAWN BY

ESR

SHEET NAME

PLACARD

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-9

RAPID SHUTDOWN CHART

	1-10	11-20	21-30	31-40	41-50	51-60	61-70
1							
2							
3							
4							
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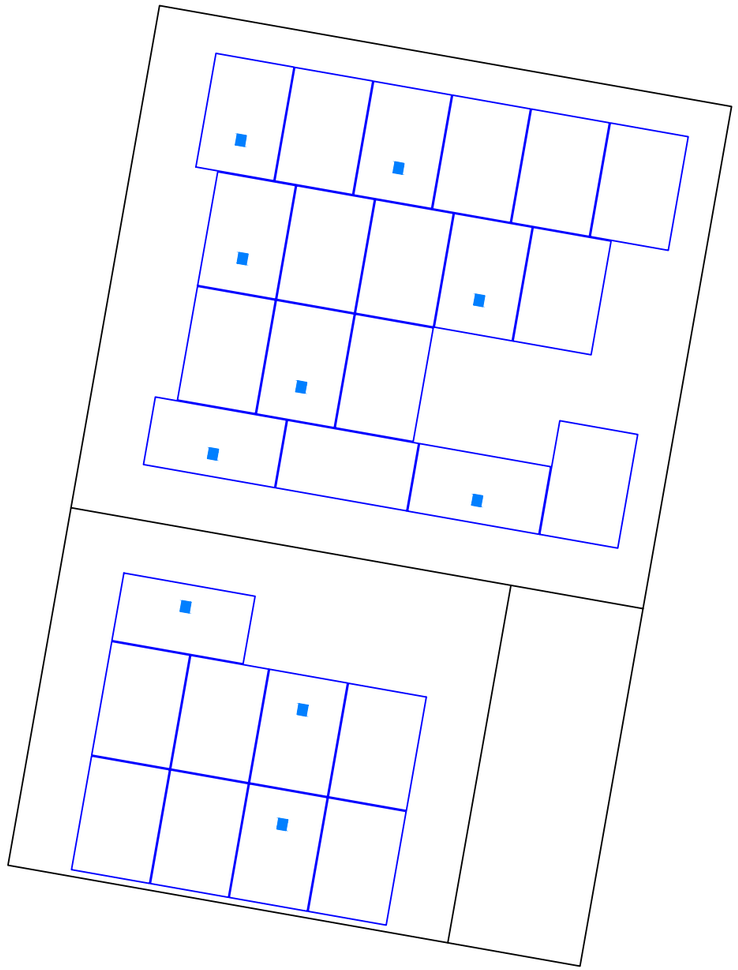

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MONA LEE SOLAR

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DATE:11/04/2024

PROJECT NAME & ADDRESS

MICHAEL BANNERMAN RESIDENCE

310 SPRUCE ST,
PHILADELPHIA, PA 19106

DRAWN BY

ESR

SHEET NAME

RSD CHART

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-10

URE
UNITED RENEWABLE ENERGY

FBM445M7G-BB / 120 cells
445 Watt Mono-Crystalline PV Module

UL 61730, CE-compliant
Quality Controlled PV-TÜV
SUD IEC 61215:2016,
IEC 61730:2016
Type 1/Class C Fire Rating

URE modules use state-of-the-art cell cutting technology, and advanced module manufacturing experience to provide leading power density and long term reliability.

Key Features

- At 445 Watts and 20.57% Efficiency URE Solar Panels are Industry Leaders in Output and Efficiency
- 25 Year Output Warranty and 25 Year Product Guarantee
- Super All Black Design with more Uniform Appearance for High Profile Residential Installations
- High Quality Solar Cell Technology allows URE to be a major international exporter to Solar Module manufacturers in the United States and Europe
- Excellent Performance in Low Light and Poor Weather Conditions to Maximize Energy Harvest
- Winner of Taiwan Excellence Award 7 Consecutive Years for Highest Efficiency Module

THE IDEAL SOLUTION FOR:

- Rooftop arrays on residential buildings
- Residential ground mount arrays

UNITED RENEWABLE ENERGY
For more information, please visit us at ***www.ureusa.com***

UNITED RENEWABLE ENERGY

Electrical Data

Model - STC		FBM440M7G-BB	FBM445M7G-BB	FBM450M7G-BB	FBM455M7G-BB
Maximum Rating Power (Pmax)	[W]	440	445	450	455
Module Efficiency	[%]	20.34	20.57	20.80	21.03
Open Circuit Voltage (Voc)	[V]	41.70	41.90	42.10	42.30
Maximum Power Voltage	[V]	34.60	34.80	35.00	35.20
Short Circuit Current (Isc)	[A]	13.41	13.48	13.56	13.63
Maximum Power Current	[A]	12.72	12.79	12.86	12.93

*Standard Test Condition (STC): Cell Temperature 25 °C, Irradiance 1000 W/m², AM 1.5
*Values without tolerance are typical numbers.Measurement tolerance: ± 3%

Mechanical Data

Item	Specification
Dimensions	1908 mm (L)[1] x 1134 mm (W)[1] x 35 mm (D)[2] / 75.12" (L)[1] x 44.65" (W)[1] x 1.38" (D)[2]
Weight	24.2 kg / 53.35 lbs
Solar Cell	12x10 pieces monocrystalline solar cells series strings
Front Glass	White toughened safety glass, 3.2mm thickness
Cell Encapsulation	EVA (Ethylene-Viny-Acetate)
Back Cover	Black composite film
Frame	Black anodized aluminum profile
Junction Box	IP 68, 3 diodes
Connectors Type	Staubli MC4
Cable	1200mm (cable length can be customized), 4mm²
Package Configuration	31 pcs Per Pallet, 744 pcs per 40' HQ container

[1] : With assembly tolerance of ± 2 mm [± 0.08 "]
[2] : With assembly tolerance of ± 0.8 mm [± 0.03 "]

Operating Conditions

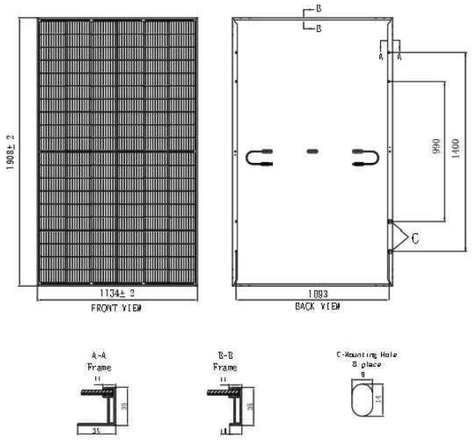
Item	Specification
Mechanical Load	5400 Pa
Maximum System Voltage	1000V
Series Fuse Rating	30 A
Operating Temperature	-40 to 85 °C

Temperature Characteristics

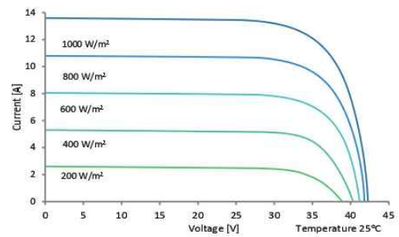
Item	Specification
Nominal Module Operating Temperature	45°C ± 2°C
Temperature Coefficient of Isc	0.048 % / °C
Temperature Coefficient of Voc	-0.27 % / °C
Temperature Coefficient of Pmax	-0.33 % / °C

*Nominal module operating temperature (NMOT): Air mass AM 1.5, irradiance 800W/m², temperature 20°C, windspeed 1 m/s.
*Reduction in efficiency from 1000W/m² to 200W/m² at 25°C: 3.5 ± 2%.

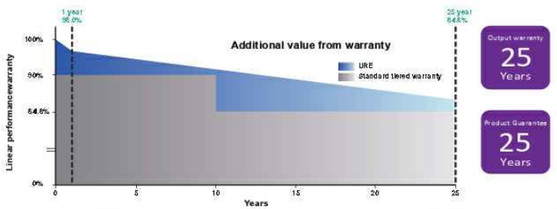
Engineering Drawing (mm)



Dependence on Irradiance



Reliability with Warranty



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MONA LEE SOLAR

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C HERNANDEZ
ENGINEER
PE087541
Exp. 09/30/25
02/05/25

REVISIONS		
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DATE:11/04/2024

PROJECT NAME & ADDRESS
MICHAEL BANNERMAN RESIDENCE
310 SPRUCE ST,
PHILADELPHIA, PA 19106

DRAWN BY
ESR

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-11

Tesla Solar Inverter
with Site Controller

—

Tesla Solar Inverter completes the Tesla home solar system, converting DC power from solar to AC power for home consumption. Tesla's renowned expertise in power electronics has been combined with robust safety features and a simple installation process to produce an outstanding solar inverter that is compatible with both Solar Roof and traditional solar panels. Once installed, homeowners use the Tesla mobile app to manage their solar system and monitor energy consumption, resulting in a truly unique ecosystem experience.

KEY FEATURES

- Built on Powerwall technology for exceptional efficiency and reliability
- Wi-Fi, Ethernet, and cellular connectivity with easy over-the-air updates
- Designed to integrate with Tesla Powerwall and Tesla App
- 0.5% revenue-grade metering for Solar Renewable Energy Credit (SREC) programs included

Tesla Solar Inverter Technical Specifications

Electrical Specifications: Output (AC)

Model Number	1538000-xx-y			
Output (AC)[1]	3.8 kW	5 kW	5.7 kW	7.6 kW
Nominal Power	3,800 W	5,000 W	5,700 W	7,600 W
Maximum Apparent Power	3,840 VA	5,040 VA	6,000 VA	7,680 VA
Maximum Continuous Current	16 A	21 A	24 A	32 A
Breaker (Overcurrent Protection)	20 A	30 A	30 A	40 A
Nominal Power Factor	1 - 0.9 (leading / lagging			
THD (at Nominal Power)	<5%			

Electrical Specifications: Input (DC)

MPPT	4
Input Connectors per MPPT	1-2-1-2
Maximum Input Voltage	600 VDC
DC Input Voltage Range	60 - 550 VDC
DC MPPT Voltage Range	60 - 480 VDC[1]
Maximum Current per MPPT (I_{MP})	13 A[2]
Maximum Short Circuit Current per MPPT (I_{SC})	17 A[2]

[1]Maximum current.

[2]Where the DC input current exceeds an MPPT rating, jumpers can be used to allow a single MPPT to intake additional DC current up to 26 A I_{MP} / 34 A I_{SC}.

Performance Specifications

Peak Efficiency	98.6% at 240 V
CEC Efficiency	98.0% at 240 V
Allowable DC/AC Ratio	1.7
Customer Interface	Tesla Mobile App
Internet Connectivity	Wi-Fi (2.4 GHz, 802.11 b/g/n), Ethernet, Cellular (LTE/4G)[3]
Revenue Grade Meter	Revenue Accurate (+/- 0.5%)
AC Remote Metering Support	Wi-Fi (2.4 GHz, 802.11 b/g/n)
Protections	Integrated arc fault circuit interrupter (AFCI), Rapid Shutdown
Supported Grid Types	60 Hz, 240 V Split Phase
Warranty	12.5 years

[3]Cellular connectivity subject to network operator service coverage and signal strength.

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PROJECT NAME & ADDRESS
MICHAEL BANNERMAN RESIDENCE
310 SPRUCE ST, PHILADELPHIA, PA 19106

DRAWN BY
ESR

SHEET NAME
EQUIPMENT SPECIFICATION

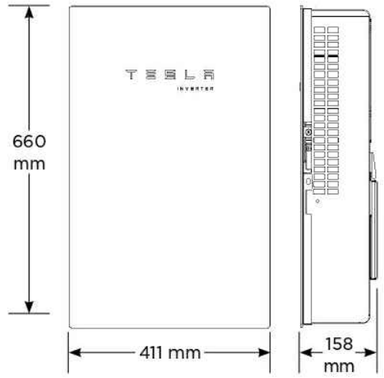
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-12

Tesla Solar Inverter Technical Specifications

Mechanical Specifications

Dimensions	660 mm x 411 mm x 158 mm (26 in x 16 in x 6 in)



Weight	52 lb[4]
Mounting Options	Wall mount (bracket)

[4]Door and bracket can be removed for a mounting weight of 37 lb.

Environmental Specifications

Operating Temperature	-30°C to 45°C (-22°F to 113°F)[5]
Operating Humidity (RH)	Up to 100%, condensing
Storage Temperature	-30°C to 70°C (-22°F to 158°F)
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Rating	Type 3R
Ingress Rating	IP55 (Wiring compartment)
Pollution Rating	PD2 for power electronics and terminal wiring compartment, PD3 for all other components
Operating Noise @ 1 m	< 40 db(A) nominal, < 50 db(A) maximum

[5]Performance may be de-rated to 6.2 kW at 240 V when operating at temperatures greater than 45°C.

Compliance Information

Grid Certifications	UL 1741, UL 1741 SA, UL 1741 SB, UL 1741 PCS, IEEE 1547-2018, IEEE 1547.1
Safety Certifications	UL 1741 PVRSS, UL 1699B, UL 1998 (US), UL 3741
Emissions	EN 61000-6-3 (Residential), FCC 47CFR15.109 (a)

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310 SPRUCE ST, PHILADELPHIA, PA 19106

DRAWN BY
ESR

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-13

Solar Shutdown Device Technical Specifications

—

The Solar Shutdown Device is a Mid-Circuit Interrupter (MCI) and is part of the PV system rapid shutdown (RSD) function in accordance with Article 690 of the applicable NEC. When paired with Tesla Solar Inverter, solar array shutdown is initiated by any loss of AC power.

	Model	MCI-1	MCI-2
Electrical Specifications	Nominal Input DC Current Rating (I_{MP})	13 A	13 A
	Maximum Input Short Circuit Current (I_{SC})	19 A	17 A
	Maximum System Voltage (PVHCS)	600 V DC	1000 V DC[6]
	[6]Maximum System Voltage is limited by Tesla Solar Inverter to 600 V DC.		
RSD Module Performance	Maximum Number of Devices per String	5	5
	Control	Power Line Excitation	Power Line Excitation
	Passive State	Normally Open	Normally Open
	Maximum Power Consumption	7 W	7 W
	Warranty	25 years	25 years
Environmental Specifications	Operating Temperature	-40°C to 50°C (-40°F to 122°F)	-45°C to 70°C (-49°F to 158°F)
	Storage Temperature	–30°C to 70°C (–22°F to 158°F)	–30°C to 70°C (–22°F to 158°F)
	Enclosure Rating	NEMA 4X / IP65	NEMA 4X / IP65
Mechanical Specifications	Electrical Connections	MC4 Connector	MC4 Connector
	Housing	Plastic	Plastic
	Dimensions	125 x 150 x 22 mm (5 x 6 x 1 in)	173 x 45 x 22 mm (6.8 x 1.8 x 1 in)
	Weight	350 g (0.77 lb)	120 g (0.26 lb)
	Mounting Options	ZEP Home Run Clip M4 Screw (#10) M8 Bolt (5/16") Nail / Wood screw	Wire Clip
Compliance Information	Certifications	UL 1741 PVRSE, UL 3741, PVRSA (Photovoltaic Rapid Shutdown Array)	
	RSD Initiation Method	PV System AC Breaker or Switch	
UL 3741 PV Hazard Control (and PVRSA) Compatibility		See Tesla Solar Inverter Installation Manual	

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PROJECT NAME & ADDRESS

MICHAEL BANNERMAN RESIDENCE
310 SPRUCE ST, PHILADELPHIA, PA 19106

DRAWN BY
ESR

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-14

DATASHEET

FRANKLINWH

aPower + aGate

Whole-home storage to energize your fullest life

Reliable
Exceeds performance standards, backed by 12-year warranty

Scalable
Highest system density allows up to 15 units for 204 kWh[1]

Hassle-free
Remote monitoring and user-friendly app limits O&M

Flexible
Technology-agnostic system can be used with any solar inverter

Simplified
Pre-assembled for fast, easy one-step installation

WWW.FRANKLINWH.COM

DATASHEET

Franklin Home Power Solution ("FHP")

Franklin Home Power goes well beyond the demand for safe, reliable back-up to optimize daily household energy management. Our powerful performance stems from integrating the highest AC battery capacity with the industry's most intelligent controls.

a. aPower is the AC battery with built-in advanced inverter.

b. aGate is the energy management device connecting the grid, the loads,the generator and the solar system.

c. FranklinWH App provides seamless monitoring and control of your whole home energy.

Performance

AC Battery

Battery Chemistry	Lithium Iron Phosphate (LFP)
Usable System Energy	13.6 kWh per unit, scalability up to 15 units[1]
Aggregate Throughput	43 MWh
Communications	Ethernet / 4G / WiFi
Nominal AC Voltage	120 V / 240 V, 60 Hz
Maximum Continuous / Peak Discharge Power (10 s)	5 kW / 10 kW
Maximum Supply Fault Current	20 kA
Switch Over Time (grid to micro-grid)	<16 ms
Round Trip Efficiency	89%[2]
Inverter Topology	Isolated
Noise Emission (optimal)	<30 dB (A)
User Interface	FranklinWH App
Warranty	12 years

Electrical Connections

aPower Over Current Protection Device	90 A Max
Solar Input Over Current Protection Device	80 A Max
Generator Over Current Protection Device[3]	200 A Max
Smart Circuits Over Current Protection Device[4]	Opt. a 1 × 80 A Max @240 V & 1 × 50 A Max @240 V Opt. b 1 × 80 A Max @240 V & 2 × 50 A Max @120 V

Electrical Interface

Coupling	AC Coupled
Feed-in Phase	Split Phase
Connection Support	L1 / L2 / N / PE

Work Modes

Self-Consumption
Load Shifting
Backup Standby

Environmental

Operating Temperature	-4°F to 122°F (-20°C to 50°C)
Operating Humidity (RH)	Up to 100% RH, condensing
Altitude	Maximum 9,843 ft (3,000 m)
Ingress Rating	IP67 (Battery and power converter system) IP56 (Wiring compartment)
Storage Condition	14°F to 113°F (-10°C to 45°C) Up to 95% RH, non-condensing
Enclosure Type	NEMA type 3R
Environment	Indoor and outdoor rated

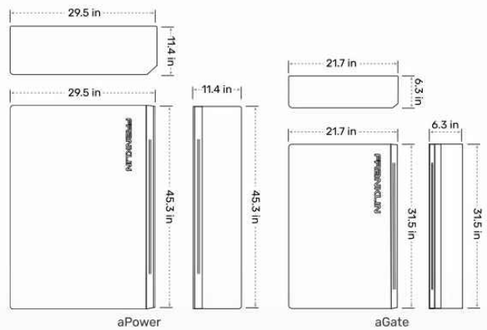
Mechanical

Dimensions(H*W*D)	aPower X: 45.3 × 29.5 × 11.4 in (1150 × 750 × 290 mm) aGate X: 31.5 × 21.7 × 6.3 in (800 × 550 × 160 mm)
Weight	aPower X: 408 lb (185 Kg) aGate X: 50 lb (23 Kg)
Installation	Wall mount or floor mount

Compliance & Certificates

Certificates	
	aPower X: UL 9540, UL 1741, UL 1741SA, UL 1973, UL 9540A, IEEE 1547, IEEE 1547.1, UN 38.3
	aGate X: UL 1741 PCS, UL 67[5], UL 869A[5], UL 916[5]
Seismic	AC156, OSHPD, IEEE 693-2005 (high)
Environmental	California Proposition 65 RoHS Directive 2011 / EU
Emissions	FCC Part 15 Class B, ICES 003

1: Please contact us if you have large capacity requirements.
2: At beginning of life, AC to battery to AC, 50% power rating.
3: Generator integration is optional.
4: Smart Circuits are optional.
5: Sections from these standards were used during the safety evaluation and included in the UL 1741 listing.



Address: 1731 Technology Dr. Suite 530 San Jose , CA 95110
Telephone: +1 888-837-2655
Email: info@franklinwh.com
Website: www.franklinwh.com

WWW.FRANKLINWH.COM

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PHILADELPHIA, PA 19106

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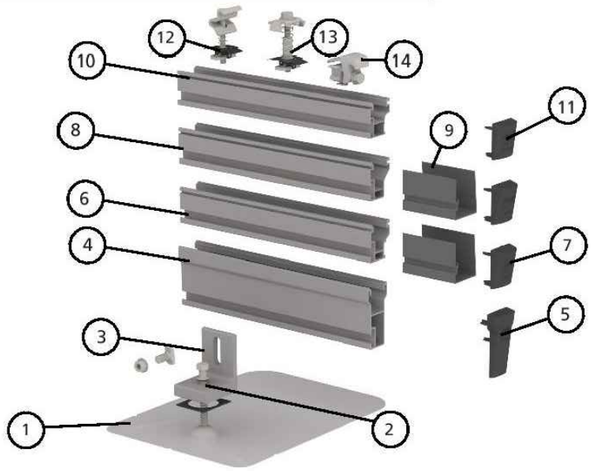
SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

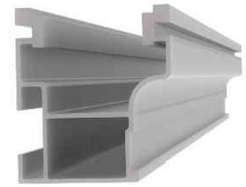
SHEET NUMBER
PV-15

CrossRail System



Item No.	Description	Part No.
1	EverFlash XP Comp Kit, Mill or Dark	4000060, 4000061, 4000057
2	Lag Bolt D145/16 x 4" SS	4000359
3	L-Foot XP Set, Mill or Dark	4000036, 4000038
4	CrossRail 80 168" Rail, Mill	4000508
5	CrossRail 80 End Cap, Black	4001221
6	CrossRail 48-XL 166", Mill or Dark	4000695, 4000705
7	CrossRail 48-X/48-XL End Cap or Flat End Cap	4000433, 4000431
8	CrossRail 48-X 166" or 180", Mill or Dark	4000662, 4000675, 4000663
9	CrossRail 48-X/48-XL 3" Sleeve	4000583
10	CrossRail 44-X 166", Mill or Dark	4000019, 4000020
11	CrossRail 44-X End Cap	4000067
12	CR Mid Clamp Silver or Dark	4000601-H, 4000602-H
13	CR End Clamp Silver or Dark	4000429, 4000430
14	Yeti Clamp (Hidden End Clamp)	40000050-H

CrossRail 44-X

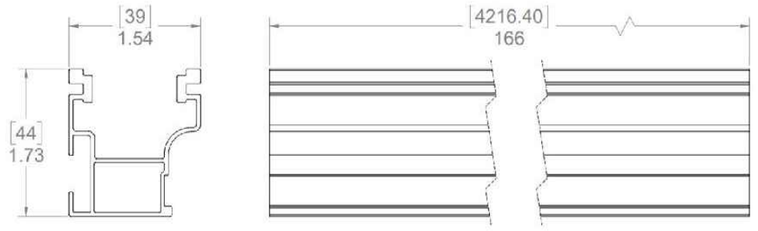


Mechanical Properties

	CrossRail 44-X
Material	6000 Series Aluminum
Ultimate Tensile Strength	37.7 ksi (260 MPa)
Yield Strength	34.8 ksi (240 MPa)
Weight	0.47 lbs/ft (0.699 kg/m)
Finish	Mill or Dark Anodized

Section Properties

	CrossRail 44-X
Sx	0.1490 in^3 (0.3785 cm^3)
Sy	0.1450 in^3 (0.3683 cm^3)
A (X-Section)	0.4050 in^2 (1.0287 cm^2)



Dimensions in [mm] Inches

Notes:

- Structural values and span charts determined in accordance with Aluminum Design Manual and ASCE 7-16
- UL2703 Listed System for Fire and Bonding

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SHEET NAME
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ANSI B
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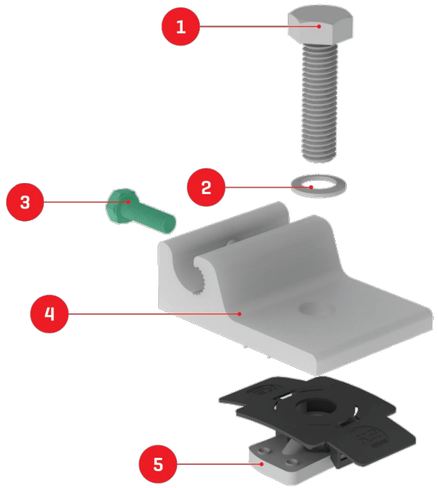
SHEET NUMBER
PV-16

We support PV systems
Formerly Everest Solar Systems



Everest Ground Lug

TECHNICAL SHEET

Item Number	Description	Part Number
1	13mm Hex Bolt	4000006-H | Everest Ground Lug Set, 13mm Hex
2	Lock Washer	
3	Grounding Bolt	
4	Ground Lug	
5	MK3 Slot Nut	

Technical Data

	Everest Ground Lug
Material	Aluminum with stainless steel hardware
Finish	Tin-plated
Roof connection	Rail channel insert
Code compliance	UL 2703
Compatibility	All CrossRail Systems and MiniRail

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SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-17

CERTIFICATE OF COMPLIANCE

Certificate Number	E467724
Report Reference	E467724-20150108
Date	2021-April-07
Issued to:	K2 Systems LLC 2835 La Mirada Dr, Suite A Vista CA, 92081 US
This is to certify that representative samples of	MOUNTING SYSTEMS, MOUNTING DEVICES, CLAMPING DEVICES AND GROUND LUGS FOR USE WITH PHOTOVOLTAIC MODULES AND PANELS Everest Crossrail System, utilizing Crossrail 48, 48-S, 48-X, 48-XL, 44-X rails, and Everest MiniRail XPRess System for System Fire Classification and Bonding. Everest CrossRail System, utilizing CrossRail 80 for Bonding.
	Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	UL 2703, Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for use with Flat-Plate Photovoltaic Modules and Panels.
Additional Information:	See the UL Online Certifications Directory at https://iq.ulprospector.com for additional information

This Certificate of Compliance does not provide authorization to apply the UL Mark. Only the UL Follow-Up Services Procedure provides authorization to apply the UL Mark.

Only those products bearing the UL Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

Look for the UL Certification Mark on the product.

Bruce Mahrenholz, Director North American Certification Program

UL LLC

MONA LEE SOLAR

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C HERNANDEZ
ENGINEER
PE087541
Exp. 09/30/25
02/05/25

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	11/04/2024	
REVISION	02-05-2025	A

DATE:11/04/2024

PROJECT NAME & ADDRESS

MICHAEL BANNERMAN RESIDENCE
310 SPRUCE ST,
PHILADELPHIA, PA 19106

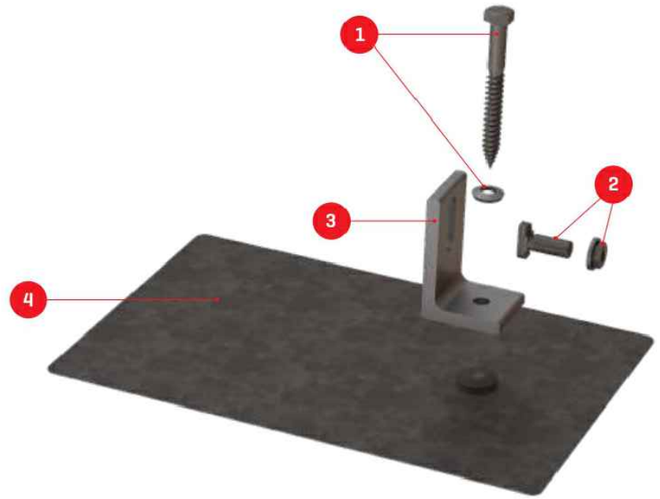
DRAWN BY
ESR

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-18

We support PV systems
Formerly Everest Solar Systems



EverFlash eComp Kit

TECHNICAL SHEET

Item Number	Description	Part Number
1	5/16" Lag Screw w/ EPDM washer	4000366 | EverFlash eComp Kit, Black 4000367 | EverFlash eComp Kit, Silver 4000679 | EverFlash eComp Kit, Mill LF, Dark Flash
2	T-Bolt & Hex Nut	
3	L-Foot	
4	eComp Flashing	

Technical Data

	EverFlash eComp Kit
Roof type	Composition shingle
Material	Aluminum and stainless steel for high corrosion resistance
Finish	Mill or dark anodized
Roof connection	5/16" lag screw
Code compliance	UL 2703, IAMPO Certified
Compatibility	CrossRail 44-X, 48-X, 48-XL, 80

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MICHAEL BANNERMAN RESIDENCE
310 SPRUCE ST, PHILADELPHIA, PA 19106

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SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-19

Specifications

Eaton DG222NRB

Catalog Number: DG222NRB

Eaton General duty cartridge fuse safety switch, 60 A, NEMA 3R, Painted galvanized steel, Class H fuses, Fusible with neutral, Two-pole, Three-wire, Category: general duty safety switch, 240 V

General specifications

Product Name
Eaton general duty cartridge fuse safety switch

Catalog Number
DG222NRB

UPC
782113144221

Product Length/Depth
7.35 in

Product Height
14.37 in

Product Width
8.4 in

Product Weight
10 lb

Warranty
Eaton Selling Policy 25-000, one (1) year from the date of installation of the Product or eighteen (18) months from the date of shipment of the Product, whichever occurs first.

Compliances
NEC 230.62 (C) Compliant Barrier

Certifications
UL Listed

Catalog Notes
Maximum hp ratings apply only when dual element fuses are used. 3-Phase hp rating shown is a grounded B phase rating, UL listed.

Physical Attributes

Enclosure
NEMA 3R

Enclosure material
Painted galvanized steel

Fuse configuration
Fusible with neutral

Number Of Poles
Two-pole

Number of wires
3

Type
General duty, cartridge fused

Performance Ratings

Amperage Rating
60A

Fuse class provision
Class H fuses

Voltage rating
240V

Miscellaneous

Product Category
General duty safety switch

Resources

Multimedia
Switching Devices Flex Center

Double Up on Safety

Specifications and datasheets
Eaton Specification Sheet - DG222NRB

Powering Business Worldwide

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MICHAEL BANNERMAN RESIDENCE
310 SPRUCE ST, PHILADELPHIA, PA 19106

DRAWN BY
ESR

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-20

Specifications

Eaton DG221URB

Catalog Number: DG221URB

Eaton General duty non-fusible safety switch, single-throw, 30 A, 240 V, NEMA 3R, Rainproof, Painted galvanized steel, Two-pole, Two-wire

General specifications

Product Name
Eaton general duty non-fusible safety switch

Catalog Number
DG221URB

UPC
782113120232

Product Length/Depth
6.88 in

Product Height
10.81 in

Product Width
6.38 in

Product Weight
6 lb

Warranty
Eaton Selling Policy 25-000, one (1) year from the date of installation of the Product or eighteen (18) months from the date of shipment of the Product, whichever occurs first.

Compliances
NEC 230.62 (C) Compliant Barrier

Certifications
UL Listed

Catalog Notes
WARNING! Switch is not approved for service entrance unless a neutral kit is installed.

Physical Attributes

Enclosure
NEMA 3R

Enclosure material
Painted galvanized steel

Fuse configuration
Non-fusible

Number Of Poles
Two-pole

Number of wires
2

Type
Non-fusible, single-throw

Performance Ratings

Amperage Rating
30A

Voltage rating
240V

Miscellaneous

Product Category
General duty safety switch

Resources

Multimedia
Double Up on Safety
Switching Devices Flex Center

Specifications and datasheets
Eaton Specification Sheet - DG221URB

Powering Business Worldwide

Eaton Corporation plc
Eaton House
30 Pembroke Road
Dublin 4, Ireland
Eaton.com

Eaton.com/socialmedia

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PROJECT NAME & ADDRESS
MICHAEL BANNERMAN RESIDENCE
310 SPRUCE ST,
PHILADELPHIA, PA 19106

DRAWN BY
ESR

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-21

DAVID C. HERNANDEZ, PE

513-418-8812 4912 Prospect Ave., Blue Ash OH 45242 davehernandezpe@gmail.com

DATE: February 05, 2025

RE: 310 Spruce St, Philadelphia, PA 19106, USA

To Whom It May Concern,

As per your request, Exactus Energy has conducted a site assessment of the building at the above address.

PV solar panels are proposed to be installed on roof areas as shown in the submitted plans. The panels are clamped to rails which are attached to the roof with a flushed mounting system. The PV system (PV modules, racking, mounting hardware, etc.) shall be installed according to the manufacturer's approved installation specifications. The Engineer of Record and Exactus Energy claim no responsibility for misuse or improper installation.

It was found that the roof systems satisfactorily meet the applicable standards included in the PA Uniform Construction Code (UCC), IBC 2018, IEBC 2018, IRC 2018, and ASCE 7-16 as well as the design criteria shown below:

Design Criteria:

Risk Category	= II
Exposure Category	= B
Wind speed	= 115 mph
Ground snow load	= 30 psf
Roof dead load	= 12 psf
Solar system dead load	= 3 psf

Overall, the roof system integrity is adequate to support the PV alteration with no modifications or reinforcements as required per 2018 IEBC Sections 502.4 and 502.5

This letter was completed in accordance to recognized design standards, professional engineering experience, and judgement. Prior to installation, the on-site contractor must notify Exactus Energy if there are any discrepancies, or damages to the members, that was not addressed in the plan set.

If you have any further questions, please do not hesitate to contact me.

Acknowledged by: