**STAFF REPORT:** 10/14/2020 MEETING **PREPARED BY**: J. ROSS
**APPLICATION NUMBER:** #20-6657
**ADDRESS:** 15024 ASHTON STREET
**HISTORIC DISTRICT:** ROSEDALE PARK
**APPLICANT:** DWIGHT BLAKEY (OWNER); PETER DINICOLA (CONTRACTOR)
**DATE OF PROVISIONALLY-COMPLETE APPLICATION**: 9/5/2020
**DATE OF STAFF VISIT:** 10/01/2020

**SCOPE:** INSTALL TWO NEW SOLAR PANEL ARRAYS AT ROOF

**EXISTING CONDITIONS**
Erected ca. 1990, the building located at 15024 Ashton is a two-story, single-family house which is located within a double lot at the western edge of the Rosedale Park Historic District. The property's rear yard backs on to the Southfield Highway's access road. The building's asphalt-shingle roof is hipped, with multiple projecting gables at the front elevation and an intersecting gabled wing at the rear elevation. Exterior walls are clad with panel brick and vinyl siding and windows are vinyl.

**PROPOSAL**
With the current proposal, the applicant is seeking the Commission's approval to install two new, multi-panel solar arrays at the building's side and rear roofs. Both roof planes proposed for alteration face south. Specifically, the new installations are proposed as per the submitted documents and the following description:

- At the south-facing/side elevation roof plane of the hipped roof, install a 20'x18'-4" panel array which is pushed 4'-6" east from the building's front elevation
- At rear projecting wing, south-facing roof plane, install a 7'-1"x36'-2" panel array

**OBSERVATIONS AND RESEARCH**

- The Rosedale Park Historic District was designated in 2007
- As previously-noted, the home itself is not of historic age/was erected ca. 1990
- 15024 Ashton is the second parcel to the north of the intersection of Chalfonte Avenue and Ashton Street
- The property's rear yard backs on to the Southfield Highway access road
- All of the homes within the near vicinity of 15024 Ashton are of historic age
- Due the home's large scale and the location of the parcel, the proposed solar arrays will be visible from both Chalfonte Avenue (the rear and side elevation arrays) and Ashton Street (the side elevation array)

**ISSUES**

- As per the National Park Service guidance regarding solar panels, "an installation that negatively impacts the historic character of a **property** will not meet the Standards." However, the National Park Service does allow for the installation of solar panels which are "minimally visible."
- The house is not historic so there are no historic compatibility issues in re: to the home itself/specifically and the proposed installation. However, in this case, HDC staff has evaluated the proposal within the context of/has defined the historic "property" to include 15024 Ashton AND the historic district/adjacent historic homes
- The proposed new solar arrays will be visible from both Ashton Street and Chalfonte Avenue.
- The panel array at the **side** elevation will be highly visible from the public right-of-way on Ashton Street. It is HDC staff's opinion that this array is not compatible with the historic appearance of the adjacent/nearby historic homes within the district.
- However, it is staff's opinion that the solar panel display proposed for the rear wing of the home will have a minimal impact on the district's historic character as the installation shall be situated within a tertiary/secondary viewshed that is located to the rear of the adjacent historic homes and at the edge of the district, directly off the Southfield Highway.
- If the Commission determines that the solar panel array proposed for installation at the side elevation is inappropriate, staff requests that the Commission outline any alternative

locations at the 10/14/2020 meeting which them deem acceptable for staff to approve at an administrative level.

**RECOMMENDATION**

It is HDC staff's opinion that the following work items are appropriate to the defined Elements of Design for the Rosedale Park Historic District and the Secretary of the Interior's Standards for Rehabilitation (36 CFR Part 67). Staff therefore recommends that the Commission issue a Certificate of Appropriateness (COA) for the following work items:

- Install a multi-panel solar array at the rear projecting wing, south-facing roof plane, as per the submitted proposal

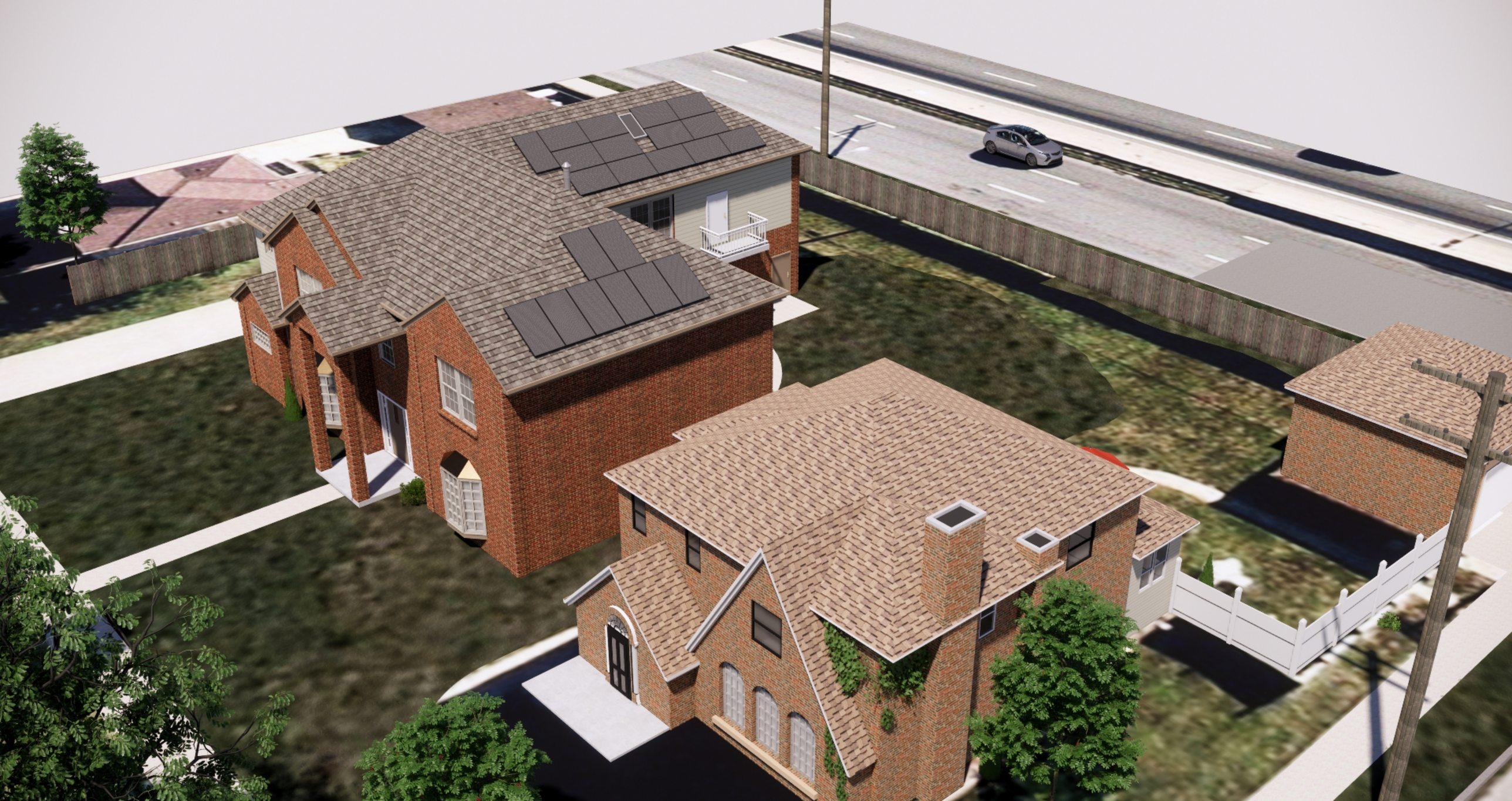
However, the is staff's opinion that the proposed work items are not appropriate to the defined Elements of Design for the Rosedale Park Historic District and the Secretary of the Interior's Standards for Rehabilitation (36 CFR Part 67). Staff therefore recommends that the Commission deny the issuance of a Certificate of Appropriateness (COA) for the following work items:

- Install a multi-panel solar array at the south-facing/side elevation roof plane of the hipped roof as per the proposal


Google
Street View
LOCATION OF PROPOSED ARRAYS, IN RED
Rosemont Ave
Google


15024 Ashton Road
Ashton Rd
Southfield Rd
Chalfonte Ave
Chalfonte Ave


CONCEPTUAL RENDERINGS OF
PANEL ARRAYS



THIS IS A 3-PAGE FORM - ALL INFORMATION IS REQUIRED FOR PROJECT REVIEW

# HISTORIC DISTRICT COMMISSION
# PROJECT REVIEW REQUEST

City of Detroit - Planning & Development Department
2 Woodward Avenue, Suite 808
Detroit, Michigan 48226

Date: 1/20/2020

## PROPERTY INFORMATION

ADDRESS: 15024 Ashton Rd AKA: _____

HISTORIC DISTRICT: _____

SCOPE OF WORK: (Check ALL that apply)
- ☐ Windows/ Doors
- ☐ Roof/Gutters/ Chimney
- ☐ Porch/ Deck
- ☐ Landscape/Fence/ Tree/Park
- ☐ General Rehab
- ☐ New Construction
- ☐ Demolition
- ☐ Addition
- ☑ Other: Roof mounted solar panels

## APPLICANT IDENTIFICATION

- ☐ Property Owner/ Homeowner
- ☑ Contractor
- ☐ Tenant or Business Occupant
- ☐ Architect/Engineer/ Consultant

NAME: Dwight Blakey COMPANY NAME: _____

ADDRESS: 15024 Ashton Rd CITY: Detroit STATE: MI ZIP: 48083

PHONE: 313.220.2019 MOBILE: _____ EMAIL: _____

## PROJECT REVIEW REQUEST CHECKLIST

Please attach the following documentation to your request:

***PLEASE KEEP FILE SIZE OF ENTIRE SUBMISSION UNDER 30MB***

- [X] **Completed Building Permit Application** (highlighted portions only)
- [✓] **ePLANS Permit Number** (only applicable if you've already applied for permits through ePLANS)
- [X] **Photographs** of ALL sides of existing building or site
- [✓] **Detailed photographs** of location of proposed work (photographs to show existing condition(s), design, color, & material)
- [✓] **Description of existing conditions** (including materials and design)
- [✓] **Description of project** (if replacing any existing material(s), include an explanation as to why replacement--rather than repair--of existing and/or construction of new is required)
- [✓] **Detailed scope of work** (formatted as bulleted list)
- [✓] **Brochure/cut sheets** for proposed replacement material(s) and/or product(s), as applicable

**NOTE:**
Based on the scope of work, additional documentation may be required.
**See www.detroitmi.gov/hdc for scope-specific requirements.**

Upon receipt of this documentation, staff will review and inform you of the next steps toward obtaining your building permit from the Buildings, Safety Engineering and Environmental Department (BSEED) to perform the work.

**SUBMIT COMPLETED REQUESTS TO HDC@DETROITMI.GOV**

# P2 - BUILDING PERMIT APPLICATION

Date: _____

## PROPERTY INFORMATION

Address: 15024 Ashton Rd Floor: _____ Suite#: _____ Stories: _____

AKA: _____ Lot(s): _____ Subdivision: _____

Parcel ID#(s): _____ Total Acres: _____ Lot Width: _____ Lot Depth: _____

Current Legal Use of Property: _____ Proposed Use: _____

Are there any existing buildings or structures on this parcel? ☐ Yes ☐ No

## PROJECT INFORMATION

**Permit Type:** ☐ New ☒ Alteration ☐ Addition ☐ Demolition ☐ Correct Violations

☐ Foundation Only ☐ Change of Use ☐ Temporary Use ☐ Other: Roof mounted solar panels

☐ Revision to Original Permit #: _____ (Original permit has been issued and is active)

**Description of Work** (Describe in detail proposed work and use of property, attach work list)

22 roof mounted modules, grid tied, 6.60 kW, solar installation on existing residence

☐ MBC use change ☐ No MBC use change

**Included Improvements** (Check all applicable; these trade areas require separate permit applications)

☐ HVAC/Mechanical ☒ Electrical ☐ Plumbing ☐ Fire Sprinkler System ☐ Fire Alarm

**Structure Type**

☐ New Building ☐ Existing Structure ☐ Tenant Space ☐ Garage/Accessory Building

☐ Other: _____ Size of Structure to be Demolished (LxWxH) _____ cubic ft.

Construction involves changes to the floor plan? ☐ Yes ☐ No

(e.g. interior demolition or construction to new walls)

Use Group: _____ Type of Construction (per current MI Bldg Code Table 601) _____

**Estimated Cost of Construction** $ 44,620.00 (By Contractor) $ _____ (By Department)

**Structure Use**

☐ Residential-Number of Units: _____ ☐ Office-Gross Floor Area _____ ☐ Industrial-Gross Floor Area _____

☐ Commercial-Gross Floor Area: _____ ☐ Institutional-Gross Floor Area _____ ☐ Other-Gross Floor Area _____

Proposed No. of Employees: _____ List materials to be stored in the building: _____

**PLOT PLAN SHALL BE submitted on separate sheets and shall show all easements and measurements (must be correct and in detail). SHOW ALL streets abutting lot, indicate front of lot, show all buildings, existing and proposed distances to lot lines.** (Building Permit Application Continues on Next Page)

**For Building Department Use Only**

Intake By: _____ Date: _____ Fees Due: _____ DngBld? ☐ No

Permit Description:

Permit #:

Current Legal Land Use: _____ Proposed Use: _____

Permit#: _____ Date Permit Issued: _____ Permit Cost: $ _____

Zoning District: _____ Zoning Grant(s): _____

Lots Combined? ☐ Yes ☐ No (attach zoning clearance)

**Revised Cost** (revised permit applications only) Old $ _____ New $ _____

Structural: _____ Date: _____ Notes: _____

Zoning: _____ Date: _____ Notes: _____

Other: _____ Date: _____ Notes: _____

## IDENTIFICATION (All Fields Required)

**Property Owner/Homeowner** ☐ Property Owner/Homeowner is Permit Applicant

Name: Dwight Blakey Company Name:

Address: 15024 Ashton Rd City: Detroit State: MI Zip: 48223

Phone: 313.220.2019 Mobile: Email:

Driver's License #: Email:

**Contractor** ■ Contractor is Permit Applicant

Representative Name: Peter DeNicola Company Name: Power Home Solar, LLC

Address: 500 Stephenson Hwy City: Troy State: MI Zip: 48083

Phone: 919.300.7976 Mobile: Email: permit@powerhome.com

City of Detroit License #: 000036728002

## TENANT OR BUSINESS OCCUPANT ☐ Tenant is Permit Applicant

Name: Phone: Email:

## ARCHITECT/ENGINEER/CONSULTANT ☐ Architect/Engineer/Consultant is Permit Applicant

Name: State Registration#: Expiration Date:

Address: City: State: Zip:

Phone: Mobile: Email:

## HOMEOWNER AFFIDAVIT (Only required for residential permits obtained by homeowner.)

I hereby certify that I am the legal owner and occupant of the subject property and the work described on this permit application shall be completed by me. I am familiar with the applicable codes and requirements of the City of Detroit and take full responsibility for all code compliance, fees and inspections related to the installation/work herein described. I shall neither hire nor sub-contract to any other person, firm or corporation any portion of the work covered by this building permit.

Print Name: (Homeowner) Signature: Date:

Subscribed and sworn to before me this day of 20 A.D. County, Michigan

Signature: (Notary Public) My Commission Expires:

## PERMIT APPLICANT SIGNATURE

I hereby certify that the information on this application is true and correct. I have reviewed all deed restrictions that may apply to this construction and am aware of my responsibility thereunder. I certify that the proposed work is authorized by the owner of the record and I have been authorized to make this application as the property owner(s) authorized agent. Further I agree to conform to all applicable laws and ordinances of jurisdiction. **I am aware that a permit will expire when no inspections are requested and conducted within 180 days of the date of issuance or the date of the previous inspection and that expired permits cannot be**

Print Name: Peter DeNicola (Permit Applicant) Signature: PD Date: 1/20/2020

Driver's License #: 000036728002 Expiration: 6/5/24

Subscribed and sworn to before me this day of 20 A.D. County, Michigan

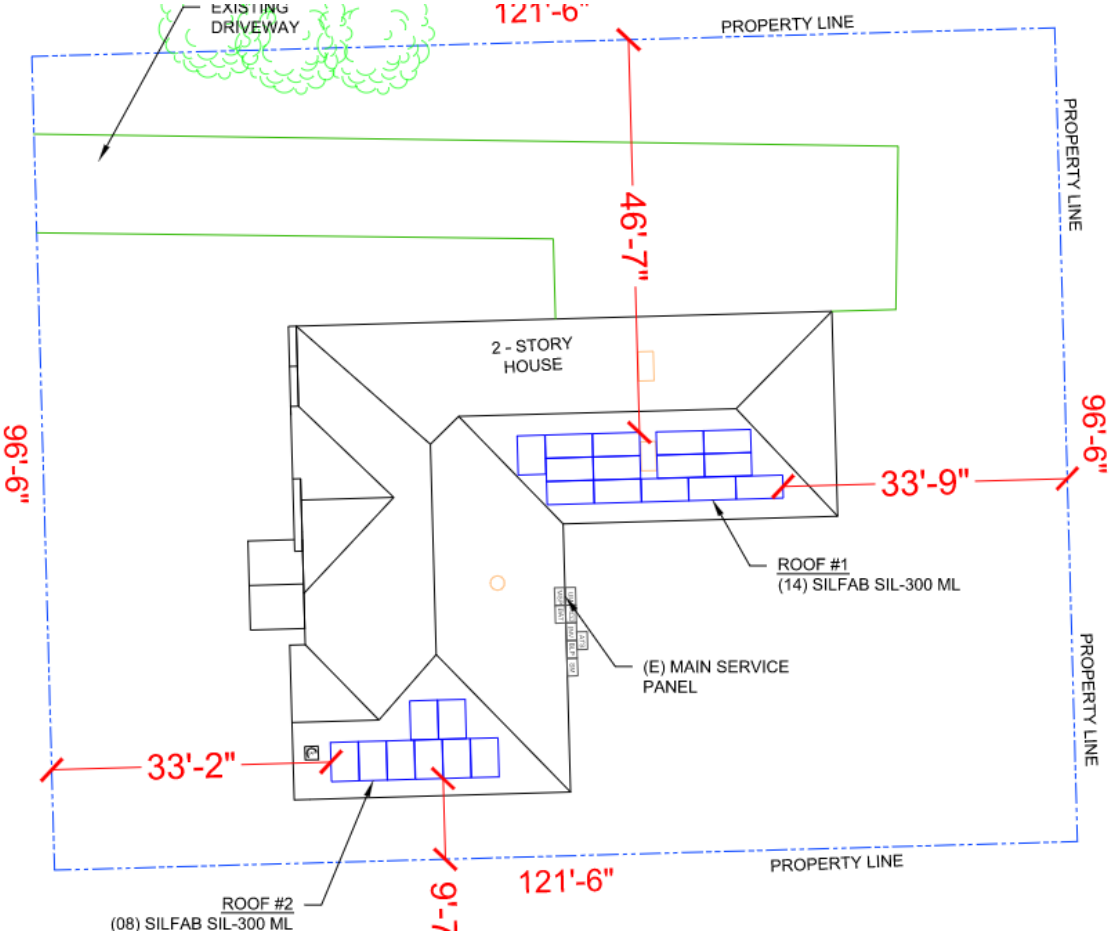
Signature: (Notary Public) My Commission Expires:

**Section 23a of the state construction code act of 1972, 1972PA230, MCL 125.1523A, prohibits a person from conspiring to circumvent the licensing requirements of this state relating to persons who are to perform work on a residential building or a residential structure. Visitors of Section 23a are subject to civil fines.**

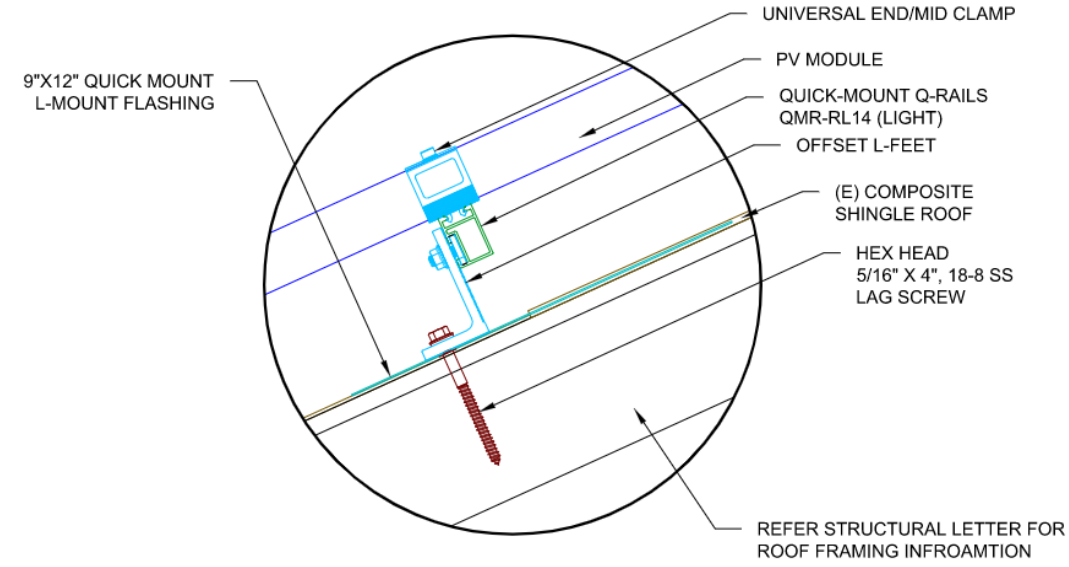
This application can also be completed online. Visit detroitmi.gov/bseed/elaps for more information.

Permit Number: BLD2020-00175

Scope of Work: 22 roof mounted modules, grid tied, 6.60 kW, solar installation on existing residence


| BILL OF MATERIALS | | |
|---|---|---|
| EQUIPMENT | QTY | DESCRIPTION |
| SOLAR PV MODULE | 22 | SILFAB SIL-300 ML |
| OPTIMIZER | 22 | SOLAREDGE POWER OPTIMIZER P320 |
| INVERTER | 1 | SOLAREDGE STOREDGE SE7600A-US INVERTER |
| AC DISCONNECT | 1 | 60A FUSED, (2) 40A FUSES, 240V, NEMA 3R, UL LISTED |
| AUTO TRANSFORMER | 1 | SOLAREDGE AUTO-TRANSFORMER SEAUTO-TX-5000 |
| ENERGY METER | 1 | SOLAREDGE ENERGY METER SE-MTR240-0-000-S2 |
| BATTERY | 1 | LGCHEM RESU10H BATTERY |
| SOLADECK | 2 | SOLADECK |
| RAILS | 19 | QRAIL LIGHT 14 FT. BLACK |
| SPLICE KIT | 5 | QSPLICE INTERNAL LIGHT |
| TRUNK CABLE | 0 | TRUNK/PC CABLE CLIP |
| MODULE CLAMPS | 31 | UNIVERSAL MID CLAMP |
| GROUNDING LUG | 9 | WEEB LUG W/ T-BOLT |
| END CLAMPS | 36 | UNIVERSAL END CLAMPS |
| ATTACHMENT | 70 | L-MOUNT ATTACHMENT (QUICKMOUNT) |
| T-BOLT | 94 | T-BOLT W/ NUT M8 X 20MM |
| LOAD CENTER | 1 | 125A LOAD CENTER 240V |
| END CLAMP CLIP | 5 | WEEB BMC MILL |


UNIVERSAL END/MID CLAMP
PV MODULE
QUICK-MOUNT Q-RAILS
QMR-RL14 (LIGHT)
OFFSET L-FEET
(E) COMPOSITE
SHINGLE ROOF
HEX HEAD
5/16" X 4", 18-8 SS
LAG SCREW
9"X12" QUICK MOUNT
L-MOUNT FLASHING
REFER STRUCTURAL LETTER FOR
ROOF FRAMING INFROAMTION

# PROJECT DESCRIPTION:

22 x SILFAB SIL-300 ML MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES
SYSTEM SIZE: 6.6 kW DC STC
ARRAY AREA:ROOF #1- 256.20 SQ FT.
ARRAY AREA:ROOF #2- 146.40 SQ FT.

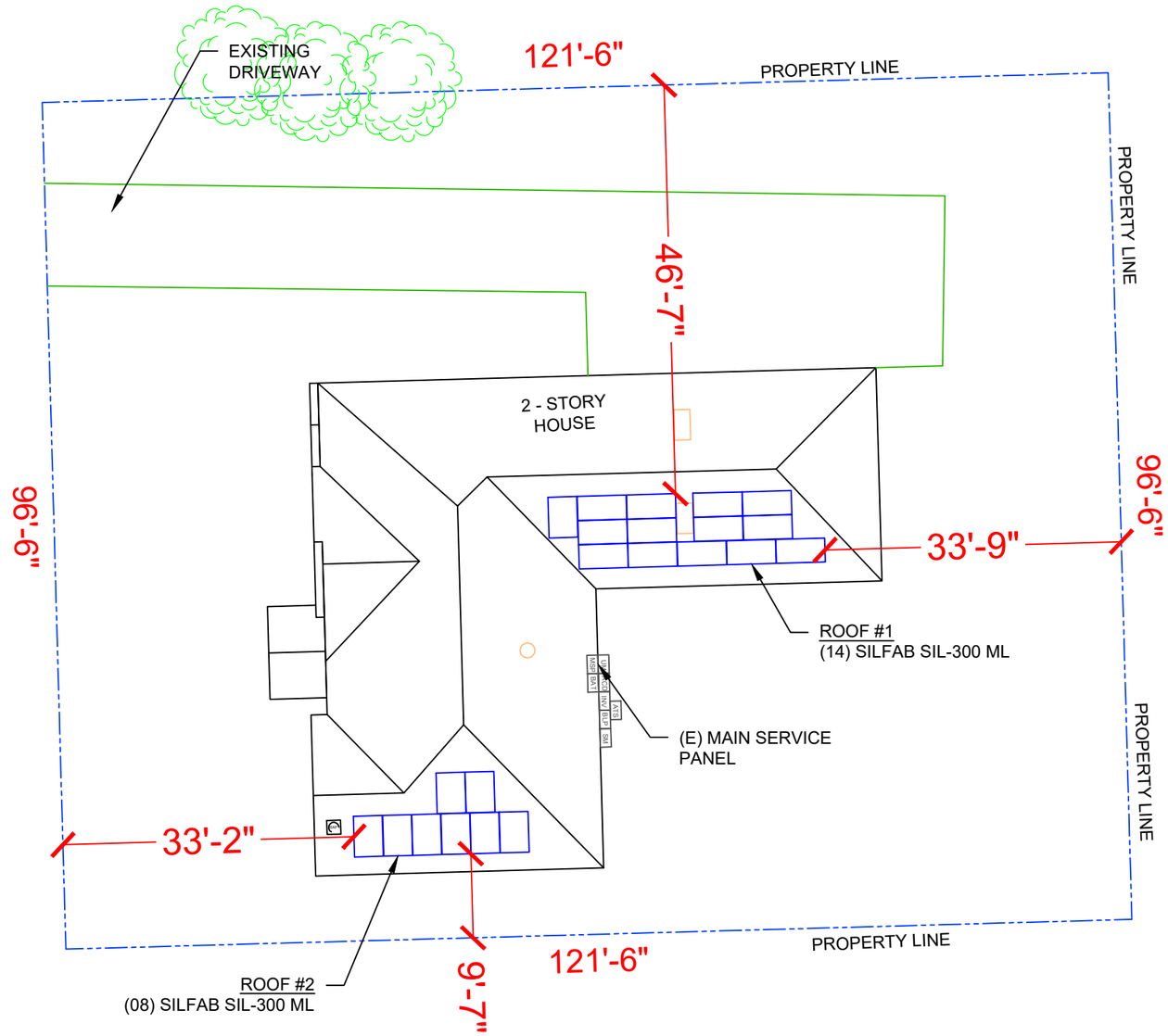
EQUIPMENT SUMMARY

| | |
|---|---|
| 22 | SILFAB SIL-300 ML MODULES |
| 22 | SOLAREDGE POWER OPTIMIZER P320 |
| 01 | SOLAREDGE STOREDGE SE7600A-US INVERTER |

APPLICABLE CODES & STANDARDS
BUILDING: MICHIGAN RESIDENTIAL CODE 2015
ELECTRICAL: NEC 2017

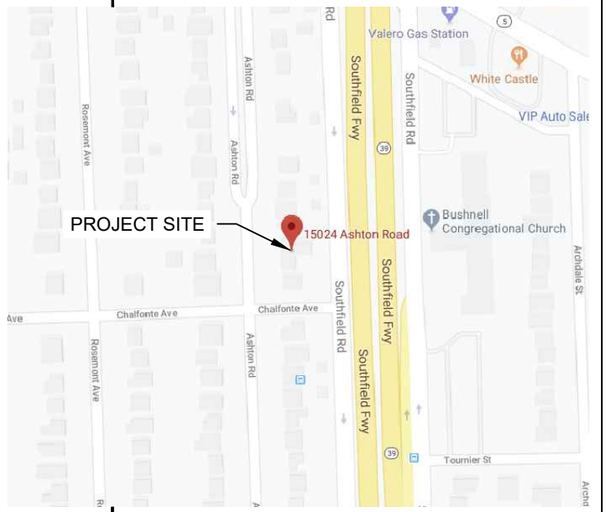
DESIGN SPECIFICATION
OCCUPANCY: II
CONSTRUCTION: SINGLE-FAMILY
ZONING: RESIDENTIAL
GROUND SNOW LOAD: REFER STRUCTURAL LETTER
WIND EXPOSURE: REFER STRUCTURAL LETTER
WIND SPEED: REFER STRUCTURAL LETTER

AUTHORITIES HAVING JURISDICTION
BUILDING: WAYNE COUNTY
ZONING: WAYNE COUNTY
UTILITY: DTE ENERGY




1 PLOT PLAN WITH ROOF PLAN
PV-1 SCALE: 1/16"=1'-0"


2 HOUSE PHOTO
PV-1 SCALE: NTS




3 VICINITY MAP
PV-1 SCALE: NTS

SHEET INDEX




POWERHOME
POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com


REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD, DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
PLOT PLAN & VICINITY MAP

SHEET SIZE
ANSI B
11" X 17"

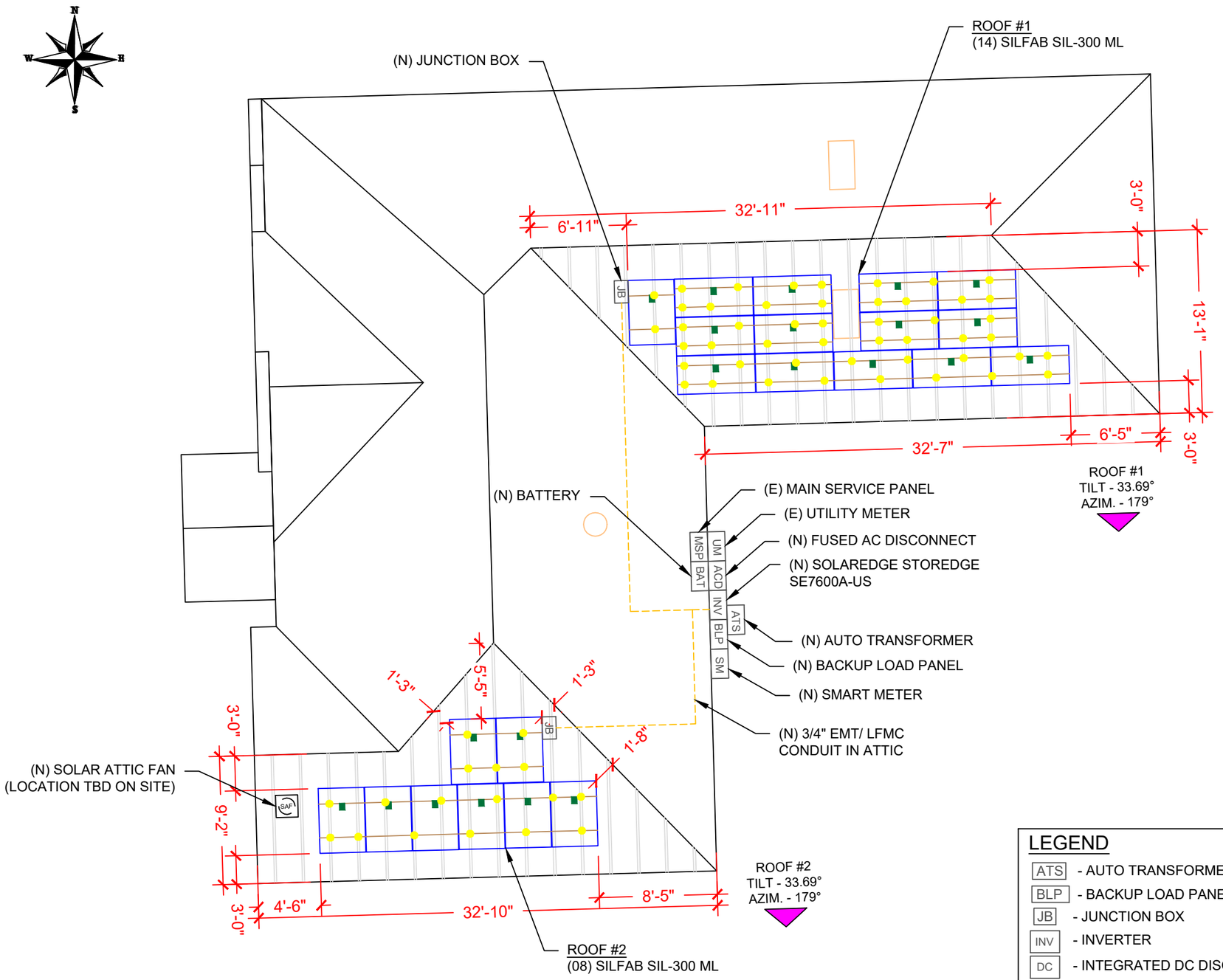
SHEET NUMBER
PV-1

## MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 22 MODULES
MODULE TYPE = SILFAB SIL-300 ML MODULES
MODULE WEIGHT = 41.89 LBS / 19 KG.
MODULE DIMENSIONS = 66.92"x 39.37" = 18.30 SF

## INSTALL NOTE:

MAINTAIN 3 FT SETBACK FROM RIDGE, EAVE/GUTTER AND EDGE OF THE ROOF AS PER COUNTY REQUIREMENT.




| ROOF DESCRIPTION | | | | |
|---|---|---|---|---|
| ROOF TYPE | | | ASPHALT SHINGLES | |
| ROOF LAYER | | | 1 LAYER | |
| ROOF | ROOF TILT | AZIMUTH | TRUSS / RAFTER SIZE | TRUSS / RAFTER SPACING |
| #1,#2 | 33.69° | 179° | REFER STRUCTURAL LETTER | |

| ARRAY AREA & ROOF AREA CALC'S | | | | |
|---|---|---|---|---|
| ROOF | # OF MODULES | ARRAY AREA (Sq. Ft.) | ROOF AREA (Sq. Ft.) | ROOF AREA COVERED BY ARRAY (%) |
| #1 | 14 | 256.20 | 428.93 | 60 |
| #2 | 8 | 146.40 | 315.13 | 46 |

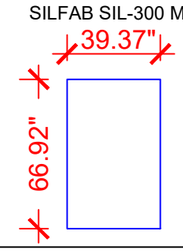
SAF

## SOLAR ATTIC FAN

NOTES:

- THE LOCATION OF THE SAF SHOULD BE DETERMINED ON SITE.
- THE SAF SHOULD BE LOCATED 30"-36" FROM THE PEAK OF THE ROOF OR ABOUT 5 ROWS DOWN FROM THE RIDGE.
- THE SAF SHOULD NOT BE MOUNTED ON ANY STRUCTURAL MEMBER LIKE TRUSS/RAFTER.
- "CAN VENTS" CAN BE REPLACED BY SAF.
- SAF CANNOT BE MOUNTED ON A METAL ROOF. PLEASE CARRY GABLE VENT FANS FOR METAL ROOF INSTALLATION (IF APPLICABLE).

SILFAB SIL-300 ML




## LEGEND

| | | | |
|---|---|---|---|
| ATS | - AUTO TRANSFORMER | SM | - SMART METER |
| BLP | - BACKUP LOAD PANEL | BAT | - BATTERY |
| JB | - JUNCTION BOX | | - VENT, ATTIC FAN (ROOF OBSTRUCTION) |
| INV | - INVERTER | | - ROOF ATTACHMENT |
| DC | - INTEGRATED DC DISCONNECT | | - RAFTERS |
| SLD | - SOLAR LOAD CENTER | | - CONDUIT |
| PM | - PRODUCTION METER | CB | - COMBINER BOX |
| MSP | - MAIN SERVICE PANEL | | |

1 ROOF PLAN & MODULES

PV-2 SCALE: 1/8"=1'-0"


POWERHOME

POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com


REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

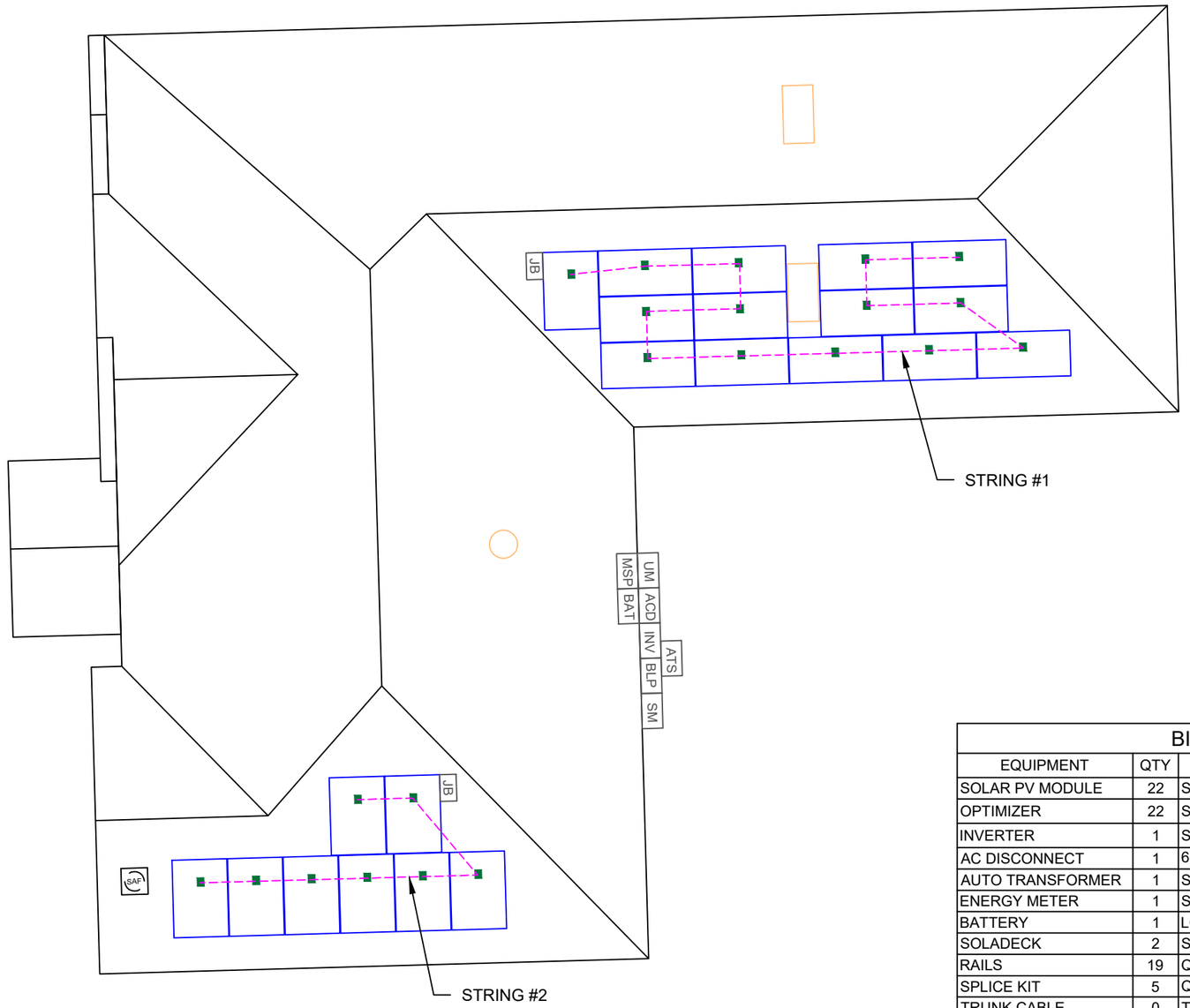
DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD, DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
ROOF PLAN & MODULES

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-2




1 ROOF PLAN WITH STRING LAYOUT

PV-2A SCALE: 1/8"=1'-0"

| BILL OF MATERIALS | | |
|---|---|---|
| EQUIPMENT | QTY | DESCRIPTION |
| SOLAR PV MODULE | 22 | SILFAB SIL-300 ML |
| OPTIMIZER | 22 | SOLAREDGE POWER OPTIMIZER P320 |
| INVERTER | 1 | SOLAREDGE STOREDGE SE7600A-US INVERTER |
| AC DISCONNECT | 1 | 60A FUSED, (2) 40A FUSES, 240V, NEMA 3R, UL LISTED |
| AUTO TRANSFORMER | 1 | SOLAREDGE AUTO-TRANSFORMER SEAUTO-TX-5000 |
| ENERGY METER | 1 | SOLAREDGE ENERGY METER SE-MTR240-0-000-S2 |
| BATTERY | 1 | LGCHEM RESU10H BATTERY |
| SOLADECK | 2 | SOLADECK |
| RAILS | 19 | QRAIL LIGHT 14 FT. BLACK |
| SPLICE KIT | 5 | QSPLICE INTERNAL LIGHT |
| TRUNK CABLE | 0 | TRUNK/PC CABLE CLIP |
| MODULE CLAMPS | 31 | UNIVERSAL MID CLAMP |
| GROUNDING LUG | 9 | WEEB LUG W/ T-BOLT |
| END CLAMPS | 36 | UNIVERSAL END CLAMPS |
| ATTACHMENT | 70 | L-MOUNT ATTACHMENT (QUICKMOUNT) |
| T-BOLT | 94 | T-BOLT W/ NUT M8 X 20MM |
| LOAD CENTER | 1 | 125A LOAD CENTER 240V |
| END CLAMP CLIP | 5 | WEEB BMC MILL |

POWERHOME
POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

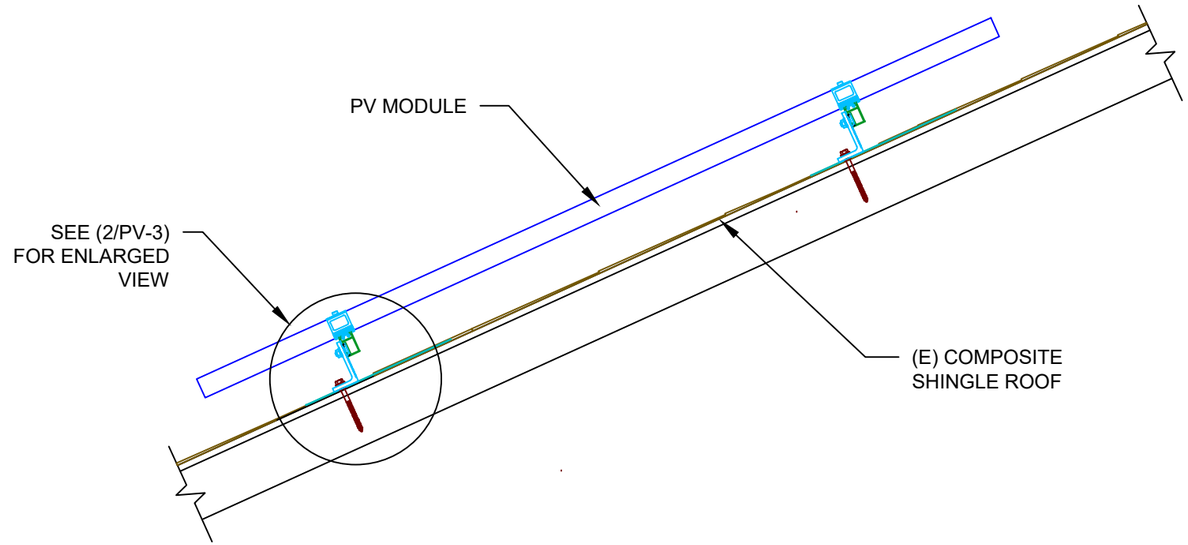
DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD, DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
STRING LAYOUT

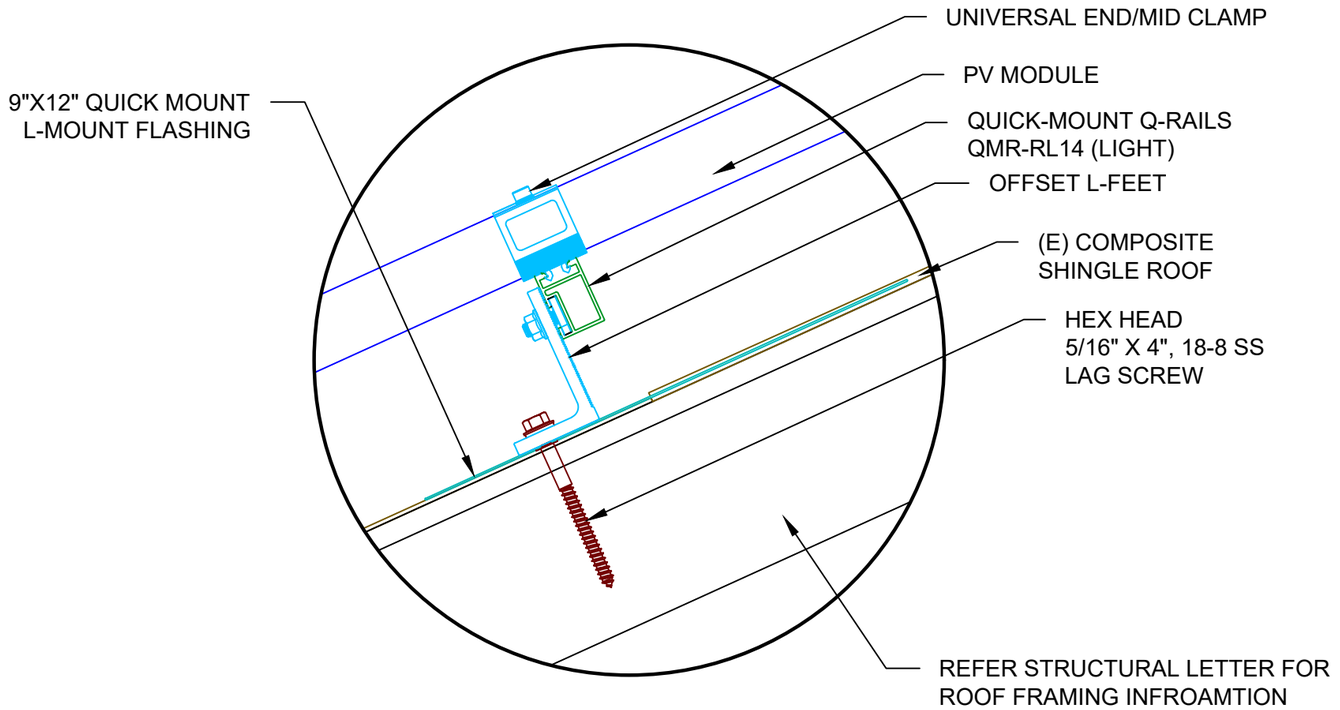
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-2A




## 1 ATTACHMENT DETAIL

PV-3 SCALE: 1" = 1'-0"




## 2 ATTACHMENT DETAIL (enlarged view)

PV-3 SCALE: NTS

POWERHOME
POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY
RESIDENCE

15024 ASHTON RD,
DETROIT, MI 48223

DESIGNED BY

PHS

SHEET NAME

ATTACHMENT
DETAIL

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-3

(22) SILFAB SIL-300 ML MODULES
(1) STRING OF 14 MODULES CONNECTED IN SERIES
(1) STRING OF 08 MODULES CONNECTED IN SERIES

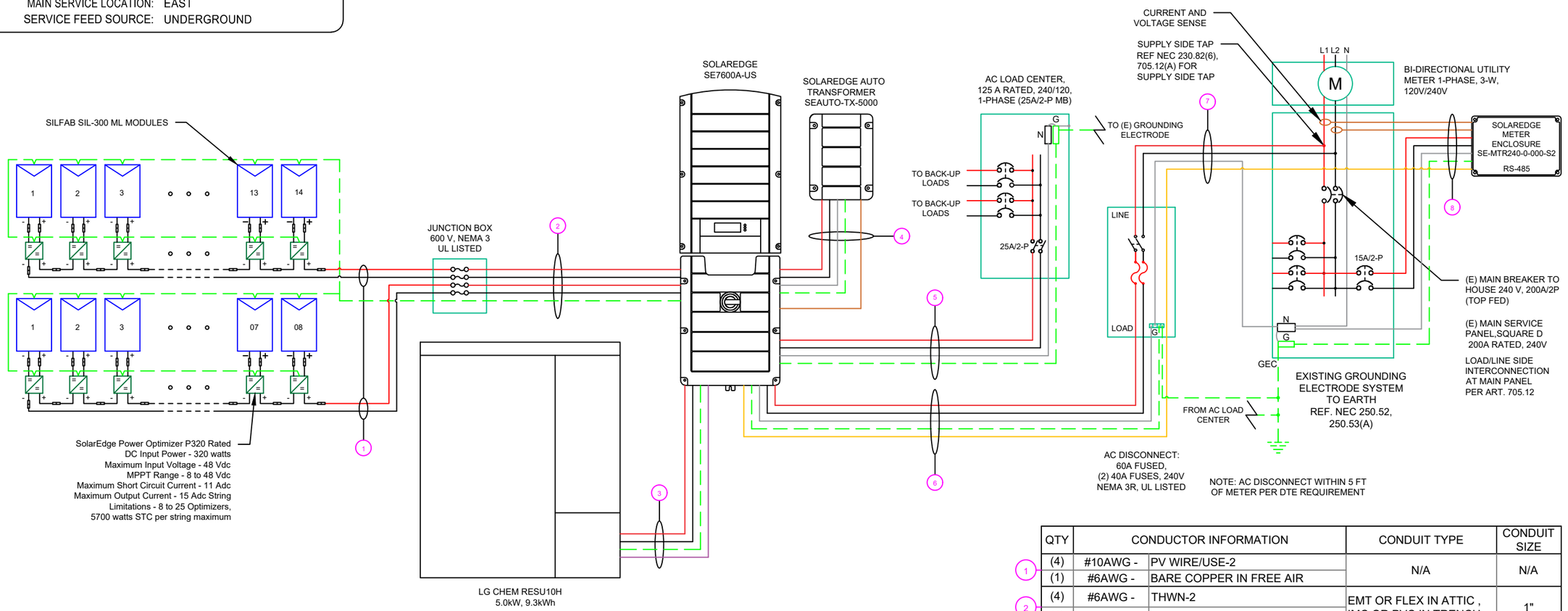
| SERVICE INFO | |
|---|---|
| UTILITY PROVIDER: | DTE ENERGY |
| MAIN SERVICE VOLTAGE: | 240V |
| MAIN PANEL BRAND: | SQUARE D |
| MAIN SERVICE PANEL: | 200A |
| MAIN CIRCUIT BREAKER RATING: | 200A |
| MAIN SERVICE LOCATION: | EAST |
| SERVICE FEED SOURCE: | UNDERGROUND |

## 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 NEC 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 BOXES, 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.) THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE

## WIRE LEGEND

- PV ARRAY +VE CONDUCTOR AND L1
- PV ARRAY -VE CONDUCTOR AND L2
- NEUTRAL CONDUCTOR
- EGC AND GEC
- SINGLE TWISTED PAIR, BELDEN 3106A
- SINGLE TWISTED PAIR, BELDEN 3088A
- 5 CONDUCTOR CABLE, BELDEN 3064A




| | QTY | CONDUCTOR INFORMATION | | CONDUIT TYPE | CONDUIT SIZE |
|---|---|---|---|---|---|
| 1 | (4) | #10AWG - | PV WIRE/USE-2 | N/A | N/A |
| | (1) | #6AWG - | BARE COPPER IN FREE AIR | | |
| 2 | (4) | #6AWG - | THWN-2 | EMT OR FLEX IN ATTIC , IMC OR PVC IN TRENCH | 1" |
| | (1) | #6AWG - | THWN-2 GND | | |
| 3 | (2) | #10AWG - | THWN-2 | EMT OR FLEX | 3/4" |
| | (1) | #10AWG - | THWN-2 GND | | |
| | (1) | 5 CONDUCTOR CABLE, BELDEN 3064A | | | |
| 4 | (3) | #10AWG - | THWN-2 | EMT OR FLEX | 3/4" |
| | (1) | #10AWG - | THWN-2 GND | | |
| | (1) | SINGLE TWISTED PAIR, BELDEN 3088A | | | |
| 5 | (3) | #10AWG - | THWN-2 | EMT OR FLEX | 3/4" |
| | (1) | #10AWG - | THWN-2 GND | | |
| 6 | (3) | #6AWG - | THWN-2 | EMT OR FLEX | 3/4" |
| | (1) | #6AWG - | THWN-2 GND | | |
| | (1) | SINGLE TWISTED PAIR, BELDEN 3106A | | | |
| 7 | (3) | #6AWG - | THWN-2 | EMT OR FLEX | 3/4" |
| | (1) | SINGLE TWISTED PAIR, BELDEN 3106A | | | |
| 8 | (3) | #14AWG - | THWN-2 | EMT OR FLEX | 3/4" |
| | (1) | #14AWG - | THWN-2 GND | | |
| | (2) | SINGLE TWISTED PAIR, BELDEN 3088A | | | |
| | (1) | SINGLE TWISTED PAIR, BELDEN 3106A | | | |

**WARNING: PHOTOVOLTAIC POWER SOURCE**
LABEL 1
ON ALL CONDUITS
SPACED AT MAX 10FT

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
TURN RAPID SHUTDOWN SWITCH TO THE "ON" POSITION
**LABEL 2**
AT INVERTER

**! CAUTION ! SOLAR ELECTRIC SYSTEM CONNECTED AND ENERGIZED**
**LABEL 3**
AT INVERTER

**PHOTOVOLTAIC DC DISCONNECT**
**LABEL 4**
AT EACH DC
DISCONNECT

**! WARNING ! ELECTRIC SHOCK HAZARD DO NOT TOUCH TERMINALS. TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION**
**LABEL 5**
AT EACH AC
DISCONNECT

**PHOTOVOLTAIC AC DISCONNECT**
**LABEL 6**
AT EACH AC
DISCONNECT

**! WARNING ! DUAL POWER SOURCES SECOND SOURCE IS PV SYSTEM**
**LABEL 8**
AT MEP

**! WARNING ! SOLAR SYSTEM CONNECTED AND ENERGIZED**
**LABEL 9**
AT MEP

**! CAUTION ! SOLAR POINT OF INTERCONNECTION**
**LABEL 10**
AT UTILITY METER

**! WARNING ! THE SERVICE METER IS ALSO SERVED BY A PHOTOVOLTAIC SYSTEM**
**LABEL 11**
AT UTILITY METER


POWERHOME
POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com


REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD,
DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
ELECTRICAL LINE DIAGRAM

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-4

**BATTERY MOUNTING NOTES:**

REQUIRED:

1. THERE MUST BE NO HIGHLY FLAMMABLE OR EXPLOSIVE MATERIALS NEARBY.
2. THE AMBIENT TEMPERATURE SHOULD BE WITHIN THE RANGE OF 14 ~ 113°F (-10 ~ 45°C)
3. BATTERY PACK MUST BE INSTALLED ON WALLS THAT ARE UPRIGHT AND CAN SUPPORT BATTERY WEIGHT.
4. PRODUCT CAN BE INSTALLED INDOORS (EX. BASEMENT OR GARAGE); OR, OUTDOORS BUT MUST BE INSTALLED UNDER AN EAVE AND OUT OF DIRECT SUNLIGHT.

### CAUTION ###

- IF THE AMBIENT TEMPERATURE IS OUTSIDE THE OPERATING RANGE, THE BATTERY PACK STOPS OPERATING TO PROTECT ITSELF.
- THE OPTIMAL TEMPERATURE RANGE FOR THE BATTERY PACK TO OPERATE IS FROM 59 TO 86°F (15 TO 30°C).
- FREQUENT EXPOSURE TO HARSH TEMPERATURES MAY DETERIORATE THE PERFORMANCE AND LIFE OF THE BATTERY PACK.

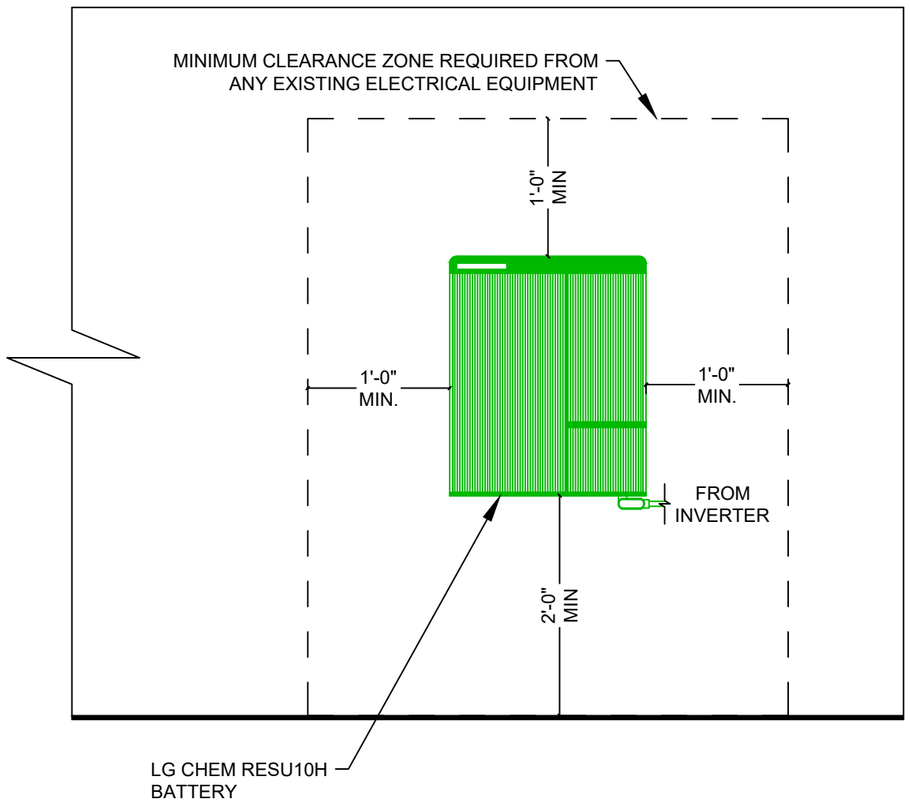
RECOMMENDED:

1. THE BUILDING SHOULD BE DESIGNED TO WITHSTAND EARTHQUAKES.
2. THE WATERPROOF AND PROPERLY VENTILATED AREA IS RECOMMENDED. (IP55)
3. INSTALL THE PRODUCT ON A FLAT WALL.
4. INSTALL THE PRODUCT OUT OF REACH OF CHILDREN AND ANIMALS.

GENERAL NOTE:

THE BATTERY IS RATED FOR INDOOR (WALL-MOUNTED)/ OUTDOOR INSTALLATION.
INGRESS RATING: IP55
IP55 RATED ENCLOSURE CHARACTERISTICS:

1. PROTECTION FROM DIRT, DUST, OIL AND OTHER NON-CORROSIVE MATERIAL.
2. COMPLETE PROTECTION FROM CONTACT WITH ENCLOSED EQUIPMENT.
3. PROTECTION FROM WATER, UP TO WATER PROJECTED BY NOZZLE AGAINST ENCLOSURE FROM ANY DIRECTION.

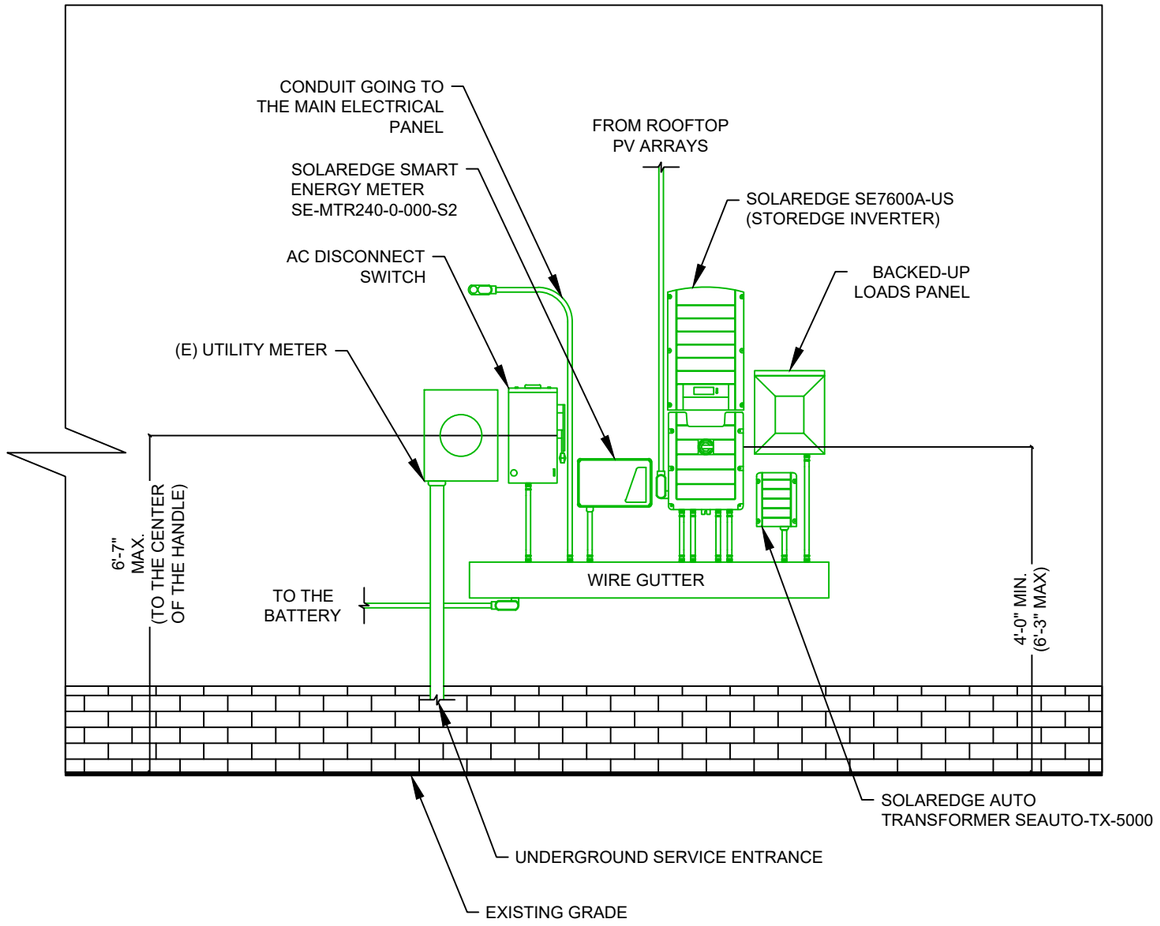



1 GENERAL BATTERY ELEVATION

PV-4(A) SCALE: 1/2" = 1'-0"

NOTES:

1. RECOMMEND FUSES IN STOREDGE INVERTER:
   - 25A 600VDC QUICK-ACTING, 10x38MM SOLAR MIDGET FUSES (EXAMPLE: LITTELFUSE P/N OSPF025)
2. EXTERNAL COMBINER BOX IS NEEDED TO SUPPORT TWO BATTERIES
3. AUTO-TRANSFORMER CONNECTIONS:
   - 6' MAX
   - VERTICAL MOUNTING ONLY (CONDUIT CONNECTION FROM THE BOTTOM)
   - USE 10 AWG WIRE FOR GROUNDING
4. BATTERY CONNECTION:
   - 35' MAX
   - DISTANCE LARGER THAN 5' REQUIRES INSTALLATION OF EXTERNAL DC SAFETY SWITCH ON THE BATTERY SIDE
5. INSTALL TYPE B 2-POLE 25A MAIN CIRCUIT BREAKER ON BACK-UP LOAD PANEL TO ENSURE THE 25A PHASE LIMIT IMBALANCE IS MAINTAINED AT ALL TIMES.
6. BATTERY CONTROL CONNECTION:
   - CONTROL [B-, A+] MUST BE TWISTED PAIR
7. INSTALL THE GFDI IN ACCORDANCE WITH APPLICABLE LOCAL STANDARDS AND DIRECTIVES.
8. MINIMUM CLEARANCE FOR LGCHEM BATTERY SHOULD BE 12" ON RIGHT, LEFT & TOP AND 24" FROM THE FLOOR.




2 GENERAL EQUIPMENT ELEVATION

PV-4(A) SCALE: NTS


POWERHOME

POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com


REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD, DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
EQUIPMENT ELEVATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-4(A)

| SOLAR MODULE SPECIFICATIONS | |
|---|---|
| MANUFACTURER / MODEL # | SILFAB SIL-300 ML |
| VMP | 32.8V |
| IMP | 9.16A |
| VOC | 39.85V |
| ISC | 9.71A |
| TEMP. COEFF. VOC | -0.28%/°C |
| MODULE DIMENSION | 66.92"L x 39.37"W x 1.49"D (In Inch) |

| INVERTER #1 SPECIFICATIONS | |
|---|---|
| MANUFACTURER / MODEL # | SOLAREDGE SE7600A-US |
| AC POWER OUTPUT (LOADS/GRID) | 7600VA |
| AC POWER OUTPUT (BACKUP) | 5000VA |
| NOMINAL OUTPUT VOLTAGE | 240 VAC |
| MAX OUTPUT CURRENT @240V (LOADS/GRID) | 32A |
| MAX OUTPUT CURRENT @240V (BACKUP) | 21A |
| NOMINAL DC INPUT VOLTAGE | 400Vdc |
| MAX DC INPUT VOLTAGE | 500Vdc |
| CEC WEIGHTED EFFICIENCY | 97.5% |
| MAX DC POWER (PV) | 10250W |
| MAX INPUT CURRENT (PV) | 23Adc |
| CONT. PEAK POWER (BATTERY) | 3300W |
| MAX INPUT CURRENT (BATTERY) | 8.5Adc |

| POWER OPTIMIZER SPECIFICATIONS | |
|---|---|
| MANUFACTURER / MODEL # | SOLAREDGE P320 |
| MAXIMUM INPUT POWER | 320W |
| MINIMUM INPUT VOLTAGE | 8 Vdc |
| MAXIMUM INPUT VOLTAGE | 48Vdc |
| MAXIMUM MODULE ISC | 11 Adc |
| MAXIMUM OUTPUT CURRENT | 15 Adc |
| MAXIMUM OUTPUT VOLTAGE | 60 Vdc |
| MAXIMUM OUTPUT CURRENT | 15 Adc |

| AUTO-TRANSFORMER SPECIFICATIONS | |
|---|---|
| MANUFACTURER / MODEL # | SOLAREDGE SEAUTO-TX-5000 |
| RATED POWER - CONTINUOUS | 5000VA |
| OUTPUT VOLTAGE | 120/240V SPLIT PHASE |
| MAX. OUTPUT CURRENT PER PHASE | 25A |
| DIMENSIONS | 6.7"H x 7.9"W x 5.5"D |

| BATTERY SPECIFICATIONS | |
|---|---|
| MANUFACTURER / MODEL # | LGCHEM RESU10H |
| MAX CHARGE/DISCHARGE POWER | 5kW |
| MAX CHARGE/DISCHARGE CURRENT | 11.9A@420V / 14.3A@350V |
| ABSOLUTE MAX VOLTAGE | 520Vdc |
| VOLTAGE RANGE CHARGE | 400 - 450Vdc |
| VOLTAGE RANGE DISCHARGE | 350 - 430 Vdc |
| TOTAL ENERGY | 9.8 kWh @25°C |
| USABLE ENERGY | 9.3 kWh @25°C |

| AMBIENT TEMPERATURE SPECS | |
|---|---|
| RECORD LOW TEMP | -20° |
| AMBIENT TEMP (HIGH TEMP 2%) | 32° |
| CONDUIT HEIGHT | 0.5" |
| ROOF TOP TEMP | 54° |
| CONDUCTOR TEMPERATURE RATE | 90° |
| MODULE TEMPERATURE COEFFICIENT OF Voc | -0.28% /°C |

DC CONDUCTOR AMPACITY CALCULATIONS:
ARRAY TO JUNCTION BOX:

| | |
|---|---|
| EXPECTED WIRE TEMP (In Celsius) | 54° |
| TEMP. CORRECTION PER NEC TABLE 310.15 (B)(2)(a) | 0.71 |
| NO. OF CURRENT CARRYING CONDUCTORS | 4 |
| CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a) | 0.8 |
| CIRCUIT CONDUCTOR SIZE | 10 AWG |
| CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16) | 40A |

| | |
|---|---|
| REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B) | 18.75A |
| 1.25 X Isc | |
| DERATED AMPACITY OF CIRCUIT CONDUCTOR | 22.72A |
| TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16) | |
| Result should be greater than (18.75A) otherwise less the entry for circuit conductor size and ampacity | |

FROM JUNCTION BOX TO INVERTER:

| | |
|---|---|
| EXPECTED WIRE TEMP (In Celsius) | 54° |
| TEMP. CORRECTION PER NEC TABLE 310.15 (B)(2)(a) | 0.71 |
| NO. OF CURRENT CARRYING CONDUCTORS | 4 |
| CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a) | 0.8 |
| CIRCUIT CONDUCTOR SIZE | 10 AWG |
| CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16) | 40A |

| | |
|---|---|
| REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B) | 18.75A |
| 1.25 X Isc | |
| DERATED AMPACITY OF CIRCUIT CONDUCTOR | 22.72A |
| TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16) | |
| Result should be greater than (18.75A) otherwise less the entry for circuit conductor size and ampacity | |

FROM BATTERY TO INVERTER:

| | |
|---|---|
| EXPECTED WIRE TEMP (In Celsius) | 32° |
| TEMP. CORRECTION PER NEC TABLE 310.15 (B)(2)(a) | 0.96 |
| NO. OF CURRENT CARRYING CONDUCTORS | 2 |
| CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a) | 1 |
| CIRCUIT CONDUCTOR SIZE | 10 AWG |
| CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE310.15(B)(16) | 40A |

| | |
|---|---|
| REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B) | 23.625A |
| 1.25 X Isc | |
| DERATED AMPACITY OF CIRCUIT CONDUCTOR | 38.40A |
| TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16) | |
| Result should be greater than (23.625A) otherwise less the entry for circuit conductor size and ampacity | |

FROM AUTO-TRANSFORMER TO INVERTER:

| | |
|---|---|
| EXPECTED WIRE TEMP (In Celsius) | 32° |
| TEMP. CORRECTION PER NEC TABLE 310.15 (B)(2)(a) | 0.96 |
| NO. OF CURRENT CARRYING CONDUCTORS | 2 |
| CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a) | 1 |
| CIRCUIT CONDUCTOR SIZE | 10 AWG |
| CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16) | 40A |

| | |
|---|---|
| REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B) | 31.25A |
| 1.25 X Isc | |
| DERATED AMPACITY OF CIRCUIT CONDUCTOR | 38.40A |
| TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16) | |
| Result should be greater than (31.25A) otherwise less the entry for circuit conductor size and ampacity | |

AC CONDUCTOR AMPACITY CALCULATIONS:
FROM INVERTER TO BACK-UP PANEL:

| | |
|---|---|
| No. OF INVERTER | 1 |
| EXPECTED WIRE TEMP (In Celsius) | 32° |
| TEMP. CORRECTION PER NEC TABLE 310.15(B)(2)(a) | 0.96 |
| NO. OF CURRENT CARRYING CONDUCTORS | 2 |
| CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a) | 1 |
| CIRCUIT CONDUCTOR SIZE | 10 AWG |
| CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16) | 40A |

| | |
|---|---|
| REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B) | 31.25A |
| 1.25 X MAX INVERTER OUTPUT CURRENT (BACKUP POWER) | |
| DERATED AMPACITY OF CIRCUIT CONDUCTOR | 38.4A |
| TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16) | |
| Result should be greater than (31.25A) otherwise less the entry for circuit conductor size and ampacity | |

AC CONDUCTOR AMPACITY CALCULATIONS:
FROM INVERTER TO MEP:

| | |
|---|---|
| No. OF INVERTER | 1 |
| EXPECTED WIRE TEMP (In Celsius) | 32° |
| TEMP. CORRECTION PER NEC TABLE 310.15(B)(2)(a) | 0.96 |
| NO. OF CURRENT CARRYING CONDUCTORS | 2 |
| CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a) | 1 |
| CIRCUIT CONDUCTOR SIZE | 6 AWG |
| CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16) | 75A |

| | |
|---|---|
| REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B) | 40A |
| 1.25 X MAX INVERTER OUTPUT CURRENT (LOADS/GRID) | |
| DERATED AMPACITY OF CIRCUIT CONDUCTOR | 72A |
| TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16) | |
| Result should be greater than (40A) otherwise less the entry for circuit conductor size and ampacity | |

POWERHOME
POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD,
DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
WIRING CALCULATIONS

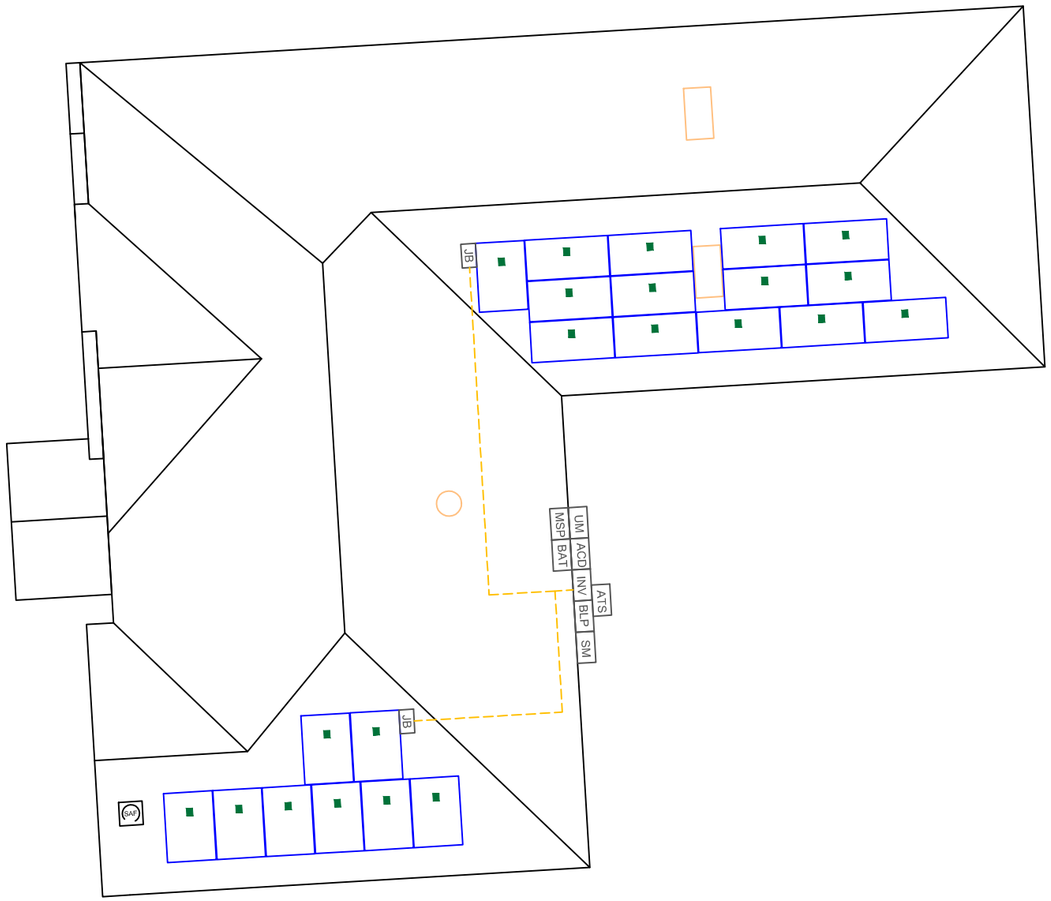
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-5

1-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

# SOLAREDGE OPTIMIZER CHART




POWERHOME

POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY
RESIDENCE

15024 ASHTON RD,
DETROIT, MI 48223

DESIGNED BY

PHS

SHEET NAME

SOLAREDGE
OPTIMIZER CHART

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-6

Silfab SOLAR

# SIL-300 ML

BAA ARRA · 25 YEAR PRODUCT WARRANTY · AUTOMATED MANUFACTURING · JUST-IN-TIME · PVEL DNV·GL TOP PERFORMER · TIER 1 BANKABLE $$$ · HIGH EFFICIENCY

## 60 Cell
## Monocrystalline PV Module

### INDUSTRY LEADING WARRANTY
All our products include an industry leading 25-year product workmanship and 30-year performance warranty.

### 35+ YEARS OF SOLAR INNOVATION
Leveraging over 35+ years of worldwide experience in the solar industry, Silfab is dedicated to superior manufacturing processes and innovations such as Bifacial and Back Contact technologies, to ensure our partners have the latest in solar innovation.

### NORTH AMERICAN QUALITY
Silfab is the largest and most automated solar manufacturer in North America. Utilizing premium quality materials and strict quality control management to deliver the highest efficiency, premium quality PV modules 100% made in North America.

CE · ETL US Intertek · ETL Intertek · IEC · CEC LISTED · FSEC · Fraunhofer ISE

CHUBB*
* Chubb provides error and omission insurance to Silfab Solar Inc.

### BAA / ARRA COMPLIANT
Silfab panels are designed and manufactured to meet Buy American Act Compliance. The US State Department, US Military and FAA have all entrusted Silfab panels in their solar installations.

### LIGHT AND DURABLE
Engineered to accommodate low load bearing structures up to 5400Pa. The light-weight frame is exclusively designed for wide-ranging racking compatibility and durability.

### LOWEST DEFECT RATE
Total automation ensures strict quality controls during the entire manufacturing process at our ISO certified facilities. 48.18 ppm as per December 2018.

### DOMESTIC PRODUCTION
Silfab is 100% North American which means our customer service is direct, efficient and local. Your solar panels can be delivered anywhere in the Continental USA within days.

### AESTHETICALLY PLEASING
All black sleek design doesn't compromise on quality.

### PID RESISTANT
PID Resistant due to advanced cell technology and material selection. In accordance to IEC 62804-1

| Electrical Specifications | | SILFAB SIL-300 ML mono PERC | |
|---|---|---|---|
| Test Conditions | | STC | NOCT |
| Module Power (Pmax) | Wp | 300 | 227 |
| Maximum power voltage (Vpmax) | V | 32.8 | 29.5 |
| Maximum power current (Ipmax) | A | 9.16 | 7.69 |
| Open circuit voltage (Voc) | V | 39.85 | 36.9 |
| Short circuit current (Isc) | A | 9.71 | 7.96 |
| Module efficiency | % | 18.4 | 17.3 |
| Maximum system voltage (VDC) | V | 1000 | |
| Series fuse rating | A | 20 | |
| Power Tolerance | Wp | -0/+10 | |

Measurement conditions: STC 1000 W/m2 • AM 1.5 • Temperature 25 °C • NOCT 800 W/m² • AM 1.5 • Measurement uncertainty ≤ 3%
• Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by -0/+10W.

| Temperature Ratings | | SILFAB SIL-300 ML mono PERC |
|---|---|---|
| Temperature Coefficient Isc | %/°C | 0.064 |
| Temperature Coefficient Voc | %/°C | -0.28 |
| Temperature Coefficient Pmax | %/°C | -0.36 |
| NOCT (± 2°C) | °C | 45 |
| Operating temperature | °C | -40/+85 |

| Mechanical Properties and Components | | SILFAB SIL-300 ML mono PERC |
|---|---|---|
| Module weight (± 1 kg) | kg | 19 |
| Dimensions (H x L x D; ± 1mm) | mm | 1700 x 1000 x 38 |
| Maximum surface load (wind/snow)* | N/m² | 4000 Pa rear load / 5400 Pa front load |
| Hail impact resistance | | ø 25 mm at 83 km/h |
| Cells | | 60 - Si monocrystalline - 4 or 5 busbar - 156.75 x 156.75 mm |
| Glass | | 3.2 mm high transmittance, tempered, antireflective coating |
| Backsheet | | Multilayer polyester-based |
| Frame | | Anodized Al (Black) |
| Bypass diodes | | 3 diodes, 20SQ040 (45V/20A) |
| Cables and connectors | | 1200 mm ø 5.7 mm (4 mm2), MC4 compatible (refer to installation manual) |
| Junction Box | | UI 3730 Certified, IP67 rated |

| Warranties | SILFAB SIL-300 ML mono PERC |
|---|---|
| Module product workmanship warranty | 25 years** |
| Linear power performance guarantee | 30 years<br>≥ 97% end of 1st year<br>≥ 90% end of 12th year<br>≥ 82% end of 25th year<br>≥ 80% end of 30th year |

| Certifications | SILFAB SIL 300 ML mono PERC |
|---|---|
| Product | ULC ORD C1703, UL 1703, IEC 61215, IEC 61730-1 and IEC 61730-2 Certified.<br>FSEC and CEC listed. IEC 62716 Ammonia Corrosion, IEC 61701:2011<br>Salt Mist Corrosion Certified<br>UL Fire Rating: Type 2 |
| Factory | ISO9001:2015 |

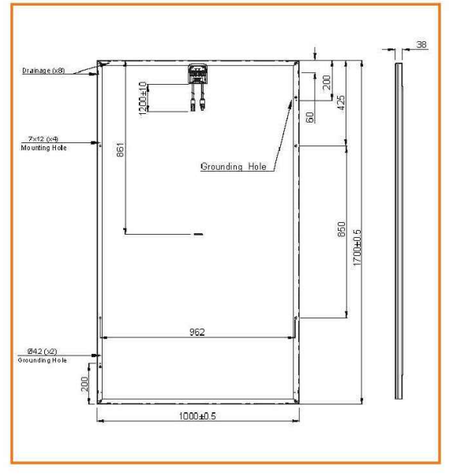
*Please refer to the Safety and Installation Manual for mounting specifications.
**12 year extendable to 25 years subject to registration and conditions outlined under "Warranty" at www.silfabsolar.com.

⚠ Warning: Read the installation and User Manual before handling, installing and operating modules.

Third-party generated pan files from Fraunhofer-Institute for Solar Energy Systems ISE are available for download at: www.silfabsolar.com/downloads

2019 TOP PERFORMER PVEL DNV·GL PV MODULE RELIABILITY SCORECARD

- Modules Per Pallet: 26
- Pallets Per Truck: 36
- Modules Per Truck: 936




Silfab Solar Inc.
240 Courtneypark Drive East
Mississauga ON L5T 2Y3 Canada
Tel +1 905-255-2501 | Fax +1 905-696-0267
info@silfabsolar.com | www.silfabsolar.com

Silfab Solar Inc.
800 Cornwall Ave
Bellingham WA 98225 USA
Tel +1 360-569-4733

POWERHOME
POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD, DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-7

# SolarEdge Single Phase StorEdge Inverter

## for North America SE3800A-US[1], SE7600A-US [1]

- Single inverter for PV, grid-tied storage and backup power
- Includes the hardware required to provide automatic backup power to backed-up loads in case of grid interruption
- Includes all interfaces needed for battery connection
- UL1741 SA certified, for CPUC Rule 21 grid compliance

| | SE3800A-US | SE7600A-US | |
|---|---|---|---|
| **OUTPUT - AC (LOADS/GRID)** | | | |
| Rated AC Power Output | 3800 | 7600 | VA |
| Max AC Power Output | 4175 | 8350 | VA |
| AC Output Voltage Min-Nom-Max (L-L)[2] | 211-240-264 | | Vac |
| AC Frequency Min-Nom-Max [2] | 59.3 - 60 - 60.5 | | Hz |
| Maximum Continuous Output Current @240V | 16 | 32 | A |
| GFDI | 1 | | A |
| Utility Monitoring, Islanding Protection, Country Configurable Thresholds | Yes | | |
| Charge Battery from AC (if Allowed) | Yes | | |
| THD | <3 | | % |
| Typical Nighttime Power Consumption | <5 | | W |
| **OUTPUT - AC (BACKUP POWER)[3]** | | | |
| Rated AC Power Output | 5000[4] | | VA |
| Max AC Power Output - Surge | 6600[5] | | VA |
| AC Output Voltage Min-Nom-Max (L-L) | 211-240-264 | | Vac |
| AC Output Voltage Min-Nom-Max (L-N) | 105-120-132 | | Vac |
| AC Frequency Min-Nom-Max | 55 - 60 - 65 | | Hz |
| Maximum Continuous Output Current @240V - Backup Mode | 21 | | A |
| Max Continuous Output Current per Phase @120V | 25 | | A |
| GFDI | 1 | | A |
| AC Circuit Breaker | Yes | | |
| THD | <5 | | % |
| Automatic switchover time | <2 | | sec |
| Typical Nighttime Power Consumption | <5 | | W |
| **INPUT - DC (PV and BATTERY)** | | | |
| Transformer-less, Ungrounded | Yes | | |
| Max Input Voltage | 500 | | Vdc |
| Nom DC Input Voltage | 400 | | Vdc |
| Reverse-Polarity Protection | Yes | | |
| Ground-Fault Isolaton Detection | 600kΩ Sensitivity | | |
| Maximum Inverter Efficiency | 98 | | % |
| CEC Weighted Efficiency | 97.5 | | % |
| **INPUT - DC (PV)** | | | |
| Maximum DC Power (STC) | 5100 | 10250 | W |
| Max Input Current[5] | 13 | 23 | Adc |
| 2-pole Disconnection | Yes | | |
| **INPUT - DC (BATTERY)** | | | |
| Supported Battery Types | LG Chem RESU10H | | |
| Number of Batteries per Inverter | 1 or 2[6] | | |
| Continuous Power | 5000 | | W |
| Peak Power | 7000 | | W |
| Max Input Current | 17.5 | | Adc |
| 2-pole Disconnection | Yes | | |
| DC Fuses on Plus and Minus | 25A (field replaceable) | | |
| **ADDITIONAL FEATURES** | | | |
| Supported Communication Interfaces | RS485 for battery, RS485, Ethernet, Cellular, ZigBee (optional) | | |
| Revenue Grade Data, ANSI C12.20 | Optional[7] | | |
| Integrated AC, DC and Communication Connection Unit | Yes | | |
| AC Disconnect | Yes | | |
| Manual Inverter Bypass Switch | Yes | | |
| DC Voltage Rapid Shutdown (PV and Battery) | Yes, according to NEC 2014 and 2017 690.12 | | |
| Auto-transformer thermal protection | Yes | | |

[1] **These specifcations apply to inverters with part numbers SExxxxA-USS2 and connection unit model number BCU-1PH-USS**
[2] For other regional settings please contact SolarEdge Support
[3] Not designed for standalone applications and requires AC for commissioning
[4] The rated AC power output is the minimum between the AC Power Output and the battery continuous peak power
[5] A higher current source may be used; the inverter will limit its input current to the values stated
[6] When connecting two LG Chem batteries, each battery must have a different part number; supporting SolarEdge firmware required
[7] Revenue grade inverter P/N: SExxxxA-USS2ONHY2

# SolarEdge Auto-transformer

## SEAUTO-TX-5000

| | SEAUTO-TX-5000 | |
|---|---|---|
| **ELECTRICAL RATINGS** | | |
| Rated Power - Continuous | 5000 | VA |
| Rated Power - Peak | 7600 for 10sec | VA |
| Output Voltage | 120/240V Split Phase | |
| Max Continuous Output Current per Phase @120V | 25 | A |
| Split Phase Imbalance (@Rated Power) | Yes, up to 25A difference between phases | |
| Thermal Protection | Yes | |
| **INSTALLATION SPECIFICATIONS** | | |
| AC Output conduit size / AWG range | 0.75" / 14-6 AWG | |
| Dimensions (HxWxD) | 6.7 x 7.9 x 5.5 / 170 x 200 x 140 | in / mm |
| Weight | 29.7 / 13.5 | lb / kg |
| Min - Max Operating Temperature | -13 to +140 / -25 to +60 | °F / °C |
| Protection Rating | NEMA 3R | |
| Installation | Wall mounted | |


# SolarEdge Electricity Meter for North America

## SE-MTR240-0-000-S2

For meter specifications refer to: https://www.solaredge.com/sites/default/files/se_electricity_meter_na.pdf

CE FC



POWERHOME
POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD,
DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-8

# Energy Meter with Modbus Connection

## for North America

SE-MTR240-0-000-S2

ACCESSORIES


## Energy Meter for Residential Installations

- Simple installation and connectivity
- Type NEMA 3R enclosure for outdoor protection
- Provides high accuracy meter readings
- Communicates over RS485 to provide monitoring data
- Suitable for export limitation, consumption monitoring and StorEdgeTM applications

solaredge.com

solaredge



CE RoHS

# Energy Meter with Modbus Connection

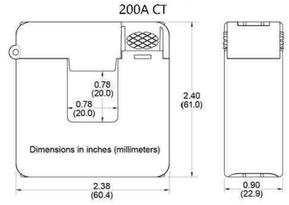
## for North America

SE-MTR240-0-000-S2

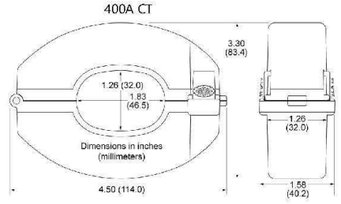
| | SE-MTR240-0-000-S2 | UNITS |
|---|---|---|
| **METER ELECTRICAL SERVICE** | | |
| Meter Operating Voltage Range - Line to Line | 211 - 264 | Vac |
| AC Frequency | 60 | Hz |
| Grids Supported | L1 / L2 / N / PE | |
| Power Consumption (typ.) | 1.2 | W |
| **COMMUNICATION** | | |
| Meter Communication Interfaces | RS485 | |
| Response Time | ≤1 sec | |
| Device ID (Modbus) | 2 | |
| **METER ACCURACY (@77°F / 25°C , PF:0.7- 1)** | | |
| 1% - 100% of Rated CT Current | ±1.0 | % |
| **STANDARD COMPLIANCE** | | |
| Safety | UL508A | |
| Emissions | FCC part15 class B | |
| **INSTALLATION SPECIFICATIONS** | | |
| Dimensions (HxWxD) | 8.1 x 12.4 x 4.6 / 206.6 x 316 x 117.5 | in / mm |
| Weight | 3.9 / 1.8 | lb / kg |
| Operating Temperature Range | -40 to +131 / -40 to +55 | °F / °C |
| Protection Rating | NEMA Type 3R | |
| Conduit Entry Diameters | 0.75 / 1 | in / mm |
| Mounting Type | Wall mount | |

### Current Transformer Dimensions

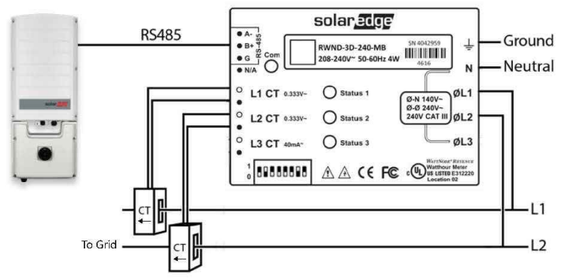
200A CT




400A CT




### Connecting the Energy Meter




* Current Transformers (CTs) should be ordered separately: SEACT0750-200NA-20 (200A); SEACT1250-400NA-20 (400A). Each comes in boxes of 20.

POWERHOME
POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY
RESIDENCE

15024 ASHTON RD,
DETROIT, MI 48223

DESIGNED BY

PHS

SHEET NAME

EQUIPMENT SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-8A

LG Chem

# Product Specification (1/2)

## RESU10H

**Solaredge compatible**

| Electrical Characteristics | | |
|---|---|---|
| **Total Energy** | | 9.8 kWh @25°C (77°F) |
| **Usable Energy**[1] | | 9.3 kWh @25°C (77°F) |
| **Voltage Range** | **Charge** | 400 ~ 450 VDC |
| | **Discharge** | 350 ~ 430 VDC |
| **Absolute Max. Voltage** | | 520VDC |
| **Max. Charge/Discharge Current** | | 11.9A@420V / 14.3A@350V |
| **Max. Charge/Discharge Power**[2] | | 5kW |
| **Peak Power (only discharging)**[3] | | 7kW for 10 sec. |
| **Peak Current (only discharging)** | | 18.9A@370V for 10 sec. |
| **Communication Interface** | | RS485 |
| **DC Disconnect** | | Circuit Breaker, 25A, 600V rating |
| **Connection Method** | | Spring Type Connector |
| **User interface** | | LEDs for Normal and Fault operation |
| **Protection Features** | | Over Voltage / Over Current / short circuit / Reverse Polarity |
| **Scalability (Total Energy, Max. Charge/Discharge Power, Peak Power (only discharging))** | | Max. 2 in parallel (19.6 kWh @25°C (77°F), 6.6KW, 7kW for 10 sec.) |

| Operating Conditions | |
|---|---|
| **Installation Location** | Indoor(Wall-Mounted) / Outdoor |
| **Operating Temperature** | 14 ~ 113°F (-10 ~ 45°C) |
| **Operating Temperature (Recommended)** | 59 ~ 86°F (15 ~ 30°C) |
| **Storage Temperature** | -22 ~ 131°F (-30 ~ 55°C) |
| **Humidity** | 5%~95% |
| **Altitude** | Max. 6,562ft (2,000m) |
| **Cooling Strategy** | Natural Convection |

| Certification | | |
|---|---|---|
| **Safety** | **Cell** | UL1642 |
| | **Battery Pack** | UL1973 / CE / RCM / TUV (IEC 62619) |
| **Emissions** | | FCC |
| **Hazardous Materials Classification** | | Class 9 |
| **Transportation** | | UN38.3 (UNDOT) |
| **Ingress Rating** | | IP55 |

※ Test Conditions - Temperature 25°C, at the beginning of life
※ Total Energy is measured under specific condition from LGC(0.3CCCV/0.3CC)
※ DC/DC Discharge Efficiency 94.5%

1) Value for Battery Cell Only (Depth of Discharge 95%), 2kW charge/discharge power.
2) LG Chem recommends 3.3kW for maximum battery lifetime
3) Peak Current excludes repeated short duration (less than 10 sec. of current pattern).

LG Chem

Product Specification (1/2)

RESU10H

Solaredge compatible

| Electrical Characteristics | | |
|---|---|---|
| **Total Energy** | | 9.8 kWh @25°C (77°F) |
| **Usable Energy**[1] | | 9.3 kWh @25°C (77°F) |
| **Voltage Range** | **Charge** | 400 ~ 450 VDC |
| | **Discharge** | 350 ~ 430 VDC |
| **Absolute Max. Voltage** | | 520VDC |
| **Max. Charge/Discharge Current** | | 11.9A@420V / 14.3A@350V |
| **Max. Charge/Discharge Power**[2] | | 5kW |
| **Peak Power (only discharging)**[3] | | 7kW for 10 sec. |
| **Peak Current (only discharging)** | | 18.9A@370V for 10 sec. |
| **Communication Interface** | | RS485 |
| **DC Disconnect** | | Circuit Breaker, 25A, 600V rating |
| **Connection Method** | | Spring Type Connector |
| **User interface** | | LEDs for Normal and Fault operation |
| **Protection Features** | | Over Voltage / Over Current / short circuit / Reverse Polarity |
| **Scalability (Total Energy, Max. Charge/Discharge Power, Peak Power (only discharging))** | | Max. 2 in parallel (19.6 kWh @25°C (77°F), 6.6KW, 7kW for 10 sec.) |

| Operating Conditions | |
|---|---|
| **Installation Location** | Indoor(Wall-Mounted) / Outdoor |
| **Operating Temperature** | 14 ~ 113°F (-10 ~ 45°C) |
| **Operating Temperature (Recommended)** | 59 ~ 86°F (15 ~ 30°C) |
| **Storage Temperature** | -22 ~ 131°F (-30 ~ 55°C) |
| **Humidity** | 5%~95% |
| **Altitude** | Max. 6,562ft (2,000m) |
| **Cooling Strategy** | Natural Convection |

| Certification | | |
|---|---|---|
| **Safety** | **Cell** | UL1642 |
| | **Battery Pack** | UL1973 / CE / RCM / TUV (IEC 62619) |
| **Emissions** | | FCC |
| **Hazardous Materials Classification** | | Class 9 |
| **Transportation** | | UN38.3 (UNDOT) |
| **Ingress Rating** | | IP55 |

※ Test Conditions - Temperature 25°C, at the beginning of life
※ Total Energy is measured under specific condition from LGC(0.3CCCV/0.3CC)
※ DC/DC Discharge Efficiency 94.5%

1) Value for Battery Cell Only (Depth of Discharge 95%), 2kW charge/discharge power.
2) LG Chem recommends 3.3kW for maximum battery lifetime
3) Peak Current excludes repeated short duration (less than 10 sec. of current pattern).

POWERHOME

POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD, DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-8B

solaredge

# Power Optimizer

P320 / P370 / P400 / P405 / P505

POWER OPTIMIZER


## PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Compliant with arc fault protection and rapid shutdown NEC requirements (when installed as part of the SolarEdge system)
- Module-level voltage shutdown for installer and firefighter safety

www.solaredge.us

solaredge

## Power Optimizer

P320 / P370 / P400 / P405 / P505

| OPTIMIZER MODEL (typical module compatibility) | P320 (for high-power 60-cell modules) | P370 (for higher-power 60 and 72-cell modules) | P400 (for 72 & 96-cell modules) | P405 (for thin film modules) | P505 (for higher current modules) | |
|---|---|---|---|---|---|---|
| **INPUT** | | | | | | |
| Rated Input DC Power[1] | 320 | 370 | 400 | 405 | 505 | W |
| Absolute Maximum Input Voltage (Voc at lowest temperature) | 48 | 60 | 80 | 125 | 83 | Vdc |
| MPPT Operating Range | 8 - 48 | 8 - 60 | 8 - 80 | 12.5 - 105 | 12.5 - 83 | Vdc |
| Maximum Short Circuit Current (Isc) | 11 | | 10.1 | | 14 | Adc |
| Maximum DC Input Current | 13.75 | | 12.63 | | 17.5 | Adc |
| Maximum Efficiency | 99.5 | | | | | % |
| Weighted Efficiency | 98.8 | | | | 98.6 | % |
| Overvoltage Category | II | | | | | |
| **OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)** | | | | | | |
| Maximum Output Current | 15 | | | | | Adc |
| Maximum Output Voltage | 60 | | | 85 | | Vdc |
| **OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)** | | | | | | |
| Safety Output Voltage per Power Optimizer | 1 ± 0.1 | | | | | Vdc |
| **STANDARD COMPLIANCE** | | | | | | |
| EMC | FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3 | | | | | |
| Safety | IEC62109-1 (class II safety), UL1741 | | | | | |
| RoHS | Yes | | | | | |
| **INSTALLATION SPECIFICATIONS** | | | | | | |
| Maximum Allowed System Voltage | 1000 | | | | | Vdc |
| Compatible inverters | All SolarEdge Single Phase and Three Phase inverters | | | | | |
| Dimensions (W x L x H) | 128 x 152 x 28 / 5 x 5.97 x 1.1 | | 128 x 152 x 36 / 5 x 5.97 x 1.42 | 128 x 152 x 50 / 5 x 5.97 x 1.96 | 128 x 152 x 59 / 5 x 5.97 x 2.32 | mm / in |
| Weight (including cables) | 630 / 1.4 | | 750 / 1.7 | 845 / 1.9 | 1064 / 2.3 | gr / lb |
| Input Connector | MC4[2] | | | | | |
| Output Wire Type / Connector | Double Insulated; MC4 | | | | | |
| Output Wire Length | 0.95 / 3.0 | 1.2 / 3.9 | | | | m / ft |
| Operating Temperature Range | -40 - +85 / -40 - +185 | | | | | °C / °F |
| Protection Rating | IP68 / NEMA6P | | | | | |
| Relative Humidity | 0 - 100 | | | | | % |

[1] Rated STC power of the module. Module of up to +5% power tolerance allowed.
[2] For other connector types please contact SolarEdge

| PV SYSTEM DESIGN USING A SOLAREDGE INVERTER[3][4] | | SINGLE PHASE HD-WAVE | SINGLE PHASE | THREE PHASE 208V | THREE PHASE 480V | |
|---|---|---|---|---|---|---|
| Minimum String Length (Power Optimizers) | P320, P370, P400 | 8 | | 10 | 18 | |
| | P405 / P505 | 6 | | 8 | 14 | |
| Maximum String Length (Power Optimizers) | | 25 | | 25 | 50[5] | |
| Maximum Power per String | | 5700 (6000 with SE7600-US - SE11400-US) | 5250 | 6000 | 12750 | W |
| Parallel Strings of Different Lengths or Orientations | | Yes | | | | |

[3] For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf.
[4] It is not allowed to mix P405/P505 with P320/P370/P400/P600/P700/P800 in one string.
[5] A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement

CE



POWERHOME
POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD, DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-9

# QRail™— Fully Integrated Mounting and Racking System

The QRail Series is a strong and versatile solar array mounting system that provides unrivaled benefits to solar designers and installers. Combined with Quick Mount PV's industry-leading waterproof mounts, QRail offers a complete racking solution for mounting solar modules on any roof.

Easily design array configurations with the QDesign software application. Generate complete engineering reports and calculate a precise bill of materials for all the mounting, racking and accessories needed for a complete solar array.

## Comprehensive, One-Source Solution

QRail, together with Quick Mount PV's waterproof mounting products, provides the benefit of a single-sourced, seamlessly integrated rooftop installation that works with all roof types — composition/asphalt shingles, flat or curved tile, metal shingle, shake, slate and low slope roofs. The QRail system also works with any roof attachment system for maximum flexibility.

## Superior Strength and Versatility

QRail is engineered for optimal structural performance. The system is certified to UL 2703, fully code compliant and backed by a 25-year warranty. QRail is available in Light, Standard and Heavy versions to match all geographic locations. QRail is compatible with virtually all modules and works on a wide range of pitched roof surfaces. Modules can be mounted in portrait or landscape orientation in standard or shared-rail configurations.


*QRails come in two lengths — 168 inches (14 ft) and 208 inches (17.3 ft) Mill and Black Finish*

# Fast, Simple Installation: It Just Clicks

## QClick Technology™

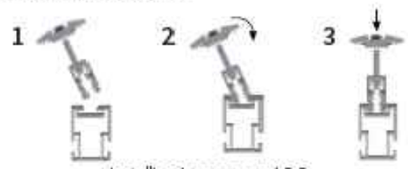
The universal mid and end clamps use QClick technology to simply "click" into the rail channel and remain upright, ready to accept the module. The pre-assembled clamps fit virtually all module frames and require no extra hardware, eliminating pre-loading and reducing installation time.

**Universal End Clamp**

*2 clamps for modules from 30-45mm or 38-50mm thick*

**Universal Bonded Mid Clamp**

*2 clamps for modules from 30-45mm or 38-50mm thick*




*Installing is as easy as 1-2-3*

## QSplice™ Technology

QRail's innovative internal QSplice installs in seconds, requiring no tools or screws. Simply insert QSplice into the rail and slide the other rail on to create a fully structural, bonded splice. An external splice is also available.



*Installs in seconds — no tools or hardware required*

## Fully Integrated Electrical Bonding

The QRail system provides an integrated electrical bonding path, ensuring that all exposed metal parts and the solar module frames are electrically connected. All electrical bonds are created when the components are installed and tightened down.

POWERHOME
POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY
RESIDENCE
15024 ASHTON RD,
DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-10

# QRail™ Configurations


| Item Code | Part Number | Description | Finish |
|---|---|---|---|
| QMR-RL14 A 60 | 800 | QRail Light, 14 ft., 60 Pack | Mill |
| QMR-RL17.3 A 60 | 801 | QRail Light, 17.3 ft, 60 Pack | Mill |
| QMR-RL14 B 60 | 805 | QRail Light, 14 ft., 60 Pack | Black |
| QMR-RL17.3 B 60 | 806 | QRail Light, 17.3 ft, 60 Pack | Black |
| QMR-RS14 A 60 | 810 | QRail Standard, 14 ft., 60 Pack | Mill |
| QMR-RS17.3 A 60 | 811 | QRail Standard, 17.3 ft, 60 Pack | Mill |
| QMR-RS14 B 60 | 815 | QRail Standard, 14 ft., 60 Pack | Black |
| QMR-RS17.3 B 60 | 816 | QRail Standard, 17.3 ft, 60 Pack | Black |
| QMR-RH14 A 60 | 820 | QRail Heavy, 14 ft., 60 Pack | Mill |
| QMR-RH17.3 A 60 | 821 | QRail Heavy, 17.3 ft, 60 Pack | Mill |
| QMR-RH14 B 60 | 825 | QRail Heavy, 14 ft, 60 Pack | Black |
| QMR-RH17.3 B 60 | 826 | QRail Heavy, 17.3 ft, 60 Pack | Black |



# QSplice™ Internal Structural Splice


| Item Code | Part Number | Description | Finish |
|---|---|---|---|
| QMR-ISL A 15 | 830 | QSplice Internal, Light, 15 Pack | Mill |
| QMR-ISS A 15 | 831 | QSplice Internal, Standard, 15 Pack | Mill |
| QMR-ISH A 15 | 832 | QSplice Internal, Heavy, 15 Pack | Mill |

# QSplice™ External Structural Splice


| Item Code | Part Number | Description | Finish |
|---|---|---|---|
| QMR-ESS A 15 | 834 | QSplice External, Standard, 15 Pack | Mill |
| QMR-ESH A 15 | 835 | QSplice External, Heavy, 15 Pack | Mill |



POWERHOME
POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD, DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-11(A)

## Universal End Clamp with QClick® Technology

*Black* *Mill*

| Item Code | Part Number | Description | Finish |
|---|---|---|---|
| QMR-UEC3045 A 20 | 860 | Universal End Clamp, 30-45mm, 20 Pack | Mill |
| QMR-UEC3850 A 20 | 861 | Universal End Clamp, 38-50mm, 20 Pack | Mill |
| QMR-UEC3045 B 20 | 865 | Universal End Clamp, 30-45mm, 20 Pack | Black |
| QMR-UEC3850 B 20 | 866 | Universal End Clamp, 38-50mm, 20 Pack | Black |
| QMR-UEC3045BP A 20 | 862 | Universal End Clamp, 30-45mm, w/ Bonding, 20 Pack | Mill |
| QMR-UEC3850BP A 20 | 863 | Universal End Clamp, 38-50mm, w/ Bonding, 20 Pack | Mill |
| QMR-UEC3045BP B 20 | 867 | Universal End Clamp, 30-45mm, w/ Bonding, 20 Pack | Black |
| QMR-UEC3850BP B 20 | 868 | Universal End Clamp, 38-50mm, w/ Bonding, 20 Pack | Black |

## Mid Clamp with QClick® Technology

*Black* *Mill*

| Item Code | Part Number | Description | Finish |
|---|---|---|---|
| QMR-UMC3045BP 1.2 A 20 | 872 | Universal Mid Clamp, 30-45mm, w/ Bonding, 20 Pack | Mill |
| QMR-UMC3850BP 1.2 A 20 | 873 | Universal Mid Clamp, 38-50mm, w/ Bonding, 20 Pack | Mill |
| QMR-UMC3045BP 1.2 B 20 | 877 | Universal Mid Clamp, 30-45mm, w/ Bonding, 20 Pack | Black |
| QMR-UMC3850BP 1.2 B 20 | 878 | Universal Mid Clamp, 38-50mm, w/ Bonding, 20 Pack | Black |



## Single-Slot L-Foot

| Item Code | Part Number | Description | Finish |
|---|---|---|---|
| QMC-LF A 12 | 692 | Single-slot L-foot, 12 Pack | Mill |
| QMC-LF B 12 | 693 | Single-slot L-foot, 12 Pack | Black |

## End Caps

*Heavy* *Standard* *Light*

| Item Code | Part Number | Description | Finish |
|---|---|---|---|
| QMR-CPL B 50 | 885 | End Cap Light, 50 Pack | Black |
| QMR-CPS B 50 | 886 | End Cap Standard, 50 Pack | Black |
| QMR-CPH B 50 | 887 | End Cap Heavy, 50 Pack | Black |



POWERHOME
POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD, DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-11(B)

# T-Bolt

| Item Code | Part Number | Description | Finish |
|---|---|---|---|
| QMR-TB A 300 | 880 | T-Bolt w/ Nut, 300 Pack | stainless steel |

# Wire Clip

*Works with both PV and Trunk Cabling*

| Item Code | Part Number | Description | Finish |
|---|---|---|---|
| QMR-WC A 300 | 892 | Trunk/PV Cable, 300 Pack | stainless steel |



# Grounding Lug

| Item Code | Part Number | Description | Finish |
|---|---|---|---|
| QMR-GL A 50 | 890 | WEEB Lug w/ T-Bolt, 50 Pack | n/a |

# WEEB BMC

| Item Code | Part Number | Description | Finish |
|---|---|---|---|
| QMR-ECW A 50 | 891 | WEEB BMC, 50 Pack | stainless steel |



POWERHOME
POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD, DETROIT, MI 48223

DESIGNED BY
PHS

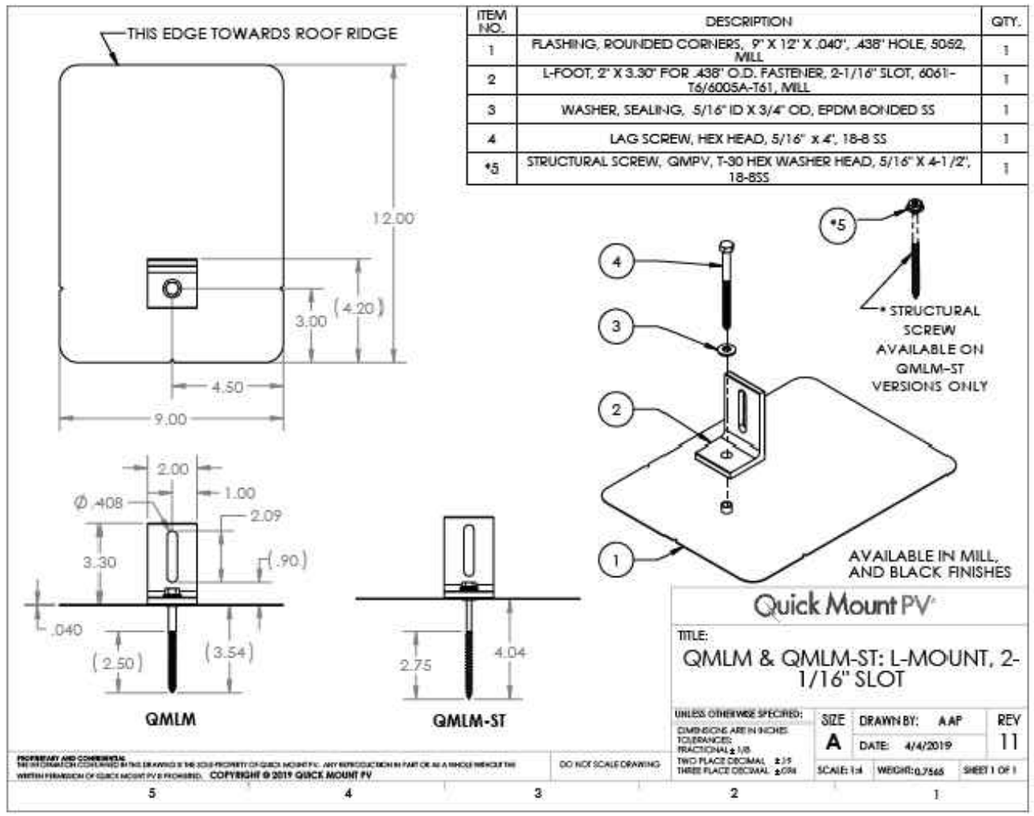
SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-11(C)

# L-Mount | QMLM / QMLM-ST

Elevated Water Seal Technology®




| ITEM NO. | DESCRIPTION | QTY. |
|---|---|---|
| 1 | FLASHING, ROUNDED CORNERS, 9" X 12" X .040", .438" HOLE, 5052, MILL | 1 |
| 2 | L-FOOT, 2" X 3.30" FOR .438" O.D. FASTENER, 2-1/16" SLOT, 6061-T6/6005A-T61, MILL | 1 |
| 3 | WASHER, SEALING, 5/16" ID X 3/4" OD, EPDM BONDED SS | 1 |
| 4 | LAG SCREW, HEX HEAD, 5/16" x 4", 18-8 SS | 1 |
| *5 | STRUCTURAL SCREW, QMPV, T-30 HEX WASHER HEAD, 5/16" X 4-1/2", 18-8SS | 1 |

Quick Mount PV

TITLE: QMLM & QMLM-ST: L-MOUNT, 2-1/16" SLOT

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES. TOLERANCES: FRACTIONAL ± 1/8, TWO PLACE DECIMAL ±.25, THREE PLACE DECIMAL ±.094

SIZE A | DRAWN BY: A AP | DATE: 4/4/2019 | REV 11 | SCALE: 1:4 | WEIGHT: 0.7565 | SHEET 1 OF 1

PROPRIETARY AND CONFIDENTIAL. THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF QUICK MOUNT PV. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF QUICK MOUNT PV IS PROHIBITED. COPYRIGHT © 2019 QUICK MOUNT PV

DO NOT SCALE DRAWING

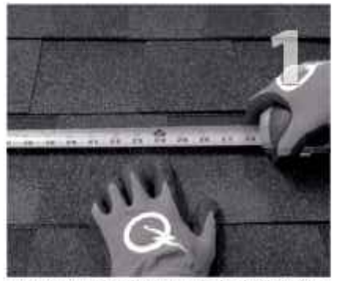
5 4 3 2 1

Quick Mount PV
RESPECT THE ROOF

## L-Mount Installation Instructions

**Installation Tools Required:** tape measure, roofing bar, chalk line, stud finder, caulking gun, sealant compatible with roofing materials, drill with 7/32" or 1/8" bit, drill or impact gun with 1/2" socket.

**WARNING:** Quick Mount PV products are NOT designed for and should NOT be used to anchor fall protection equipment.




Locate, choose, and mark centers of rafters to be mounted. Select the courses of shingles where mounts will be placed.


Carefully lift composition roof shingle with roofing bar, just above placement of mount. Remove nails as required and backfill holes with aproved sealant. See "Proper Flashing Placement" on next page.


Insert flashing between 1st and 2nd course. Slide up so top edge of flashing is at least ¾" higher than the butt-edge of the 3rd course and lower flashing edge is above the butt-edge of 1st course. Mark center for drilling.


If attaching with lag bolt use a 7/32" bit (Lag). Use a ⅛" bit (ST) for attaching with the structural screw. Drill pilot hole into roof and rafter, taking care to drill square to the roof. Do not use mount as a drill guide. Drill a 2" deep hole into rafter.


Clean off any sawdust, and fill hole with sealant compatible with roofing materials.


Place L-foot onto elevated flute and rotate L-foot to desired orientation.


Prepare lag bolt or structural screw with sealing washer. Using a ½-inch socket on an impact gun, drive prepared lag bolt through L-foot until L-foot can no longer easily rotate. **DO NOT over-torque.** NOTE: Structural screw can be driven with T-30 hex head bit.

BI 7.2.3-44


You are now ready for the rack of your choice. Follow all the directions of the rack manufacturer as well as the module manufacturer. NOTE: Make sure top of L-Foot makes solid contact with racking.

**All roofing manufacturers' written instructions must also be followed by anyone modifying a roof system. Consult the roof manufacturer's specs and instructions prior to working on the roof.**

Apr-2019 Rev 6


POWERHOME

POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com


REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Signature with Seal

DATE: 01/06/2020

PROJECT NAME & ADDRESS

DWIGHT BLAKEY RESIDENCE
15024 ASHTON RD,
DETROIT, MI 48223

DESIGNED BY
PHS

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-12

# APPLICATION FOR BLIGHT CLERANCE

Please send my clearance by: ☐FAX ☐MAIL or I'll ☐PICK-UP in Office **PLEASE PRINT & COMPLETE IN FULL**

I am an Applicant for a Buildings Safety Engineering & Environmental (BSEED): (Pick One)→ X permit ____certificate ____variance
COMPLETE ONE APPLICATION FOR EACH ADDRESS ____ other ____

FOR: Property Address: 15024 Ashton Road Property Owner's Name: Dwight Blakey

Applicant's Name: Peter DeNicola Applicant is: ___Property Owner X Contractor ____Other: ____
(Person's name not Company name) First Last

Applicant's Address: 500 Stephenson Hwy, Troy MI 48083 Phone: 919.300.7976 Email: permit@powerhome.com
Street Address, City & State & Zip (area code) xxx-xxxx

Applicant's Company Name & Address: Power Home Solar, LLC 919 N Main St , Mooresville NC 28115

List ALL Property Addresses in the city of Detroit that are owned/have been owned by: APPLICANT, PROPERTY OWNER and related entities (use a separate sheet if needed), *IF GRANTED THE CLEARANCE WILL ONLY BE FOR THE ADDRESS ABOVE:*

I certify that the information above is true to the best of my knowledge and understand that providing false information may deem me, my company AND the owner of the property ineligible for BSEED permit, certificate or variance.

Applicant Signature: PDC Date: 08/06/2020

Return this form to DAH using one of these methods: Email: dah_cs@detroitmi.gov Fax: 313 224-7923 Mail/In-Person: Department of Appeals & Hearings 2 Woodward Ave., Suite 1004, Detroit, MI 48226

DO NOT WRITE IN THIS SECTION - DAH STAFF ONLY

☐ GRANTED Date/Time: ____

By: ____

☐ DENIED Reviewed by: ____ (Print Initials) Date/Time: ____

Clearance sent to Applicant by:
☐ FAX ☐ MAIL Date ____

# APPLICATION FOR BLIGHT CLERANCE

Please send my clearance by: ☐FAX ☐MAIL or I'll ☐PICK-UP in Office **PLEASE PRINT & COMPLETE IN FULL**

I am an Applicant for a Buildings Safety Engineering & Environmental (BSEED): (Pick One)→ X permit ____certificate ____variance ____ other _____

COMPLETE ONE APPLICATION FOR EACH ADDRESS

FOR: Property Address: 15024 Ashton Rd Property Owner's Name: Dwight Blakey

Applicant's Name: Peter DeNicola Applicant is: ___Property Owner X Contractor ____Other: _____
(Person's name not Company name) First Last

Applicant's Address: 500 Stephenson Hwy, Troy MI 48083 Phone: 919.300.7976 Email: permit@powerhome.com
Street Address, City & State & Zip (area code) xxx-xxxx

Applicant's Company Name & Address: Power Home Solar, LLC 919 N Main St , Mooresville NC 28115

List ALL Property Addresses in the city of Detroit that are owned/have been owned by: APPLICANT, PROPERTY OWNER and related entities (use a separate sheet if needed), *IF GRANTED THE CLEARANCE WILL ONLY BE FOR THE ADDRESS ABOVE:*

I certify that the information above is true to the best of my knowledge and understand that providing false information may deem me, my company AND the owner of the property ineligible for BSEED permit, certificate or variance.

Applicant Signature: PDC Date: _____

Return this form to DAH using one of these methods: Email: dah_cs@detroitmi.gov Fax: 313 224-7923 Mail/In-Person: Department of Appeals & Hearings 2 Woodward Ave., Suite 1004, Detroit, MI 4

DO NOT WRITE IN THIS SECTION - DAH STAFF ONLY

☐ GRANTED Date/Time: _____

By: _____

☐ DENIED Reviewed by: _____ Print Initials Date/Time: _____

Clearance sent to Applicant by:
☐ FAX ☐ MAIL Date _____

APPROVED
Blight Clearance
Buildings, Safety Engineering & Environmental Department
CITY OF DETROIT
Date: 01/15/20
Permit Number: BLD2020-00175

Penn FUSION Engineering

152 S. Broad St.
Lansdale, PA 19446
(215)361-8040

January 2, 2020

**PowerHome Solar**
919 N. Main St
Mooresville, NC 28115

**RE:** **Blakey Residence**
**15024 Ashton Road, Detroit, MI 48223**
**Client Project #: 15024BLAK**
**PFE Project #: 201002**

On behalf of PowerHome Solar, Penn Fusion Engineering LLC (PFE) performed a structural analysis of the roof at the above referenced location. The purpose of our analysis was to determine if the existing roof system is structurally sufficient to support the new photovoltaic moudles in addition to the code required design loads. Information used for this analysis was determined by a site survey performed by a representative of PFE and is isolated only to the areas where the modules are intended to be placed. If any discrepancies are found by the contractor during installation, please contact PFE.

**System Specifications:**
Panel Specs: (22) Silfab Solar - SLA-M
Racking System: Quick Mount PV - QRail Light

The modules are to be located on the following roof planes:

| Mounting Plane | Rafter Size | Rafter Spacing | Horizontal Span | Collar Ties | Collar Tie Spacing | Sheathing | Shingle Type | Number of Shingle Layers | Ceiling Profile |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2x6 | 16" | 13ft. 11in. | N/A | 0" | CDX 1/2" | Asphalt Shingles | 1 | Flat |
| 2 | 2x6 | 16" | 12ft. 0in. | N/A | 0" | CDX 1/2" | Asphalt Shingles | 1 | Flat |

The roof design has been analyzed in accordance with the 2015 Michigan Residential Code with design loads as follows:

Ground Snow (Pg): 20 psf
Wind Speed (V): 115 mph

**Mounting Plane 1**
The calculations for these structural members are attached. It has been determined by this office that the roof, as specified above, is adequate to support the new PV modules in addition to the code required design loading.

Attach the module rail brackets to the roof with 5/16" lag bolts at 48 on center maximum with staggered penetration such that load is distributed evenly among roof members. Provide a minimum of 2" of penetration into the wood members.

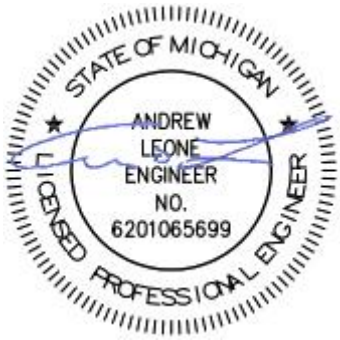
**Mounting Plane 2**
The calculations for these structural members are attached. It has been determined by this office that the roof, as specified above, is adequate to support the new PV modules in addition to the code required design loading.

Attach the module rail brackets to the roof with 5/16" lag bolts at 48 on center maximum with staggered penetration such that load is distributed evenly among roof members. Provide a minimum of 2" of penetration into the wood members.

This office has determined that the installation of the PV System as specified above will meet the structural requirements of the 2015 Michigan Residential Code and ASCE7-10 when installed in accordance with the manufacture's instructions.

If you have any questions regarding this analysis, please feel free to contact us.

Best Regards,
**Penn Fusion Engineering LLC**




Andrew D. Leone, P.E.
Principal

152 S. Broad St.
Lansdale, PA 19446
(267)640-2758

Client Name: PowerHome Solar
PFE Project Number: 201002
Client Project Number: 15024BLAK
Project: Blakey Residence
Address: 15024 Ashton Road
Detroit, MI 48223
Description: Mounting Plane 1
Calculations By: ADL
Date: January 2, 2020

## Roof Construction

2x6 Rafters at 16" on center

| | |
|---|---|
| A= | 8.25 $in^2$ |
| Ix= | 20.8 $in^4$ |
| Sx= | 7.56 $in^3$ |
| Wood Species= | Doug-Fir Larch #2 |
| Fb= | 900 psi |
| Fv= | 180 psi |
| E= | 1600000 psi |
| Roof Slope= | 34 ° |
| Rafter Span= | 13.92 ft |
| Ceiling Attached to Rafters?: | No |

## Design Criteria

| | |
|---|---|
| Ground Snow ($P_g$): | 20 psf |
| Design Wind Speed: | 115 mph |
| Live Load: | 20 psf |
| Dead Load: | 4.91 psf |
| PV Modules: | 3.62 psf |

### Wind Calculations

| | |
|---|---|
| Directionality Factor ($K_d$): | 0.85 |
| Topographic Factor ($K_{zt}$): | 1 |
| Velocity Pressure Exposure Coefficient ($K_z$): | 0.7 |
| Importance Factor (I): | 1 |
| Velocity Pressure ($q_z$): | 20.14 psf |
| Tributary Square Footage on Component: | 10.83 $ft^2$ |
| Component Roof Pressures: | 21.69 / -27.66 psf |

### Snow Load Calculations

| | |
|---|---|
| Exposure Factor ($C_e$): | 1 |
| Thermal Factor ($C_t$): | 1 |
| Importance Factor (I): | 1 |
| Flat Roof Snow Loads ($P_f$): | 14 psf |
| Roof Slope Factor ($C_s$): | 0.9 |
| Sloped Snow Loads ($P_s$): | 12.6 psf |
| Unbalanced Snow Load: | 0 psf |

## Member Calculations

### Bending

| | | | | |
|---|---|---|---|---|
| $M_d$: | 921.81 | ft*lb | | |
| $f_b$: | 1462.71 | psi | | |
| Load Duration Factor ($C_d$): | 1.15 | | | |
| Stability Factor ($C_L$): | 1 | | | |
| Wet Service Factor ($C_M$): | 1 | | | |
| Temperature Factor ($C_T$): | 1 | | | |
| Size Factor ($C_F$): | 1.3 | | | |
| Flat Use Factor ($C_{fu}$): | 1 | | | |
| Incising Factor ($C_i$): | 1 | | | |
| Repetitive Member Factor ($C_r$): | 1.15 | | | |
| $F_b$: | 900 | psi | | |
| $F'_b$: | 1547.33 | psi | **1462.71<=1547.33** | **OK in Bending** |

### Shear

| | | | | |
|---|---|---|---|---|
| $V_d$: | 264.84 | lb | | |
| $f_v$: | 48.15 | psi | | |
| Load Duration Factor ($C_d$): | 1.15 | | | |
| Wet Service Factor ($C_M$): | 1 | | | |
| Temperature Factor ($C_T$): | 1 | | | |
| Size Factor ($C_F$): | 1.3 | | | |
| Flat Use Factor ($C_{fu}$): | 1 | | | |
| Incising Factor ($C_i$): | 1 | | | |
| $F_v$: | 180 | psi | | |
| $F'_v$): | 207 | psi | **48.15<=207** | **OK in Shear** |

### Deflection

| | | | | |
|---|---|---|---|---|
| Live Load Deflection ($\Delta_L$): | 0.68 | in | **L/247** | **OK in Live Load Deflection** |
| Total Load Deflection ($\Delta_T$): | 0.97 | in | **L/173** | **OK in Total Load Deflection** |

## Uplift Calculation

| | | |
|---|---|---|
| Tributary Square Footage on Component: | 10.83 | $ft^2$ |
| Uplift Pressure: | -27.66 | psf |
| Uplift per Lag: | -299.64 | lbs |
| Lag Screw Diameter: | 5/16 | in |
| Allowable Withdrawal per Inch: | 490.99 | lbs/in |
| Minimal Screw Penetration: | 0.61 | in |

**Install 5/16" diameter lag screws @ 48 on center with minimum penetration of 2" into rafter.**

152 S. Broad St.
Lansdale, PA 19446
(267)640-2758

Client Name: PowerHome Solar
PFE Project Number: 201002
Client Project Number: 15024BLAK
Project: Blakey Residence
Address: 15024 Ashton Road
Detroit, MI 48223
Description: Mounting Plane 2
Calculations By: ADL
Date: January 2, 2020

## Roof Construction

2x6 Rafters at 16" on center

| | |
|---|---|
| A= | 8.25 $in^2$ |
| Ix= | 20.8 $in^4$ |
| Sx= | 7.56 $in^3$ |
| Wood Species= | Doug-Fir Larch #2 |
| Fb= | 900 psi |
| Fv= | 180 psi |
| E= | 1600000 psi |
| Roof Slope= | 34 ° |
| Rafter Span= | 12.01 ft |
| Ceiling Attached to Rafters?: | No |

## Design Criteria

| | |
|---|---|
| Ground Snow ($P_g$): | 20 psf |
| Design Wind Speed: | 115 mph |
| Live Load: | 20 psf |
| Dead Load: | 4.91 psf |
| PV Modules: | 3.62 psf |

### Wind Calculations

| | |
|---|---|
| Directionality Factor ($K_d$): | 0.85 |
| Topographic Factor ($K_{zt}$): | 1 |
| Velocity Pressure Exposure Coefficient ($K_z$): | 0.7 |
| Importance Factor (I): | 1 |
| Velocity Pressure ($q_z$): | 20.14 psf |
| Tributary Square Footage on Component: | 10.83 $ft^2$ |
| Component Roof Pressures: | 21.69 / -27.66 psf |

### Snow Load Calculations

| | |
|---|---|
| Exposure Factor ($C_e$): | 1 |
| Thermal Factor ($C_t$): | 1 |
| Importance Factor (I): | 1 |
| Flat Roof Snow Loads ($P_f$): | 14 psf |
| Roof Slope Factor ($C_s$): | 0.9 |
| Sloped Snow Loads ($P_s$): | 12.6 psf |
| Unbalanced Snow Load: | 0 psf |

## Member Calculations

### Bending

| | | | |
|---|---|---|---|
| $M_d$: | 685.48 ft*lb | | |
| $f_b$: | 1087.7 psi | | |
| Load Duration Factor ($C_d$): | 1.15 | | |
| Stability Factor ($C_L$): | 1 | | |
| Wet Service Factor ($C_M$): | 1 | | |
| Temperature Factor ($C_T$): | 1 | | |
| Size Factor ($C_F$): | 1.3 | | |
| Flat Use Factor ($C_{fu}$): | 1 | | |
| Incising Factor ($C_i$): | 1 | | |
| Repetitive Member Factor ($C_r$): | 1.15 | | |
| $F_b$: | 900 psi | | |
| $F'_b$: | 1547.33 psi | **1087.7<=1547.33** | **OK in Bending** |

### Shear

| | | | |
|---|---|---|---|
| $V_d$: | 228.38 lb | | |
| $f_v$: | 41.52 psi | | |
| Load Duration Factor ($C_d$): | 1.15 | | |
| Wet Service Factor ($C_M$): | 1 | | |
| Temperature Factor ($C_T$): | 1 | | |
| Size Factor ($C_F$): | 1.3 | | |
| Flat Use Factor ($C_{fu}$): | 1 | | |
| Incising Factor ($C_i$): | 1 | | |
| $F_v$: | 180 psi | | |
| $F'_v$): | 207 psi | **41.52<=207** | **OK in Shear** |

### Deflection

| | | | |
|---|---|---|---|
| Live Load Deflection ($\Delta_L$): | 0.37 in | **L/385** | **OK in Live Load Deflection** |
| Total Load Deflection ($\Delta_T$): | 0.53 in | **L/270** | **OK in Total Load Deflection** |

## Uplift Calculation

| | |
|---|---|
| Tributary Square Footage on Component: | 10.83 $ft^2$ |
| Uplift Pressure: | -27.66 psf |
| Uplift per Lag: | -299.64 lbs |
| Lag Screw Diameter: | 5/16 in |
| Allowable Withdrawal per Inch: | 490.99 lbs/in |
| Minimal Screw Penetration: | 0.61 in |

**Install 5/16" diameter lag screws @ 48 on center with minimum penetration of 2" into rafter.**