



Ruthanne Fuller  
Mayor

**City of Newton, Massachusetts**  
Department of Planning and Development  
1000 Commonwealth Avenue Newton, Massachusetts 02459

Telephone  
(617) 796-1120  
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(617) 796-1086  
www.newtonma.gov

Barney S. Heath  
Director

**APPLICATION FOR LOCAL HISTORIC DISTRICT CERTIFICATE OF  
APPROPRIATENESS, NON-APPLICABILITY, OR HARDSHIP**

DATE RECEIVED: \_\_\_\_\_ PROJECT #: \_\_\_\_\_  
PROJECT ADDRESS: 87 Rockland Place, Newton, MA 02464

**PROJECT INFORMATION**

IS THE PROPERTY AND/OR STRUCTURE DESIGNATED (check all that apply):

- LOCAL HISTORIC DISTRICT       LOCAL LANDMARK       NATIONAL REGISTER SITE

(Depending on how a property is designated, different Newton City Ordinances may apply.)

NAME OF LOCAL HISTORIC DISTRICT: Newton Upper Falls

TYPE OF STRUCTURE(S) AFFECTED (Check all that apply):

- HOUSE       FENCE       GARAGE       NON-RESIDENTIAL BUILDING       SHED  
 SIGN       WALL       OTHER

IF OTHER, PLEASE DESCRIBE: \_\_\_\_\_

WHAT YEAR WAS THE STRUCTURE BUILT (IF KNOWN): 1809

TYPE OF PROPOSED WORK (Check all that apply):

- ADDITION       ALTERATION       DEMOLITION       NEW CONSTRUCTION       REPAIR  
 REPLACEMENT       OTHER

IF OTHER, PLEASE DESCRIBE: pv solar installation

DESCRIBE SCOPE OF WORK:

roof mounted pv solar panels - 7.700kw system -  
22 total panels - 100A

BRIEFLY DESCRIBE THE HISTORY OF THE PROPERTY (IF KNOWN):

**THIS APPLICATION FORM MUST BE ACCOMPANIED BY A GENERAL PERMIT APPLICATION FORM AND BY THE REQUIRED SUBMISSION MATERIALS IDENTIFIED ON THE LOCAL HISTORIC DISTRICT APPLICATION REQUIREMENTS SHEET. INCOMPLETE OR INACCURATE APPLICATIONS WILL NOT BE ACCEPTED.**

THE COVER PAGE AND THE INSTRUCTIONS ON THE BACK OF THE APPLICATION FORMS HAVE ADDITIONAL INFORMATION ABOUT THE APPLICATION INTAKE AND REVIEW PROCESS, AND THE HARD COPY REQUIREMENTS.



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GENERAL PERMIT APPLICATION

PROJECT #: \_\_\_\_\_ ZONING DISTRICT: SR3 DATE RECEIVED: \_\_\_\_\_

PROJECT DESCRIPTION:  
roof mounted pv solar panels - 7.700 kw system - 22 total panels - 100A.

PROPERTY LOCATION INFORMATION

STREET ADDRESS: 87 Rockland Place, Newton, MA 02464 CITY/ZIP: Newton, MA 02464

LEGAL DESCRIPTION (SECTION, BLOCK, LOT): \_\_\_\_\_

PROPERTY OWNER INFORMATION

NAME: Margaret Alexander PHONE: 617-332-3731 ALT. PHONE: \_\_\_\_\_

MAILING ADDRESS: 87 Rockland Place E-MAIL ADDRESS: \_\_\_\_\_

PROPERTY OWNER CONSENT

I am (we are) the owner(s) of the property subject to this application and I (we) consent as follows:

1. This application for a land use permit or administrative approval for development on my (our) property is made with my permission.
2. I (we) grant permission for officials and employees of the City of Newton to access my property for the purposes of this application.

X Margaret Alexander 9/27/2021  
 (Property Owner Signature) (Date)

X Margaret Alexander 9/27/2021  
 (Property Owner Signature) (Date)

NOTICE: The City of Newton staff may need access to the subject property during regular business hours and will attempt to contact the applicant/agent prior to any visit. Further, members of a regulatory authority of the city may visit the property as well.

APPLICANT / AGENT INFORMATION

NAME: Daniel Kelley PHONE: 774-320-5539 ALT. PHONE: \_\_\_\_\_

MAILING ADDRESS: 135 Robert Treat Paine Dr. Taunton, MA 02780 E-MAIL ADDRESS: permits

X Daniel Kelley 9/27/2021  
 (Applicant/Agent Signature) (Date)

NOTICE: The applicant/agent is the primary contact and may be any individual representing the establishment or property owner. The applicant/agent must also be legally authorized to make decisions on behalf of the Property Owner(s) in regards to the application.

OFFICE USE ONLY BELOW THIS LINE

CHECK APPROPRIATE PERMIT OR REVIEW PROCESS (CHECK ALL BEING SUBMITTED)

<input type="checkbox"/>	Zoning Review Application	<input type="checkbox"/>	Comprehensive Permit
<input type="checkbox"/>	Administrative Site Plan Review	<input type="checkbox"/>	Variance Application
<input type="checkbox"/>	Sign Permit	<input type="checkbox"/>	Historic Preservation Review
<input type="checkbox"/>	Special Permit/Site Plan Approval	<input type="checkbox"/>	Conservation Commission Review
<input type="checkbox"/>	Fence Appeal	<input type="checkbox"/>	Other, describe

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PERMIT INTAKE INITIALS  
AND DATE STAMP

NOTE: This form MUST accompany all other Department of Planning and Development applications.

To Be Completed By Applicant

# Property Record Card

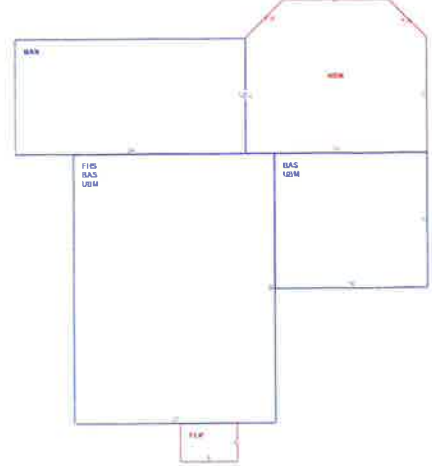
## Property

Property SBL 51009 0034  
 Address 87 ROCKLAND PL  
 Tax Bill Number 2200674  
 Land Use 1010  
 Land Use Description SINGLE FAMILY  
 Lot Size 20,830 sq ft  
 Frontage 133 ft  
 Zoning SR3  
 Map ID 126NW  
 ID 51009 0034

## Primary Property Image



## Property Sketch



## Current Owner

Owner ALEXANDER MICHAEL &  
 Information MARGARET  
 87 ROCKLAND PL  
 NEWTON, MA 02464

## Sale History

Owner ALEXANDER MICHAEL &  
 MARGARET  
 Co Owner  
 Sale Date 2012-07-02  
 Sale Price \$631,650  
 Legal 1418/147  
 Reference

## Assessment History

Assessed Value	Fiscal Year
\$928,000	2021
\$928,000	2020
\$901,000	2019
\$809,400	2018

## Visit History

Visit Date	Type
2019-02-19	Exterior
2017-03-09	Exterior
2016-04-13	Exterior

## Building General

Building Style	Old Style
Year Built	1869
Story Height	1.5
Neighborhood Code	5A

## Building Exterior

Exterior Condition	Average
Exterior Walls	Clapboard
Masonry/Trim	None
Foundation Type	Brick/Fldstone
Roof Type	Gable
Roof Material	Asphalt Shingl
Deck Area	288
Porch Area	sq ft
Enclosed Porch Area	24

## Building Interior

Rooms	7
Bedrooms	2
Baths	2
Heat Type	Hot Wtr Radiat
Fuel Type	Gas
Air Conditioning	None
Fireplaces	1
Kitchen Quality	Average
Bath Quality	Above Average
Interior Condition	Average
Building Size	1,394 sq ft
Unfinished Attic Area	sq ft
Basement Area	812
Finished Basement Area	sq ft

## Building Area

Building Type	RESIDENTIAL
Gross Building Area	2,812 sq ft
Effective Area	2,518 sq ft
Building Area	1,394 sq ft

## Condominium

## Detached Structures

## Apartments















# BARUN CORP

September 2, 2021

RE: CERTIFICATION LETTER

Project Address: Margaret Alexander Residence  
87 Rockland Place  
Newton, MA 02464

## Design Criteria:

- Applicable Codes = 2015 IBC W/MA (780 CMR) 9th Edition , 2015 IRC W/MA (780 CMR) 9th Edition, ASCE 7-10, and 2015 NDS
- Risk Category = II
- Wind Speed = 130 mph, Exposure Category B, Partially/Fully Enclosed Method
- Ground Snow Load = 40 psf
- Roof 1-3: 2x6 @ 24" OC, Roof DL = 10 psf, Roof LL/SL = 26 psf (Non-PV), Roof LL/SL = 13.9 psf (PV)

To Whom It May Concern,

A jobsite survey of the existing framing system of the address indicated above was performed . All structural evaluation is based on the site inspection observations and the design criteria listed above.

Existing roof structural framing has been reviewed for additional loading due to installation of PV Solar System on the roof. The structural review applies to the sections of roof that is directly supporting the solar PV system.

Based on this evaluation, I certify that the alteration to the existing structure by installation of the PV system meets the requirements of the applicable existing building and/or new building provisions adopted/referenced above.

Additionally, the PV module assembly including attachment hardware has been reviewed to be in accordance with the manufacturer's specifications and to meet and/or exceed the requirements set forth by the referenced codes.

Sincerely,

Yuri Yurianto, S.E., P.E.



By Yuri at 6:41:01 AM, 9/2/2021

# Roof 1-3

PV System Dead Load (PV-DL)		
PV module weight		2.5 psf
Hardware assembly weight		0.5 psf
	<b>PV-DL</b>	<b>3 psf</b>

Roof Dead Load (R-DL)	Material	Panel Area
Existing Roofing Material	Comp Roof 1 layers	2.5 psf
Underlayment		0.5 psf
Plywood Sheathing		1.5 psf
Rafter Size and Spacing	2 x 6 @ 24 in. O.C.	1.15 psf
Vaulted ceiling	Yes	3 psf
Miscellaneous		1.5 psf
<b>Total Roof Dead Load</b>	<b>R-DL</b>	<b>10 psf</b>

Reduced Roof Live Load (Lr)	Expression	Value
Roof Live Load	$L_o$	20.0 psf
Member Tributary Area	$A_t$	< 200 sf
Roof 1-3 Roof Pitch		11/12 or 43°
Trubutary Area Reduction	$R_1$	1
Slope Roof Reduction	$R_2$	0.65
Reduced Roof Live Load	$L_r = L_o (R_1) (R_2)$	<b>13.0 psf</b>

Snow Load	Value
Ground Snow Load	$p_g$ 40
Effective Roof Slope	43°
Snow Importance Factor	$I_s$ 1.0
Snow Exposure Factor	$C_e$ 1.0
Snow Thermal Factor	$C_t$ 1.1
Minimum Flat Roof Snow Load	$p_{f-min}$ 30
Flat Roof Snow Load	<b><math>p_f</math> 30.8</b>

Slope Roof Snow Load on Roof	(All other surfaces)
Roof Slope Factor	$C_{s-roof}$ 0.83
	<b><math>p_{s-roof}</math> 25.60</b>

Sloped Roof Snow Load on PV	(Unobstructed slippery surfaces)
Roof Slope Factor	$C_{s-pv}$ 0.45
	<b><math>p_{s-pv}</math> 13.90</b>





**WoodWorks**  
SOFTWARE FOR WOOD DESIGN

**COMPANY**  
  
Sep. 2, 2021 16:00

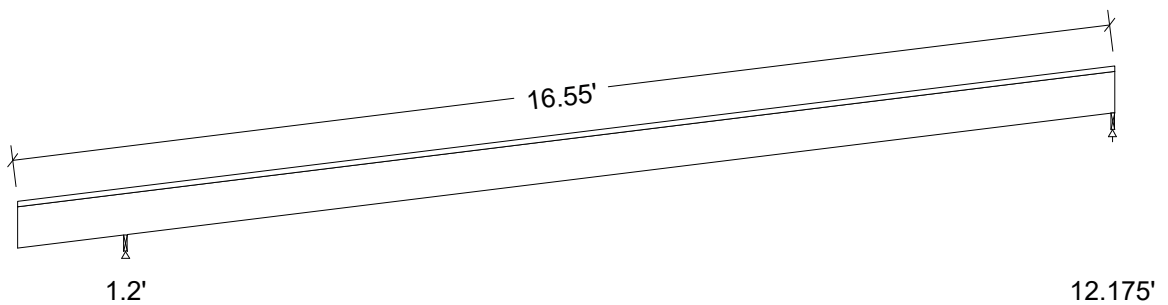
**PROJECT**  
Margaret Alexander Residence  
Roof 1-3

**Design Check Calculation Sheet**  
WoodWorks Sizer 2019 (Update 2)

**Loads:**

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
DL	Dead	Full Area	No			10.00	(24.0")	psf
DL-PV	Dead	Partial Area	No	3.00	11.00	3.00	(24.0")	psf
SL-PV	Snow	Partial Area	No	3.00	11.00	13.90	(24.0")	psf
SL-RF1	Snow	Partial Area	No	0.00	3.00	25.60	(24.0")	psf
SL-RF2	Snow	Partial Area	No	11.00	12.20	25.60	(24.0")	psf

**Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :**



Unfactored:			
Dead		213	183
Snow		256	181
Factored:			
Total		469	364
Bearing:			
F'theta		628	628
Capacity			
Joist	824		471
Support	586		469
Des ratio			
Joist	0.57		0.77
Support	0.80		0.78
Load comb	#2		#2
Length	0.50*		0.50*
Min req'd	0.40**		0.39**
Cb	1.75		1.00
Cb min	1.75		1.00
Cb support	1.25		1.00
Fcp sup	625		625

\*Minimum bearing length setting used: 1/2" for end supports and 1/2" for interior supports

\*\*Minimum bearing length governed by the required width of the supporting member.

**Roof 1-3**

**Lumber-soft, S-P-F, No.1/No.2, 2x6 (1-1/2"x5-1/2")**

Supports: All - Timber-soft Beam, D.Fir-L No.2

Roof joist spaced at 24.0" c/c; Total length: 17.0'; Clear span(horz): 1.188', 10.938'; Volume = 1.0 cu.ft.; Pitch: 11/12  
Lateral support: top = continuous, bottom = at supports; Repetitive factor: applied where permitted (refer to online help);

**This section PASSES the design code check.**

**Analysis vs. Allowable Stress and Deflection using NDS 2018 :**

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 47	Fv' = 155	psi	fv/Fv' = 0.30
Bending(+)	fb = 1490	Fb' = 1504	psi	fb/Fb' = 0.99
Bending(-)	fb = 89	Fb' = 858	psi	fb/Fb' = 0.10
Live Defl'n	0.59 = L/304	0.74 = L/240	in	0.79
Total Defl'n	1.63 = L/109	1.64 = L/109	in	1.00

**Additional Data:**

FACTORS:	F/E(ksi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	135	1.15	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.15	1.00	1.00	1.000	1.300	-	1.15	1.00	1.00	-	2
Fb'-	875	1.15	1.00	1.00	0.570	1.300	-	1.15	1.00	1.00	-	2
Fcp'	425	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.4 million	1.00	1.00	1.00	-	-	-	-	1.00	1.00	-	2
Emin'	0.51 million	1.00	1.00	1.00	-	-	-	-	1.00	1.00	-	2

**CRITICAL LOAD COMBINATIONS:**

Shear : LC #2 = D + S  
 Bending(+): LC #2 = D + S  
 Bending(-): LC #2 = D + S  
 Deflection: LC #2 = D + S (live)  
                   LC #2 = D + S (total)  
 Bearing : Support 1 - LC #2 = D + S  
                   Support 2 - LC #2 = D + S

D=dead S=snow

All LC's are listed in the Analysis output

Load combinations:

**CALCULATIONS:**

V max = 278, V design = 258 lbs; M(+) = 939 lbs-ft; M(-) = 56 lbs-ft

EIy = 29.12 lb-in<sup>2</sup>

"Live" deflection is due to all non-dead loads (live, wind, snow...)

Total deflection = 1.5 dead + "live"

Bearing: Allowable bearing at an angle F'theta calculated for each support as per NDS 3.10.3

Lateral stability(-): Lu = 14.88' Le = 22.81' RB = 25.9; Lu based on full span

**Design Notes:**

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.
4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.
5. SLOPED BEAMS: level bearing is required for all sloped beams.
6. The critical deflection value has been determined using maximum back-span deflection. Cantilever deflections do not govern design.

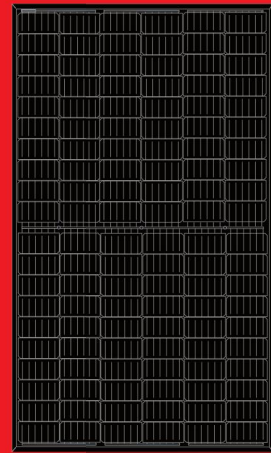


# LR4-60HPB 345~365M

Hi-MO 4m

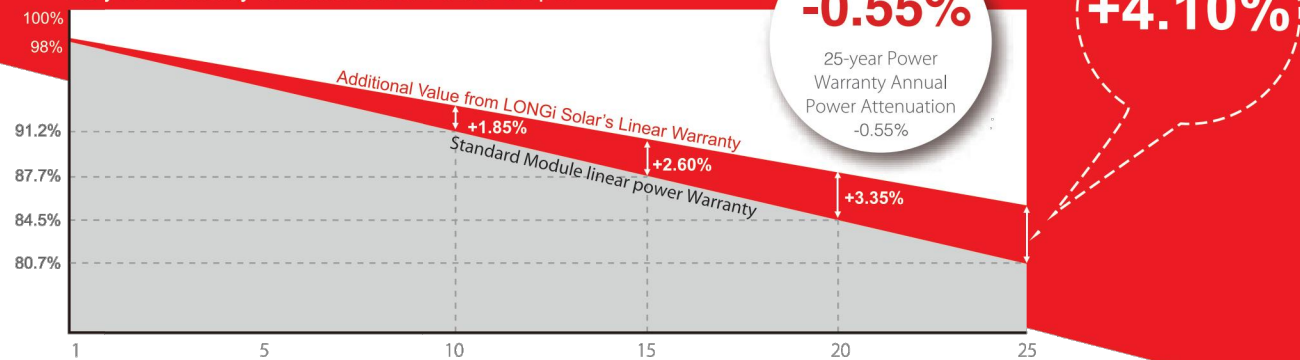
NEW

**High Efficiency  
Low LID Mono PERC with  
Half-cut Technology**



\*Both 6BB & 9BB are available

10-year Warranty for Materials and Processing;  
25-year Warranty for Extra Linear Power Output



### Complete System and Product Certifications

IEC 61215, IEC61730, UL61730  
ISO 9001:2008: ISO Quality Management System  
ISO 14001: 2004: ISO Environment Management System  
TS62941: Guideline for module design qualification and type approval  
OHSAS 18001: 2007 Occupational Health and Safety



\* Specifications subject to technical changes and tests. LONGi Solar reserves the right of interpretation.

**Positive power tolerance** (0 ~ +5W) guaranteed

**High module conversion efficiency** (up to 20%)

**Slower power degradation** enabled by Low LID Mono PERC technology: first year <2%, 0.55% year 2-25

**Solid PID resistance** ensured by solar cell process optimization and careful module BOM selection

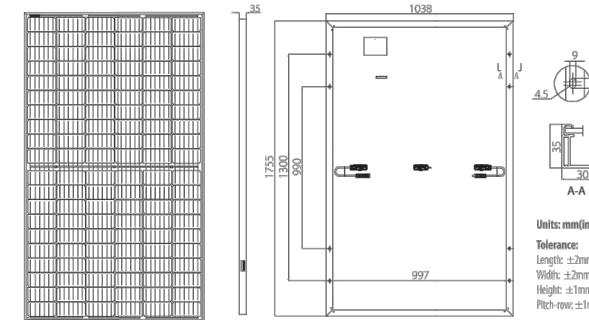
**Reduced resistive loss** with lower operating current

**Higher energy yield** with lower operating temperature

**Reduced hot spot risk** with optimized electrical design and lower operating current

# LR4-60HPB 345~365M

## Design (mm)



## Mechanical Parameters

Cell Orientation: 120 (6×20)  
Junction Box: IP68, three diodes  
Output Cable: 4mm<sup>2</sup>, 300mm in length, length can be customized  
Glass: Single glass  
3.2mm coated tempered glass  
Frame: Anodized aluminum alloy frame  
Weight: 19.5kg  
Dimension: 1755×1038×35mm  
Packaging: 30pcs per pallet  
180pcs per 20'GP  
780pcs per 40'HC

## Operating Parameters

Operational Temperature: -40°C ~ +85°C  
Power Output Tolerance: 0 ~ +5 W  
Voc and Isc Tolerance: ±3%  
Maximum System Voltage: DC1000V (IEC/UL)  
Maximum Series Fuse Rating: 20A  
Nominal Operating Cell Temperature: 45±2°C  
Safety Class: Class II  
Fire Rating: UL type 1 or 2

## Electrical Characteristics

Test uncertainty for Pmax: ±3%

Model Number	LR4-60HPB-345M		LR4-60HPB-350M		LR4-60HPB-355M		LR4-60HPB-360M		LR4-60HPB-365M	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax/W)	345	255.6	350	259.3	355	263.0	360	266.7	365	270.4
Open Circuit Voltage (Voc/V)	40.2	37.5	40.4	37.7	40.6	37.9	40.8	38.1	41.0	38.3
Short Circuit Current (Isc/A)	11.06	8.92	11.16	8.99	11.25	9.06	11.33	9.13	11.41	9.20
Voltage at Maximum Power (Vmp/V)	34.2	31.6	34.4	31.8	34.6	32.0	34.8	32.1	35.0	32.3
Current at Maximum Power (Imp/A)	10.09	8.09	10.18	8.16	10.27	8.23	10.35	8.30	10.43	8.36
Module Efficiency(%)	18.9		19.2		19.5		19.8		20.0	

STC (Standard Testing Conditions): Irradiance 1000W/m<sup>2</sup>, Cell Temperature 25°C, Spectra at AM1.5

NOCT (Nominal Operating Cell Temperature): Irradiance 800W/m<sup>2</sup>, Ambient Temperature 20°C, Spectra at AM1.5, Wind at 1m/S

## Temperature Ratings ( STC )

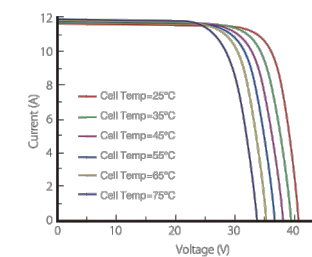
Temperature Coefficient of Isc: +0.057%/°C  
Temperature Coefficient of Voc: -0.286%/°C  
Temperature Coefficient of Pmax: -0.370%/°C

## Mechanical Loading

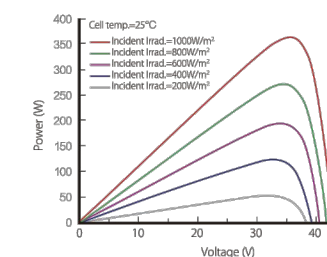
Front Side Maximum Static Loading: 5400Pa  
Rear Side Maximum Static Loading: 2400Pa  
Hailstone Test: 25mm Hailstone at the speed of 23m/s

## I-V Curve

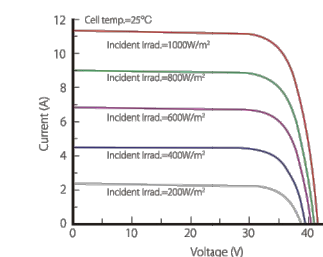
Current-Voltage Curve (LR4-60HPB-360M)



Power-Voltage Curve (LR4-60HPB-360M)



Current-Voltage Curve (LR4-60HPB-360M)



# LONGi

Room 801, Tower 3, Lujiazui Financial Plaza, No.826 Century Avenue, Pudong Shanghai, 200120, China  
Tel: +86-21-80162606 E-mail: module@longi-silicon.com Facebook: www.facebook.com/LONGi Solar

Note: Due to continuous technical innovation, R&D and improvement, technical data above mentioned may be of modification accordingly. LONGi have the sole right to make such modification at anytime without further notice; Demanding party shall request for the latest datasheet for such as contract need, and make it a consisting and binding part of lawful documentation duly signed by both parties.

# LONGi

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# PHOTOVOLTAIC SYSTEM

## CODES:

THIS PROJECT COMPLIES WITH THE FOLLOWING:  
 2015 INTERNATIONAL BUILDING CODE (IBC) W/780 CMR  
 2015 INTERNATIONAL RESIDENTIAL CODE (IRC) W/780 CMR  
 2018 INTERNATIONAL MECHANICAL CODE (IMC)  
 2018 INTERNATIONAL PLUMBING CODE (IPC)  
 2018 INTERNATIONAL FUEL GAS CODE (IFGC)  
 2018 INTERNATIONAL ENERGY CONSERVATION CODE (IECC)  
 2015 INTERNATIONAL EXISTING BUILDING CODE (IEBC) w/780 CMR  
 2018 INTERNATIONAL SWIMMING POOL AND SPA CODE (ISPSA)  
 2020 NATIONAL ELECTRICAL CODE (NEC)  
 AS ADOPTED BY CITY OF NEWTON (MA)

## CONSTRUCTION NOTES:

CONDUIT AND CONDUCTOR SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS.

ALL SOLAR ENERGY SYSTEM EQUIPMENT SHALL BE SCREENED TO THE MAXIMUM EXTENT POSSIBLE AND SHALL BE PAINTED A COLOR SIMILAR TO THE SURFACE UPON WHICH THEY ARE MOUNTED.

MODULES SHALL BE TESTED, LISTED AND IDENTIFIED WITH FIRE CLASSIFICATION IN ACCORDANCE WITH UL 2703. SMOKE AND CARBON MONOXIDE ALARMS ARE REQUIRED PER SECTION R314 AND 315 TO BE VERIFIED AND INSPECTED BY INSPECTOR IN THE FIELD.

DIG ALERT (811) TO BE CONTACTED AND COMPLIANCE WITH EXCAVATION SAFETY PRIOR TO ANY EXCAVATION TAKING PLACE

PHOTOVOLTAIC SYSTEM GROUND WILL BE TIED INTO EXISTING GROUND AT MAIN SERVICE FROM DC DISCONNECT/INVERTER AS PER 2020 NEC SEC 250.166(A).

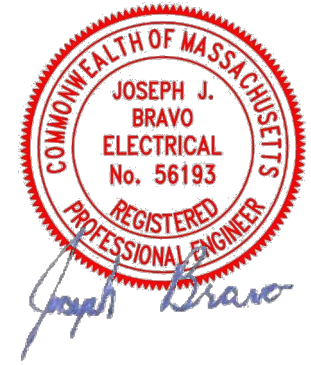
SOLAR PHOTOVOLTAIC SYSTEM EQUIPMENT WILL BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS OF ART. 690 OF THE 2020 NEC

THE EXISTING MAIN SERVICE PANEL WILL BE EQUIPPED WITH A GROUND ROD OR UFER

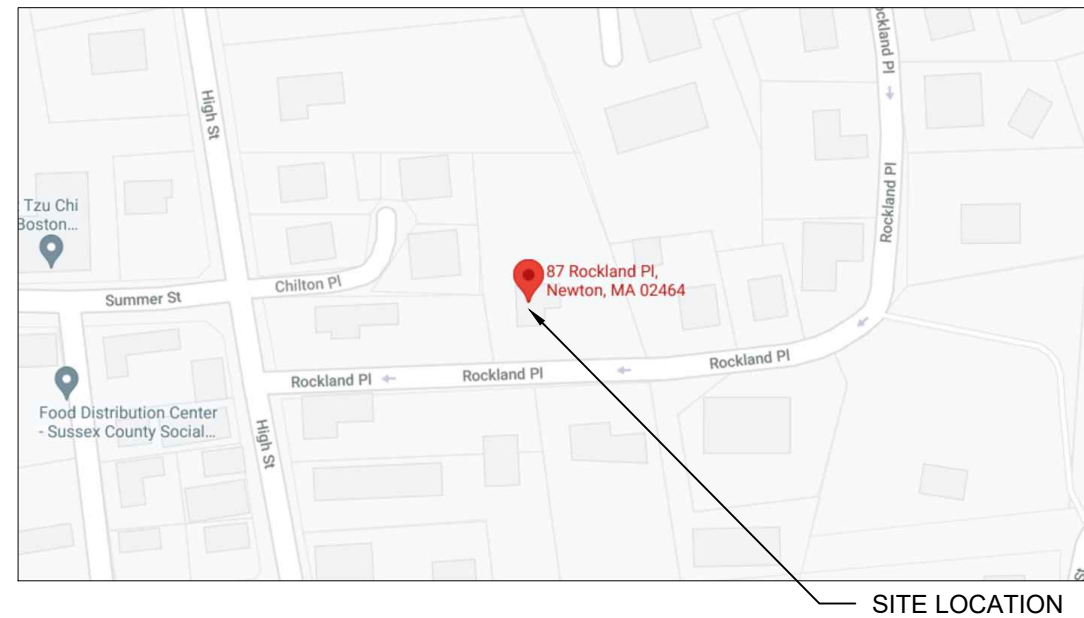
UTILITY COMPANY WILL BE NOTIFIED PRIOR TO ACTIVATION OF THE SOLAR PV SYSTEM

SOLAREGE OPTIMIZERS ARE LISTED TO IEC 62109-1 (CLASS II SAFETY) AND UL 1741 STANDARDS

INSTALL CREW TO VERIFY ROOF STRUCTURE PRIOR TO COMMENCING WORK. EMT CONDUIT ATTACHED TO THE ROOF USING CONDUIT MOUNT.



## VICINITY MAP:



SITE LOCATION

## TABLE OF CONTENTS:

PV-1	SITE LOCATION
PV-2	SITE PLAN
PV-2A	ROOF PLAN WITH MODULES LAYOUT
PV-2B	STRUCTURAL CALCULATIONS
PV-3	MOUNTING DETAILS
PV-4	THREE LINE DIAGRAM
PV-5	CONDUCTOR CALCULATIONS
PV-5B	EXISTING SERVICE PANEL
PV-6	EQUIPMENT & SERVICE LIST
PV-7	LABELS
PV-7A	SITE PLACARD
PV-8	OPTIMIZER CHART
PV-9	SAFETY PLAN
PV-10	SAFETY PLAN
APPENDIX	MANUFACTURER SPECIFICATION SHEETS

**CLIENT:**  
 MARGARET ALEXANDER  
 87 ROCKLAND PLACE, NEWTON, MA 02464  
 AHJ: CITY OF NEWTON (MA)  
 UTILITY: EVERSOURCE ENERGY (EASTERN MA)  
 PHONE: (617) 332-3731

**SYSTEM:**  
 SYSTEM SIZE (DC): 22 X 350 = 7.700 kW  
 SYSTEM SIZE (AC): 6.000 kW @ 240V  
 MODULES: 22 X LONGI SOLAR:  
 LR4-60HPB-350M  
 OPTIMIZERS: 22 X SOLAREGE P401  
 INVERTER: SOLAREGE SE6000H-USRGM [S1]

REVISIONS		
NO.	DESCRIPTION	DATE

  
**freedom**  
FOREVER

FREEDOM FOREVER MASSACHUSETTS LLC  
 135 ROBERT TREAT PAINE DR., TAUNTON, MA  
 02780  
 Tel: (800) 385-1075  
**MATTHEW MARKHAM**



**CONTRACTOR LICENSE:**  
 HOME IMPROVEMENT CONTRACTOR 198080:  
 BUSINESS ELECTRICAL CONTRACTOR LICENSE  
 902-EL-A1; CONSTRUCTION SUPERVISOR  
 LICENSE CS-111662; MASTER ELECTRICIAN  
 1136 MR

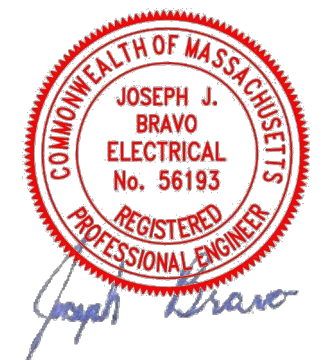
SITE LOCATION			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
F102502	8/31/2021	G.J.	PV-1



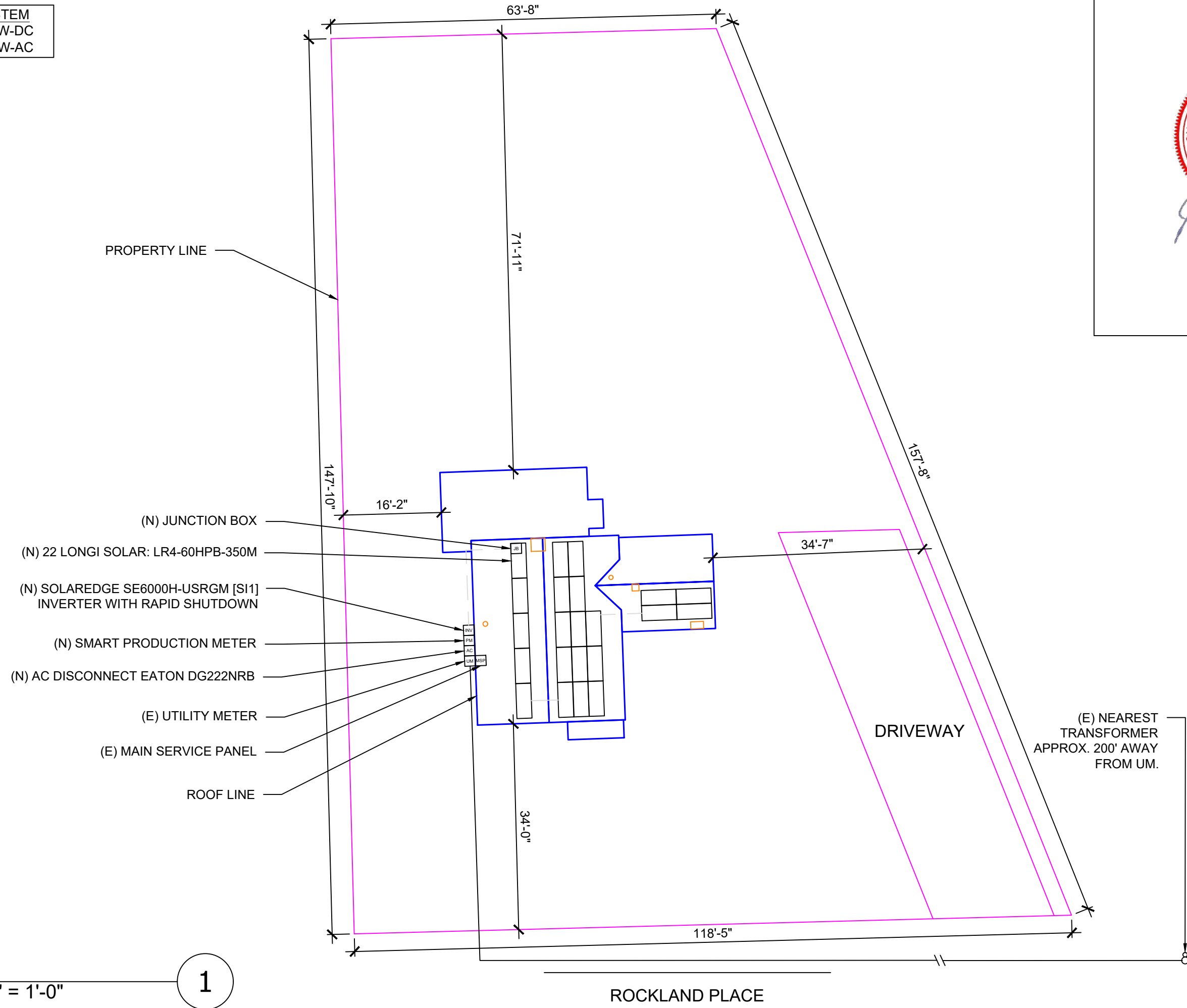
**LEGEND:**

	OBSTRUCTION
	PIPE VENT
	MODULES
	CONDUIT
	UTILITY METER
	AC DISCONNECT
	MSP
	JUNCTION BOX
	INVERTER
	SMART PRODUCTION METER
	SMART PRODUCTION METER

**PV SYSTEM**  
 7.700 kW-DC  
 6.000 kW-AC



AC DISCONNECT IS 24/7 ACCESSIBLE, WITHIN 10 FEET OF, WITHIN VISIBLE SIGHT OF, AND ON SAME WALL AS THE UTILITY METER.



ROOF AREA: 1642.66 SQ FT

**CLIENT:**  
 MARGARET ALEXANDER  
 87 ROCKLAND PLACE, NEWTON, MA 02464  
 AHJ: CITY OF NEWTON (MA)  
 UTILITY: EVERSOURCE ENERGY (EASTERN MA)  
 PHONE: (617) 332-3731

**SYSTEM:**  
 SYSTEM SIZE (DC): 22 X 350 = 7.700 kW  
 SYSTEM SIZE (AC): 6.000 kW @ 240V  
 MODULES: 22 X LONGI SOLAR: LR4-60HPB-350M  
 OPTIMIZERS: 22 X SOLAREEDGE P401  
 INVERTER: SOLAREEDGE SE6000H-USRGM [S11]

REVISIONS

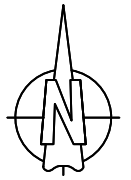
NO.	DESCRIPTION	DATE

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SITE PLAN

JOB NO: F102502	DATE: 8/31/2021	DESIGNED BY: G.J.	SHEET: PV-2
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**SITE PLAN**  
 SCALE: 1/16" = 1'-0"

1

ROCKLAND PLACE

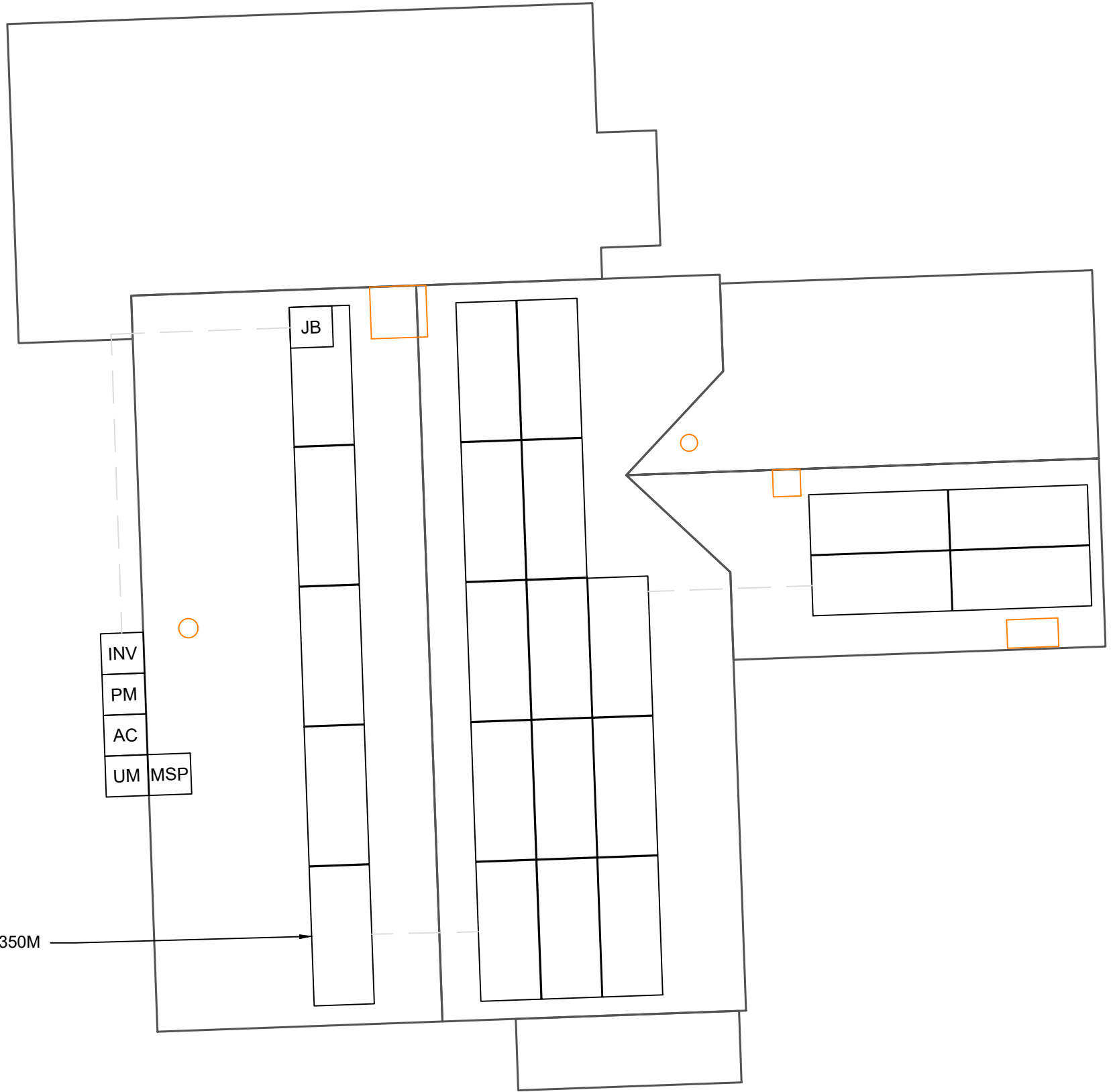
(E) NEAREST TRANSFORMER APPROX. 200' AWAY FROM UM.

**LEGEND:**

	OBSTRUCTION
	PIPE VENT
	MODULES
	CONDUIT
	UTILITY METER
	AC DISCONNECT
	MSP
	JUNCTION BOX
	INVERTER
	SMART PRODUCTION METER
	PM

**PV SYSTEM**  
**7.700 kW-DC**  
**6.000 kW-AC**

AC DISCONNECT IS 24/7 ACCESSIBLE, WITHIN 10 FEET OF, WITHIN VISIBLE SIGHT OF, AND ON SAME WALL AS THE UTILITY METER.



(N) 22 LONGI SOLAR: LR4-60HPB-350M



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

**1**

**NOTES:**

- EMT CONDUIT ATTACHED TO THE ROOF USING CONDUIT MOUNTS
- ATTACHED CLAMPS AT 25% FROM THE EDGE AND 50% FROM THE CENTER OF THE MODULES
- JUNCTION BOX IS MOUNTED TO THE RAIL.



By Yuri at 6:40:39 AM, 9/2/2021

ROOF AREA: 1642.66 SQ FT

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REVISIONS		
NO.	DESCRIPTION	DATE



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 1136 MR

ROOF PLAN WITH MODULES LAYOUT

JOB NO: F102502	DATE: 8/31/2021	DESIGNED BY: G.J.	SHEET: PV-2A
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By Yuri at 6:40:41 AM, 9/2/2021

## ROOF DETAILS:

TOTAL ROOF AREA: 1642.66 SQ FT  
 ARRAY COVERAGE: 24.17%  
 SYSTEM DISTRIBUTED WEIGHT: 2.31 LBS  
 UNIRAC: SFM INFINITY MICRORAIL POINT-LOAD: 22.92 LBS

ROOF AREA STATEMENT						
ROOF	MODULE QUANTITY	ROOF PITCH	ARRAY PITCH	AZIMUTH	ROOF AREA	ARRAY AREA
1	13	43°	43°	88°	500.38 SQ FT	234.65 SQ FT
2	4	43°	43°	178°	176.08 SQ FT	72.2 SQ FT
3	5	43°	43°	268°	492.24 SQ FT	90.25 SQ FT

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REVISIONS		
NO.	DESCRIPTION	DATE



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ROOF DETAILS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
F102502	8/31/2021	G.J.	PV-2B



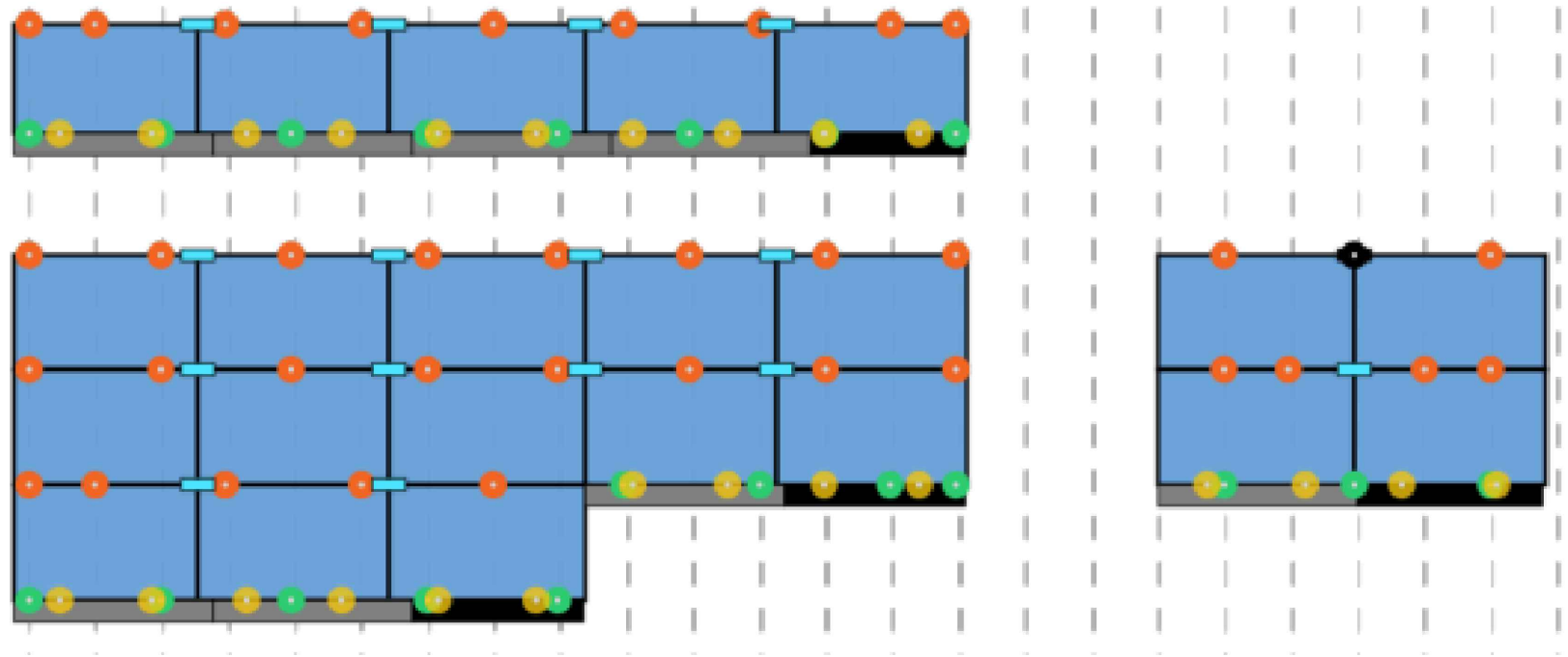
**LEGEND**

**Module (Roof Zones)**

- Zone 1
- Zone 2
- Zone 3

**SFM Components**

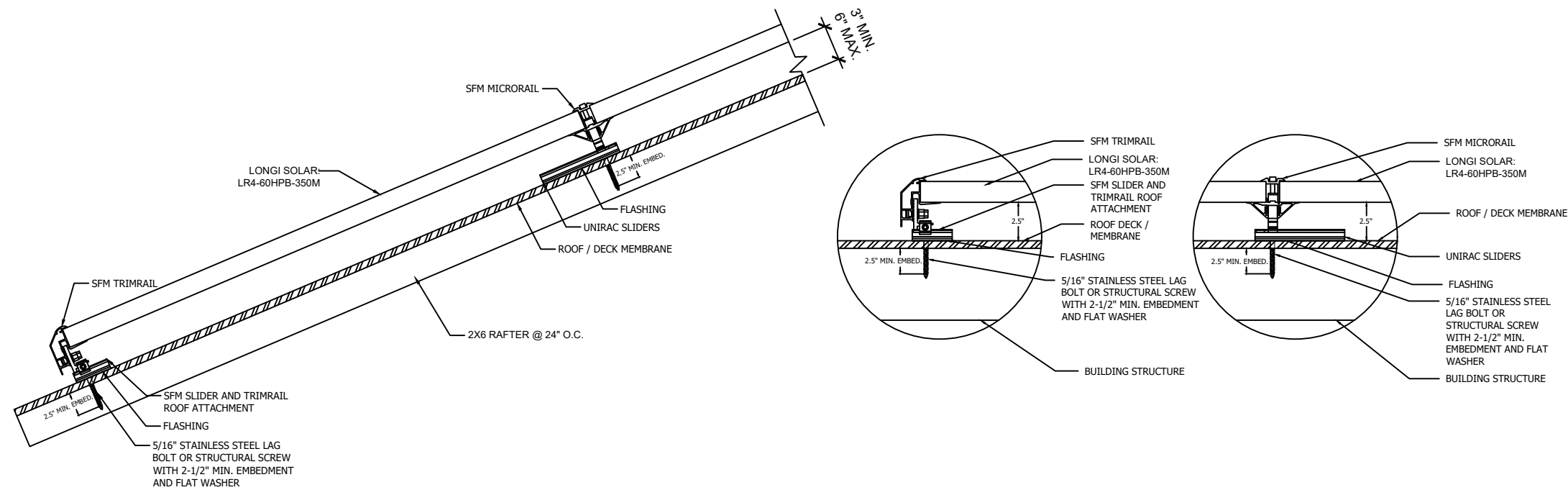
- SFM Microrail 2"
- SFM Splice 6.5"
- SFM Attached Splice 8"
- SFM Trim Attachment
- SFM Trim Univ Clip
- Full Trim Section
- Cut Trim Section



**PARTIAL ROOF FRAMING PLAN**

**MAX ATTACHMENT SPAN - 4' STAGGERED**

Scale: NTS



**SOLAR PV ARRAY SECTION VIEW**

Scale: NTS

**ATTACHMENT DETAIL**

Scale: NTS



By Yuri at 6:40:42 AM, 9/2/2021

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REVISIONS		
NO.	DESCRIPTION	DATE

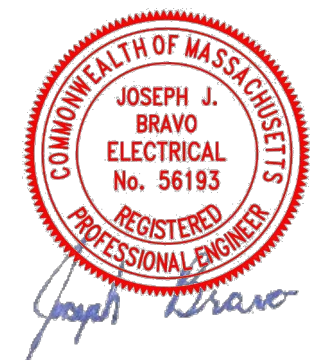


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1136 MR

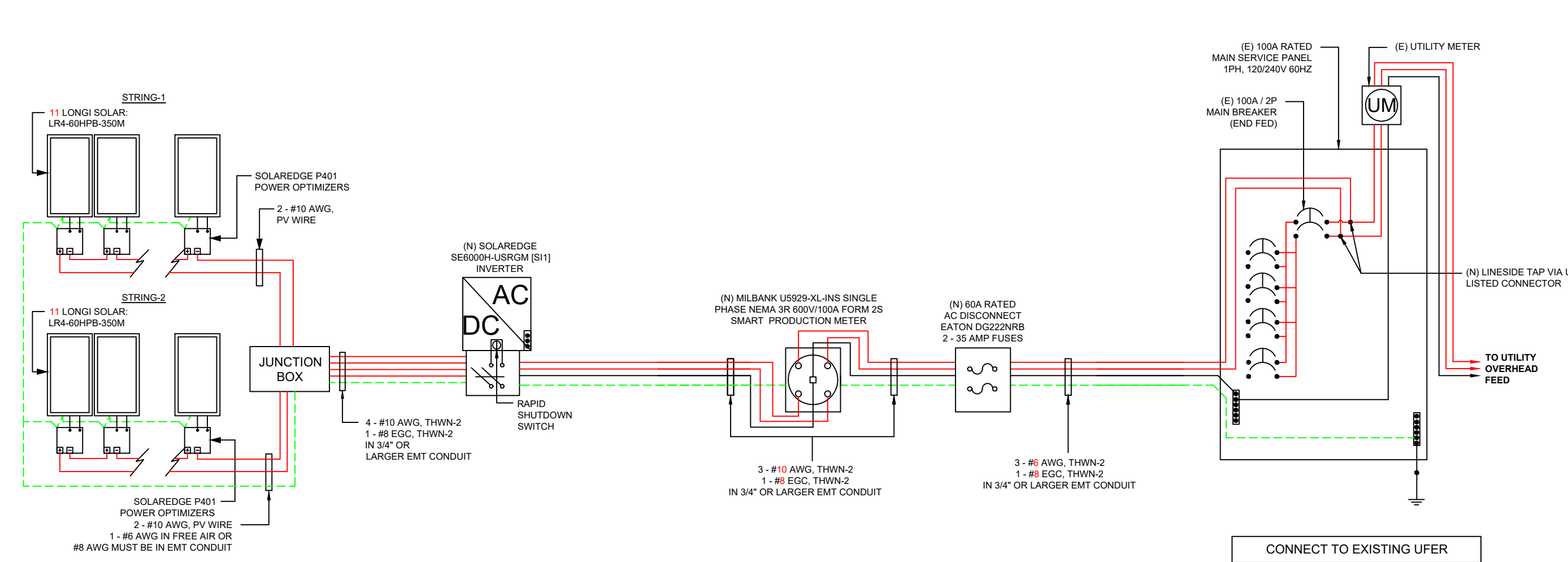
MOUNTING DETAILS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
F102502	8/31/2021	G.J.	PV-3

BACKFEED FUSE SIZING		PV SYSTEM	
MAX. CONTINUOUS OUTPUT 25.00A @ 240V		7.700 kW-DC	
25.00	X 1.25 = 31AMPS	35A FUSES - OK	
		6.000 kW-AC	



*Joseph J. Bravo*

AC DISCONNECT IS 24/7 ACCESSIBLE, WITHIN 10 FEET OF, WITHIN VISIBLE SIGHT OF, AND ON SAME WALL AS THE UTILITY METER.



CONNECT TO EXISTING UFER

NOTE:  
CONDUIT AND CONDUCTORS SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS

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THREE LINE DIAGRAM			
JOB NO: F102502	DATE: 8/31/2021	DESIGNED BY: G.J.	SHEET: PV-4




**WIRE SCHEDULE**

RACEWAY #	EQUIPMENT			WIRE LOCATION	CONDUCTOR QTY.	AWG WIRE SIZE	STARTING ALLOWABLE AMPACITY @ 90°C 310.15(B)(16)	TEMPERATURE CORRECTION FACTOR 310.15(B)(2)(a)	ADJUSTMENT FACTOR FOR MORE THAN 3 CONDUCTORS 310.15(B)(3)(a)	ADJUSTED CONDUCTOR AMPACITY @ 90°C	MAXIMUM CURRENT APPLIED TO CONDUCTORS IN RACEWAY	
1	DC	MODULE	TO	OPTIMIZER	ROOF / FREE-AIR	2	10	40	0.96	1	38.40	17.44
2	DC	OPTIMIZER	TO	JUNCTION BOX	ROOF / FREE-AIR	2	10	40	0.96	1	38.40	18.75
3	DC	JUNCTION BOX	TO	INVERTER	EXTERIOR WALL	4	10	40	0.96	0.8	30.72	18.75
4	AC	INVERTER	TO	PRODUCTION METER	EXTERIOR WALL	3	10	40	0.96	1	38.40	31.25
5	AC	PRODUCTION METER	TO	AC DISCONNECT	EXTERIOR WALL	3	10	40	0.96	1	38.40	31.25
6	AC	AC DISCONNECT	TO	POI	EXTERIOR WALL	3	6	75	0.96	1	72.00	31.25

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 135 ROBERT TREAT PAINE DR., TAUTON, MA 02780  
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CONDUCTOR CALCULATIONS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
F102502	8/31/2021	G.J.	PV-5





*Joseph Bravo*

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 1136 MR

EXISTING SERVICE PANEL			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
F102502	8/31/2021	G.J.	PV-5B



## BREAKER SIZES:

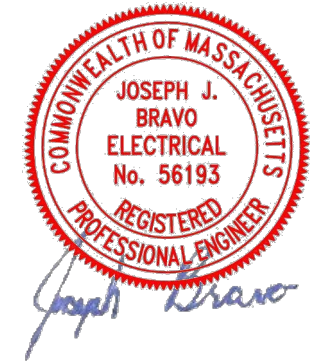

## SERVICE LIST:

NONE

## MATERIAL LIST:

QTY.	PART	PART #	DESCRIPTION
22	MODULES	114-350	LONGI SOLAR: LR4-60HPB-350M
22	OPTIMIZERS	130-401	SOLAREEDGE P401 POWER OPTIMIZER - FRAME MOUNTED MODULE ADD-ON
1	JUNCTION BOX	480-276	600VDC NEMA 3R UL LISTED JUNCTION BOX
2	CONNECTORS	240-300	STAUBLI / MULTI-CONTACT MC4 CONNECTORS (FEMALE)
2	CONNECTORS	240-301	STAUBLI / MULTI-CONTACT MC4 CONNECTORS (MALE)
1	INVERTER	120-603	SOLAREEDGE SE6000H-USRGM [S1] 240V INVERTER UL 1741 SA CERTIFIED INTEGRATED ARC FAULT PROTECTION AND RAPID SHUTDOWN
1	AC DISCONNECT	323-061	60A RATED 240VAC NEMA 3R UL LISTED
1	FUSES	330-035	35A FUSE 1 PH 240VAC
1	FUSE REDUCER	330-530	30A-60A FUSE REDUCER
1	PRODUCTION METER	333-011	EATON B-LINE 011 METER SOCKET 125A 4 JAW 1PH NEMA 3R FORM 2S TOP FEED
40	ROOF ATTACHMENT 1	261-602	UNIRAC: SFM INFINITY MICRORAIL
16	SFM TRIM 1	241-253	FLASHKIT SFM TRIM COMP DARK
42	SFM SLIDER 1	261-603	FLASHKIT SFM SLIDER COMP DARK
13	BONDING CLAMP 1	221-100	SFM N/S BONDING CLAMP
5	BONDING CLAMP 1	241-404	SFM TRIM BONDING CLAMP
24	MOUNT ASSEMBLY 1	241-405	MLPE MOUNT ASSY
13	SFM SPLICE 1	261-604	SFM SPLICE
3	SFM ATTACHED SPLICE 1	211-101	SFM ATTACHED SPLICE 8 INCH
19	TRIMRAIL 1	261-606	SFM TRIMRAIL UNIV CLIP W/ HDW
6	TRIM SPLICE 1	261-605	SFM TRIM SPLICE DRK
10	TRIMRAIL 1	211-115	SFM TRIMRAIL UNIV DRK
22	GROUND LUG 1	260-585	ILSCO GROUND LUG
22	TRIM END CAPS 1	221-200	UNIRAC SFM TRIM END CAPS

PART NUMBER	PART TYPE	DESCRIPTION	QUANTITY
256072U	<b>Trim</b>	SFM TRIMRAIL 72 UNIV DRK	12
250120U	<b>Trim Splice</b>	SFM TRIM SPLICE DRK	8
004200D	<b>Roof Attachment</b>	FLASHKIT SFM TRIM COMP DARK	20
250020U	<b>MicroRail (3)</b>	SFM MICRORAIL 2"	36
250030U	<b>MicroRail Att Splice</b>	SFM ATT SPLICE 8"	1
250010U	<b>MicroRail Splice</b>	SFM SPLICE 6.5"	15
004270D	<b>Roof Attachment</b>	FLASHKIT SFM SLIDER COMP DARK	37
008100U	<b>Bonding Clamp</b>	SFM TRIM BONDING CLAMP	4
250110U	<b>Clip</b>	SFM TRIMRAIL UNIV CLIP W/HDW	24
008009P	<b>Grounding Lug</b>	ILSCO LAY IN LUG (GBL4DBT)	3
008000U	<b>N-S Wire Clip</b>	SFM N/S BONDING CLAMP	6
250130U	<b>End Cap</b>	SFM TRIM END CAPS	4



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### EQUIPMENT & SERVICE LIST

JOB NO:	DATE:	DESIGNED BY:	SHEET:
F102502	8/31/2021	G.J.	PV-6

**MAIN PHOTOVOLTAIC SYSTEM DISCONNECT**  
690.13(B)

**DO NOT DISCONNECT UNDER LOAD**  
NEC 690.15 (B) & NEC 690.33(D)(2)

**WARNING**  
SINGLE 120-VOLT SUPPLY DO NOT CONNECT MULTIWIRED BRANCH CIRCUITS  
NEC 710.15(C) & 692.9 (C)

**WARNING** DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM  
NEC 705.12(D) & NEC 690.59

**WARNING**  
TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL  
NEC 110.27(C) & OSHA 1910.145(F)(7)

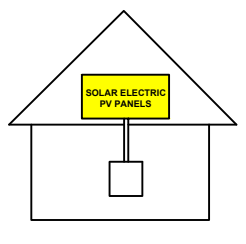
**WARNING**  
ELECTRICAL SHOCK HAZARD  
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION  
706.15(C)(4) & 690.13(B)

**WARNING**  
THIS EQUIPMENT FED BY MULTIPLE SOURCES: TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN POWER SUPPLY SHALL NOT EXCEED AMPACITY OF BUSBAR  
NEC 705.12(B)(3)(E)

**WARNING**  
THE DISCONNECTION OF THE GROUNDED CONDUCTOR(S) MAY RESULT IN OVERVOLTAGE ON THE EQUIPMENT  
NEC 690.31(E)

**RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM**  
690.56(C)(3)

**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  
IFC 605.11.3.1(1) & 690.56(C)



**CAUTION**  
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED  
NEC 705.12(D) & NEC 690.59

**WARNING**  
POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.  
NEC 705.12(C) & NEC 690.59

**WARNING**  
ARC FLASH AND SHOCK HAZARD APPROPRIATE PPE REQUIRED  
24 INCH FLASH HAZARD BOUNDARY  
3 CALCMF2 FLASH HAZARD AT 18 INCHES  
480 VAC SHOCK HAZARD WHEN COVER IS REMOVED  
42 INCH LIMITED APPROACH  
12 INCH RESTRICTED APPROACH - 500 V CLASS 00 GLOVES  
1 INCH PROHIBITED APPROACH - 500 V CLASS 00 GLOVES  
LOCATION: 87 ROCKLAND PLACE NEWTON, MA 02464

**PHOTOVOLTAIC AC DISCONNECT**  
NEC 690.13(B)

**PHOTOVOLTAIC AC DISCONNECT**  
RATED AC OUTPUT CURRENT: **25.00A**  
NOMINAL OPERATING AC VOLTAGE: **240V**  
NEC 690.54

**WARNING** DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM  
NEC 705.12(D) & NEC 690.59

**SOLAR PV DC CIRCUIT**  
EVERY 10' ON CONDUIT AND ENCLOSURES  
NEC 690.31(O)(2)

**PHOTOVOLTAIC POWER SOURCE**  
EVERY 10' ON CONDUIT AND ENCLOSURES  
NEC 690.31(D)(2)

MAXIMUM VOLTAGE **480** V  
MAXIMUM CIRCUIT CURRENT **16.5** A  
MAX DC-DC CONVERTER OUTPUT CURRENT **15** A

**NOTES:**

- NEC ARTICLES 690 AND 705 AND IRC SECTION R324 MARKINGS SHOWN HEREON.
- ALL MARKING SHALL CONSIST OF THE FOLLOWING:
  - UV RESISTANT SIGN MATERIAL WITH ENGRAVED OR MACHINE PRINTED LETTERS OR ELECTRO-PLATING.
  - RED BACKGROUND COLOR WHITE TEXT AND LINE WORK.
  - ARIAL FONT.
- ALL SIGNS SHALL BE SIZED APPROPRIATELY AND PLACED IN THE LOCATIONS SPECIFIED. SIGNAGE CANNOT BE HAND-WRITTEN.
- SIGNS SHALL BE ATTACHED TO THE SERVICE EQUIPMENT WITH POP-RIVETS OR SCREWS



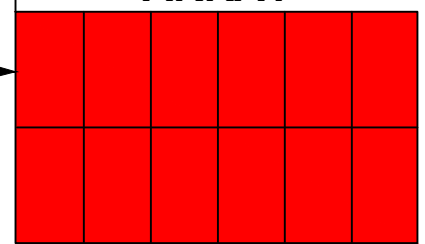
**PHOTOVOLTAIC DC DISCONNECT**  
NEC 690.13(B)

**MAXIMUM DC VOLTAGE OF PV SYSTEM**  
NEC 690.53

**WARNING**  
ELECTRICAL SHOCK HAZARD  
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION  
DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT  
706.15(C)(4) & 690.13(B)

**WARNING**  
ELECTRICAL SHOCK HAZARD  
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION  
706.15(C)(4) & 690.13(B)

**WARNING**  
TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL  
NEC 110.27(C) & OSHA 1910.145(F)(7)



NEC 690.31(G)(3) & (4)

CLIENT:  
MARGARET ALEXANDER  
87 ROCKLAND PLACE, NEWTON, MA 02464  
AHJ: CITY OF NEWTON (MA)  
UTILITY: EVERSOURCE ENERGY (EASTERN MA)  
PHONE: (617) 332-3731

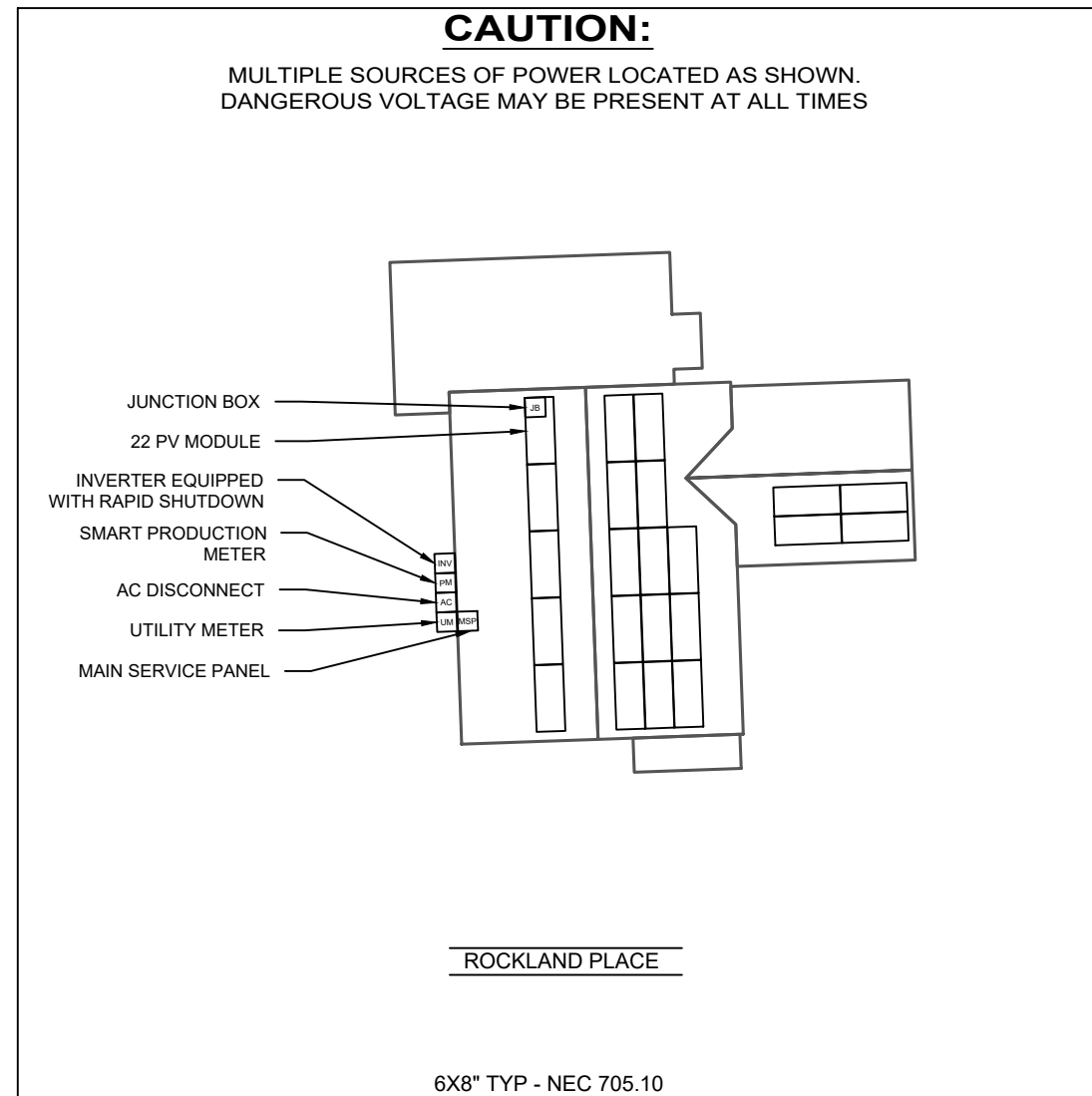
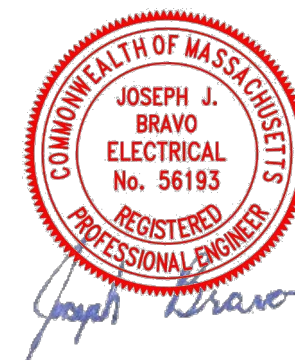
SYSTEM:  
SYSTEM SIZE (DC): 22 X 350 = 7.700 kW  
SYSTEM SIZE (AC): 6.000 kW @ 240V  
MODULES: 22 X LONGI SOLAR: LR4-60HPB-350M  
OPTIMIZERS: 22 X SOLAREDGE P401  
INVERTER: SOLAREDGE SE6000H-USRGM [S11]

REVISIONS		
NO.	DESCRIPTION	DATE

**freedom FOREVER**  
FREEDOM FOREVER MASSACHUSETTS LLC  
135 ROBERT TREAT PAINE DR., TAUNTON, MA 02780  
Tel: (800) 385-1075  
MATTHEW MARKHAM

*Matthew Markham*  
CONTRACTOR LICENSE:  
HOME IMPROVEMENT CONTRACTOR 198080:  
BUSINESS ELECTRICAL CONTRACTOR LICENSE 902-EL-A1; CONSTRUCTION SUPERVISOR LICENSE CS-111662; MASTER ELECTRICIAN 1136 MR

LABELS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
F102502	8/31/2021	G.J.	PV-7



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1136 MR

SITE PLACARD

JOB NO: F102502	DATE: 8/31/2021	DESIGNED BY: G.J.	SHEET: PV-7A
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**NOTES:**

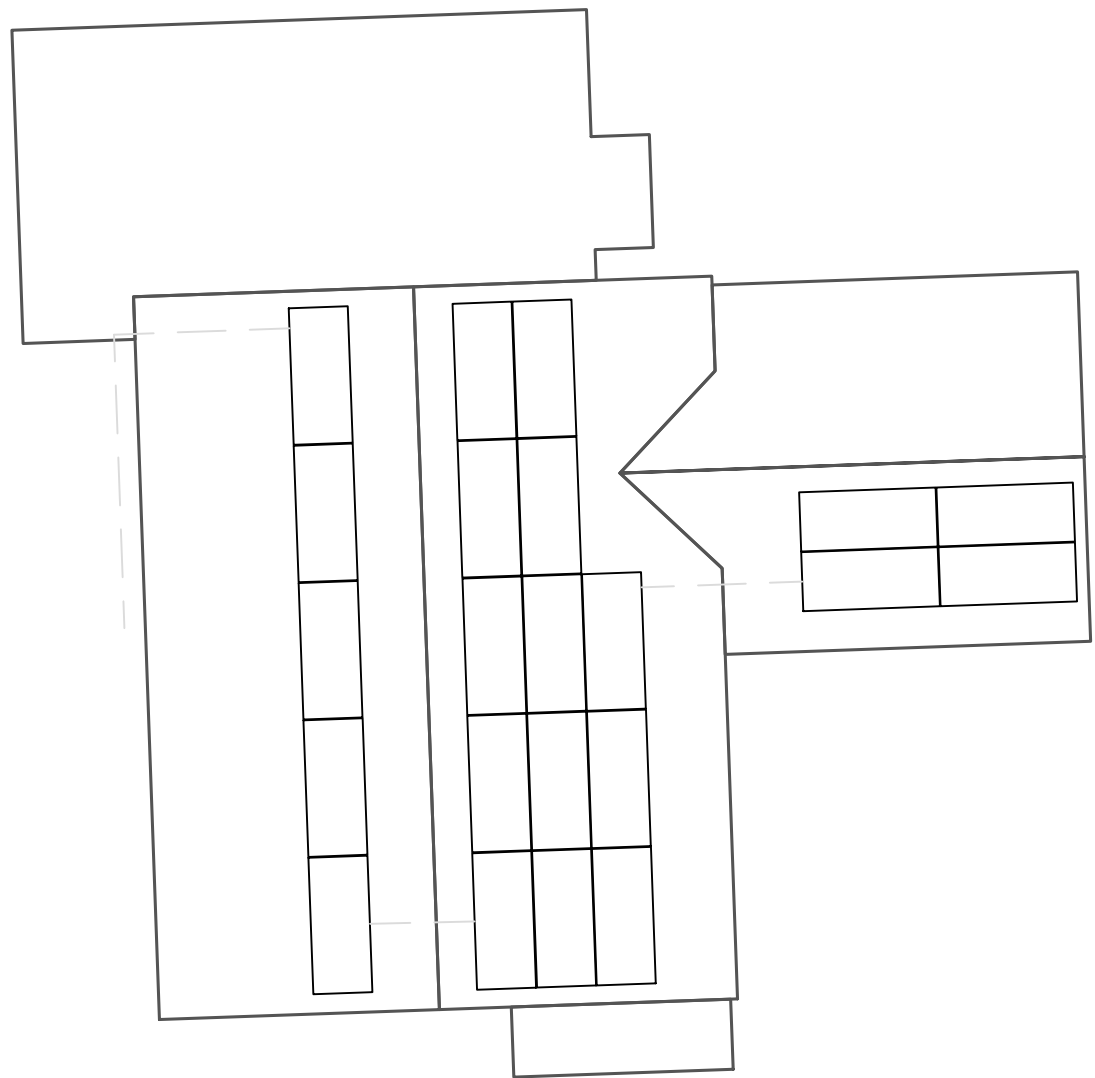
1. NEC ARTICLES 690 AND 705 AND IRC SECTION R324 MARKINGS SHOWN HEREON.
2. ALL MARKING SHALL CONSIST OF THE FOLLOWING:
  - A. UV RESISTANT SIGN MATERIAL WITH ENGRAVED OR MACHINE PRINTED LETTERS OR ELECTRO-PLATING.
  - B. RED BACKGROUND COLOR WHITE TEXT AND LINE WORK.
  - C. AERIAL FONT.
3. ALL SIGNS SHALL BE SIZED APPROPRIATELY AND PLACED IN THE LOCATIONS SPECIFIED. SIGNAGE CANNOT BE HAND-WRITTEN.
4. SIGNS SHALL BE ATTACHED TO THE SERVICE EQUIPMENT WITH POP-RIVETS OR SCREWS.



# SOLAREEDGE OPTIMIZER CHART

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

1  
2  
3  
4  
5  
6  
7  
8  
9  
10

ROCKLAND PLACE

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OPTIMIZER CHART			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
F102502	8/31/2021	G.J.	PV-8

# SAFETY PLAN

## INSTRUCTIONS:

1. USE SYMBOLS IN KEY TO MARK UP THIS SHEET.
2. SAFETY PLAN MUST BE MARKED BEFORE JOB STARTS AS PART OF THE PRE-PLAN
3. DOCUMENT ALL ADDITIONAL HAZARDS ON THIS PAGE & MAKE NOTES ON THE JHA SHEET

## IN CASE OF EMERGENCY

NEAREST HOSPITAL OR OCCUPATIONAL/INDUSTRIAL CLINIC

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

### SAFETY COACH CONTACT INFORMATION

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

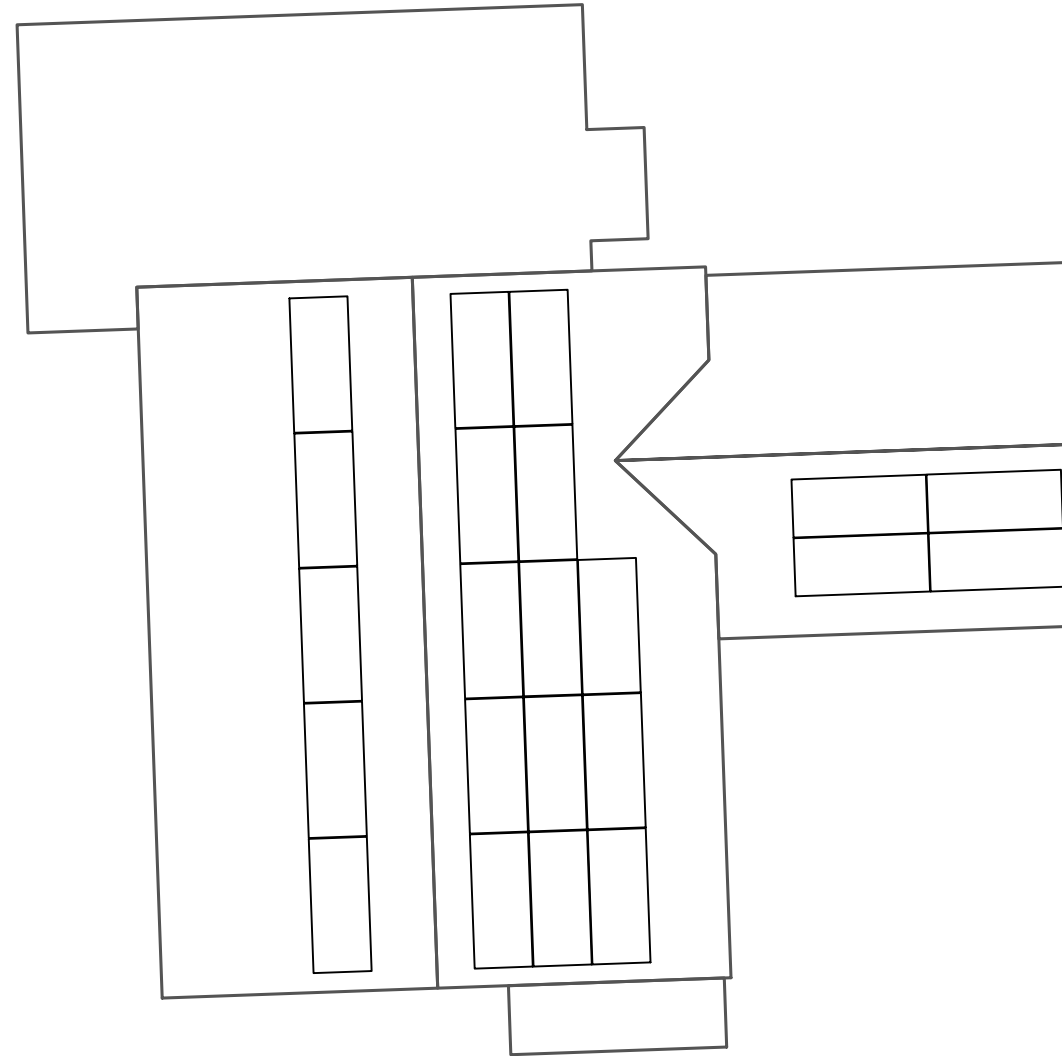
ALL EMPLOYEES ON SITE SHALL BE MADE AWARE OF THE SAFETY PLAN AND SIGN INDICATING THAT THEY ARE AWARE OF THE HAZARDS ON-SITE AND THE PLAN FOR WORKING SAFELY.

NAME

SIGNATURE














<u>NAME</u>	<u>SIGNATURE</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

DATE: \_\_\_\_\_ TIME: \_\_\_\_\_



ROCKLAND PLACE

# MARK UP KEY

-  PERMANENT ANCHOR
-  TEMPORARY ANCHOR
-  INSTALLER LADDER
-  JUNCTION / COMBINER BOX
-  STUB-OUT
-  SKYLIGHT
-  NO LADDER ACCESS (STEEP GRADE OR GROUND LEVEL OBSTRUCTIONS)
-  RESTRICTED ACCESS
-  CONDUIT
-  GAS SHUT OFF
-  WATER SHUT OFF
-  SERVICE DROP
-  POWER LINES

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### REVISIONS

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02780  
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1136 MR

### SAFETY PLAN

JOB NO:	DATE:	DESIGNED BY:	SHEET:
F102502	8/31/2021	G.J.	PV-9

# JOB HAZARD ANALYSIS

Crew leader to fill out all sections below, hold a pre-job safety meeting with all personnel, and upload this completed document and the Safety Plan to Site Capture

## Ladder Access

- Ladders must be inspected before each use.
- Extension ladders must be set up on a firm and level surface at a 4-to-1 rise to run angle (or 75 degrees) and the top must be secured to the structure. Extension style ladders placed on uneven, loose or slippery surfaces must additionally have the base firmly anchored or lashed so the base will not slip out.
- Extension ladders must be used with walk-through devices or the ladder must extend 36" above the stepping off point.
- A-frame ladders must only be climbed with the ladder spreader bars locked in the open position; A-frame ladders shall not be climbed while in the closed position (ex, closed and used while leaned against a structure).

Additional notes:

## Mobile Equipment

- Only Qualified operators will operate equipment; operators must maintain a certification on their person for the equipment being operated.
- Type(s) of mobile equipment (Type/Make/Model):
- Qualified operator(s):

## Material Handling and Storage

- Materials will be staged/stored in a way that does not present a hazard to client, personnel or public. Materials stored on the roof will be physically protect from failing or sliding off.

## Fall Protection

- A site-specific plan for fall prevention and protection is required prior to starting work and must remain onsite at all times until work is complete; a fall rescue plan must be outlined and discussed among the crew prior to work start.
- First-person-Up (FPU) must install their anchor and connect before any other task, including installing other anchors. The Last-Person-Down (LPD) must be the only person on a roof uninstalling fall protection.

FPCP (name and title):

FPU and LPD (name and title):

## Electrical Safety

- The Electrical Qualified Person (EQP) is required onsite to perform electrical work.
- All electrical work will be performed with equipment in an electrically safe condition (de-energized) unless approval has been granted prior to work.
- Service drops and overhead electrical hazards will be identified and protected from contact, as necessary.

EQP (name and title):

## Public Protection

- The safety of the Client and Public must be maintained at all times.
- The Client and the Public shall be prevented from entering the work zone through the use of barriers and/or signage, as required.
- Company, Client and Public property shall be protected from falling objects.
- Pets (including dogs) shall be secured by their owners prior to work start.
- The Client should not leave pets, family members, or others in charge or care of Employees, Contractors, or Temporary Workers.

Crew leader responsible for communication with the client:

Client and public is excluded from work area by barricades (N/A, Yes, No):

## Training and Pre-Job Safety Briefing

- All employees onsite shall be made aware of the specific hazards of this project and review this HJA during a pre-job briefing, and their signature indicates awareness of site conditions and the plan to eliminate any hazards identified prior to and during the project.

Crew leader (name/title):

Crew member (name/title):

Crew member (name/title):

Crew member (name/title):

Crew member (name/title):

Crew member (name/title):

## Airborne Contaminants:

- Asbestos-containing (Transite) piping (ACP) - Do not disturb (move, drill, cut fracture, etc.)
- Asbestos-containing thermal insulation (ACI) and Asbestos-containing duct wrapping (ACW) - do not disturb, no attic or crawlspace access is allowed if work to be performed could cause exposure to personnel, client or public.

If yes, list specific tasks and protection in place:

## Weather and Environment

- The site supervisor shall forecast the weather conditions at the job site, prior to crew arrival, in order to mitigate any hazards associated with inclement weather (heat, cold, wind, rain, etc.)
- The site supervisor will utilized a portable wind meter (anemometer) to verify actual onsite wind conditions, by checking at the ground and on any elevated work surface (ex, rooftop) prior to work start, at midday and prior to solar panel staging on a roof.
- Elevated work involving the moving or maneuvering of solar panels shall cease at 25mph (sustained wind) until wind subsides.

Forecasted weather maximum temp (degrees f):

## Heat Related Illness Prevention

- Employees shall have access to potable drinking water that is fresh, pure, and suitably cool. The water shall be located as close as practicable to the areas where employees are working. Water shall be supplied in sufficient quantity at the beginning of the work shift to provide at least one quart per employee per hour for drinking for the entire shift. Employees may begin the shift with smaller quantities of water if they identify the location and have effective means for replenishment during the shift to allow employees to drink on quart or more per hour. The frequent drinking of water shall be encouraged.
- Shade shall be present when temperature exceeds 80 degrees Fahrenheit. When the outdoor temperature in the work exceeds 80 degrees Fahrenheit, employees shall have and maintain one or more areas with shade at all times.
- New employees must be acclimatized. New employees will be monitored by their Crew Leader (site supervisor) for the first two (2) weeks of employment or longer when necessary.
- Employees will be allowed and encouraged to implement scheduled breaks during each shift. Employees must take cool-down breaks in the shade any time they feel the need to do so to protect them from overheating. Supervisors are REQUIRED to allow employees any break period they need during high heat conditions.
- Cool Vests are encouraged for all employees at all times during periods of high heat.
- Identify the location of the closet Occupational/Industrial Clinic or Hospital in case a crew member becomes ill.

What is the specific plan to provide and replenish sufficient water for all employees on site?

If offsite replenish is necessary, where will you go to replenish water (location/address):

Who will replenish the drinking water (name):

## Restroom facilities

- Employees shall have access to restroom facilities with hand-washing stations. Use of onsite restroom is at the client's discretion (location is annotated below). If client does not give permission, location of suitable restroom facilities with hand-washing stations offsite will be provided. The onsite supervisor will identify location and make arrangements to ensure all employees have access at any point.

Restroom facilities will be (circle one): Onsite - Offsite

If Offsite, add location name and address:

## Incident Reporting Procedure

Contact your Site Supervisor  
Name:

Phone:

Contact your Manager  
Name:

Phone:

Contact your Site Supervisor  
Name:

Phone:

With: Your full name, phone number, office location, brief description of what happen and when.

## NOTE ADDITIONAL HAZARDS NOT ADDRESSED ABOVE

(add as many as necessary by using additional sheets)

Define the Hazard:	Method/steps to prevent incident:
Define the Hazard:	Method/steps to prevent incident:
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**CLIENT:**  
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1136 MR

**SAFETY PLAN**

JOB NO: F102502	DATE: 8/31/2021	DESIGNED BY: G.J.	SHEET: PV-10
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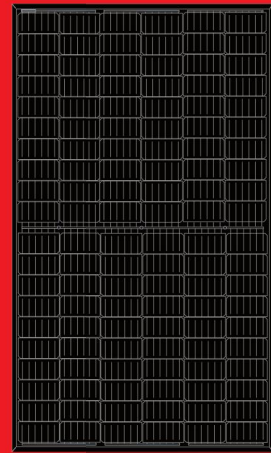


# LR4-60HPB 345~365M

Hi-MO 4m

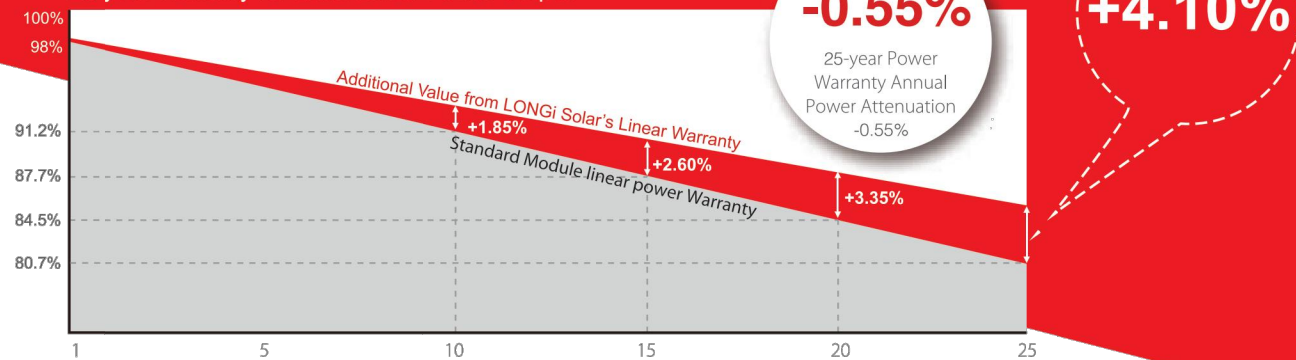
NEW

**High Efficiency  
Low LID Mono PERC with  
Half-cut Technology**



\*Both 6BB & 9BB are available

10-year Warranty for Materials and Processing;  
25-year Warranty for Extra Linear Power Output



### Complete System and Product Certifications

IEC 61215, IEC61730, UL61730  
ISO 9001:2008: ISO Quality Management System  
ISO 14001: 2004: ISO Environment Management System  
TS62941: Guideline for module design qualification and type approval  
OHSAS 18001: 2007 Occupational Health and Safety



\* Specifications subject to technical changes and tests. LONGi Solar reserves the right of interpretation.

**Positive power tolerance** (0 ~ +5W) guaranteed

**High module conversion efficiency** (up to 20%)

**Slower power degradation** enabled by Low LID Mono PERC technology: first year <2%, 0.55% year 2-25

**Solid PID resistance** ensured by solar cell process optimization and careful module BOM selection

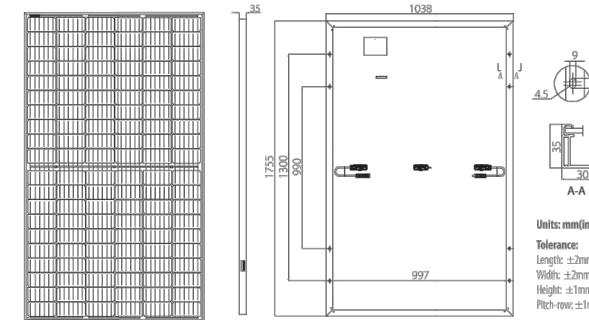
**Reduced resistive loss** with lower operating current

**Higher energy yield** with lower operating temperature

**Reduced hot spot risk** with optimized electrical design and lower operating current

# LR4-60HPB 345~365M

## Design (mm)



## Mechanical Parameters

Cell Orientation: 120 (6×20)  
Junction Box: IP68, three diodes  
Output Cable: 4mm<sup>2</sup>, 300mm in length, length can be customized  
Glass: Single glass  
3.2mm coated tempered glass  
Frame: Anodized aluminum alloy frame  
Weight: 19.5kg  
Dimension: 1755×1038×35mm  
Packaging: 30pcs per pallet  
180pcs per 20'GP  
780pcs per 40'HC

## Operating Parameters

Operational Temperature: -40°C ~ +85°C  
Power Output Tolerance: 0 ~ +5 W  
Voc and Isc Tolerance: ±3%  
Maximum System Voltage: DC1000V (IEC/UL)  
Maximum Series Fuse Rating: 20A  
Nominal Operating Cell Temperature: 45±2°C  
Safety Class: Class II  
Fire Rating: UL type 1 or 2

## Electrical Characteristics

Test uncertainty for Pmax: ±3%

Model Number	LR4-60HPB-345M		LR4-60HPB-350M		LR4-60HPB-355M		LR4-60HPB-360M		LR4-60HPB-365M	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax/W)	345	255.6	350	259.3	355	263.0	360	266.7	365	270.4
Open Circuit Voltage (Voc/V)	40.2	37.5	40.4	37.7	40.6	37.9	40.8	38.1	41.0	38.3
Short Circuit Current (Isc/A)	11.06	8.92	11.16	8.99	11.25	9.06	11.33	9.13	11.41	9.20
Voltage at Maximum Power (Vmp/V)	34.2	31.6	34.4	31.8	34.6	32.0	34.8	32.1	35.0	32.3
Current at Maximum Power (Imp/A)	10.09	8.09	10.18	8.16	10.27	8.23	10.35	8.30	10.43	8.36
Module Efficiency(%)	18.9		19.2		19.5		19.8		20.0	

STC (Standard Testing Conditions): Irradiance 1000W/m<sup>2</sup>, Cell Temperature 25°C, Spectra at AM1.5

NOCT (Nominal Operating Cell Temperature): Irradiance 800W/m<sup>2</sup>, Ambient Temperature 20°C, Spectra at AM1.5, Wind at 1m/S

## Temperature Ratings ( STC )

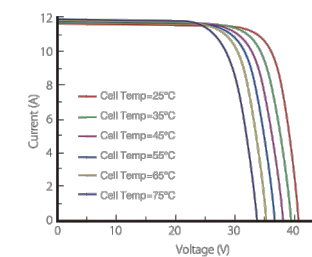
Temperature Coefficient of Isc: +0.057%/°C  
Temperature Coefficient of Voc: -0.286%/°C  
Temperature Coefficient of Pmax: -0.370%/°C

## Mechanical Loading

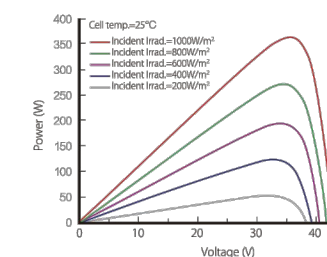
Front Side Maximum Static Loading: 5400Pa  
Rear Side Maximum Static Loading: 2400Pa  
Hailstone Test: 25mm Hailstone at the speed of 23m/s

## I-V Curve

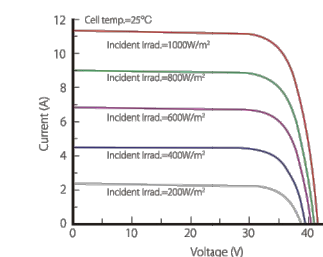
Current-Voltage Curve (LR4-60HPB-360M)



Power-Voltage Curve (LR4-60HPB-360M)



Current-Voltage Curve (LR4-60HPB-360M)



# LONGi

Room 801, Tower 3, Lujiazui Financial Plaza, No.826 Century Avenue, Pudong Shanghai, 200120, China  
Tel: +86-21-80162606 E-mail: module@longi-silicon.com Facebook: www.facebook.com/LONGi Solar

Note: Due to continuous technical innovation, R&D and improvement, technical data above mentioned may be of modification accordingly. LONGi have the sole right to make such modification at anytime without further notice; Demanding party shall request for the latest datasheet for such as contract need, and make it a consisting and binding part of lawful documentation duly signed by both parties.

# LONGi

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# Power Optimizer

For North America

P370 / P400 / P401 / P485 / 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
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

## Power Optimizer For North America

P370 / P400 / P401 / P485 / P505

Optimizer model (typical module compatibility)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P401 (for high power 60 and 72 cell modules)	P485 (for high-voltage modules)	P505 (for higher current modules)	
<b>INPUT</b>						
Rated Input DC Power <sup>(1)</sup>	370	400		485	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	60	80	60	125 <sup>(2)</sup>	83 <sup>(2)</sup>	Vdc
MPPT Operating Range	8 - 60	8 - 80	8-60	12.5 - 105	12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11	10.1	11.75	11	14	Adc
Maximum Efficiency	99.5					%
Weighted Efficiency	98.8					%
Overtoltage Category	II					
<b>OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER)</b>						
Maximum Output Current	15					Adc
Maximum Output Voltage	60			80		Vdc
<b>OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE INVERTER OFF)</b>						
Safety Output Voltage per Power Optimizer	1 ± 0.1					Vdc
<b>STANDARD COMPLIANCE</b>						
Photovoltaic Rapid Shutdown System	NEC 2014, 2017 & 2020			NEC 2014, 2017 & 2020	NEC 2014, 2017 & 2020	
EMC	FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3					
Safety	IEC62109-1 (class II safety), UL1741					
Material	UL94 V-0, UV Resistant					
RoHS	Yes					
<b>INSTALLATION SPECIFICATIONS</b>						
Maximum Allowed System Voltage	1000					Vdc
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters					
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1	129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 153 x 29.5 / 5.1 x 6 x 1.16	129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 162 x 59 / 5.1 x 6.4 x 2.3	mm / in
Weight (including cables)	655 / 1.4	750 / 1.7	655 / 1.4	845 / 1.9	1064 / 2.3	gr / lb
Input Connector	MC4 <sup>(3)</sup>			Single or dual MC4 <sup>(3)(4)</sup>		MC4 <sup>(3)</sup>
Input Wire Length	0.16 / 0.52, 0.9 / 2.95 <sup>(4)</sup>	0.16 / 0.52	0.16 / 0.52, 0.9 / 2.95 <sup>(4)</sup>	0.16 / 0.52	0.16 / 0.52	m / ft
Output Wire Type / Connector	Double Insulated / MC4					
Output Wire Length	1.2 / 3.9					m / ft
Operating Temperature Range <sup>(5)</sup>	-40 to +85 / -40 to +185					°C / °F
Protection Rating	IP68 / NEMA6P					
Relative Humidity	0 - 100					%

(1) Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed  
 (2) NEC 2017 requires max input voltage be not more than 80V  
 (3) For other connector types please contact SolarEdge  
 (4) For dual version for parallel connection of two modules use P485-4NMDMRM. In the case of an odd number of PV modules in one string, installing one P485 dual version power optimizer connected to one PV module. When connecting a single module seal the unused input connectors with the supplied pair of seals  
 (5) For ambient temperature above +85°C / +185°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details

PV System Design Using a SolarEdge Inverter <sup>(6)(7)</sup>	Single Phase HD-Wave	Single phase	Three Phase for 208V grid	Three Phase for 277/480V grid		
Minimum String Length (Power Optimizers)	P370, P400, P401 P485, P505	8	10	18		
Maximum String Length (Power Optimizers)		6	8	14		
Maximum Nominal Power per String		25	25	50		
Parallel Strings of Different Lengths or Orientations		5700 <sup>(8)</sup> (6000 with SE7600-US - SE11400-US)	5250 <sup>(8)</sup>	6000 <sup>(9)</sup>	12750 <sup>(10)</sup>	
		Yes				W

(6) For detailed string sizing information refer to: [http://www.solaredge.com/sites/default/files/string\\_sizing\\_na.pdf](http://www.solaredge.com/sites/default/files/string_sizing_na.pdf)  
 (7) It is not allowed to mix P485/P505 with P370/P400/P401 in one string  
 (8) If the inverters rated AC power ≤ maximum nominal power per string, then the maximum power per string will be able to reach up to the inverters maximum input DC power. Refer to: <https://www.solaredge.com/sites/default/files/se-power-optimizer-single-string-design-application-note.pdf>  
 (9) For 208V grid: it is allowed to install up to 7,200W per string when the maximum power difference between each string is 1,000W  
 (10) For 277/480V grid: it is allowed to install up to 15,000W per string when the maximum power difference between each string is 2,000W

# Single Phase Inverter with HD-Wave Technology

for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US



INVERTERS

## Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)

[solaredge.com](http://solaredge.com)



## Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US		
<b>OUTPUT</b>									
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA	
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA	
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac	
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac	
AC Frequency (Nominal)	59.3 - 60 - 60.5 <sup>(1)</sup>							Hz	
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A	
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A	
GFDI Threshold	1							A	
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes								
<b>INPUT</b>									
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W	
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W	
Transformer-less, Ungrounded	Yes								
Maximum Input Voltage	480							Vdc	
Nominal DC Input Voltage	380				400			Vdc	
Maximum Input Current @240V <sup>(2)</sup>	8.5	10.5	13.5	16.5	20	27	30.5	Adc	
Maximum Input Current @208V <sup>(2)</sup>	-	9	-	13.5	-	-	27	Adc	
Max. Input Short Circuit Current	45							Adc	
Reverse-Polarity Protection	Yes								
Ground-Fault Isolation Detection	600ka Sensitivity								
Maximum Inverter Efficiency	99	99.2						%	
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%	
Nighttime Power Consumption	< 2.5							W	
<b>ADDITIONAL FEATURES</b>									
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)								
Revenue Grade Data, ANSI C12.20	Optional <sup>(3)</sup>								
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect								
<b>STANDARD COMPLIANCE</b>									
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07								
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)								
Emissions	FCC Part 15 Class B								
<b>INSTALLATION SPECIFICATIONS</b>									
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG				1" Maximum / 14-4 AWG				
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG				1" Maximum / 1-3 strings / 14-6 AWG				
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174				21.3 x 14.6 x 7.3 / 540 x 370 x 185				in / mm
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9	38.8 / 17.6				lb / kg	
Noise	< 25				<50				dBA
Cooling	Natural Convection								
Operating Temperature Range	-13 to +140 / -25 to +60 <sup>(4)</sup> (-40°F / -40°C option) <sup>(5)</sup>							°F / °C	
Protection Rating	NEMA 4X (Inverter with Safety Switch)								

<sup>(1)</sup> For other regional settings please contact SolarEdge support

<sup>(2)</sup> A higher current source may be used; the inverter will limit its input current to the values stated

<sup>(3)</sup> Revenue grade inverter P/N: SExxxxH-US000NNC2

<sup>(4)</sup> For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

<sup>(5)</sup> -40 version P/N: SExxxxH-US000NNU4



[pe.eaton.com](http://pe.eaton.com)

## Eaton general duty cartridge fuse safety switch

**DG222NRB**

**UPC:**782113144221

### Dimensions:

- **Height:** 14.37 IN
- **Length:** 7.35 IN
- **Width:** 8.4 IN

**Weight:**10 LB

**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.

### Warranties:

- 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.

### Specifications:

- **Type:** General duty, cartridge fused
- **Amperage Rating:** 60A
- **Enclosure:** NEMA 3R
- **Enclosure Material:** Painted galvanized steel
- **Fuse Class Provision:** Class H fuses
- **Fuse Configuration:** Fusible with neutral
- **Number Of Poles:** Two-pole
- **Number Of Wires:** Three-wire
- **Product Category:** General duty safety switch
- **Voltage Rating:** 240V

### Supporting documents:

- [Eatons Volume 2-Commercial Distribution](#)
- [Eaton Specification Sheet - DG222NRB](#)

### Certifications:

- UL Listed

**Product compliance:** No Data



# Single Meter Sockets Without Bypass

100 Amp Self-Contained

# Single Meter Sockets Without Bypass

100 Amp Self-Contained

Single Meter Sockets/  
Without Bypass



### Application

- Single meter position
- Designed to receive watt-hour meters that meet ANSI C12.10
- Surface or semi-flush mounting
- Overhead or underground feed

### Construction

- Type 3R construction
- Snap type sealing ring included
- 5th jaw provision at nine o'clock - 011 series only
- Ring style

### Standards

- UL 414 listed, complies with ANSI C12.7

### Finish

- ANSI 61 gray acrylic electrocoat finish

### Accessories

- 5th jaw kit — catalog #50365
- Screw type sealing ring — catalog #25016D (included with MS73 catalog numbers)
- Steel and clear lexan covers for socket opening
- AW hubs

011

### Overhead-Surface Mount

CATALOG NUMBER	AIC RATING	AMPACITY MAX. CONT.	VOLTAGE	SERVICE TYPE	NUMBER OF JAWS	HUB PROV.	CONDUCTOR LUG RANGE		FIGURE NUMBER	DIMENSIONS (INCHES)		
							PHASE CONDUCTOR LINE/LOAD	NEUTRAL CONDUCTOR		HEIGHT (H)	WIDTH (W)	DEPTH (D)
011	†	150 125	600	1Ø 3W	4	AW	14 AWG - 2/0 AWG	14 AWG - 2/0 AWG	Fig. 1	12	8	4 5/8
011MS73	†	150 125	600	1Ø 3W	4	AW	14 AWG - 2/0 AWG	14 AWG - 2/0 AWG	Fig. 1	12	8	4 5/8
927	†	150 125	600	3Ø 4W	7	AW	14 AWG - 1/0 AWG	14 AWG - 2/0 AWG	Fig. 3	17	8	4 5/8

### Overhead-Flush Mount

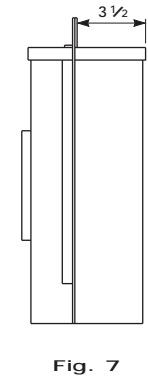
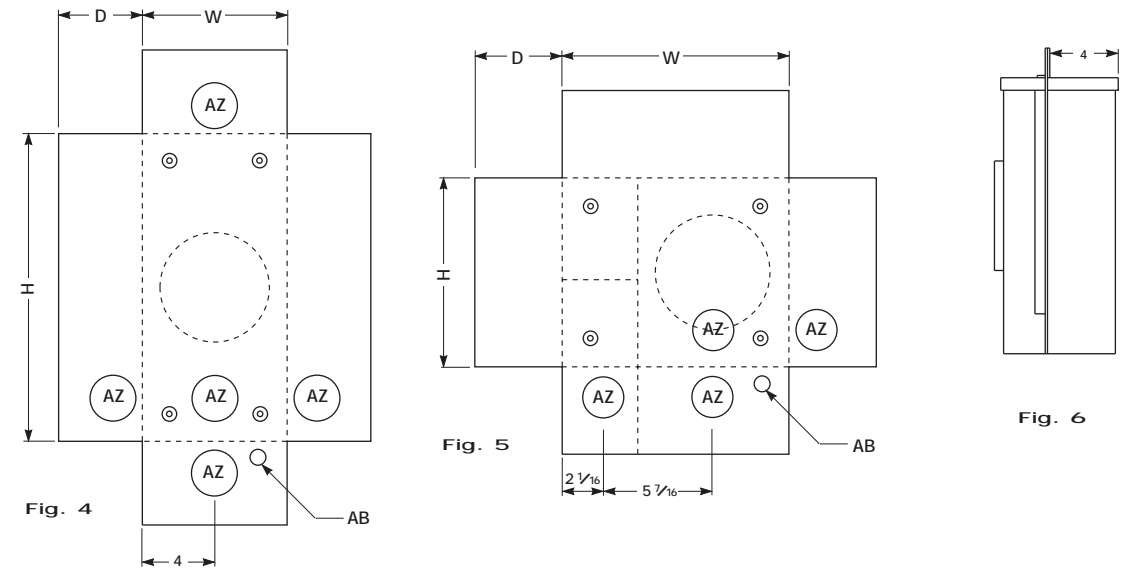
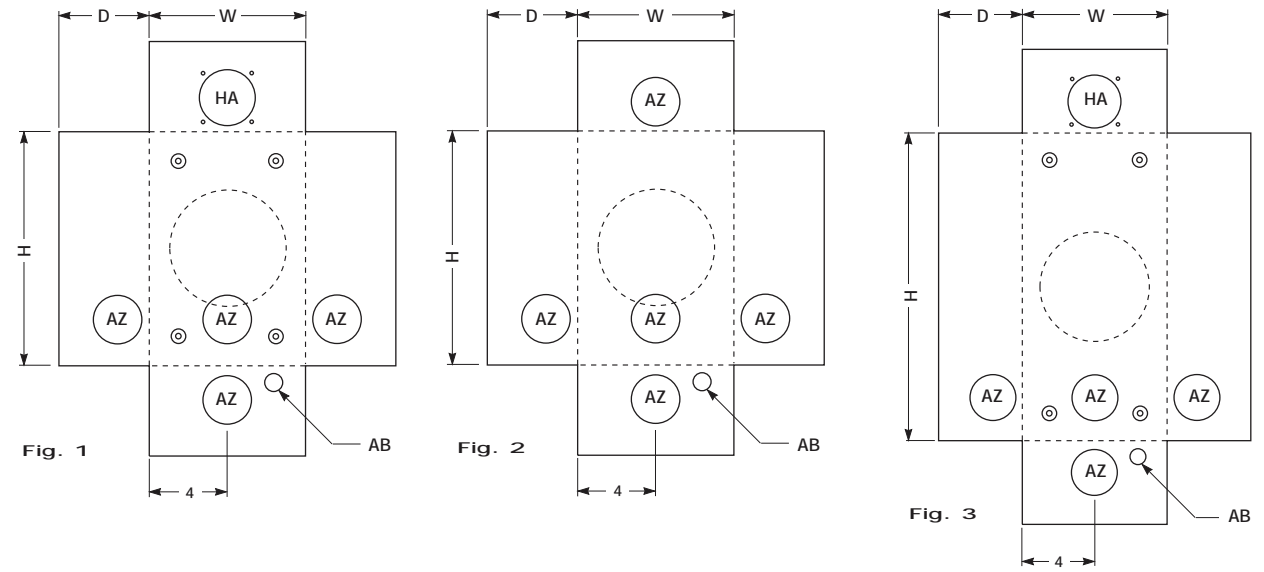
CATALOG NUMBER	AIC RATING	AMPACITY MAX. CONT.	VOLTAGE	SERVICE TYPE	NUMBER OF JAWS	HUB PROV.	CONDUCTOR LUG RANGE		FIGURE NUMBER	DIMENSIONS (INCHES)		
							PHASE CONDUCTOR LINE/LOAD	NEUTRAL CONDUCTOR		HEIGHT (H)	WIDTH (W)	DEPTH (D)
011F	†	150 125	600	1Ø 3W	4	NONE	14 AWG - 2/0 AWG	14 AWG - 2/0 AWG	Fig. 2,6	12	8	4 5/8
011SF	†	150 125	600	1Ø 3W	4	NONE	14 AWG - 2/0 AWG	14 AWG - 2/0 AWG	Fig. 2,7	12	8	4 5/8
927F	†	125 100	600	3Ø 4W	7	NONE	14 AWG - 1/0 AWG	14 AWG - 2/0 AWG	Fig. 4	17	8	4 5/8

### Underground-Surface Mount

CATALOG NUMBER	AIC RATING	AMPACITY MAX. CONT.	VOLTAGE	SERVICE TYPE	NUMBER OF JAWS	HUB PROV.	CONDUCTOR LUG RANGE		FIGURE NUMBER	DIMENSIONS (INCHES)		
							PHASE CONDUCTOR LINE/LOAD	NEUTRAL CONDUCTOR		HEIGHT (H)	WIDTH (W)	DEPTH (D)
U011	†	150 125	600	1Ø 3W	4	NONE	14 AWG - 2/0 AWG	14 AWG - 2/0 AWG	Fig. 5	12	12	4 5/8

† = Meter sockets shown on this page have certain short circuit current ratings when used in conformance with the tables on page 8.

Single Meter Sockets/  
Without Bypass

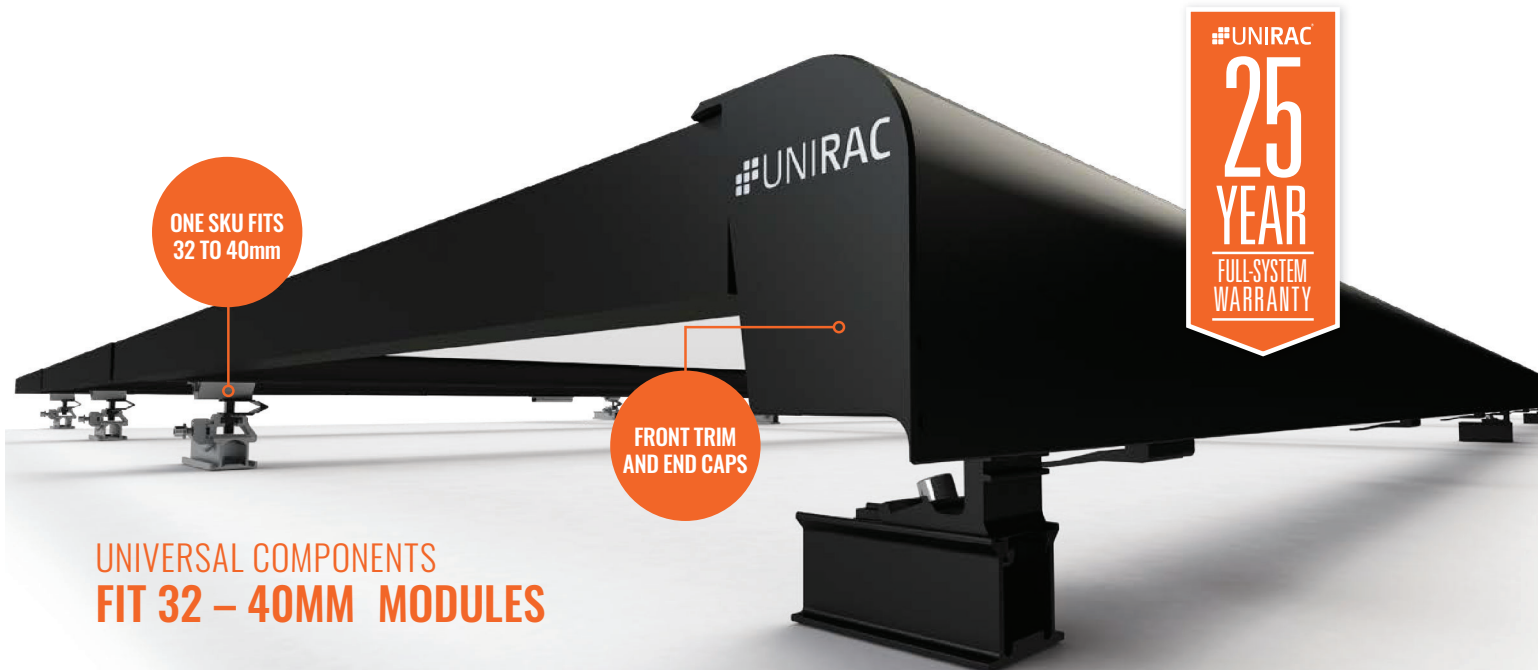


Knockouts — Conduit Sizes	
AB	= 1/2"
AZ	= 2" - 1 1/2" - 1 1/4" - 1"
HA	= AW HUB

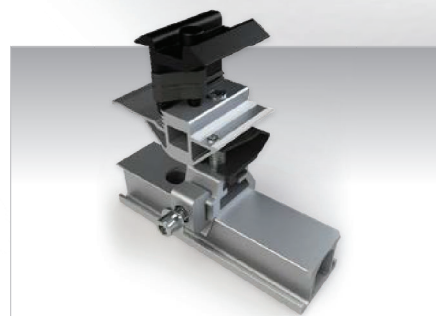
# SFM INFINITY



Take your business to the next level with **SFM INFINITY**, UNIRAC's rail-less PV mounting system for flush mount installations on comp shingle and tile roofs. An advanced 3rd generation product platform in use by top solar contractors nationwide, **SFM INFINITY** optimizes your operations on and off the roof, with approximately 40% less labor, 30% logistics savings, and 20% fewer roof attachments than traditional solar racking. Plus, 87% of homeowners prefer **SFM INFINITY's** aesthetics.



UNIVERSAL COMPONENTS  
FIT 32 – 40MM MODULES



**SUPERIOR PERFORMANCE**  
Enhance your business with two installs per day and 30% less cost.



**EASY INSTALLATION**  
Pre-assembled components, 20% fewer roof attachments, and level array in seconds with post height adjustment.



**HOMEOWNER PREFERRED**  
More than 4 out of 5 homeowners prefer **SFM INFINITY'S** aesthetics over a leading rail brand.

## REVOLUTIONIZING ROOFTOP SOLAR

FOR QUESTIONS OR CUSTOMER SERVICE VISIT [UNIRAC.COM](http://UNIRAC.COM) OR CALL (505) 248-2702

# SFM INFINITY

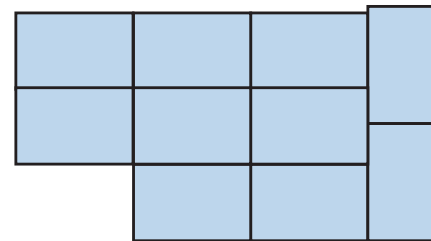
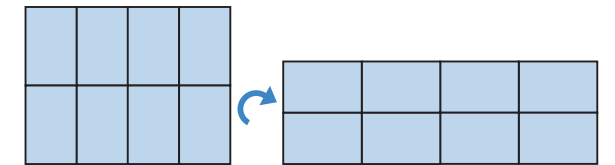
## DESIGN GUIDELINES



While you will see advantages simply from switching to **SFM INFINITY**, the following guidelines will help you to maximize its benefits.

### DEFAULT TO LANDSCAPE

When possible, design in landscape orientation in order to fit more modules on the roof and minimize roof attachments.



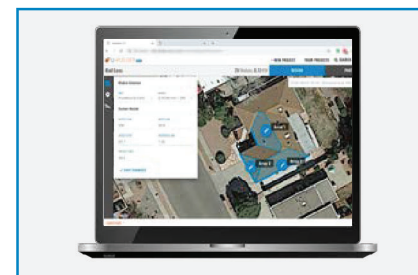
### MIX MODULE ORIENTATIONS

**SFM INFINITY** is easily configured in mixed array shapes and module orientations to maximize array density and to avoid vent pipes and other obstacles. Because mounting locations are not constrained by rails, **SFM INFINITY** has unmatched flexibility to enhance your projects.

### CONSULT THE QUICK TIPS VIDEOS

Visit UNIRAC's mobile-friendly library of short, topic-specific videos which answer common questions and demonstrate how simple it is to install **SFM INFINITY**.

Quick Tips Videos: <https://unirac.com/SFM-Infinity/>



### DESIGN IN U-BUILDER

Layout your arrays in **U-Builder**, UNIRAC's free solar design software, to optimize **SFM INFINITY'S** capabilities, including mixing module orientations and minimizing roof attachments. Quickly create layouts on Google or Bing Maps and generate project documents.

U-Builder: <https://design.unirac.com/>

## REVOLUTIONIZING ROOFTOP SOLAR

FOR QUESTIONS OR CUSTOMER SERVICE VISIT [UNIRAC.COM](http://UNIRAC.COM) OR CALL (505) 248-2702



2.0 Product Description	
Product	Photovoltaic Mounting System, Sun Frame Microrail - Installed Using Unirac Installation Guide, Rev PUB2019MAR01 with Annex North Row Extension Installation Guide Rev PUB2019FEB20
Brand name	Unirac
Description	<p>The product covered by this report is the Sun Frame Micro Rail roof mounted Photovoltaic Rack Mounting System. This system is designed to provide bonding and grounding to photovoltaic modules. The mounting system employs anodized or mill finish aluminum brackets that are roof mounted using the slider, outlined in section 4 of this report. There are no rails within this product, whereas the 3" Micro Rail, Floating Splice, and 9" Attached Splice electrically bond the modules together forming the path to ground.</p> <p>The Micro Rails are installed onto the module frame by using a stainless steel bolt anodized with black oxide with a stainless type 300 bonding pin, torqued to 20 ft-lbs, retaining the modules to the bracket. The bonding pin of the Micro Rail when bolted and torqued, penetrate the anodized coating of the photovoltaic module frame to contact the metal, creating a bonded connection from module to module.</p> <p>The grounding of the entire system is intended to be in accordance with the latest edition of the National Electrical Code, including NEC 250: Grounding and Bonding, and NEC 690: Solar Photovoltaic Systems. Any local electrical codes must be adhered in addition to the national electrical codes. The Grounding Lug is secured to the photovoltaic module, torqued in accordance with the installation manual provided in this document.</p> <p>Other optional grounding includes the use of the Enphase UL2703 certified grounding system, which requires a minimum of 2 micro-inverters mounted to the same rail, and using the same engage cable.</p>
Models	Unirac SFM

2.0 Product Description	
Model Similarity	NA
Ratings	<p><b>Fuse Rating:</b> 30A</p> <p><b>Module Orientation:</b> Portrait or Landscape  <b>Maximum Module Size:</b> 17.98 ft<sup>2</sup>  <b>UL2703 Design Load Rating:</b> 33 PSF Downward, 33 PSF Upward, 10 PSF Down-Slope                      Tested Loads - 50 psf/2400Pa Downward, 50psf/2400Pa Uplift, 15psf/720Pa Down Slope                      Trina TSM-255PD05.08 and Sunpower SPR-E20-327 used for Mechanical Loading</p> <p>Increased size ML test:  <b>Maximum Module Size:</b> 22.3 ft<sup>2</sup>  <b>UL2703 Design Load Rating:</b> 113 PSF Downward, 50 PSF Upward, 30 PSF Down-Slope                      LG355S2W-A5 used for Mechanical Loading test.  <b>Mounting configuration:</b> Four mountings on each long side of panel with the longest span of 24"</p> <p><b>UL2703 Design Load Rating:</b> 46.9 PSF Downward, 40 PSF Upward, 10 PSF Down-Slope                      LG395N2W-A5, LG360S2W-A5 and LG355S2W-A5 used for used for Mechanical Loading test.  <b>Mounting configuration:</b> Six mountings for two modules used with the maximum span of 74.5"</p> <p>Fire Class Resistance Rating:                      - Class A for Steep Slope Applications when using Type 1 Modules. Can be installed at any interstitial gap. Installations must include Trim Rail.                      - Class A for Steep Slope Applications when using Type 2 Modules. Can be installed at any interstitial gap. Installations must include Trim Rail.                      - Class A Fire Rated for Low Slope applications with Type 1 or 2 listed photovoltaic modules. This system was evaluated with a 5" gap between the bottom of the module and the roof's surface</p> <p><i>See section 7.0 illustration # 1 and 1a for a complete list of PV modules evaluated with these racking systems</i></p>
Other Ratings	NA

**AUTHORIZATION TO MARK**

This authorizes the application of the Certification Mark(s) shown below to the models described in the Product(s) Covered section when made in accordance with the conditions set forth in the Certification Agreement and Listing Report. This authorization also applies to multiple listee model(s) identified on the correlation page of the Listing Report.

This document is the property of Intertek Testing Services and is not transferable. The certification mark(s) may be applied only at the location of the Party Authorized To Apply Mark.

<b>Applicant:</b> Unirac, Inc	<b>Manufacturer:</b> Cixi Emeka Aluminum Co. Ltd
<b>Address:</b> 1411 Broadway Blvd NE Albuquerque, NM 87102	<b>Address:</b> No. 688 ChaoSheng Road Cixi City Zhejiang Province 315311
<b>Country:</b> USA	<b>Country:</b> China
<b>Contact:</b> Klaus Nicolaedis Tom Young	<b>Contact:</b> Jia Liu Robin Luo
<b>Phone:</b> 505-462-2190 505-843-1418	<b>Phone:</b> +86-15267030962 +86-13621785753
<b>FAX:</b> NA klaus.nicolaedis@unirac.com	<b>FAX:</b> NA
<b>Email:</b> toddg@unirac.com	<b>Email:</b> jia.liu@cxymj.com buwan.luo@cxymj.com

**Party Authorized To Apply Mark:** Same as Manufacturer  
**Report Issuing Office:** Lake Forest, CA U.S.A.

**Control Number:** 5003705

**Authorized by:** *Natalie Johnson*  
for Dean Davidson, Certification Manager



This document supersedes all previous Authorizations to Mark for the noted Report Number.

This Authorization to Mark is for the exclusive use of Intertek's Client and is provided pursuant to the Certification agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Authorization to Mark. Only the Client is authorized to permit copying or distribution of this Authorization to Mark and then only in its entirety. Use of Intertek's Certification mark is restricted to the conditions laid out in the agreement and in this Authorization to Mark. Any further use of the Intertek name for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. Initial Factory Assessments and Follow up Services are for the purpose of assuring appropriate usage of the Certification mark in accordance with the agreement, they are not for the purposes of production quality control and do not relieve the Client of their obligations in this respect.

Intertek Testing Services NA Inc.  
545 East Algonquin Road, Arlington Heights, IL 60005  
Telephone 800-345-3851 or 847-439-5667 Fax 312-283-1672

<b>Standard(s):</b>	Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels [UL 2703: 2015 Ed.1]
<b>Product:</b>	Photovoltaic Mounting System, Sun Frame Microrail - Installed Using Unirac Installation Guide, Rev PUB2019MAR01 with Annex North Row Extension Installation Guide Rev PUB2019FEB20
<b>Brand Name:</b>	Unirac
<b>Models:</b>	Unirac SFM



July 1, 2020

Unirac  
1411 Broadway Blvd. NE  
Albuquerque, NM 87102

Attn.: Unirac - Engineering Department

Re: Engineering Certification for the Unirac Sunframe Microrail, SFM Infinity U-builder Software

PZSE, Inc. - Structural Engineers has reviewed the Unirac's Sunframe Microrail, proprietary mounting system constructed from modular parts which is intended for rooftop installation of solar photovoltaic (PV) panels; and has reviewed the U-builder Online tool. This U-Builder software includes analysis for the 2" Microrail, 8" Attached Splice, 6" splice, and front trimrail. All information, data and analysis contained within are based on, and comply with the following codes and typical specifications:

1. Minimum Design Loads for Buildings and other Structures, ASCE/SEI 7-05, ASCE/SEI 7-10, ASCE/SEI 7-16
2. Massachusetts State Building Code, 780 CMR 9<sup>th</sup> Edition.
3. 2006-2018 International Building Code, by International Code Council, Inc. w/ Provisions from SEAOC PV-2 2017.
4. 2006-2018 International Residential Code, by International Code Council, Inc. w/ Provisions from SEAOC PV-2 2017.
5. AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES.

Following are typical specifications to meet the above code requirements:

<b>Design Criteria:</b>	Ground Snow Load = 0 - 100 (psf) Basic Wind Speed = 90 - 180 (mph) Roof Mean Height = 0 - 30 (ft) Roof Pitch = 0 - 45 (degrees) Exposure Category = B, C & D
<b>Attachment Spacing:</b>	Per U-builder Engineering report.
<b>Cantilever:</b>	Maximum cantilever length is L/3, where "L" is the span noted in the U-Builder online tool.
<b>Clearance:</b>	2" to 10" clear from top of roof to top of PV panel.
<b>Tolerance(s):</b>	1.0" tolerance for any specified dimension in this report is allowed for installation.
<b>Installation Orientation:</b>	See SFM Installation Guide. Landscape - PV Panel long dimension is parallel to ridge/eave line of roof and the PV panel is mounted on the long side. Portrait - PV Panel short dimension is parallel to ridge/eave line of roof and the PV panel is mounted on the short side.

1478 Stone Point Drive, Suite 190, Roseville, CA 95661  
T 916.961.3960 F 916.961.3965 W www.pzse.com  
Experience | Integrity | Empowerment

Attachment shall be staggered where ground snow load exceeds 10 PSF.

**Testing:** Values were based on UTR-299 testing provided by Unirac.

**Components and Cladding Roof Zones:**

The Components and Cladding Roof Zones shall be determined based on ASCE 7-05, ASCE 7-10 & 7-16 Component and Cladding design.

- Notes:**
- 1) U-builder Online tool analysis is only for Unirac SFM Sunframe Microrail system only and do not include roof capacity check.
  - 2) Risk Category II per ASCE 7-16.
  - 3) Topographic factor,  $k_{zt}$  is 1.0.
  - 4) Array Edge Factor  $Y_e = 1.5$
  - 5) Average parapet height is 0.0 ft.
  - 6) Wind speeds are LRFD values.
  - 7) Attachment spacing(s) apply to a seismic design category E or less.

**Design Responsibility:**

The U-Builder design software is intended to be used under the responsible charge of a registered design professional where required by the authority having jurisdiction. In all cases, this U-builder software should be used under the direction of a design professional with sufficient structural engineering knowledge and experience to be able to:

- Evaluate whether the U-Builder Software is applicable to the project, and
- Understand and determine the appropriate values for all input parameters of the U-Builder software.

This letter certifies that the Unirac SFM Sunframe Microrail, when installed according to the U-Builder engineering report and the manufacture specifications, is in compliance with the above codes and loading criteria.

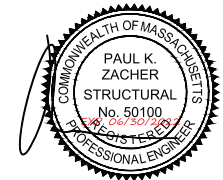
This certification excludes evaluation of the following components:

- 1) The structure to support the loads imposed on the building by the array; including, but not limited to: strength and deflection of structural framing members, fastening and/or strength of roofing materials, and/or the effects of snow accumulation on the structure.
- 2) The attachment of the SFM 2" Microrail or 8" Attached Splice to the existing structure.
- 3) The capacity of the solar module frame to resist the loads.

This requires additional knowledge of the building and is outside the scope of the certification of this racking system.

If you have any questions on the above, do not hesitate to call.

Prepared by:  
PZSE, Inc. – Structural Engineers  
Roseville, CA





# Massachusetts Cultural Resource Information System

## Scanned Record Cover Page

<b>Inventory No:</b>	NWT.3724
<b>Historic Name:</b>	Barnard, James H. House
<b>Common Name:</b>	
<b>Address:</b>	87 Rockland Pl
<b>City/Town:</b>	Newton
<b>Village/Neighborhood:</b>	Upper Falls
<b>Local No:</b>	UF-42
<b>Year Constructed:</b>	c 1870
<b>Architect(s):</b>	Hodgson, Ernest F. Company
<b>Architectural Style(s):</b>	Greek Revival; Italianate
<b>Use(s):</b>	Single Family Dwelling House
<b>Significance:</b>	Architecture
<b>Area(s):</b>	NWT.A: Newton Upper Falls Historic District NWT.R: Newton Upper Falls Historic District NWT.Y: Newton Multiple Resource Area - 1636-1907
<b>Designation(s):</b>	Nat'l Register District (09/04/1986); Nat'l Register MRA (09/04/1986); Local Historic District (12/17/1975)
<b>Building Materials(s):</b>	Roof: Asphalt Shingle Wall: Wood; Wood Clapboard Foundation: Brick; Concrete Cinderblock; Granite



The Massachusetts Historical Commission (MHC) has converted this paper record to digital format as part of ongoing projects to scan records of the Inventory of Historic Assets of the Commonwealth and National Register of Historic Places nominations for Massachusetts. Efforts are ongoing and not all inventory or National Register records related to this resource may be available in digital format at this time.

The MACRIS database and scanned files are highly dynamic; new information is added daily and both database records and related scanned files may be updated as new information is incorporated into MHC files. Users should note that there may be a considerable lag time between the receipt of new or updated records by MHC and the appearance of related information in MACRIS. Users should also note that not all source materials for the MACRIS database are made available as scanned images. Users may consult the records, files and maps available in MHC's public research area at its offices at the State Archives Building, 220 Morrissey Boulevard, Boston, open M-F, 9-5.

Users of this digital material acknowledge that they have read and understood the MACRIS Information and Disclaimer (<http://mhc-macris.net/macrisdisclaimer.htm>)

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Commonwealth of Massachusetts  
Massachusetts Historical Commission  
220 Morrissey Boulevard, Boston, Massachusetts 02125  
[www.sec.state.ma.us/mhc](http://www.sec.state.ma.us/mhc)

This file was accessed on: Monday, September 27, 2021 at 4:27: PM

FORM B - BUILDING

Assessor's number

USGS Quad

Area(s)

Form Number

Massachusetts Historical Commission  
80 Boylston Street  
Boston, Massachusetts 02116

51-09-34

Boston South

NWT. 3724  
NW2. 3724

Town NEWTON

(neighborhood or village) \_\_\_\_\_

Upper Falls

Address 87 Rockland Place

Historic Name James H. Barnard

Present residential

Original residential

Year of Construction ca. 1870

Source maps/directories

Style/Form Greek Revival/Italianate

Architect/Builder unknown

Exterior Material:

Foundation brick

Wall/Trim wood clapboard

Roof asphalt shingles

Outbuildings/Secondary Structures 1-car gable

front barn/garage on stone - clapboard

Major Alterations (with dates) third quarter

20th c. entrance porch

Condition good/excellent

Moved  no  yes Date n/a

Acreage 20,830 sq. ft.

Setting Stone and mortar wall lines front with

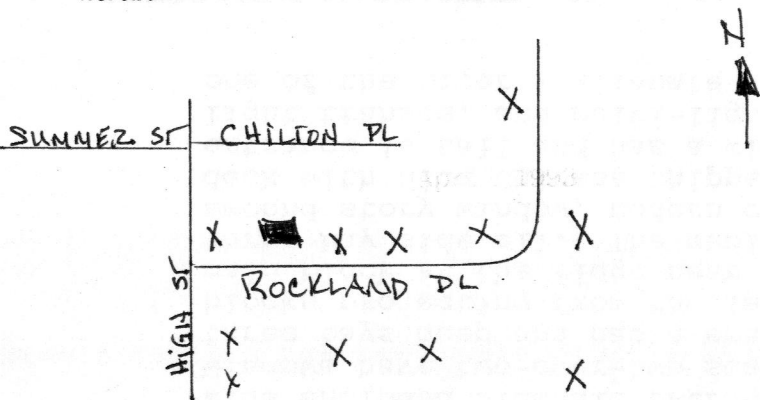
green lawn and concrete path to house - pines

and stone wall surrounds most of property and

black top drive and ramp to converted barn

Sketch Map

Draw a map showing the building's location in relation to the nearest cross streets and/or major natural features. Show all buildings between inventoried building and nearest intersection or natural feature. Label streets including route numbers, if any. Circle and number the inventoried building. Indicate north.



Recorded by Gretchen G. Schuler

Organization Newton Historical Commission

Date (month/year) April 1993

RECEIVED

JUL 7 1993

Follow Massachusetts Historical Commission Survey Manual instructions for completing this form.

MASS. HIST. COMM.

**BUILDING FORM**

**ARCHITECTURAL DESCRIPTION**  *see continuation sheet*

*Describe architectural features. Evaluate the characteristics of this building in terms of other buildings within the community.*

The transitional house displays Greek Revival characteristics in its form and dimensions and simple trim and Italianate qualities in the double door entrance with etched lights and the wide rake of the gable end. Built on a granite foundation the one and one-half story house consists of a main three-bay gable front block with a wide enclosed sidehall entrance porch and a one-story side ell. Windows have two-over-two sash set in molded frames. The house is three bays deep and has a small one-story shed roof ell on cinder blocks projecting from the left rear corner. Chimneys are on the main block at the ridge near the rear and at the ridge of the three-bay side ell. The gable end of the side ell has a small second story window, modern casement first story window and a rear deck with nice Chinese Chippendale balustrade. The side hall entrance is tall and has a wide rake on the flat roof, tall diamond light transom, and multi-light door and side lights. It screens one of the nicer Italianate double doors in the area.

**HISTORICAL NARRATIVE**  *see continuation sheet*

*Discuss the history of the building. Explain its associations with local (or state) history. Include uses of the building, and the role(s) the owners/occupants played within the community.*

Built by 1874 this house, known as the Barnard House, is representative of the beginning of the transition from the Greek Revival influence to Italianate seen mainly in the door and the two-over-two windows. James H. Barnard who was a machinist in Boston lived here from the early 1870s. Other histories indicate that this house was built in 1859, however, it does not show on the 1866 map. Deed research may help to clarify issue.

A one-story sun parlor was added in 1926 by E.F. Hodgeson Co. of Boston.

**BIBLIOGRAPHY and/or REFERENCES**  *see continuation sheet*

Atlases/Maps: 1874 (J.H. Barnard), 1886 (J.H. Barnard), 1895 (Hrs. Mary N. Barnard), 1907 (Mary E. Barnard).  
Building Permits, Inspectional Services.  
Directories: 1868-1900s.

Listed as C

**Recommended for listing in the National Register of Historic Places. If checked, you must attach a completed National Register Criteria Statement form.**



FORM B - BUILDING

MASSACHUSETTS HISTORICAL COMMISSION  
294 Washington Street, Boston, MA 02108

NRDIS  
NRMRA

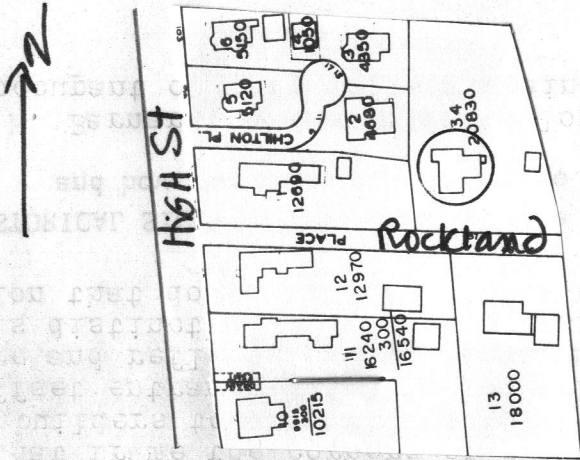
NWT. 3724

Area <u>A-4</u>	Form no. <u>3724</u> UF 42
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Location Newton Upper Falls  
 Address 87 Rockland Place  
 Historic Name Barnard House  
 Original Residence  
 Present Same  
 Ownership:  Private individual  
                   Private organization \_\_\_\_\_  
                   Public \_\_\_\_\_  
 Original owner James and Mary  
                                   Barnard

location in relation to nearest cross streets and other buildings or geographical features. Indicate north.



DESCRIPTION:

Date 1859  
 Source Water Records, Assessor's Records  
 Style Italianate  
 Architect local builder  
 Exterior wall fabric clapboard  
 Outbuildings garage  
 Major alterations (with dates) \_\_\_\_\_  
 Moved \_\_\_\_\_ Date \_\_\_\_\_  
 Approx. acreage 1/2 acre

Recorded by Deborah Lane  
 Organization Newton Historical Comm.  
 Date May, 1981

Setting Set amid a row of Victorian era residences that line Rockland Place, a quiet, narrow lane.

(Staple additional sheets here)

**SIGNIFICANCE**

**MAJOR** \_\_\_\_\_  
**CONTRIBUTING**   X  

**ARCHITECTURAL SIGNIFICANCE** (describe important architectural features and evaluate in terms of other buildings within community)

This 1-1/2 story "L" shaped cottage is set gable end to the street and was constructed following the sidehall plan, a popular house type among local builders. The eaves are projected and also have cornice returns. The fluted pilasters that frame the corners of the structure are evidence of the tendency of local builders to draw from a variety of sources in their architectural designs. The offset entrance which has double doors and etched glass is an important feature and reflects the Italianate influence. The bracket supported entrance hood is distinctive. The glass entrance porch is a later, albeit sympathetic, addition that does not obscure the entrance detail.

**HISTORICAL SIGNIFICANCE** (explain the role owners played in local or state history and how the building relates to the development of the community)

James H. Barnard, a machinist employed at one of the local mills, was a long-time occupant of this well-maintained residence.

**BIBLIOGRAPHY and/or REFERENCES**

Newton Atlas, 1874  
Newton City Directory, 1868