

SUNRUN



Sunrun Inc. | 1.855.4SUNRUN | sunrun.com

July 13, 2016

Town of Southbridge
41 Elm Street
Southbridge, MA 01550

NOTICE OF CANCELLATION

To Whom It May Concern,

The purpose of this letter is to request the cancellation of building permit #B-274 and electrical permit #10128 for the photovoltaic solar project located at 12 Buckley Street. The homeowner, Todd Carlson, has decided not to move forward with the project.

If you have any questions or concerns, please feel free to contact me. Thank you for your consideration.

Regards,

Conor Smith
(978) 493-4131
conor.smith@sunrun.com

RECEIPT DATE 1/5/16 No. **701454**

RECEIVED FROM Sunrun Installation \$ 181.00

One Hundred Eighty-One DOLLARS

FOR RENT B-274 & E-10/28 12 Buckley St, Apt #
 FOR 2211 038
1/5/14

ACCOUNT		<input type="radio"/> CASH
PAYMENT		<input checked="" type="radio"/> CHECK
BAL. DUE		<input type="radio"/> MONEY ORDER
		<input type="radio"/> CREDIT CARD

FROM _____ TO _____

BY Judy 3-11



PERMIT
 OFFICE OF
INSPECTOR OF WIRES

No. **10128**

FEE \$ 81.00

Southbridge, MA

DATE 1/5/16

Permission is hereby granted to Nathan Ashe

Solar
Installation

To commence work at 12 Buckley St.

Owned by Todd Carlson

Occupied by _____

W. Gibson Jay
 INSPECTOR OF WIRES



The Commonwealth of Massachusetts
 Town of Southbridge
 Department of Inspections Services
 41 Elm Street
BUILDING PERMIT JOB CARD



Permit No: B-274

Date: 12-31-15

THIS CERTIFIES THAT: Todd Carlson

Has permission to : Install solar panels as per plan

Situated on : 12 Buckley Street

The person accepting this permit shall in every respect conform to the terms of the application on file in this office and the provisions of the Mass. State Building Code, town by-law, and all other state and local regulations regarding to the construction and maintenance of buildings.
 Work must be started within 6 months. Any violation of the above terms will constitute revocation of this permit.

LOSS OF JOB CARD CONSTITUTES A FINE

PLEASE RETURN JOB CARD TO INSPECTIONS OFFICE AFTER COMPLETION OF WORK.

THIS CARD MUST BE DISPLAYED IN A CONSPICUOUS PLACE ON THE PREMISES.

Note: A certificate of occupancy will be issued by this office upon return of this card with all required signatures.

- Gas _____
- Plumbing- Underground _____
- Plumbing Insp. - Rough: _____
- Plumbing Insp. - Finish _____
- Electrical - Underground _____
- Electrical Insp. - Rough _____
- Electrical Insp. - Finish _____
- Septic System _____
- Insp. By Fire Dept. _____
- Highway Dept. _____
- Bldg. Fd. & Drains _____
- Bldg. Framing _____
- Bldg. Insulation _____
- Bldg. Final _____
- Conservation Commission _____
- Tax Assessor _____
- Sheet Metal _____


 Nick Tortis

Inspector of Buildings/Building Commissioner



Town of Southbridge
41 Elm St.
Southbridge, MA 01550



Building Permit Application To Construct, Repair, Renovate Or
Demolish a *One- or Two-Family Dwelling*

This Section For Official Use Only

Building Permit Number: B-274 Date Applied: _____
 Nick Tortis Building Official Signature: [Signature] Date: 12/31/15

SECTION 1: SITE INFORMATION

1.1 Property Address: 12 Buckley St. Southbridge, Ma. 01550
 1.1a Is this an accepted street? yes no _____
 1.2 Assessors Map & Parcel Numbers
 Map Number 020 Parcel Number 052
 1.3 Zoning Information: Zoning District RF Proposed Use R-3
 1.4 Property Dimensions: Lot Area (sq ft) _____ Frontage (ft) _____

1.5 Building Setbacks (ft)

Front Yard		Side Yards		Rear Yard	
Required	Provided	Required	Provided	Required	Provided

1.6 Water Supply: (M.G.L. c. 40, § 54) Public Private
 1.7 Flood Zone Information: Zone: _____ Outside Flood Zone? Check if yes
 1.8 Sewage Disposal System: Municipal On site disposal system

SECTION 2: PROPERTY OWNERSHIP¹

2.1 Owner¹ of Record: Todd Carlson Southbridge, Ma. 01550
 Name (Print) _____ City, State, ZIP _____
12 Buckley st. 508-523-5701 toddc107@gmail.com
 No. and Street Telephone Email Address

SECTION 3: DESCRIPTION OF PROPOSED WORK² (check all that apply)

New Construction Existing Building Owner-Occupied Repairs(s) Alteration(s) Addition
 Demolition Accessory Bldg. Number of Units _____ Other Specify: Rooftop Solar

Brief Description of Proposed Work²:
Installation of an interconnected rooftop solar system
2.750 kw DC / 10 Panels

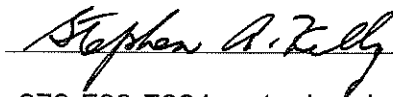
SECTION 4: ESTIMATED CONSTRUCTION COSTS

Item	Estimated Costs: (Labor and Materials)	Official Use Only
1. Building	\$ 1724.25	1. Building Permit Fee: \$ _____ Indicate how fee is determined: <input type="checkbox"/> Standard City/Town Application Fee <input type="checkbox"/> Total Project Cost ³ (Item 6) x multiplier _____ x _____ 2. Other Fees: \$ _____ List: _____ Total All Fees: \$ <u>100.00 min.</u> Check No. _____ Check Amount: _____ Cash Amount: _____ <input type="checkbox"/> Paid in Full <input type="checkbox"/> Outstanding Balance Due: _____
2. Electrical	\$ 4023.25	
3. Plumbing	\$	
4. Mechanical (HVAC)	\$	
5. Mechanical (Fire Suppression)	\$	
6. Total Project Cost:	\$ 5747.50	

rec# 701454 1/5/16

12 Buckley St.

SECTION 5: CONSTRUCTION SERVICES

5.1 Construction Supervisor License (CSL)
Stephen A. Kelly
 Name of CSL Holder
734 Forest st #400
 No. and Street
Marlborough, Ma. 01752
 City/Town, State, ZIP

978-793-7881 stephen.kelly @sunrun.com
 Telephone Email address

CS-040622 8/1/17
 License Number Expiration Date
 List CSL Type (see below) U

Type	Description
<input checked="" type="checkbox"/> U	Unrestricted (Buildings up to 35,000 cu. ft.)
<input type="checkbox"/> R	Restricted 1&2 Family Dwelling
<input type="checkbox"/> M	Masonry
<input type="checkbox"/> RC	Roofing Covering
<input type="checkbox"/> WS	Window and Siding
<input type="checkbox"/> SF	Solid Fuel Burning Appliances
<input type="checkbox"/> I	Insulation
<input type="checkbox"/> D	Demolition

5.2 Registered Home Improvement Contractor (HIC)
Sunrun Installation Services Inc.
 HIC Company Name or HIC Registrant Name
734 Forest st #400
 No. and Street
Marlborough, Ma. 01752 978-549-9438
 City/Town, State, ZIP Telephone

180120 10/14/16
 HIC Registration Number Expiration Date
stephen.kelly@sunrun.com
 Email address

SECTION 6: WORKERS' COMPENSATION INSURANCE AFFIDAVIT (M.G.L. c. 152, § 25C(6))

Workers Compensation Insurance affidavit must be completed and submitted with this application. Failure to provide this affidavit will result in the denial of the Issuance of the building permit.

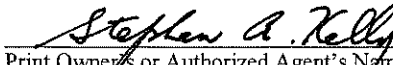
Signed Affidavit Attached? Yes No

SECTION 7a: OWNER AUTHORIZATION TO BE COMPLETED WHEN OWNER'S AGENT OR CONTRACTOR APPLIES FOR BUILDING PERMIT

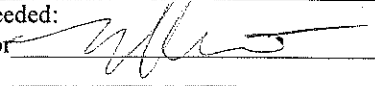
I, as Owner of the subject property, hereby authorize Sunrun Installation Services Inc.
 to act on my behalf, in all matters relative to work authorized by this building permit application.
Todd Carlson
 Print Owner's Name (Electronic Signature) Date

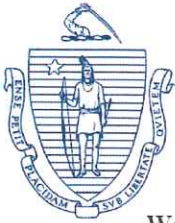
SECTION 7b: OWNER¹ OR AUTHORIZED AGENT DECLARATION

By entering my name below, I hereby attest under the pains and penalties of perjury that all of the information contained in this application is true and accurate to the best of my knowledge and understanding.

 Stephen A. Kelly 12-17-2015
 Print Owner's or Authorized Agent's Name (Electronic Signature) Date

NOTES:

- An Owner who obtains a building permit to do his/her own work, or an owner who hires an unregistered contractor (not registered in the Home Improvement Contractor (HIC) Program), will not have access to the arbitration program or guaranty fund under M.G.L. c. 142A. Other important information on the HIC Program can be found at www.mass.gov/oca Information on the Construction Supervisor License can be found at www.mass.gov/dps
- Other signatures needed:
 Town Tax Collector  For all projects (MGL c 40 sec. 57
 Board of Health Well permit and/or Septic permit (Title V)
 D.P.W. Water, sewer and curb cut permits
- Debris Disposal
- Name of Waste Hauler EL Harvey & Sons
 Name of Waste Facility Sunrun installation Services (734 forest st Marlborough, Ma.)



The Commonwealth of Massachusetts
 Department of Industrial Accidents
 1 Congress Street, Suite 100
 Boston, MA 02114-2017
 www.mass.gov/dia

Workers' Compensation Insurance Affidavit: Builders/Contractors/Electricians/Plumbers.
 TO BE FILED WITH THE PERMITTING AUTHORITY.

Applicant Information

Please Print Legibly

Name (Business/Organization/Individual): Sunrun Installation Services, Inc.

Address: 775 Fiero Lane, Suite 200

City/State/Zip: San Luis Obispo, CA 93401 Phone #: 978-549-9438

<p>Are you an employer? Check the appropriate box:</p> <p>1. <input checked="" type="checkbox"/> I am an employer with <u>35</u> employees (full and/or part-time).*</p> <p>2. <input type="checkbox"/> I am a sole proprietor or partnership and have no employees working for me in any capacity. [No workers' comp. insurance required.]</p> <p>3. <input type="checkbox"/> I am a homeowner doing all work myself. [No workers' comp. insurance required.] †</p> <p>4. <input type="checkbox"/> I am a homeowner and will be hiring contractors to conduct all work on my property. I will ensure that all contractors either have workers' compensation insurance or are sole proprietors with no employees.</p> <p>5. <input type="checkbox"/> I am a general contractor and I have hired the sub-contractors listed on the attached sheet. These sub-contractors have employees and have workers' comp. insurance. ‡</p> <p>6. <input type="checkbox"/> We are a corporation and its officers have exercised their right of exemption per MGL c. 152, §1(4), and we have no employees. [No workers' comp. insurance required.]</p>	<p>Type of project (required):</p> <p>7. <input type="checkbox"/> New construction</p> <p>8. <input type="checkbox"/> Remodeling</p> <p>9. <input type="checkbox"/> Demolition</p> <p>10. <input type="checkbox"/> Building addition</p> <p>11. <input type="checkbox"/> Electrical repairs or additions</p> <p>12. <input type="checkbox"/> Plumbing repairs or additions</p> <p>13. <input type="checkbox"/> Roof repairs</p> <p>14. <input checked="" type="checkbox"/> Other <u>Rooftop Solar</u></p>
--	--

*Any applicant that checks box #1 must also fill out the section below showing their workers' compensation policy information.
 † Homeowners who submit this affidavit indicating they are doing all work and then hire outside contractors must submit a new affidavit indicating such.
 ‡ Contractors that check this box must attached an additional sheet showing the name of the sub-contractors and state whether or not those entities have employees. If the sub-contractors have employees, they must provide their workers' comp. policy number.

I am an employer that is providing workers' compensation insurance for my employees. Below is the policy and job site information.

Insurance Company Name: Zurich American Insurance Company

Policy # or Self-ins. Lic. #: WC013696001 & WC013696101 Expiration Date: 10/01/2016

Job Site Address: 12 Buckley St. City/State/Zip: Southbridge, Ma. 01550

Attach a copy of the workers' compensation policy declaration page (showing the policy number and expiration date).

Failure to secure coverage as required under MGL c. 152, §25A is a criminal violation punishable by a fine up to \$1,500.00 and/or one-year imprisonment, as well as civil penalties in the form of a STOP WORK ORDER and a fine of up to \$250.00 a day against the violator. A copy of this statement may be forwarded to the Office of Investigations of the DIA for insurance coverage verification.

I do hereby certify under the pains and penalties of perjury that the information provided above is true and correct.

Signature: Stephen G. Kelly Date: 12-17-2015
 Phone #: 978-549-9438

Official use only. Do not write in this area, to be completed by city or town official.

City or Town: _____ Permit/License # _____

Issuing Authority (circle one):
 1. Board of Health 2. Building Department 3. City/Town Clerk 4. Electrical Inspector 5. Plumbing Inspector
 6. Other _____

Contact Person: _____ Phone #: _____



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
10/8/2015

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).


PRODUCER Arthur J. Gallagher & Co. Insurance Brokers of CA. 1255 Battery Street #450 San Francisco CA 94111	CONTACT NAME: PHONE (A/C, No, Ext): 415-546-9300 FAX (A/C, No): 415-536-8499 E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	
INSURED Sunrun Installation Services Inc. 775 Fiero Lane, Suite 200 San Luis Obispo, CA 93401	INSURER A : Zurich American Insurance Company NAIC # 16535	
	INSURER B :	
	INSURER C :	
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER: 339705216** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:						EACH OCCURRENCE \$ DAMAGE TO RENTED PREMISES (Ea occurrence) \$ MED EXP (Any one person) \$ PERSONAL & ADV INJURY \$ GENERAL AGGREGATE \$ PRODUCTS - COMP/OP AGG \$ \$
	AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS						COMBINED SINGLE LIMIT (Ea accident) \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
	UMBRELLA LIAB <input type="checkbox"/> OCCUR EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$						EACH OCCURRENCE \$ AGGREGATE \$ \$
A A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N	N/A	WC013696001 WC013696101	10/1/2015 10/1/2015	10/1/2016 10/1/2016	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$1,000,000 E.L. DISEASE - EA EMPLOYEE \$1,000,000 E.L. DISEASE - POLICY LIMIT \$1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
WC013696001 - \$25,000 Deductible; WC013696101 - FL, HI, MA, NJ, NY, OR, VA, WI only.
Evidence of Insurance

CERTIFICATE HOLDER Town of Southbridge 41 Elm St Southbridge MA 01550 USA	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE 

MASSACHUSETTS DRIVER'S LICENSE

4th ISS 07-13-2015 NONE 9th EMO NONE 4th NUMBER S05061292

4th EXP 08-01-2020 3 DOB 08-01-1959

5 SEX M 11 HGT 5-11

6 CLASSES FOR REST NONE

1 **KELLY**

2 STEPHEN A

8 16 PARKWAY RD
STONEHAM, MA 02180-2821

5 00 07-15-2015 Rev. 07-15-2009

Stephen A. Kelly

Chris C. Smith REGISTRAR

**Massachusetts Department of Public Safety
Board of Building Regulations and Standards**

License: **CS-040622**
Construction Supervisor

STEPHEN A KELLY
16 PARKWAY ROAD
STONEHAM MA 02180



Matthew C. ...
Commissioner

Expiration:
08/01/2017



The Commonwealth of Massachusetts
Office of Consumer Affairs and Business Regulation

10 Park Plaza - Suite 5170
Boston, Massachusetts 02116

Home Improvement Contractor Registration

Registration: 180120
Type: Supplement Card
Expiration: 10/14/2016

SUNRUN INSTALLATION SERVICES INC.
STEPHEN KELLY
775 FIERO LANE SUITE 200
SAN LUIS OBISPO, CA 93401



SCA 1 20M-05/11

Update Address and return card. Mark reason for change.
 Address Renewal Employment Lost Card

The Commonwealth of Massachusetts

Office of Consumer Affairs & Business Regulation

HOME IMPROVEMENT CONTRACTOR

Registration: 180120
Expiration: 10/14/2016
Type: Supplement Card

SUNRUN INSTALLATION SERVICES INC.

STEPHEN KELLY
775 FIERO LANE SUITE 200
SAN LUIS OBISPO, CA 93401

License or registration valid for individual use only
before the expiration date. If found return to:
Office of Consumer Affairs and Business Regulation
10 Park Plaza - Suite 5170
Boston, MA 02116

Stephen A. Kelly
Not valid without signature

Undersecretary

SUNRUN



Sunrun Inc. | 1.855.4SUNRUN | sunrun.com

OWNER'S AUTHORIZATION FORM
For Permit Application(s)

The sole purpose of this form is to provide Sun Run Inc with the Necessary permission from the Owner to file Permit Application(s) for such Project work as agreed upon between the Owner and the Owner's Authorized Company and its designated subcontractors.

Owner's Name: Todd Carlton

Solar Project Address: DocuSigned by:

Signature: 
002E06A19B7E404

Owner's Authorized Company: Sun Run Inc.
Company's Address: 595 Market St 29th Floor, San Francisco, CA 94105
Affiliation: Contractor
Applicable License:
State: MA



SOLAR-ROOF-CHECK THE RLA A RIGOROUS LOAD ANALYSIS

146 San Jose Court, San Luis Obsipo, CA 93405

☀ Ph: 805-215-8665

☀ Fx: 805-544-0863

DATE: 12-02-2015/Rev G

FOR: Sunrun
775 Fiero Lane Suite #200
San Luis Obispo, CA 93401

JOB: Todd Carlson Residence
12 Buckley St
Southbridge, MA 01550

To Whom It May Concern

This letter is to certify that we have performed a structural analysis of the existing roof members that are to support photovoltaic panels, as shown on the attached report. The calculations were performed in accordance with the latest editions of IBC, NDS, ASCE/SEI, CBC, and IRC, and the 8th edition 2009 Massachusetts building code.

Our analysis was based on the following design criteria:

Ground Snow (psf)	40 psf
Sloped Snow (psf), reduced per ASCE, Sect. 7.4	26 psf
Basic Wind Speed (mph):	90 mph
ASCE Code:	7-05
The PV module orientation:	Portrait
The maximum horizontal roof mount spacing:	4 ft.
The maximum vertical roof mount spacing:	2.75 ft.
Staggered roof mounts required?	Yes

Based on this analysis, we can certify that the individual existing roof framing members that support the PV panels; and the individual roof members as described in the attached report; are adequate to support the design loads as required by the various codes. This includes Dead Loads (including the weight of the PV panels), Live Loads, Snow Loads, and Wind Loads, on the roof members that support the PV panels, combined as required in the codes.

If you have any questions on this or need further clarification, please contact us at your convenience.

Sincerely
James A. Adams, S.E.



Expir. 06/30/2016

Digitally Signed by
James A. Adams, S.E.
Date: 2015.12.05 14:37:49 -0800

Date of Report: 12-02-2015/Rev G
Data Input by: Laszlo Kurta
Contact E-mail: laszlo.kurta@sunrunhome.com
Contact Phone: 805-540-7668

Job Name: Todd Carlson Residence
Job Number: 221R-012CARL
Job Address: 12 Buckley St
Southbridge, MA 01550

ABSTRACT

This Report is based on Engineering calculations using the input data supplied by the user, listed under Current Input Data. The user's input has not been independently reviewed by a licensed Professional Engineer for appropriateness or accuracy, unless Stamped by a P.E. This Report indicates Compliance/Non-Compliance with the reference Codes listed below. The following items have been checked for Code Compliance:

- Load Combination #1:

Wind Uplift on the Standoff attachment to the Roof Framing members: Wind Uplift - 0.6DL Solar

- Load Combination #2:

Supporting Rafter Strength with: DL Rf + DL Solar + Roof Live Load

- Load Combination #3:

Supporting Rafter Strength with: DL Rf + DL Solar + Wind Down

- Load Combination #4: Supporting Rafter Strength with: DL Rf + DL Solar + Snow

- Load Combination #5:

Supporting Rafter Strength with: DL Rf + DL Solar + .75Wind + .75Snow

- Load Combination #6: Check Additional Seismic Load

- Load Combination #7:

Supporting Rafter Strength with:
Wind Up - 0.6(DL Rf + DL Solar)

Job Information

Data Input By: Laszlo Kurta
Job Number: 221R-012CARL
Job Name: Todd Carlson Residence
Job Address: 12 Buckley St
City, State: Southbridge, MA 01550

Current Input Data

Payment Method	Invoice
Roof Type	CollarTies
Ceiling Type	1/2 gyp. Bd.
Collar Tie Space	24
Coverage %	16
Frame Size	2x6FS@24
Ground Snow (psf)	40
Sloped Roof Snow Load (psf)	26
Lag Screw Diam. (in)	5/16
Lag Screw Embed. (in)	2.5
Overall Span (ft)	22.6
PV Weight (psf)	3
PV Module Orientation	Portrait
Rafter Span (ft)	12.583
Rail System	2Rail
Roof Mean Height (ft)	25
Roof Slope (degrees)	34
Roofing Type	Comp. Shingle
Sloped Ceiling	No
Max. Horizontal Roof Mount(ft)	4
Max. Vertical Roof Mounts (ft)	2.75
Standoff Staggered	Yes
Wind Exposure	C
Wind Speed (mph)	90

Reference Codes

International Building Code (IBC latest edition)

American Society of Civil Engineers (ASCE/SEI 7-05, 7-10) National Design Spec. for Wood Constr. (NDS latest edition) CBC and NJ Edition

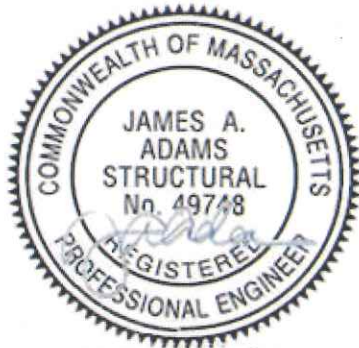
Note: For ASCE 7-10, wind includes (0.6) factor, in loading combinations.

STRUCTURAL CALCULATIONS for PV INSTALLATION

SUNRUN

Sunrun
775 Fiero Lane , Suite #200
San Luis Obispo CA, 93401
805-528-9705

USER: Laszlo Kurta
COMPANY NAME: Sunrun
SRC JOB ID: 11748
JOB REPORT DATE: 2015-12-02/Rev G
JOB NUMBER: 221R-012CARL
JOB NAME: Todd Carlson Residence
JOB ADDRESS: 12 Buckley St
Southbridge, MA 01550



Expir. 06/30/2016

Digitally Signed by
James A. Adams, S.E.
Date: 2015.12.05 14:34:30 -0800

Program Version: 2015-11-21:7

Contact: jadams@solar-roof-check.com | Phone: 805.215.8665

LOAD COMBINATIONS: ASCE 7-05, IBC 2009 (NOT APPLICABLE IN CA)

- LOADING COMB. #1: WIND UPLIFT - 0.6DL SOLAR AT STANDOFF ($C_D=1.6$) ZONE 2
- LOADING COMB. #2: DL Rf + DL SOLAR + Rf LL ($C_D=1.25$).
- LOADING COMB. #3: DL Rf + DL SOLAR + WIND DOWN ($C_D=1.6$). ZONE 1
- LOADING COMB. #4: DL Rf + DL SOLAR + SNOW ($C_D=1.15$).
- LOADING COMB. #5: DL Rf + DL SOLAR + .75WIND + .75SNOW ($C_D=1.6$) ZONE 1
- LOADING COMB. #6: CHECK SEISMIC FOR SECT. 3404.4 ALTERATIONS.
- LOADING COMB. #7: $(0.6)(DL Rf + DL SOLAR) + WIND UP$ ($C_D=1.6$). ZONE 1

LOAD COMBINATIONS: ASCE 7-10, IBC 2012 CALIFORNIA, CBC 2013

- LOADING COMB. #1: $(0.6)WIND UPLIFT - 0.6DL SOLAR AT STANDOFF$ ($C_D=1.6$) ZONE 2
- LOADING COMB. #2: DL Rf + DL SOLAR + Rf LL ($C_D=1.25$).
- LOADING COMB. #3: DL Rf + DL SOLAR + $(0.6)WIND DOWN$ ($C_D=1.6$) ZONE 1
- LOADING COMB. #4: DL Rf + DL SOLAR + SNOW ($C_D=1.15$)
- LOADING COMB. #5: DL Rf + DL SOLAR + $.75(0.6)WIND + .75SNOW$ ($C_D=1.6$) ZONE 1
- LOADING COMB. #6: CHECK SEISMIC FOR SECT. 3404.4 ALTERATIONS
- LOADING COMB. #7: $(0.6)WIND UP - 0.6(DL Rf + DL SOLAR)$ ($C_D=1.6$) ZONE 1

REFERENCES: NJ, NDS LATEST EDITION

Duration Factors	Section Modules	Size Form Factor
$C_{d_{Wind}} := 1.6$	$S_{2x2} := 0.563$ $S_{4x4} := 7.150$	$C_{f_{2x2}} := 1.5$ $C_{f_{4x4}} := 1.5$
$C_{d_{Snow}} := 1.15$	$S_{2x4} := 3.063$ $S_{4x6} := 17.650$	$C_{f_{2x4}} := 1.5$ $C_{f_{4x6}} := 1.3$
$C_{d_{DL}} := 0.9$	$S_{2x6} := 7.563$ $S_{4x8} := 30.660$	$C_{f_{2x6}} := 1.3$ $C_{f_{4x8}} := 1.3$
$C_{d_{LL}} := 1.25$	$S_{2x8} := 13.14$ $S_{4x10} := 49.900$	$C_{f_{2x8}} := 1.2$ $C_{f_{4x10}} := 1.2$
	$S_{2x10} := 21.39$ $S_{4x12} := 73.800$	$C_{f_{2x10}} := 1.1$ $C_{f_{4x12}} := 1.1$
$F_b := 1000.00 \text{ psi}$	$S_{2x12} := 31.64$	$C_{f_{2x12}} := 1.0$

USER INPUT:

1. Ceiling Type:	1/2 gyp. Bd.
2. Collar Tie Space:	24
3. Coverage %:	16
4. Frame Size:	2x6FS@24
5. Ground Snow (psf):	40
6. Sloped Roof Snow Load (psf):	26
7. Lag Screw Diameter (in):	5/16
8. Lag Screw Embedment (in):	2.5
9. Overall Span (ft):	22.6
10. PV Weight (psf):	3
11. Rafter Sloped Span (ft):	12.583
12. Rail System:	2Rail
13. Roofing Type:	Comp. Shingle
14. Roof Mean Height (ft):	25
15. Roof Slope (degrees):	34
16. Roof Type:	CollarTies
17. Sloped Ceiling?:	No
18. Standoff Max. Horz. Space (ft):	4
19. Standoff Max. Vert. Space (ft):	2.75
20. Standoff Staggered?:	Yes
21. Wind Exposure:	C
22. Wind Speed (mph):	90
23. wr = Weight of RoofType (psf):	2.20
24. wra = Weight of Rafter (psf):	1.36
25. wc = Weight of CeilingType:	2.20
26. wcj = Weight of Ceiling Joists (psf):	0.65
27. s = Rafter spacing (ft.):	2.00
28. PV Orientation:	Portrait

SLOPED/VAULTED CEILING - CARRIED BY THE TOP CHORD/RAFTER:

DL_{tc} := Deadload Top Chord (Rafter)

DL_{bc} := Deadload Bottom Chord (Ceiling)

FLAT CEILING - CARRIED BY THE CEILING JOISTS:

DL_{tc} := Deadload Top Chord (Rafter)

DL_{bc} := Deadload Bottom Chord (Ceiling)

wDL_{tc} := $DL_{tc} \times s$ (plf) 12.12

wDL_{bc} := $DL_{bc} \times s$ (plf) 6.70

TA = Horizontal spacing x Vertical spacing (sf) 11.00

Topographic Factor

Assume Roof is not on top of a hill, bluff, or mountain ridge. 1.0
Sect. 6.5.7.2, pg. 26

C_{Ls} 1.00

COMPONENTS AND CLADDING:

ASCE 7-05:

Zone 1: Net Wind Pressure - See Figure 6-3, pg. 42 13.80

Zone 2: Net Wind Pressure - See Figure 6-3, pg 42 16.30

Adjustment Factor for Height and Exposure - See Figure 6-3, pg. 44 1.35

ASCE 7-10:

Zone 1: Net Wind Pressure - See Figure 30.5-1 NA

Zone 2: Net Wind Pressure - See Figure 30.5-1, NA

Adjustment Factor for Height and Exposure - See Figure 30.5-1, NA

$p_{Zone1\ up}$ = Net Wind Pressure x Adj. Factor (psf) = 18.63

$p_{Zone2\ up}$ = Net Wind Pressure x Adj. Factor (psf) = 22.01

$p_{Zone1\ dn}$ = Net Wind Pressure x Adj. Factor (psf) = 10.00

Note: For ASCE 7-10 the wind forces have been multiplied by 0.6

LOADING COMBINATION #1: WIND UPLIFT CONNECTION TO RAFTER - ZONE 2

$P_1 := TA \times (P_{Up} - 6 \times DL_{Solar} \times \cos(\theta))$ uplift	225.64
d = Diam.lag screws User Input	5/16
t = lb/inch Withdrawal NDS 2012 - Tab. 11.2A, pg 75	235.00
e = Threaded embedment into wood User Input	2.50
W = Total withdrawal capacity	
$W := Cd_{Wind} \times t \times e$	940.00
$\% := \frac{W \times 100}{P_1}$	416.59
<< If equal to or more than 100% Code Compliant, OK!	

Table 3 represents the maximum Moment ($M = PL/a$) resulting from point loads (standoffs), for any spans (L) listed.


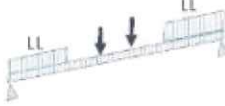
$$a = 2.67$$

Table 3 (The Moment Factor "a" for a 2 Rail system)

Table 3 (The Moment Factor "a" for Zep or similar system)

Length	Staggered		Unstaggered		Length	Staggered		Unstaggered	
	Portrait	Landscape	Portrait	Landscape		Portrait	Landscape	Portrait	Landscape
L = 4'	4.00	4.00	4.00	2.91	L = 4'	5.00	5.00	5.00	5.00
L = 5'	4.00	3.50	3.72	2.50	L = 5'	5.00	5.00	5.00	5.00
L = 6'	4.00	3.00	3.43	2.09	L = 6'	5.00	5.00	5.00	5.00
L = 7'	3.60	2.84	2.95	1.83	L = 7'	4.50	4.50	4.50	4.19
L = 8'	3.20	2.67	2.46	1.56	L = 8'	4.00	4.00	4.00	3.37
L = 9'	3.03	2.59	2.34	1.44	L = 9'	4.00	4.00	4.00	3.12
L = 10'	2.86	2.50	2.22	1.31	L = 10'	4.00	4.00	4.00	2.86
L = 11'	2.77	2.25	2.04	1.19	L = 11'	4.00	4.00	3.70	2.48
L = 12'	2.67	2.00	1.85	1.07	L = 12'	4.00	4.00	3.39	2.09
L = 13'	2.61	1.88	1.74	0.90	L = 13'	4.00	3.87	3.35	1.98
L = 14'	2.55	1.75	1.62	0.92	L = 14'	4.00	3.73	3.30	1.87
L = 15'	2.51	1.68	1.50	0.86	L = 15'	4.00	3.32	2.88	1.78
L = 16'	2.46	1.60	1.38	0.81	L = 16'	4.00	2.90	2.46	1.68
L = 17'	2.43	1.45	1.31	0.76	L = 17'	4.00	2.74	2.36	1.57
L = 18'	2.40	1.29	1.23	0.72	L = 18'	4.00	2.57	2.25	1.45
L = 19'	2.38	1.24	1.17	0.68	L = 19'	4.00	2.46	2.18	1.38
L = 20'	2.35	1.18	1.11	0.65	L = 20'	4.00	2.35	2.11	1.30
L = 21'	2.22	1.14	1.06	0.62	L = 21'	4.00	2.28	2.06	1.25
L = 22'	2.09	1.10	1.00	0.59	L = 22'	4.00	2.20	2.00	1.20

Note: For ASCE 7-10 the wind forces have been multiplied by 0.6

COMBINATION #2:		DL Rf + DL SOLAR + Rf LL (Cd=1.25) with LL= 15.91 psf	
$w := LL \times s \text{ plf}$	(plf) := 31.81	$P := TA \times DL_{\text{Solar}}$	33.00
$c := \frac{(L - 5.5)}{2}$	(ft) := 3.54	$M_{DL} := \left(wDL_{tc} \times \frac{L^2}{8} + P_{sp} \times \frac{L}{a} \right) \times \cos(\theta)$	327.80
For Spans < 10.0 ft		$M_{LL} := \frac{\left[\left(w \times \frac{3}{2 \times L} \right) \times (2 \times L - 3) \right]^2}{2 \times w} \times \cos(\theta)$	NA
For Spans = >10.0 ft		$M_{LL} := \frac{\left[\frac{w \times c \times (2 \times L - c) + w \times c^2}{2 \times L} \right]^2}{2 \times w} \times \cos(\theta)$	165.39
$M := M_{DL} + M_{LL}$	(lb-ft) := 493.18	$S_r := M \times \frac{12}{F_b \times Cd_{LL} \times Cf_x \times C_r \times C_{LS}}$	3.17
$\% := \frac{S_x}{S_r} \times 100$	<< IF EQUAL TO OR MORE THAN 100% CODE COMPLIANT, OK!		378.91
COMBINATION #3: ZONE 1		DL Rf + DL SOLAR + WIND DOWN (Cd=1.6)	
$P_3 := TA \times (p_{dn} + DL_{\text{Solar}} \times \cos(\theta))$			137.36
$M_3 := \left(wDL_{tc} \times \frac{L^2}{8} \right) \times \cos(\theta \text{ deg}) + P_3 \times \frac{L}{a}$			846.20
$S_r := M_3 \times \frac{12}{F_b \times Cd_{\text{Wind}} \times Cf_x \times C_r \times C_{LS}}$			4.25
$\% := \frac{S_x \times 100}{S_r}$	<< IF EQUAL TO OR MORE THAN 100% CODE COMPLIANT, OK!		282.68
COMBINATION #4:		DL Rf + DL SOLAR + SNOW (Cd=1.15)	
$S = \text{Sloped Roof Snow Load (psf)}$			26.00
$P_4 := TA \times (S + DL_{\text{Solar}})$			319.00
$M_4 := \left(wDL_{tc} \times \frac{L^2}{8} + P_4 \times \frac{L}{a} \right) \times \cos(\theta)$			1445.21
$S_r := M_4 \times \frac{12}{F_b \times Cd_{\text{Snow}} \times Cf_x \times C_r \times C_{LS}}$			10.09
$\% := \frac{S_x \times 100}{S_r}$	<< IF EQUAL TO OR MORE THAN 100% CODE COMPLIANT, OK!		118.96

Note: For ASCE 7-10 the wind forces have been multiplied by 0.6

LOADING COMBINATION #5: ZONE 1 DL_{Rf} + DL_{Solar} +.75WIND +.75SNOW (Cd=1.6)

S = Sloped Roof Snow Load (psf)	26.00
$P_5 := IA \times (.75 \times S + DL_{Solar}) \times \cos(\theta) + (IA \times .75 \times p_{dn})$	287.69
$M_5 := \left(wDL_{tc} \times \frac{L^2}{8} + P_5 \times \frac{L}{a} \right) \times \cos(\theta)$	1554.65
$S_r := M_5 \times \frac{12}{F_b \times C_{dWind} \times C_{f_x} \times C_r \times C_{LS}}$	7.80
$\% := \frac{S_x \times 100}{S_r} \ll \text{IF EQUAL TO OR MORE THAN 100\% CODE COMPLIANT, OK!}$	153.86

LOADING COMBINATION #6: CHECK SEISMIC LOADING:

ExistingDL := DL _{Rf} + Walls Walls := 5.5 psf	14.91
ProposedDL := ExistingDL + DL _{Solar} × C	15.39
SeismicIncrease := $100 \times \left(\frac{\text{ProposedDL}}{\text{ExistingDL}} \right) - 100$	3.22
<< IF EQUAL TO OR LESS THAN 10% CODE COMPLIANT, OK!	

SEISMIC SUMMARY

Sect. 3404.3 Alterations (See Exception):

The addition of the Solar Panels, meets the following:

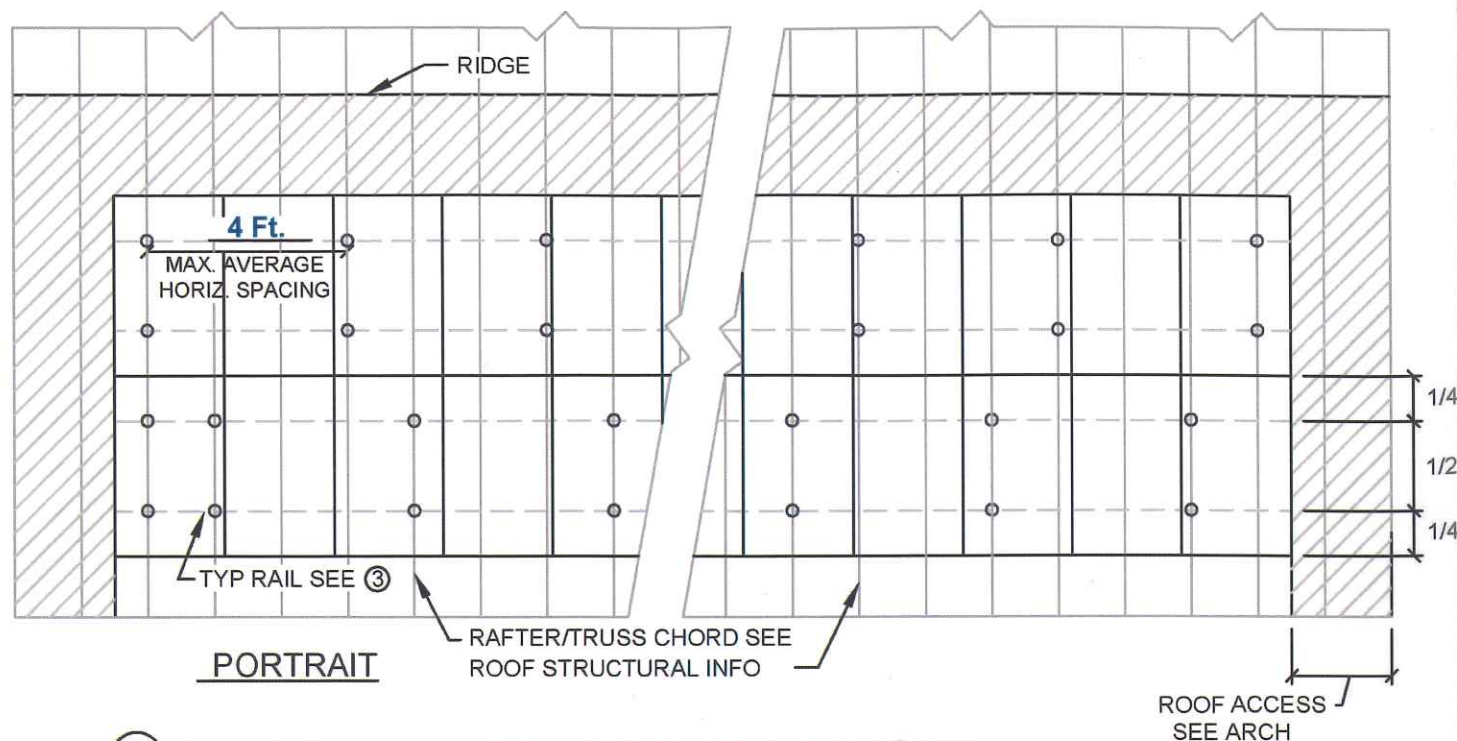
- The design strength of existing elements required to resist seismic forces is not reduced.
- The seismic force to required existing structural elements is not substantially increased.
- No new structural elements are being added.
- New nonstructural elements are being connected to existing structure per Chapter 16.
- Alterations do not create structural irregularities.

Note: For ASCE 7-10 the wind forces have been multiplied by 0.6

LOADING COMBINATION #7:	ZONE 1	(0.6)(DL Rf + DL SOLAR) + WIND UP	(Cd=1.6)
$P_7 := TA \times (p_{up} - 0.6 \times DL_{Solar} \times \cos(\theta))$			188.52
$M_7 := \left(P_7 \times \frac{L}{a} \right) - wDL_{tc} \times \frac{L^2}{8} \times \cos(\theta)$			769.10
$S_r := M_7 \times \frac{12}{F_b \times Cd_{Wind} \times C_{fx} \times C_r \times C_{LS}}$			3.86
$\% := \frac{S_x \times 100}{S_r}$		<< IF EQUAL TO OR MORE THAN 100% CODE COMPLIANT, OK!	311.01

LIMITS OF SCOPE OF WORK AND LIABILITY

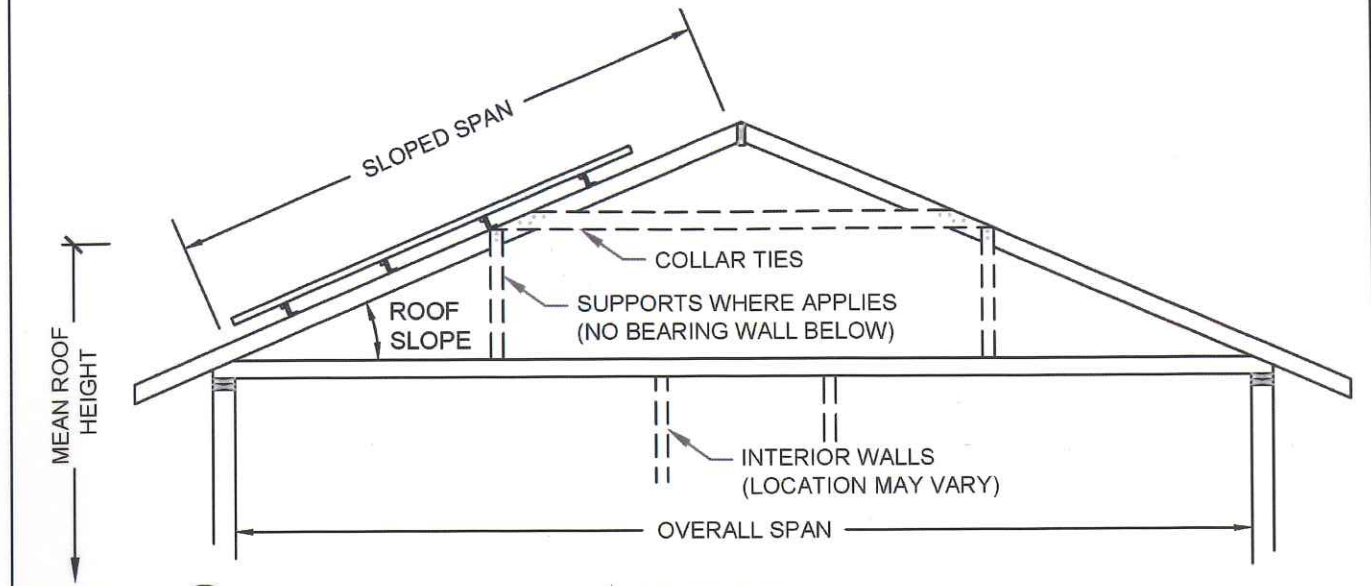
Existing deficiencies which are unknown and not observable due to their being concealed inside walls, or sandwiched behind gypsum board ceilings at the time of inspection are not included in this scope of work. These calculations are for the roof framing which supports the new PV modules. These calculations do not include a complete lateral analysis of the building, nor a prediction of the life expectancy of the existing building.



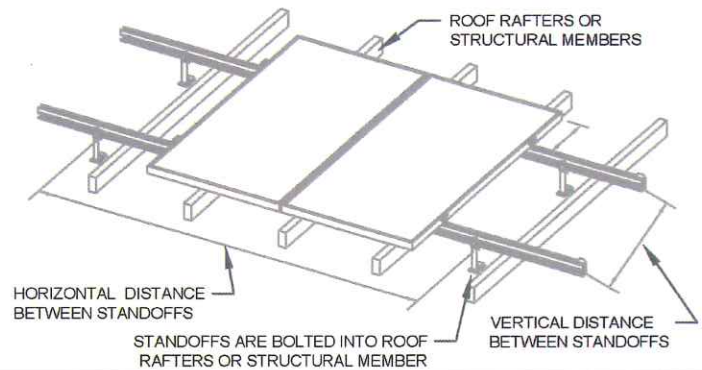
DETAIL ① STAGGERED ATTACHMENTS LAYOUT

See PV drawings for distance to edge of roof.

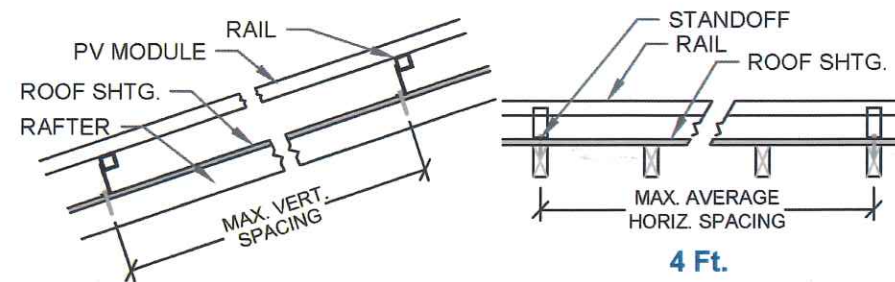
1. Installers to verify rafter size, spacing and sloped spans, and notify the E.O.R of any discrepancies before proceeding.
2. Any rotted or damaged rafters shall be replaced prior to proceeding.
3. As a precaution, old or wet snow should be removed from the roof, if the snow builds up to 18" or more.



DETAIL ② ROOF TYPE - COLLAR TIES



TYPICAL 2-RAIL SYSTEM



DETAIL ③ FLUSHMOUNT

④ STRUCTURAL INFORMATION

SRC Job Id:	11748
Ceiling Type:	1/2 gyp. Bd.
Collar Tie Space:	24
Coverage %:	16
Frame Size:	2x6FS@24
Ground Snow (psf):	40
Sloped Roof Snow Load (psf):	26
Lag Screw Diameter (in):	5/16
Lag Screw Embedment (in):	2.5
Overall Span (ft):	22.6
PV Orientation:	Portrait
PV Weight (psf):	3
Rafter Sloped Span (ft):	12.583
Rail System:	2Rail
Roofing Type:	Comp. Shingle
Roof Mean Height (ft):	25
Roof Slope (degrees):	34
Roof Type:	CollarTies
Sloped Ceiling?:	No
Standoff Max. Horz. Space (ft):	4
Standoff Max. Vert. Space (ft):	2.75
Standoff Staggered?:	Yes
Wind Exposure:	C
Wind Speed (mph):	90



Expir. 06/30/2016

Digitally Signed by James A. Adams, S.E.
Date: 2015.12.05 14:35:09 -0800

This sheet not to be used without permission from SOLAR-ROOF-CHECK.COM


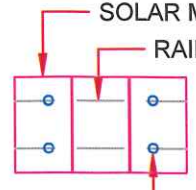






















SCOPE OF WORK

- **SYSTEM SIZE:** 2750W DC, 2400W AC
- **MODULES:** (10) REC SOLAR: REC 275TP
- **INVERTER(S):**
(10) ENPHASE ENERGY: M250-60-2LL-S2X
- **RACKING:** SNAPRACK SERIES 100 UL; FLASHED L FOOT. SEE PEN DO1.

GENERAL NOTES

- ALL WORK SHALL COMPLY WITH 2014 NEC, 2009 IBC, MUNICIPAL CODE, AND ALL MANUFACTURERS' LISTINGS AND INSTALLATION INSTRUCTIONS.
- PHOTOVOLTAIC SYSTEM WILL COMPLY WITH 2014 NEC.
- ELECTRICAL SYSTEM GROUNDING WILL COMPLY WITH 2014 NEC.
- PHOTOVOLTAIC SYSTEM IS UNGROUNDED. NO CONDUCTORS ARE SOLIDLY GROUNDED IN THE INVERTER. SYSTEM COMPLIES WITH 690.35.
- MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
- INVERTER CONFORMS TO AND IS LISTED UNDER UL 1741.
- RACKING CONFORMS TO AND IS LISTED UNDER UL 2703.
- CONSTRUCTION FOREMAN TO PLACE CONDUIT RUN PER 690.31(E) AND 2012 IFC 605.11.2.
- ARRAY DC CONDUCTORS ARE SIZED FOR DERATED CURRENT.
- 9.4 AMPS MODULE SHORT CIRCUIT CURRENT.
- 14.68 AMPS DERATED SHORT CIRCUIT CURRENT (690.8 (a) & 690.8 (b)).

LEGEND AND ABBREVIATIONS

 SERVICE ENTRANCE	
 MAIN PANEL	
 SUB-PANEL	 CHIMNEY
 PV LOAD CENTER	 ATTIC VENT
 SUNRUN METER	 FLUSH ATTIC VENT
 DEDICATED PV METER	 PVC PIPE VENT
 INVERTER(S) WITH INTEGRATED DC DISCONNECT AND AFCI	 METAL PIPE VENT
 AC DISCONNECT(S)	 T-VENT
 DC DISCONNECT(S)	 SATELLITE DISH
 COMBINER BOX	 FIRE SETBACKS
 INTERIOR EQUIPMENT	 HARDSCAPE
 SHOWN AS DASHED	 — PL — PROPERTY LINE

SCALE: NTS

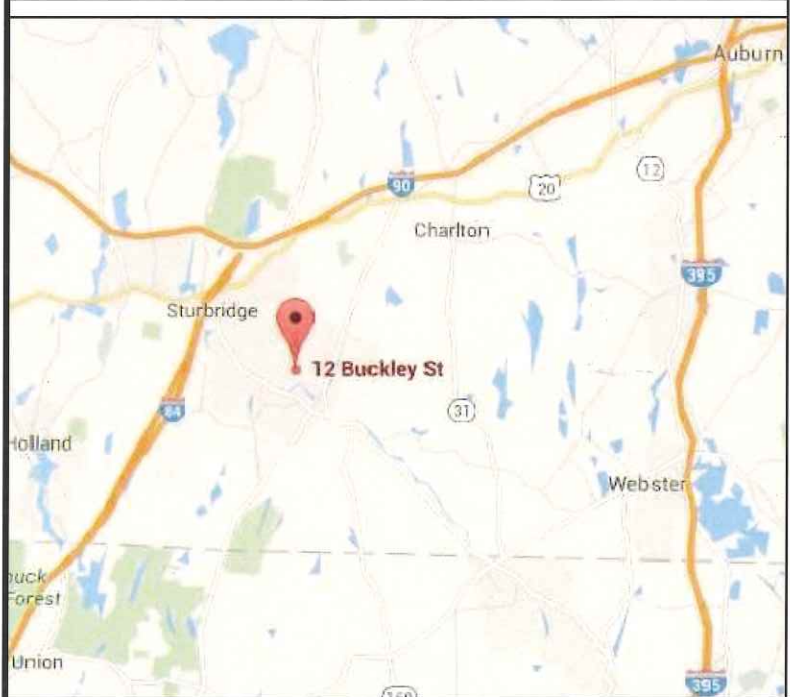
A	AMPERE
AC	ALTERNATING CURRENT
AFCI	ARC FAULT CIRCUIT INTERRUPTER
AZIM	AZIMUTH
COMP	COMPOSITION
DC	DIRECT CURRENT
(E)	EXISTING
EXT	EXTERIOR
FRM	FRAMING
INT	INTERIOR
LBW	LOAD BEARING WALL
MAG	MAGNETIC
MSP	MAIN SERVICE PANEL
(N)	NEW
NTS	NOT TO SCALE
OC	ON CENTER
PRE-FAB	PRE-FABRICATED
PSF	POUNDS PER SQUARE FOOT
PV	PHOTOVOLTAIC
TL	TRANSFORMERLESS
TYP	TYPICAL
V	VOLTS
W	WATTS

REV	NAME	DATE	COMMENTS
A			

TABLE OF CONTENTS

PAGE #	DESCRIPTION
PV-1.0	COVER SHEET
PV-2.0	SITE PLAN
PV-3.0	LAYOUT
PV-4.0	ELECTRICAL
PV-5.0	SIGNAGE

VICINITY MAP



LICENSE NO. 750184
 734 FOREST STREET #400, MARLBOROUGH, MA 01752
 PHONE 888.657.6527
 FAX 805.528.9701

CUSTOMER RESIDENCE:
 TODD CARLSON
 12 BUCKLEY ST,
 SOUTHBRIDGE, MA, 01550

TEL. (508) 523-5701 APN #: 020-052-00001

PROJECT NUMBER:
 221R-012CARL

DESIGNER:
 LASZLO KURTA

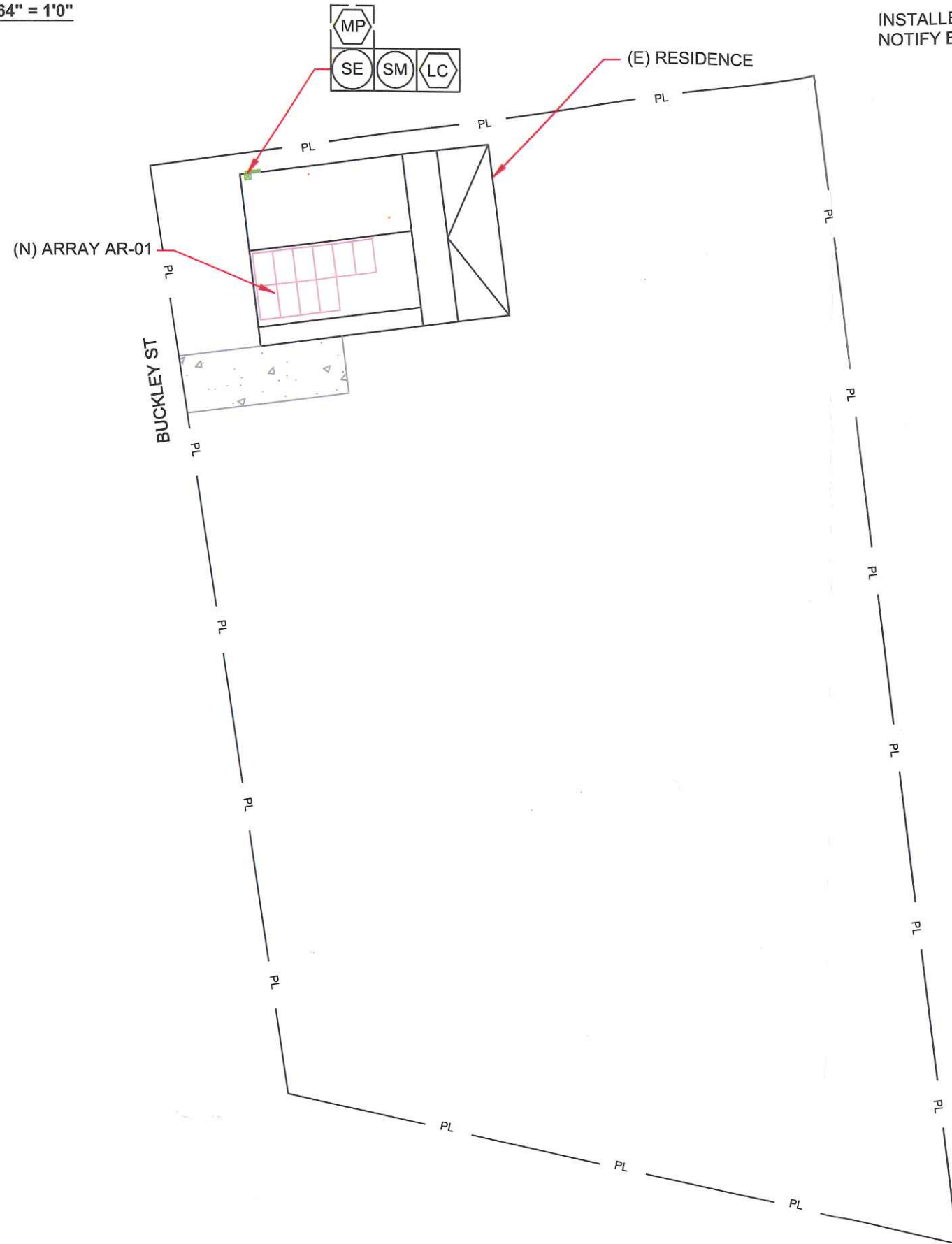
DRAFTER:
 DI

SHEET
COVER SHEET

REV: A.2 12/2/2015

PAGE
PV-1.0

SITE PLAN - SCALE = 3/64" = 1'0"



INSTALLERS TO VERIFY RAFTER SIZE, SPACING, UNSUPPORTED SPANS AND NOTIFY E.O.R OF ANY DISCREPANCIES BEFORE PROCEEDING.

	PITCH	TRUE AZIM	MAG AZIM	PV AREA (SQFT)
AR-01	34°	173°	159°	177.4



Stamped for Structural info only.

SUNRUN

LICENSE NO. 750184

734 FOREST STREET #400, MARLBOROUGH, MA 01752
PHONE 888.657.6527
FAX 805.528.9701

CUSTOMER RESIDENCE:
TODD CARLSON
12 BUCKLEY ST,
SOUTHBRIDGE, MA, 01550

TEL. (508) 523-5701 APN #: 020-052- -00001

PROJECT NUMBER:
221R-012CARL

DESIGNER:
LASZLO KURTA

DRAFTER:
DI

SHEET
SITE PLAN

REV: A.2 12/2/2015

PAGE
PV-2.0

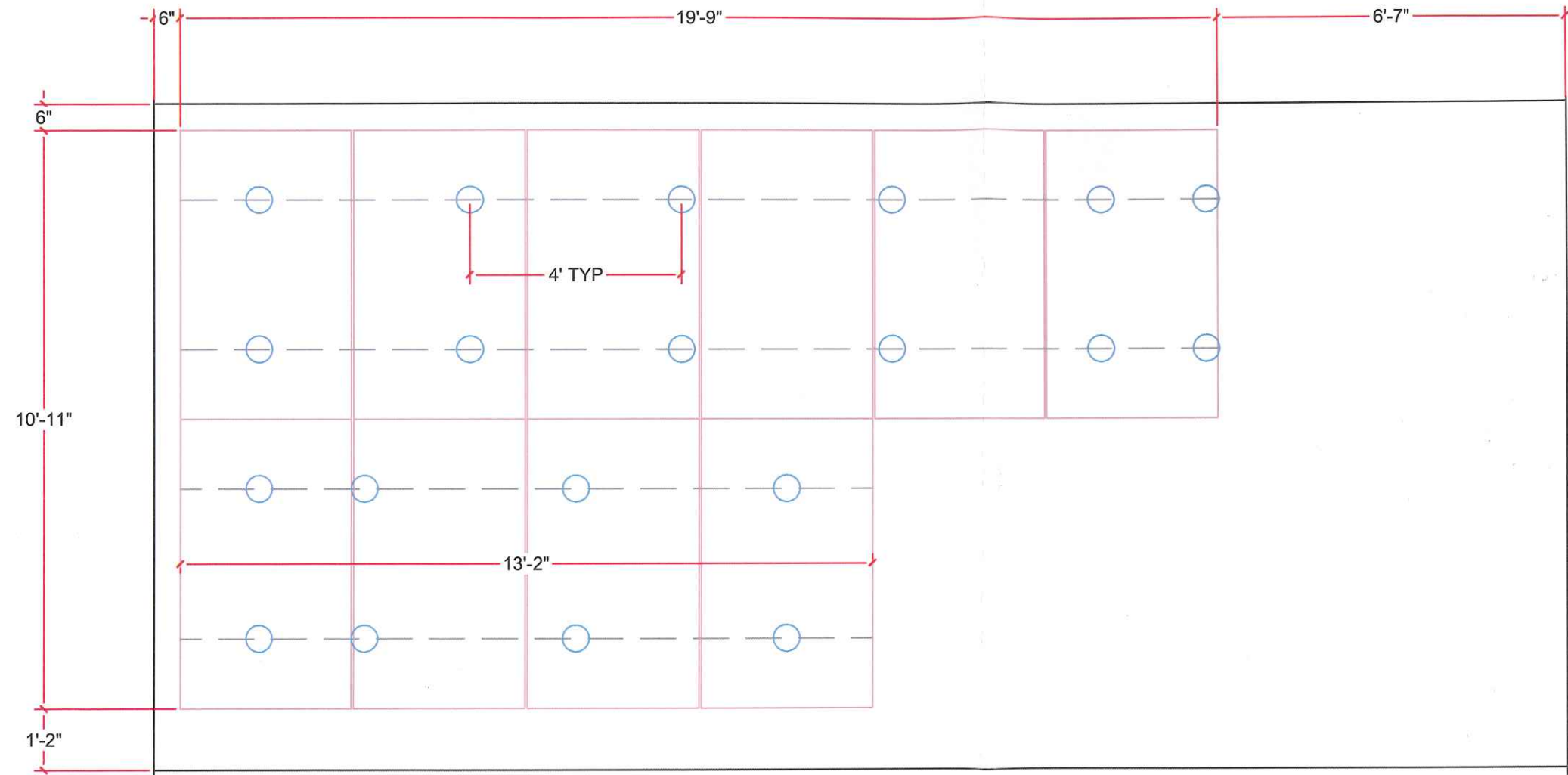
	ROOF TYPE	ATTACHMENT	ROOF HEIGHT	ROOF EXPOSURE	FRAME MATERIAL	FRAME TYPE	FRAME SIZE	MAX FRAME SPAN	OC SPACING	ROOF EDGE ZONE	MAX RAIL SPAN	MAX RAIL OVERHANG
AR-01	COMP SHINGLE	FLASHED L FOOT. SEE PEN D01.	TWO STORY	ATTIC	WOOD	RAFTER	2x6.75	12' - 7"	24"	NO	4' - 0"	1' - 10"

DESIGN CRITERIA

MODULES:
REC SOLAR: REC275TP
MODULE DIMS:
65.5" x 39" x 1.5"
MAX DISTRIBUTED LOAD: 3 PSF
SNOW LOAD: 40 PSF
WIND SPEED:
90 MPH 3-SEC GUST.
LAG SCREWS:
5/16"x4.0": 2.5" MIN EMBEDMENT

D1 - AR-01 - SCALE: 3/8" = 1'
PITCH: 34°
AZIM: 173°

INSTALLERS TO VERIFY RAFTER SIZE, SPACING, UNSUPPORTED SPANS AND NOTIFY E.O.R OF ANY DISCREPANCIES BEFORE PROCEEDING.



LICENSE NO. 750184
734 FOREST STREET #400, MARLBOROUGH, MA 01752
PHONE 888.657.6527
FAX 805.528.9701

CUSTOMER RESIDENCE:
TODD CARLSON
12 BUCKLEY ST,
SOUTHBRIDGE, MA, 01550

TEL. (508) 523-5701 APN #: 020-052--00001

PROJECT NUMBER:
221R-012CARL

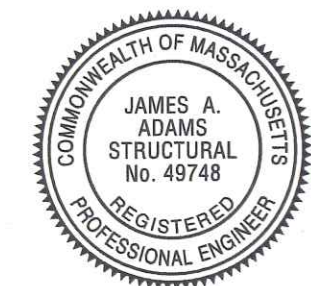
DESIGNER:
LASZLO KURTA

DRAFTER:
DI

SHEET
LAYOUT

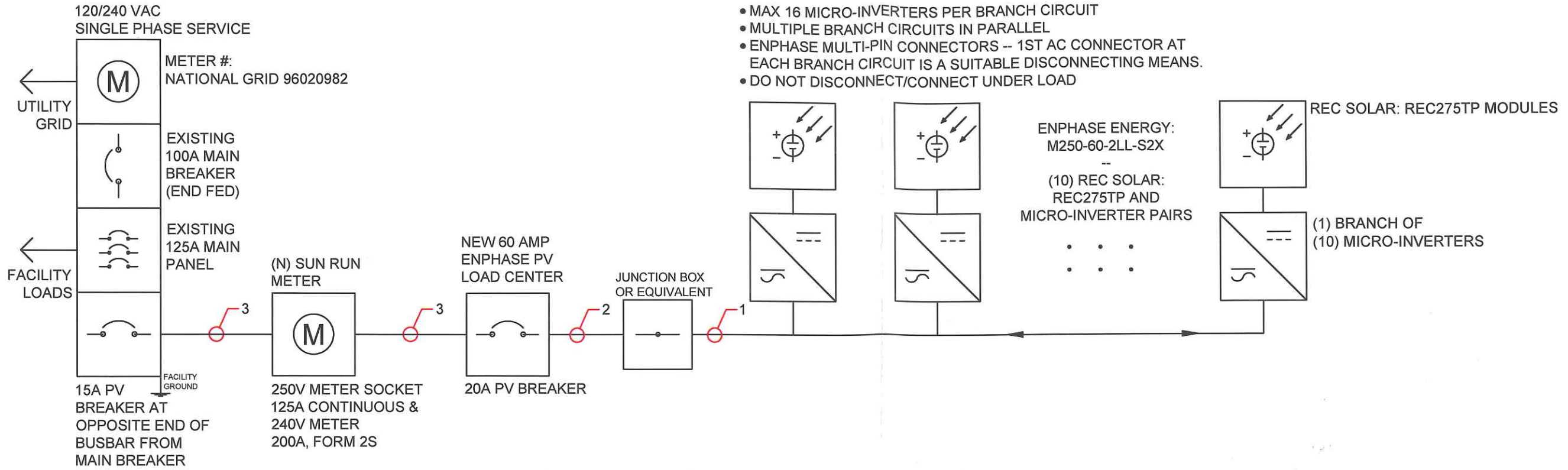
REV: A.2 12/2/2015

PAGE
PV-3.0



James A. Adams
Expir. 06/30/2016

Stamped for Structural info only.



NOTES TO INSTALLER:

1. ADD 60 AMP NEW ENPHASE PV LOAD CENTER WITH PRE-INSTALLED 20 AMP BREAKER.
2. ADD 15 AMP PV BREAKER TO MAIN PANEL.

CONDUIT SCHEDULE

#	CONDUIT	CONDUCTOR	NEUTRAL	GROUND
1	NONE	(2) 12 AWG ENGAGE CABLE	(1) 12 AWG ENGAGE CABLE	(1) 12 AWG ENGAGE CABLE
2	3/4" EMT OR EQUIV.	(2) 10 AWG THHN/THWN-2	(1) 10 AWG THHN/THWN-2	(1) 8 AWG THHN/THWN-2
3	3/4" EMT OR EQUIV.	(2) 10 AWG THHN/THWN-2	(1) 10 AWG THHN/THWN-2	(1) 8 AWG THHN/THWN-2

MODULE CHARACTERISTICS

REC SOLAR: REC275TP	275 W
OPEN CIRCUIT VOLTAGE	38.8 V
MAX POWER VOLTAGE	31.4 V
SHORT CIRCUIT CURRENT	9.4 A

SUNRUN

LICENSE NO. 750184

734 FOREST STREET #400, MARLBOROUGH, MA 01752
PHONE 888.657.6527
FAX 805.528.9701

CUSTOMER RESIDENCE:
TODD CARLSON
12 BUCKLEY ST,
SOUTHBRIDGE, MA, 01550

TEL. (508) 523-5701 APN #: 020-052--00001

PROJECT NUMBER:
221R-012CARL

DESIGNER:
LASZLO KURTA

DRAFTER:
DI

SHEET
ELECTRICAL

REV: A.2 12/2/2015

PAGE
PV-4.0

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION:
(C)(CB)
PER CODE: NEC690.13.G.3 & NEC 690.13.G.4

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

PER CODE: NEC690.56(C)

DC PHOTOVOLTAIC DISCONNECT

LABEL LOCATION:
(DC) (INV)
PER CODE: NEC690.13.B

AC PHOTOVOLTAIC DISCONNECT

LABEL LOCATION:
(AC) (POI)
PER CODE: NEC690.13.B

PHOTOVOLTAIC AC DISCONNECT
MAXIMUM AC OPERATING CURRENT A
MAXIMUM AC OPERATING VOLTAGE V

LABEL LOCATION:
(AC) (POI)
PER CODE: NEC690.54

RATED MAXIMUM POWER-POINT CURRENT (Imp) A
RATED MAXIMUM POWER-POINT VOLTAGE (Vmp) V
MAXIMUM SYSTEM VOLTAGE (VOC) V
MAXIMUM CIRCUIT CURRENT (Isc) A

LABEL LOCATION:
(DC) (INV)
PER CODE: NEC690.53

MAIN PHOTOVOLTAIC SYSTEM AC DISCONNECT

LABEL LOCATION:
(AC) (POI)
PER CODE: NEC690.13.B

WARNING: PHOTOVOLTAIC POWER SOURCE
DO NOT REMOVE UNLESS REPLACED IN EXACT LOCATION-PHOTOVOLTAIC POWER SOURCE DIRECTLY BELOW

LABEL LOCATION:
(UNDER ROOFING MATERIAL)
PER CODE: NEC690.13.G.1

SOLAR DISCONNECT

LABEL LOCATION:
ON POWERONE INVERTER
PER CODE: NEC 690.15 AND NEC 690.13(B)

CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED

DO NOT OPEN UNDER LOAD

LABEL LOCATION:
(AC) (POI)
PER CODE: NEC690.16.B

DO NOT DISCONNECT UNDER LOAD

LABEL LOCATION:
(AC)
PER CODE: NEC690.33.E.2

CAUTION PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

LABEL LOCATION:
(INDIVIDUAL BREAKERS)
PER CODE: NEC705.12.D.3.4

PHOTOVOLTAIC DC DISCONNECT

LABEL LOCATION:
(DC) (INV)
PER CODE: IFC.60.11.3 IFC 605.11.1.4
NEC 690.15, NEC 690.13(B) & NEC 690.14C.2.

PHOTOVOLTAIC AC DISCONNECT

LABEL LOCATION:
(AC) PER CODE: 690.13.B

WARNING
THIS EQUIPMENT FED BY MULTIPLE SOURCE TOTAL RATING OF OVER CURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR

PER CODE: 705.12(D)(2)

WARNING
ELECTRIC SHOCK HAZARD
THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED

LABEL LOCATION:
(DC) (INV)
PER CODE: NEC 690.35(F) TO BE USED WHEN INVERTER IS UNGROUNDED

WARNING
TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

LABEL LOCATION:
(D) (AC) (CB)
PER CODE: NEC110.27(C)

WARNING
ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION
DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

LABEL LOCATION:
(AC) (POI)
PER CODE: NEC 690.17.E

WARNING
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
(POI)
PER CODE: NEC 705.12.D.2

WARNING
ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION:
(AC) (POI)
PER CODE: NEC 690.17.E

LEGEND
(AC): AC Disconnect
(C): Conduit
(CB) Combiner Box
(D) Distribution Panel
(DC): DC Disconnect
(IC): Interior Run Conduit
(INV): Inverter with integrated DC disconnect
(LC): Load Center
(M): Utility Meter
(POI): Point of interconnection

SUNRUN

LICENSE NO. 750184

734 FOREST STREET #400, MARLBOROUGH, MA 01752
PHONE 888.657.6527
FAX 805.528.9701

CUSTOMER RESIDENCE:
TODD CARLSON
12 BUCKLEY ST,
SOUTHBRIDGE, MA, 01550

TEL. (508) 523-5701 APN #: 020-052--00001

PROJECT NUMBER:
221R-012CARL

DESIGNER:
LASZLO KURTA

DRAFTER:
DI

SHEET
SIGNAGE

REV: A.2 12/2/2015

PAGE PV-5.0