

**STATE OF NEW HAMPSHIRE
ELECTRICIANS BOARD**

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13139 M

EXPIRES: 06/30/2023

MASTER



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September 25, 2020

To: ReVision Energy
7 Commercial Drive
Brentwood, NH 03833

Subject: Structural Certification for Installation of Solar Panels
Forman Residence
197 Main Street
Meriden, NH. 03781

To Whom It May Concern,

A design check for the subject residence was done on the existing roofing and framing systems for the installation of solar panels over the roof. From a field inspection of the property, the existing roof support structures were observed by the client's auditors as follows:

The roof structure of the barn consists of metal roofing over 1x4 horizontal strappings at 24" o.c. that are supported by nominal 2x12 rafters at 24" o.c.. There are three 12'-0" bays of rafters that are supported by double 1.75x19.5 beams between bays. The double 1.75 x 19.5 wood beams sandwich 6x6 posts with 4x6 knee braces at 14'-0" o.c.. The rafters are connected to a continuous 2x12 ridge board at the peak, and are supported by the exterior double 1.75 x 19.5 header beam at the eave. There are 2x8 collar ties at 24" o.c. for structural stability.

The existing roof framing system of (MP1) is judged to be adequate to withstand the loading imposed by the installation of the solar panels. No reinforcement is necessary.

The spacing of the solar standoffs should be kept at 48" o.c. with a minimum of (4) 5/16" x 2" lag screws into the 1x4 strappings with a staggered pattern to ensure proper distribution of loads.

I further certify that all applicable loads required by the codes and design criteria listed below were applied to the Ironridge solar rail system and analyzed. Furthermore, the installation crews have been thoroughly trained to install the solar panels based on the specific roof installation instructions developed by Ironridge for the racking system and Ecofasten for the roof connections. Finally, I accept the certifications indicated by the solar panel manufacturer for the ability of the panels to withstand high wind and snow loads.

Design Criteria:

- Applicable Codes = 2015 IBC/IRC, ASCE 7-10, and 2015 NDS
- Roof Dead Load = 9 psf (MP1) - 8 psf (MP2)
- Roof Live Load = 20 psf
- Wind Speed = 115 mph, Exposure C
- Ground Snow Load = 90 psf - Roof Snow Load = 63 psf

Please contact me with any further questions or concerns regarding this project.

Sincerely,

Elaine Huang, P.E.
Project Engineer



Forman Residence, Meriden 1

Wind Calculations

Per ASCE 7-10 Components and Cladding

Input Variables

Wind Speed	115 mph
Exposure Category	C
Roof Shape	Gable/Hip
Roof Slope	28 degrees
Mean Roof Height	20 ft
Building Least Width	40 ft
Effective Wind Area	17.5 ft

Design Wind Pressure Calculations

Wind Pressure $P = qh*(G*Cp)$

$$qh = 0.00256 * Kz * Kzt * Kd * V^2 * I \quad (\text{Eq. 30.3-1})$$

$$Kz \text{ (Exposure Coefficient)} = 0.9 \quad (\text{Table 30.3-1})$$

$$Kzt \text{ (topographic factor)} = 1 \quad (\text{Fig. 26.8-1})$$

$$Kd \text{ (Wind Directionality Factor)} = 0.85 \quad (\text{Table 26.6-1})$$

$$V \text{ (Design Wind Speed)} = 115 \text{ mph}$$

$$I \text{ Importance Factor} = 1 \quad (\text{Table 1.5-1})$$

$$qh = 25.90$$

Standoff Uplift Calculations

	Zone 1	Zone 2	Zone 3	Positive	
$GCp =$	-0.90	-1.10	-1.10	0.85	(Fig. 6-11)
Uplift Pressure =	-23.31 psf	-28.49 psf	-28.49 psf	22.0 psf	
X Standoff Spacing =	4.00	4.00	4.00		
Y Standoff Spacing =	2.75	2.75	2.75		
Tributary Area =	11.00	11.00	11.00		
Footing Uplift =	-256 lb	-313 lb	-313 lb		

Standoff Uplift Check

Maximum Design Uplift = -313 lb

Standoff Uplift Capacity = 400 lb

400 lb capacity > 313 lb demand Therefore, OK

Fastener Uplift Capacity Check

Fastener = 1 - 5/16" d a Lag

Number of Fasteners = 4

Embedment Depth = 1

Pullout Capacity Per Inch = 150 lb (NDS Eq 12.2-1)

Fastener Capacity = 600 lb (NDS Eq 11.3-1)

w/ F.S. of 1.0 = 600 lb

600 lb capacity > 313 lb demand Therefore, OK

Fastener Shear Capacity Check

Embedment Depth Reduction Factor 1

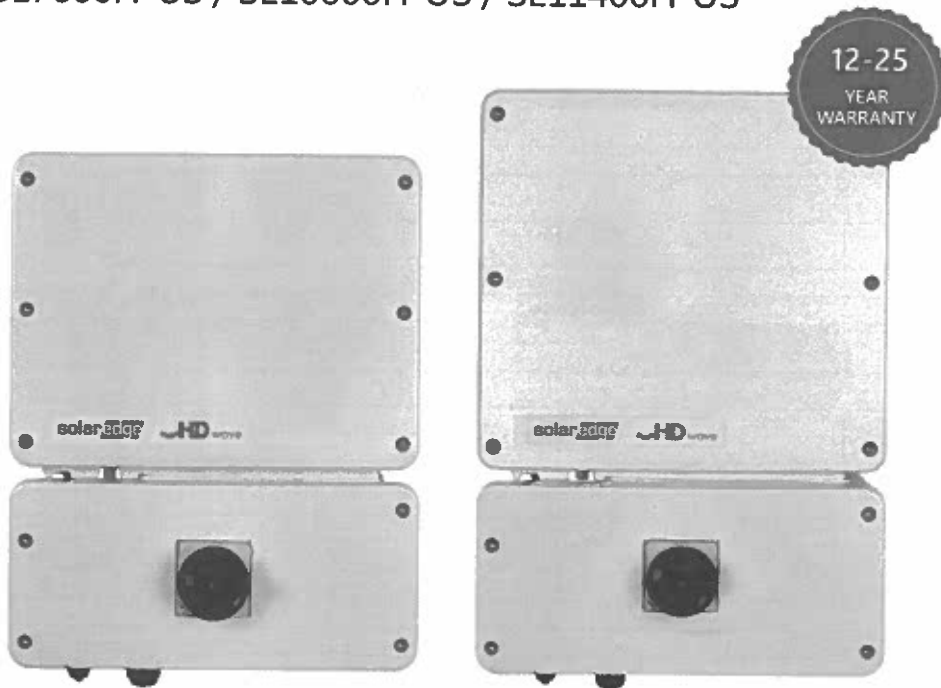
Lateral Force From Gravity Loads 264

Attachment Lateral Capacity 288 (NDS Table 12K)

288 lb capacity > 265 lb demand Therefore, OK

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 99% weighted efficiency
- // Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- // Fixed voltage inverter for longer strings
- // Integrated arc fault protection and rapid shutdown for NEC 2014, NEC 2017 and NEC 2020 per article 690.11 and 690.12
- // UL1741 SA certified, for CPUC Rule 21 grid compliance
- // Small, lightweight, and easy to install both outdoors or indoors
- // Built-in module-level monitoring
- // Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)

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

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

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US
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ADDITIONAL FEATURES	
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)
Revenue Grade Metering, ANSI C12.20	Optional*
Consumption metering	
Inverter Commissioning	With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection
Rapid Shutdown - NEC 2014, NEC 2017 and NEC 2020, 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect

STANDARD COMPLIANCE	
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCL according to T.I.L. M-07
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (H)
Emissions	FCC Part 15 Class B

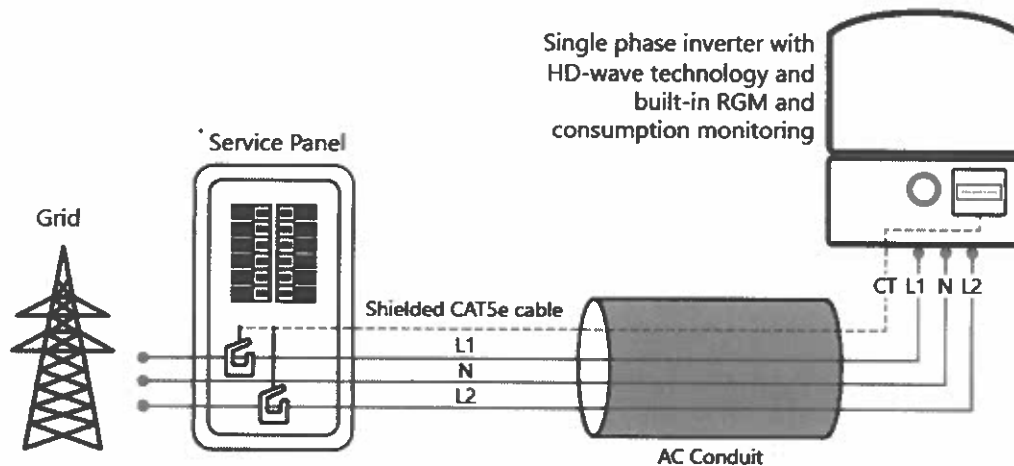
INSTALLATION SPECIFICATIONS			
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG		1" Maximum / 14-4 AWG
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG		1" Maximum / 1-3 strings / 14-6 AWG
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 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 lb / kg
Noise	< 25		< 50 dBA
Cooling	Natural Convection		
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁴⁾		°F / °C
Protection Rating	NEMA 4X (Inverter with Safety Switch)		

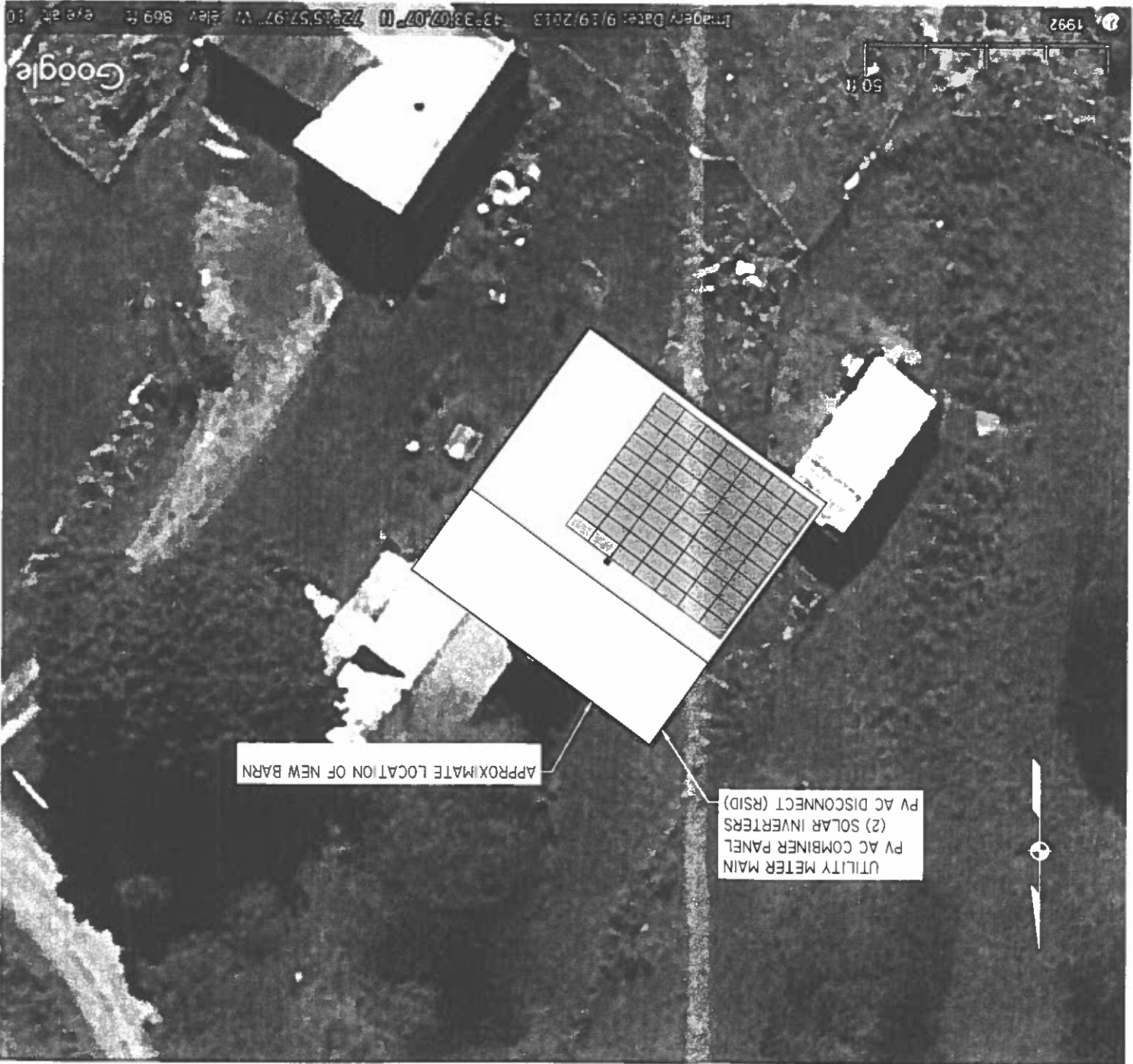
(3) Inverter with Revenue Grade Meter P/N: SExxxxH-US000BNC4: Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxxH-US000BN14. For consumption metering, current transformers should be ordered separately: SEACT0750-200NA-20 or SEACT0750-400NA-20. 20 units per box

(4) Full power up to at least 50°C / 122°F; for power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

How to Enable Consumption Monitoring

By simply wiring current transformers through the inverter's existing AC conduits and connecting them to the service panel, homeowners will gain full insight into their household energy usage helping them to avoid high electricity bills





APPROXIMATE LOCATION OF NEW BARN

UTILITY METER MAIN
PV AC COMBINER PANEL
(2) SOLAR INVERTERS
PV AC DISCONNECT (RSD)

TALATION AND
SYSTEM

