



Project Address: 13 Campbell Park, Somerville, MA 02144

Property Owner: Daniel Hullah

Contractor: ReVision Energy, Inc.

Proposed Project Narrative

ReVision Energy is proposing a rooftop solar installation at **13 Campbell Park, Somerville, Massachusetts**, as contracted by homeowner Daniel Hullah. The project consists of the installation of eighteen (18) JA Solar 440W Black photovoltaic modules for a total system size of 7.92kW DC. The proposed system is expected to generate approximately 7,365 kWh of clean electricity annually.

We understand the Historic Commission's preferences regarding the placement of solar arrays and have designed the system to balance historic preservation concerns with the property's renewable energy goals. The proposed location of the solar modules was selected based on detailed site visits, aerial modeling, and a professional shade analysis completed by ReVision Energy.

The proposed array is located on the roof plane that provides the best available solar resource for the property. According to the shade analysis, the selected roof plane has an annual Total Solar Resource Fraction (TSRF) of 70%. The TSRF is a metric that evaluates the solar potential of a roof by factoring in its tilt, orientation, and shading. A TSRF of 70% indicates strong solar viability. In contrast, the other roof plain has lower TSRF values because of insufficient direct sunlight, making it an unsuitable location for solar modules. Relocating the array would significantly reduce system performance and decrease the amount of electricity generated annually.

The homeowner currently uses approximately 10,000 kWh of electricity per year, and the proposed solar array is projected to generate approximately 7,365 kWh annually, offsetting roughly 74% of the home's annual electrical consumption. While the system will not meet 100% of the home's electricity needs, it represents the maximum practical production achievable while working within the constraints of the existing roof structure and available solar resource. Downsizing or relocating the system would result in a substantial reduction in clean energy production and financial benefits for the homeowner.

The layout of the array has also been carefully designed to minimize visual impact. Due to the geometry of the roof and the need to maximize solar production, the selected roof plane provides the most effective, concise and symmetrical arrangement of the modules. The solar panels will be mounted parallel to the existing roof surface using a low-profile racking system that keeps the modules only a few inches above the roof. Required setbacks from ridges, edges, and fire access pathways will be maintained in accordance with Massachusetts building and fire code requirements.

To further reduce visual impact, ReVision Energy has selected JA Solar Black/Black photovoltaic modules, which feature black frames, black back sheets, and no contrasting silver



components. This all-black design helps the array blend into the roof surface and provides a more aesthetically compatible appearance when viewed from surrounding public ways. The solar modules will be installed in a clean, organized layout intended to complement the existing architecture of the property.

The associated electrical equipment has also been selected and located to minimize visibility. The Enphase IQ8MC microinverters are mounted underneath the solar modules and will not be visible. The Enphase IQ Combiner Gateway, will be installed inside the basement to limit the amount of equipment needed on the side of the home. A code compliant disconnect will be added next to the existing utility meter.

Finally, the project has undergone structural engineering review as required to confirm that the existing building can safely accommodate the additional weight and wind loading associated with the solar equipment. Supporting documentation, including the shade analysis, project proposal, equipment specification sheets, site photographs, and engineering documentation, has been included for Historic Commission review. ReVision Energy will obtain all required permits and approvals prior to installation.

ReVision Energy is committed to minimizing the visual impact of this installation while providing Daniel Hullah with a safe, efficient, and sustainable source of renewable energy. The proposed design represents a thoughtful balance between preserving the historic character of the property and advancing clean energy goals through responsible solar development.



JA Structural Consulting
12 Fredrickson Rd, Norfolk, MA 02056
PHONE 1.617.416.2023
JAstructural@gmail.com

April 7, 2026

ATTN: ReVision Energy
1980 Turnpike St building 2
North Andover, MA 01845

RE: Hullah Residence Solar Panel Installation
13 Campbell Park
Somerville, MA 02144

To Whom It May Concern,

Pursuant to your request, JA Engineers has conducted a limited structural evaluation of the roof framing at the above-referenced site to determine if the roof has adequate capacity to support the proposed solar panels. Our analysis was based on the framing information and configurations provided by ReVision Energy. We understand that the structural components of the existing roof framing are in good condition. It is further understood that all existing connections between the various roof framing members are adequate to resist the current loading conditions and behave in the manner typical of a rafters and ceiling tie system or truss system prior to the installation of the solar panel.

Results:

Roof 1 (MP1) - adequate to support the proposed solar panels.

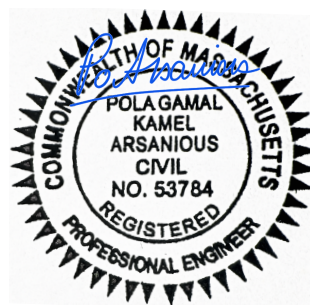
Roof Attachment Guidelines: The spacing of the solar standoffs should be maintained as stated in the wind section of these calculations. Additionally, it is important that the locations of the solar standoffs be staggered between adjacent rails so that no single rafter supports more load than under the existing conditions.

Design Criteria and Code Information

Ground Snow Load, Pg:	40 psf
Basic Wind Speed:	119 mph
Risk Category:	II
Code Used:	Massachusetts Residential Code, 10th Edition, ASCE 7-16, and 2018 NDS

Do not hesitate to contact my office at 617-416-2023 should you have any questions or if you require any additional information.

Respectfully,
JA Structural Consulting
Pola Arsanious, P.E.



Hullah Residence



Roof Attachment Spacing

Attachment spacing for the entire site: For roof-specific, please check the wind load section

Spacing of the solar standoffs panel Portrait Orientation			
Zones	Zones 1&2e&2r	Zones 2n&3r	Zone 3e
Group	1	2	3
Roof Attachment - Rafter attached Exposed	48 inch	48 inch	48 inch
Roof Attachment - Deck attached Exposed	23 inch	23 inch	23 inch
Spacing of the solar standoffs panel Landscape orientation			
Zones	Zones 1&2e&2r	Zones 2n&3r	Zone 3e
Group	1	2	3
Roof Attachment - Rafter attached Exposed	48 inch	48 inch	48 inch
Roof Attachment - Deck attached Exposed	30 inch	30 inch	30 inch

Note:

The spacing listed above is based on the Ironridge Quickmount HUG attachment system (1 layer of shingles only) with:

Rafter attachment hardware: (2) #14 screws x 3"

Deck attachment hardware: (6) #14 screws x 3"

When using other attachment hardware products, ensure that the attachment capacity matches the capacity listed in the wind calc section in blue text. The following screws are approved replacements for those listed above, and the spacing of the attachments must remain the same:

Rafter attachment hardware: For one layer of shingles: (1) 5/16" D x 4" lag screw. For two layers of shingles: (1) 5/16" D x 5" lag screw.

Deck attachment hardware: For shingle roofs: (6) 5/16" D x 2" lag screws or more. For metal roofs: (1) metal clamp/bracket to the metal roof deck.

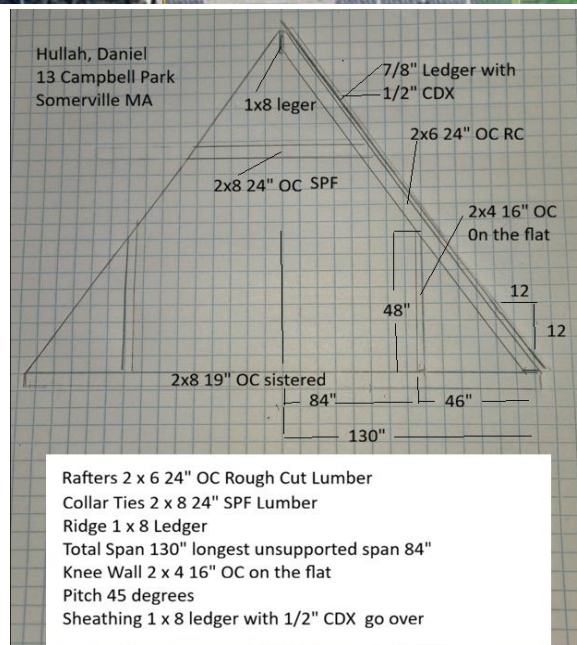
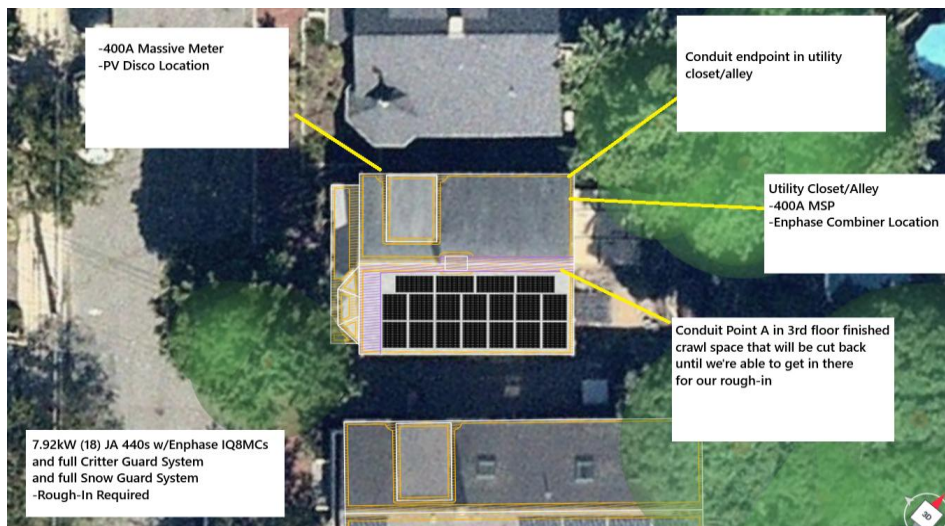
Design loads (+ and - psf) for modules		
Zones	*- psf	*+psf
Zones 1&2e&2r	-18.51 psf	10.96 psf

*For the purposes of the table above, the wind speed has been adjusted according to Risk Category I, and the snow load has been adjusted to be normal to the module.

The pertinent data of the existing roof structure is listed below:

Roof 1 MP1

Roof Rafters:	1.5X5.5 Rafters @ 24"o.c" (SPRUCE-PINE-FIR No.2 Assumed)
Roof Slope:	45 Degrees
Length of Rafter (Horizontal Projection):	7 feet
Ceiling Joists:	YES
Condition of Framing:	Good
Roof Covering:	Asphalt Shingles





Gravity Loading

Roof Snow Load Calculations		
pg = Ground Snow Load =	40 psf	ASCE, Figure 7.2-1
Ce = Exposure Factor =	1	ASCE, Table 7.3-1
Ct = Thermal Factor =	1.1	ASCE, Table 7.3-2
I = Importance Factor =	1	ASCE, Table 1.5-2
pf = 0.7 Ce Ct I pg =	30.8 psf	ASCE, Eq. 7.3-1
where pg ≤ 20 psf, pf min = I x pg =	N/A	ASCE, 7.3.4
where pg > 20 psf, pf min = I x 20 =	N/A	
Per ASCE 7, min values of pf shall apply to hip and gable roofs with slopes less than 15 degree		
Therefore, pf = Flat Roof Snow Load =	30.8 psf	
ps = Cspf		ASCE, Eq. 7.4-1
Cs = Slope Factor =	0.42	Roof 1
ps = Sloped Roof Snow Load =	12.8 psf	Roof 1

PV Dead Load = 3 psf per (ReVision Energy)

Roof 1 Dead Load		
Asphalt Shingles	4.00	
Roof Plywood	2.00	
1.5X5.5 Rafters @ 24"o.c	1.15	
Vaulted Ceiling	4.00	(Enclosed Attic)
Miscellaneous	0.32	
Total Roof DL Roof 1	11.5 psf	
DL Adjusted to 45 Degree Slope	16.2 psf	

Wind Calculations Roof 1

Per ASCE 7 Components and Cladding

Input Variables	
Wind Speed	119 mph
Exposure Category	B
Roof Shape	Gable
Roof Slope	45 degree
Mean Roof Height	25 ft
Building Least Width	16 ft
Effective Wind Area	20.9 sf
Roof Zone Edge Distance, a	3.0 ft

Design Wind Pressure Calculations		
Wind Pressure $P = qh \cdot (GC_p)(\gamma_e)(\gamma_a)$		ASCE 7 - Eq 29.4-7
$qh = 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2$		ASCE, Eq 26.10-1
K_z (Exposure Coefficient) =	0.67	ASCE, Table 26.10-1
K_{zt} (topographic factor) =	1	ASCE, Fig 26.8-1
K_d (Wind Directionality Factor) =	0.85	ASCE, Table 26.6-1
V (Design Wind Speed) =	119 mph	
I Importance Factor =	1	
qh =	20.49 psf	
γ_e =	1.5	ASCE, Fig 29.4-7
γ_a =	0.77	ASCE, Fig 29.4-8

Standoff Uplift Calculations					Fig 30.3-2
	Zones 1&2e&2r	Zones 2n&3r	Zone 3e	Positive	
GC_p =	-1.49	-1.76	-2.18	0.77	
Uplift Pressure =	-35.05 psf	-41.47 psf	-51.31 psf	18.26 psf	
Attachment Dead Load =	3.00 psf	3.00 psf	3.00 psf		
Max Rail Span Length Rafter Attached=	4.00 ft	4.00 ft	4.00 ft		
Max Rail Span Length Deck Attached=	1.90 ft	1.90 ft	1.90 ft		
Longitudinal Length =	3.21 ft	3.21 ft	3.21 ft		
Attachment Tributary Area Rafter attached=	12.84 sf	12.84 sf	12.84 sf		
Attachment Tributary Area Deck attached=	6.10 sf	6.10 sf	6.10 sf		
Footing Uplift Rafter Attached=	-247 lb	-296 lb	-372 lb		
Footing Uplift Deck Attached=	-117 lb	-141 lb	-177 lb		

Standoff Uplift Check Rafter Attached	
Maximum Design Uplift =	-372 lb
Standoff Uplift Capacity =	1004 lb
1004 lb capacity > 372 lb demand Therefore, OK	

Standoff Uplift Check Deck Attached	
Maximum Design Uplift =	-177 lb
Standoff Uplift Capacity =	195 lb
195 lb capacity > 177 lb demand Therefore, OK	

Rafter Fastener Capacity Check Per NDS

Fastener = #14 inch

Number of Fasteners = 2

Embedment Depth = 2.0 inch

Pullout Capacity Per Inch = 121 lb

Fastener Capacity = 774 lb

774.4 lb capacity > 372 lb demand **Therefore, OK**

Deck Fastener Capacity Check Per E830E

Fastener = #10 inch

Number of Fasteners = 6

Embedment Depth = 0.5 inch

Pullout Capacity = 82 lb

Fastener Capacity = 787 lb

787.2 lb capacity > 177 lb demand **Therefore, OK**

Spacing of the solar standoffs panel Portrait Orientation

Zones	Zones 1&2e&2r	Zones 2n&3r	Zone 3e
Roof Attachment - Rafter attached Exposed	48 inch	48 inch	48 inch
Roof Attachment - Deck attached Exposed	23 inch	23 inch	23 inch
Roof Attachment - Rafter attached not Exposed	48 inch	48 inch	48 inch
Roof Attachment - Deck attached not Exposed	30 inch	30 inch	30 inch

Spacing of the solar standoffs panel Landscape orientation

Zones	Zones 1&2e&2r	Zones 2n&3r	Zone 3e
Roof Attachment - Rafter attached Exposed	48 inch	48 inch	48 inch
Roof Attachment - Deck attached Exposed	30 inch	30 inch	30 inch
Roof Attachment - Rafter attached not Exposed	48 inch	48 inch	48 inch
Roof Attachment - Deck attached not Exposed	30 inch	30 inch	30 inch

Note:

The spacing listed above is based on the Ironridge Quickmount HUG attachment system (1 layer of shingles only) with:

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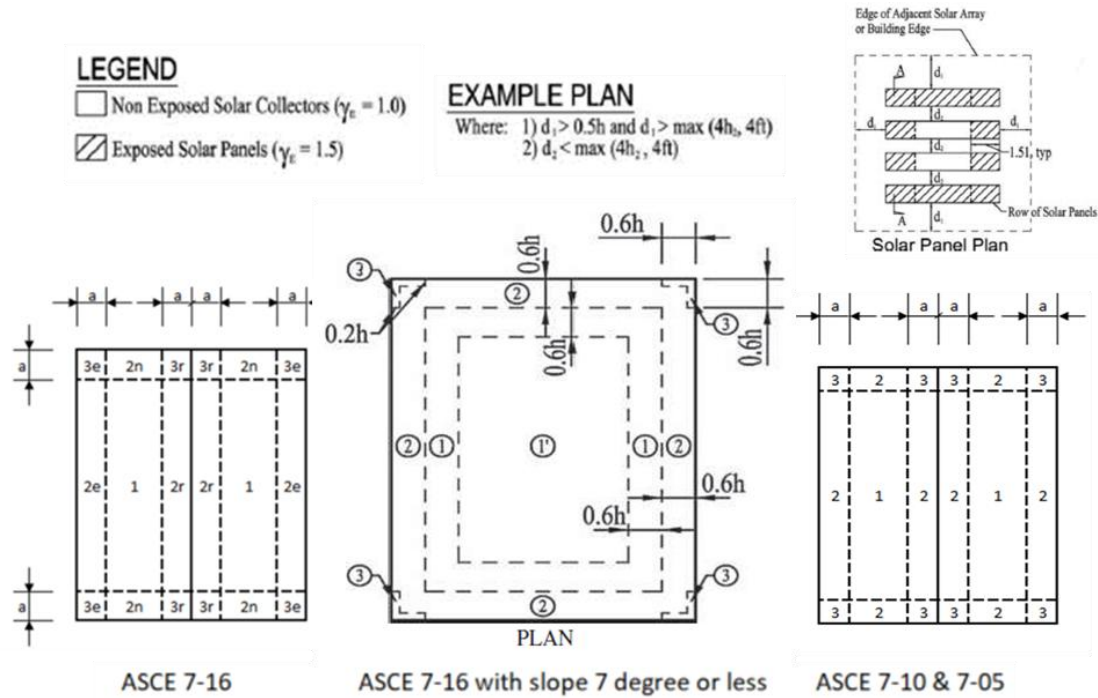
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Deck attachment hardware: For shingle roofs: (6) 5/16" D x 2" lag screws or more. For metal roofs: (1) metal clamp/bracket to the metal roof deck.

Design loads (+ and - psf) for modules

Zones	*- psf	*+psf
Zones 1&2e&2r	-12.34 psf	10.96 psf
Zones 2n&3r	-14.60 psf	10.96 psf
Zone 3e	-18.06 psf	10.96 psf

*For the purposes of the table above, the wind speed has been adjusted according to Risk Category I, and the snow load has been adjusted to be normal to the module.



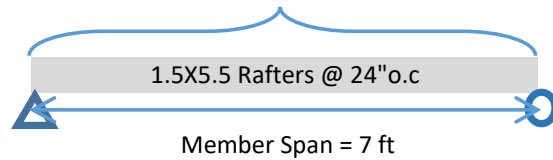


Framing Check Roof 1

PASS

w = 64 plf

Dead Load 16.2 psf
PV Load 3.0 psf
Snow Load 12.8 psf
Wind Load 18.3 psf Downward
-41.5 psf Uplift



Governing Load Combo. DL + SL
Total Load 32.0 psf

Member Properties				
Member Size	S (in ³)	I (in ⁴)	Lumber Sp/Gr	Member Spacing
1.5X5.5	7.56	20.80	SPRUCE-PINE-FIR No.2	@ 24" o.c

Check Bending Stress									
Fb (psi) =	f'b	X	Cd	X	Cf	X	Cr	X	Cm
	875	X	1.15	X	1.30	X	1.15	X	1.00
Allowed Bending Stress = 1504.3 psi									

$$\begin{aligned}\text{Maximum Moment} &= (wL^2) / 8 \\ &= 392.55 \text{ ft}\cdot\text{lb} \\ &= 4710.6 \text{ in}\cdot\text{lb} \\ \text{Actual Bending Stress} &= (\text{Maximum Moment}) / S \\ &= 622.9 \text{ psi}\end{aligned}$$

Allowed > Actual -- 41% Stressed -- Therefore, OK

Check Deflection	
Allowed Deflection (D+L) =	L/240
	= 0.350 in
Deflection Criteria Based on =	Simple Span
Actual Deflection (D+L) =	(5*w*L ⁴) / (384*E*I)
	= 0.146 in
Allowed > Actual -- Therefore OK	

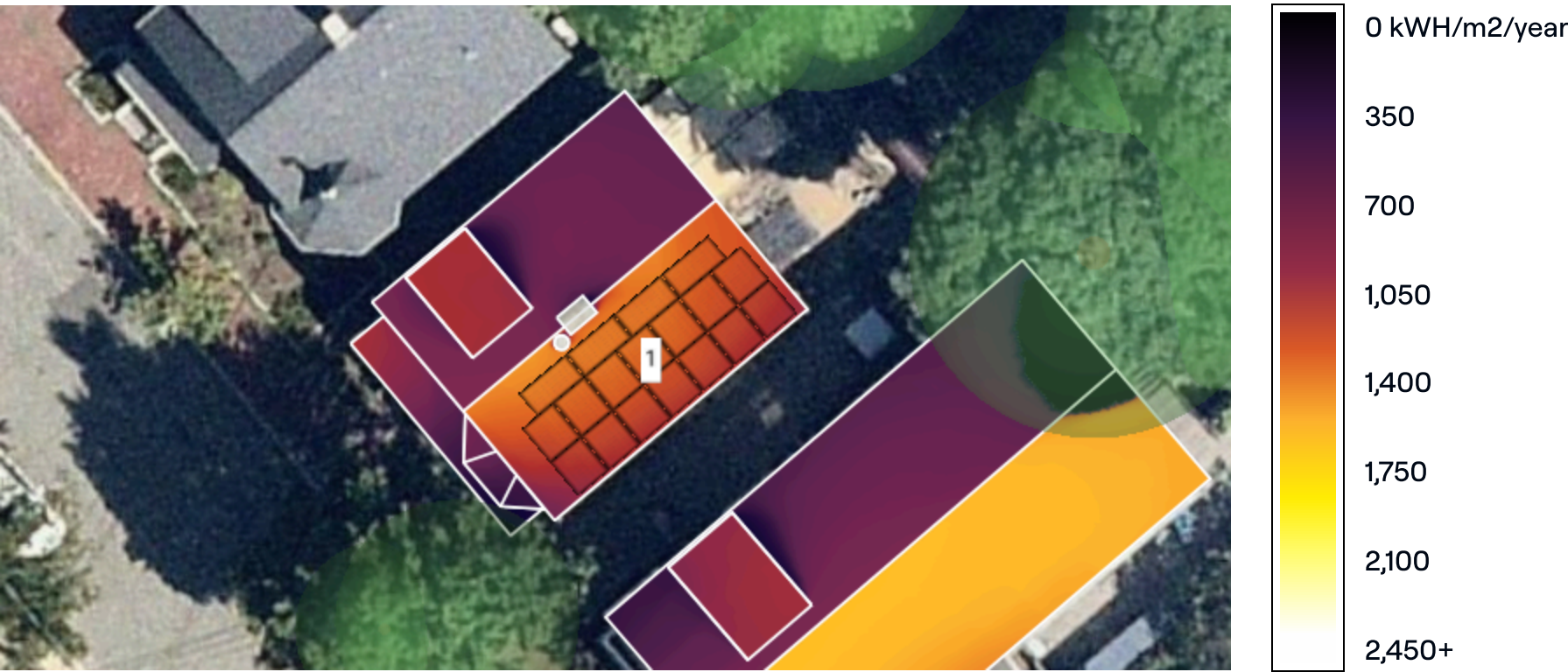
$$\begin{aligned}\text{Allowed Deflection (Snow Load)} &= L/360 \\ &= 0.233 \text{ in} \\ \text{Actual Deflection (Snow Load)} &= (5*w*L^4) / (384*E*I) \\ &= 0.048 \text{ in} \\ \text{Allowed > Actual -- Therefore OK}\end{aligned}$$

Check Shear	
Member Area =	8.3 in ²
Fv (psi) =	135 psi
Allowed Shear = Fv * A =	1114 lb
Max Shear (V) = w * L / 2 =	224 lb
Allowed > Actual -- 20.1% Stressed -- Therefore, OK	

Shade Report - 13 Campbell Park, Somerville, MA 02144, USA

Customer	Designer	Organization
Daniel Hullah	John Murphy	ReVision Energy
Address	Coordinates	Date
13 Campbell Park, Somerville, MA 02144, USA	42.3966811, -71.126154	Mar 4, 2026

Annual irradiance



Summary

Array ID	Panel count	Azimuth	Pitch	Annual TOF	Annual solar access	Annual TSRF
1	18	140°	45°	93%	75%	70%
Weighted average by panel count:					75%	70%

Monthly solar access % across arrays

Array ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	63	72	79	81	78	75	76	79	82	77	65	60

Shade Report - 13 Campbell Park, Somerville, MA 02144, USA

Customer	Designer	Organization
Daniel Hllah	John Murphy	ReVision Energy
Address	Coordinates	Date
13 Campbell Park, Somerville, MA 02144, USA	42.3966811, -71.126154	Mar 4, 2026

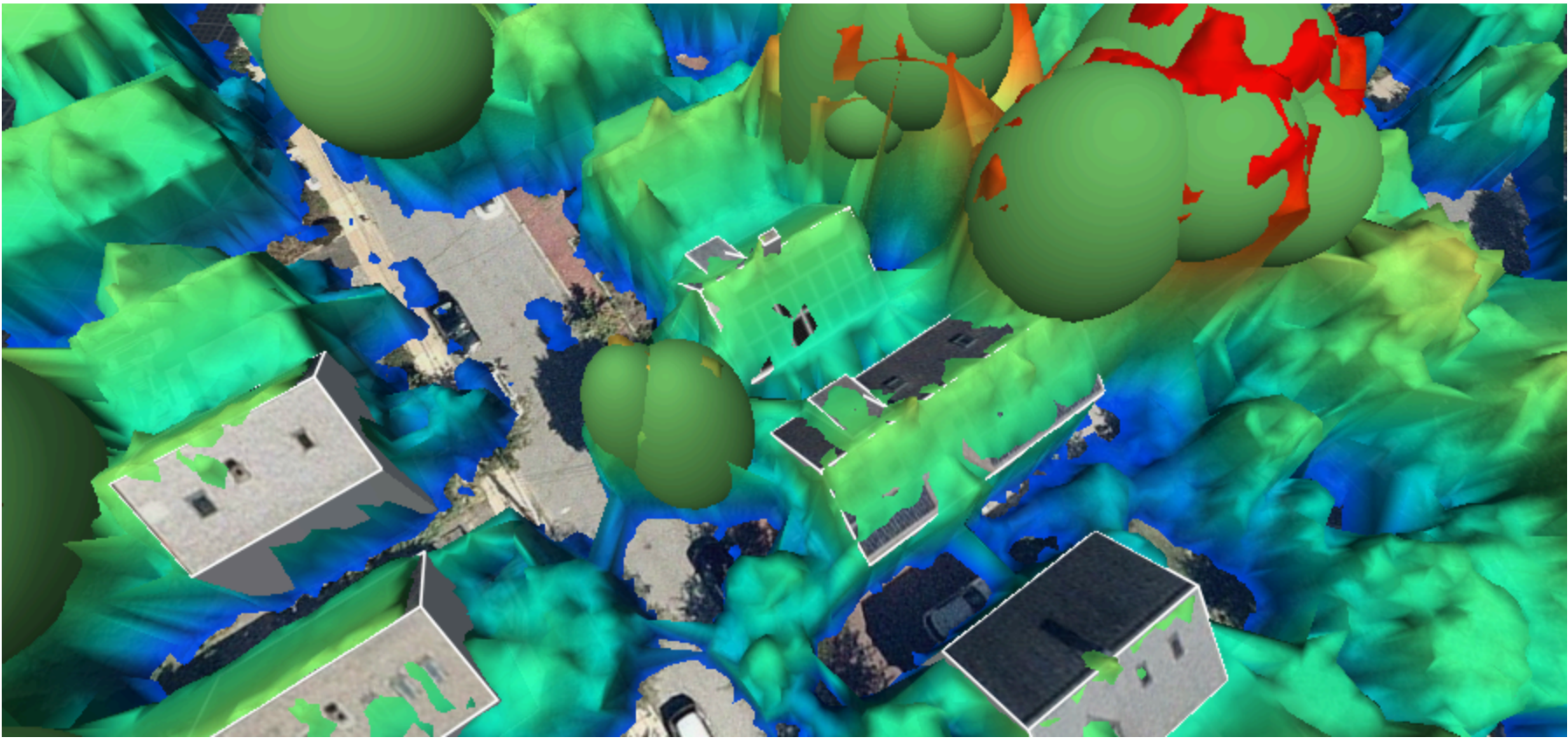
Zoomed out satellite view



3D model



3D model with LIDAR overlay



Shade Report - 13 Campbell Park, Somerville, MA 02144, USA

Customer	Designer	Organization
Daniel Hllah	John Murphy	ReVision Energy
Address	Coordinates	Date
13 Campbell Park, Somerville, MA 02144, USA	42.3966811, -71.126154	Mar 4, 2026

Street view with corresponding 3D model



I, **John Murphy**, certify that I have generated this shading report to the best of my abilities, and I believe its contents to be accurate.

View of Home from Site Visit

North /front and south side of home (visible from public way)





Back of the house (Which Hard to see from public way)





View From Public Way via Google Maps Street View – 13 campbell Park (Red House)

