Historic Preservation Services
Community Development & Neighborhood Services
281 North College Avenue
P.O. Box 580
Fort Collins, CO 80522.0580

970.416.4250
preservation@fcgov.com
fcgov.com/historicpreservation

REPORT OF ALTERATIONS TO DESIGNATED RESOURCE
Site Number/Address: 721 Peterson Street
Laurel School National Register Historic District
ISSUED: September 22, 2021

Ellen Yastrow & Robert Sims
721 Peterson Street
Fort Collins, CO 80524

Dear Property Owners:

This report is to document proposed alterations to the A.E. Dubber Residence at 721 Peterson Street, pursuant to Fort Collins Municipal Code Chapter 14, Article IV. A copy of this report may be forwarded to the Colorado Office of Archaeology and Historic Preservation.

The alterations include:

- Installation of rooftop photo-voltaic solar on the south facing roof slope of the main house and rear addition.

Our staff review of the proposed work finds the alterations do not meet the SOI Standards for Treatment of Historic Properties. A summary is provided below:

Applicable Code Standard	Summary of Code Requirement and Analysis (Rehabilitation)	Standard Met (Y/N)
SOI #1	*A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships;* **The property will remain in residential use.**	**Y**
SOI #2	*The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.* **The property was originally built in 1905 by O.E. Long, a well-known builder in the Fort Collins area during its boom years from the 1890s-1920s, for A.E. Dubber, although Dubber does not appear in city directories. The first confirmed occupants appear in the 1908 directory as Edgar T. and Bertle Pate, with no occupation listed for either. In 1925, the property is shown on**	**N**

	a Sanborn Insurance map as having a full-width porch on both its front and back. That configuration didn't change in the 1943 insurance map. The property appears to have retained this configuration throughout the historic district's period of significance (1870-1940) **The solar panel installation meets some of the provisions of this Standard, mainly by being flush-mounted to avoid introducing a new roof shape. However, the guidelines for solar installations on historic buildings recommend that panels be installed toward the rear of the roof to reduce visibility (a good rule-of-thumb is to keep panels on the rear 50% of a roof). These panels extend to the front of the main house roof (not including the porch) and will be highly visible from Plum Street. Staff would encourage relocating some of the forward panels to the garage roof at the rear of the lot.**	
SOI #3	*Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.* **The solar panels and accompanying equipment are clearly recognizable as new features that do not date from the historic district's historic period (roughly 1880-1940).**	**Y**
SOI #4	*Changes to a property that have acquired historic significance in their own right will be retained and preserved.* **The property has the following history of alterations since its 1905 construction:** - **1925 – basement finish and frame 9x20' porch; reshingle roof** - **1945 – property insulated** - **1950 – reroof (asphalt composition)** - **1972 – addition on rear of house for bedroom & sewing room** - **2017 – replaced front porch deck, posts, and foundation** - **2020 – rehabilitation of front porch**	**N/A**
SOI #5	*Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.* **No character-defining features are proposed to be altered. The solar panels are a flush-mounted system.**	**N/A**
SOI #6	*Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of*	**N/A**

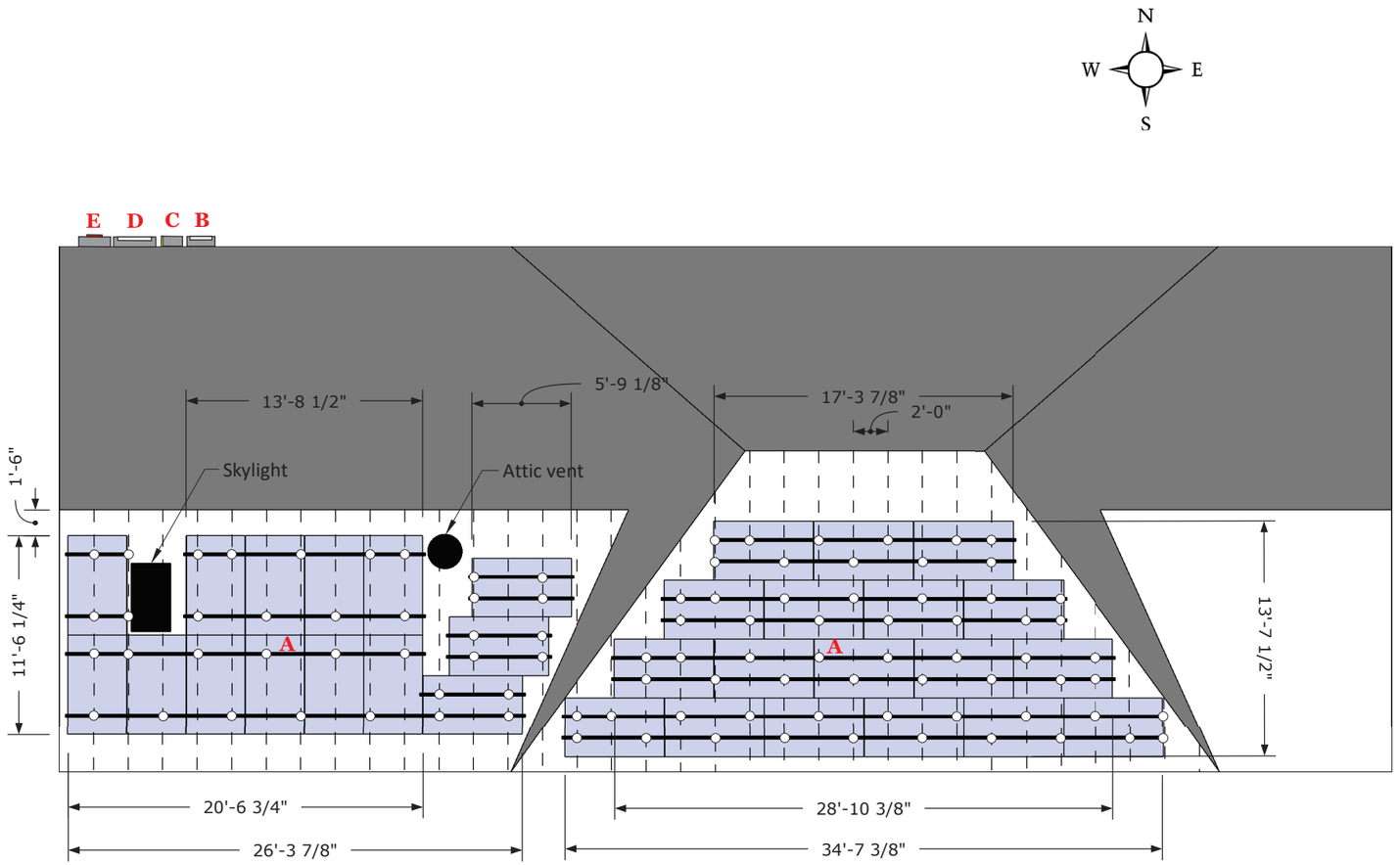
	missing features will be substantiated by documentary and physical evidence.	
SOI #7	*Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.*	**N/A**
SOI #8	*Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.*	**N/A**
SOI #9	*New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.* **As noted above, the solar panels do follow some of the guidelines for rooftop solar on residential buildings, mainly by being flush-mounted to match the roof slope. However, they are placed forward onto the front of the roof and will be comparatively visible, making them not compatible with the architectural features of the building. Staff would encourage some of the forward panels be relocated to the garage roof instead.**	**N**
SOI #10	*New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.* **Solar panels are generally fully reversible with minimal damage to historic properties.**	**Y**

Staff expects the property to remain contributing to the Laurel School Historic District and eligible for tax incentives, including the Colorado Historic Tax Credit.

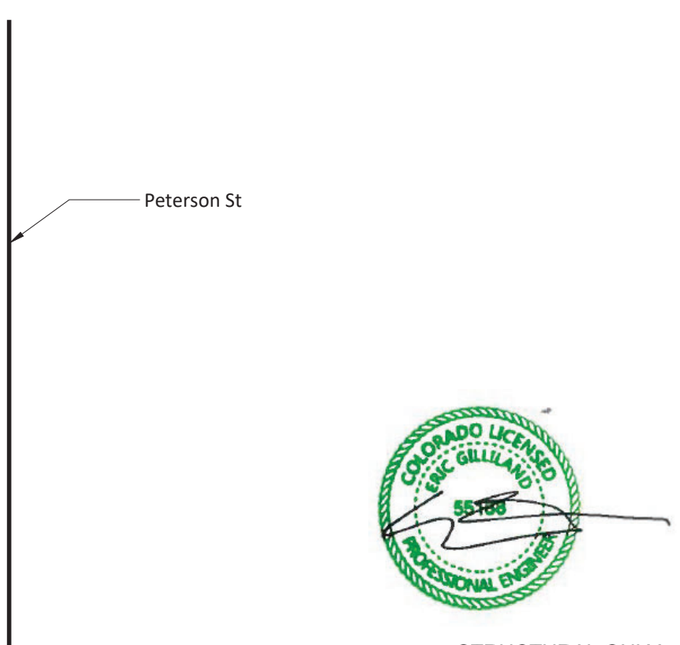
If you have any questions regarding this review, please contact me. I may be reached at jbertolini@fcgov.com or at 970-416-4250.

Sincerely,

Jim Bertolini
Historic Preservation Planner



MAX MOUNT SPACING: 4'-0"



STRUCTURAL ONLY
SIGNED: 8/25/2021
EXPIRES: 10/31/2021

Design Criteria		
AHJ	Fort Collins	
NEC	2020	
IBC	2018	
Snow	30	psf
Wind (3s)	115	mph
Exposure	B	
ASHRAE Extreme Min	-27	°C
ASHRAE 2% High	35	°C
Set Backs		
Ridge	18 or 36	in
Roof Edge	36	in
Valley	18	in
Hip	18	in

Building Information		
Electricity Usage	23,190	kWh/yr
Main Breaker	150	A
Main Busbar	200	A
Building Stories	1	
Roof Type	Comp Shingle	
S Array azimuth	180	Degrees
S Array Tilt	30,40	Degrees
S Array Shading	5	%
E Array azimuth	N/A	Degrees
E Array Tilt	N/A	Degrees
E Array Shading	N/A	%
W Array azimuth	N/A	Degrees
W Array Tilt	N/A	Degrees
W Array Shading	N/A	%

System Specificaitons		
System Type	Grid-tied	
DC Size	11.68	KW DC
AC Size	9.60	KW AC
# modules	32	
# inverters	8	
Array Area	627.4	Sq.Ft.
System Weight	2.5	lbs/Sq.Ft.

System Components				
Key	Component	Manufacturer	Catalog #	QTY
A	Modules	Longi	LR4-60HPB	32
A	Inverters	APSystems	QS1	8
B	AC Combiner	GE	TL412R1P	1
C	AC Switch	Siemens	LNF222R	1
D	Main Panel	Square D	SC816F150C	1
E	Utility Meter			1

Building Structural Info		PV System Structural Info		System Weight				Structural Calculations	
Building Stories	1	Attachment Type	UNIRAC FlashLOC	Component	Wt (lbs)	QTY	Total (lbs)	Array Area (sq.ft.)	627.4
Roof Type	Comp Shingle	# of Attachments	97	Modules	42.99	32	1375.68	Wt per Attachment (lbs.)	16.6
Rafter Type	2x4	Max Spacing (in.)	48	Micros	9.9	8	79.2	Distributed Wt (lbs/sq.ft)	2.5
Rafter inch oc	24	Module Overhang (in)	6"-15.35"	Rail	0.728	218.6	159.16	Max cantilever (in.)	15.8
		Rail Type	UNIRAC SM Light Rail	Total (lbs)			1614.04		
		Rail Length (ft)	218.6						

Evident Solar LLC

Bruce Stotts
2207 Creststone Ct
Ft Collins, CO
80525

Design

Address: 721 Peterson St, Fort Collins, CO 80524
Client: Sims, Rob
Project Valuation: $15,000.00
<PV PERMIT PACKAGE>

Structural

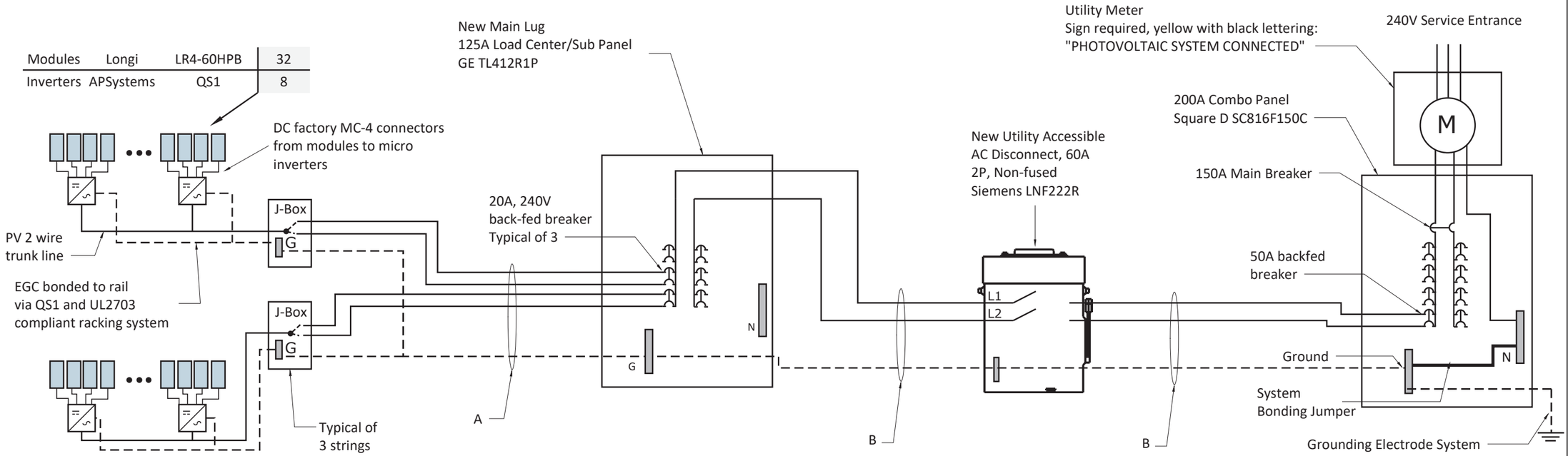
ISSUE
Drawn by: Bruce Stotts
Drawn on: Aug 10, 2021
Scale:

REVISIONS

	MM/DD/YY	REMARKS
1	08/10/21	
2	_ _/_ _/_ _	
3	_ _/_ _/_ _	
4	_ _/_ _/_ _	
5	_ _/_ _/_ _	
6	_ _/_ _/_ _	
7	_ _/_ _/_ _	
8	_ _/_ _/_ _	

A

1



System Specifications		Module Specifications		Specifications for:	Inverter	Module and Micro inverter Compatability
Location		Manufacturer	Longi	Manufacturer	APSystems	NEC 690.7 Max Voltage
AHJ	Fort Collins	Model #	LR4-60HPB	Model #	QS1	Temp corrected module Voc < Optimizer Max DC Input V
NEC	2020	Pmp	365 Wdc	Max DC Power	1500	-27.0 °C - 25 °C = -52.0 °C
System Size kW DC	11.68 kW	Voc	41 V	Max DC Volt (V)	55	-52.0 °C x -0.0027 ΔV/°C = 0.140 % Δ Voc
System Size kW AC	9.60 kW	Vmp	35.00 V	Min DC Volt (V)	16	41 V x 0.140 = 5.75 Δ Voc
Power Ratio	1.21	Isc	11.41 A	Min MPPT Volt (V)	22	5.75 V + 41 V = 46.7 Adj Voc
Total # of Modules	32	Imp	10.43 A	Max Output Volt (V)	264	Module Temp Corr Voc Micro Inverter Max Vdc
Total # of Inverters	8	Coeff Voc	-0.27% ΔV/°C	Max DC current (A)	12 x 4	46.7 V < 55 V
max modules/string	12	Coeff Pmax	-0.35% ΔP/°C	Cont Power (W)	1200	Minimum Operating Voltage (MPPT)
min modules/string	4	NRTL Listing	1703 UL	Nom AC Volt (V)	240	65.0 °C - 25 °C = 40.0
# strings on project	3	**Dimensions:**		Cont. Output Curr (A)	5	40.0 °C x -0.0035 ΔP/°C = -0.140 % Δ Vmp
Ambient Temp		Width	40.87 in.	NRTL Listing	1741	35.00 V x -0.140 = -4.90 Δ Vmp
ASHRAE Ext Min Temp	-27.0 °C	Height	69.09 in.	Inverter Grounding	Ungrounded	-4.90 V + 35.00 V = 30.1 Adj Vmp
ASHRAE 2% Avg High	35.0 °C	Weight	42.99 lbs.	Efficiency (%)	96.5%	Module Temp Corrected Vmp Micro Inverter Min MPP V
				Weight (Lbs)	9.9	30.1 V > 16 V

3-Line Diagram Notes

1. Wire sizes are as indicated or larger. All terminations rated 75°C or higher.
2. All equipment is bonded by mechanical means or by a grounding conductor. The PV system is bonded to existing household ground at the grounding terminal in the main panel to maintain NEC requirements.
3. The system is grid-intertied, no batteries.
4. The meter socket for the PV Production meter shall be marked with a stamped brass, aluminum or stainless steel tag, indicating the address including the unit, typically "PV PROD".
5. The PV Production meter shall be located within ten (10) feet of the existing utility meter. If there is any reason this cannot be accomplished, a site plan showing proposed equipment locations shall be submitted for review.

Conductor Schedule

3 Line Key	Conductors QTY	Size	Cu or Al	Insulation	EGC QTY	Size	Cu or Al	Insulation	Conduit	Location
A	6	12	Cu	THWN-2	1	12	Cu	THWN-2	1/2" EMT	Roof/Attic
B	3	6	Cu	THWN-2	1	10	Cu	THWN-2	3/4" EMT	Exterior

3 Line Key	Ambient Temp. Derate: Max Temp (°C)	Correction Factor 310.15(B)(2)(a)	Conductor: # of Current Carrying Conductors	Conduit Sizing: Area (sq.in.) Chapter 9	EGC Area (sq.in.)	Total Area (sq. in.)	40% Fill Chpt. 9 Tbl. 4 (sq.in.)	Conduit Size (in.)	Conduit Type	Voltage Drop: One-way Length (ft)	Resistance (Ω/kft)	Voltage drop (%)	Total Voltage Drop (%)
A	35	0.91	6	0.0181	0.0181	0.1267	0.213	0.50	1/2" EMT	50	1.587	0.99	1.05
B	35	0.91	3	0.0243	0.0243	0.0972	0.213	0.75	3/4" EMT	5	0.404	0.06	

Conductor Sizing

3 Line Key	Description	Nominal Current (A)	Max Cont. Output Current (A)	Conductor Size (AWG)	Cu/ Al	Insulation	Conductor Ampacity (90°)	Total # of Conductors	# of Current Carrying Conductors	Adjustment Factor for current-carrying wires	Ambient Temp. Correction Factor	Conditions of Use Ampacity	Required Ampacity	Terminal ampacity (75°C)	OCPD (A)	EGC Size (AWG)
NEC			*Current limited				310.15(B)(16)		310.15(B)(5)	310.15(B)(3)(a)	310.15(B)(2)(a)	690.8(b)(2)	690.8(B)(1)	310.15(B)(16)		250.122
A	Micro inv to AC comb	15.0	15.0	**12**	Cu	THWN-2	30	7	6	0.80	0.91	21.84	18.7	25	20	12
B	AC comb to main panel	40.0	40.0	**6**	Cu	THWN-2	75	4	3	1.00	0.91	68.25	50.0	65	60	10

Evident Solar LLC

Bruce Stotts
2207 Creststone Ct
Ft Collins, CO
80525

Design

Address: 721 Peterson St, Fort Collins, CO 80524
Client: Sims, Rob
Project Valuation: $15,000.00
<PV PERMIT PACKAGE>

Electrical

ISSUE
Drawn by: Bruce Stotts
Drawn on: Aug 10, 2021
Scale:

REVISIONS

	MM/DD/YY	REMARKS
1	08/10/21	
2	__/__/__	
3	__/__/__	
4	__/__/__	
5	__/__/__	
6	__/__/__	
7	__/__/__	
8	__/__/__	

E

1

Gilliland ENGINEERING

2333 N. Williams St.
Denver, CO 80205
330-612-3756

8/25/2021

Certification Letter for Rob Sims Residence

To whom it may concern,

This letter is to certify that the residence located at **721 Peterson St, Fort Collins, CO 80524** has been evaluated for suitability to install a photovoltaic electric system. Calculations were completed in accordance with the following building code & design criteria:

- 2018 IBC w/Fort Collins Amendments
- Ground Snow Load = 30 psf
- Wind Load = 140 MPH, Exp. C

Roof framing was observed as 2x4 Rafteres at 24" OC Spacing. The max span on the rafters underneath the PV System was 6'-0". The roof framing was found to be adequate for the additional load of the PV Modules.

This PV System will utilize Unirac FlashLoc Attachments with (1) 5/16" Diameter Stainless Steel Lag Bolt per attachment. The minimum embedment for the lag bolts are 2.5". The mechanical connections on this PV System are found to meet the requirements of the building code when installed with these specifications.

If any questions arise on the above mentioned, please feel free to reach out.

Sincerely,

Eric Gilliland, P.E.

330.612.3756

SIGNED: 8/25/2021
EXPIRES: 10/31/2021

Gilliland ENGINEERING

2333 N Williams St.
Denver, CO 80205
330-612-3756

Structural Calculations for Flush-Mount PV System

Address: 721 Peterson St, Fort Collins, CO 80524

Date Prepared: 8/25/2021

The following Calculations certify the proposed PV System Installation and is compliant with the following Codes & Design Criteria

Buiding Code: IBC 2018 w/ Amendments

Wind Speed:	140	mph, Exp. C
Ground Snow Load	30	psf
Roof Snow Load	0	psf
Roof Type	Hip	

	Min	Max	
Roof Pitch:	30	30	
Mean Roof Height:	15		ft
Sea -Elevation:	4000		ft
Furthest Distance to Roof Edge:	8		ft
Furthest Distance to Adjacent Array	8		ft
Orientation	Portrait		

SIGNED: 8/25/2021
EXPIRES: 10/31/2021

Design Loads: ASCE 7-16

Roof Snow Load (ASCE c. 7)

Flat Roof Snow Load (Pf):			0.7*Ce*Ct*Is*Pg
Ce	1		
Ct	1.1		
Is	1		
Pg	30	psf	
Pf =	23.1	psf	
Sloped Roof Snow Laod (Ps):			Cs*Pf
Cs	1		(Non-Slippery)
Ps =	**23.1**	**psf**	Minimum Roof Snow Load

Gilliland ENGINEERING

2333 N Williams St.
Denver, CO 80205
330-612-3756

Wind Load: ASCE 7-16 (29.4.4)

Wind Load (P):	qh * (GCp) * (GammaE) * (GammaA)		(EQ 29.4-7)
	Exposure C		
Kzt	1		
Uplift/Down	**(EQ 29.4-7)**	(20 sf effective area)	
P (Zone1)	**-43.23191**	**psf**	
P (Zone2)	**-63.1851**	**psf**	
P (Zone3)	**-59.85957**	**psf**	

Dead Load (ASCE Table C3-1)

PV Modules + Racking	3	psf
Asphalt Comp. Roof	2.5	psf
OSB Decking	3	psf
Roof Framing (2x6@24" OC)	5	psf
Total Dead Load =	13.5	psf

Framing Capacity (NDS 3.3.1 / NDS 4.3.1):

Framing Capacity (Fb'): Fb*Cd*Cm*Ct*Cl*Cf*Cfu*Ci*Cr*CLS

Fb 875 psi (SPF #2)

Cd (wind)	1.6	Cm	1	Cl	1	Cfu	1	Cr	1.2
Cd (Snow)	1.15	Ct	1	Cf	1.5	Ci	1	CLS	1

Fb' Wind Loads	**=**	**2415**	**psi**
Fb' Snow Loads	**=**	**1735.781**	**psi**

Gilliland ENGINEERING

2333 N Williams St.
Denver, CO 80205
330-612-3756

Frame Loading IBC 1605.3: Allowable Stress Design (ASD)

Framing Size & Spacing	2x4 Rafter	@	24 in OC

Framing Loads (lbs/ft)

Snow + Dead (D+S)	73.2 lbs/ft
Snow+Dead+Wind (D+0.75(0.6W+S))	100.558718 lbs/ft
Uplift (0.6D+0.6W):	-35.678291 lbs/ft
Downforce (D+0.6W)	78.878291 lbs/ft

Attachment Loading IBC 1605.3: Allowable Stress Design (ASD)

Attachment Loads (psf)

Zone 1 Uplift (0.6D+0.6W):	-24.1391455 psf	
Zone 2 Uplift (0.6D+0.6W):	-36.1110588 psf	
Zone 3 Uplift (0.6D+0.6W):	-34.1645697 psf	Note: Module Pressures Shared with Zone 1 Areas
Attachment spacing (Zone 1):	4 ft	
Attachment spacing (Zone 2):	4 ft	
Attachment spacing (Zone 3):	4 ft	6" Max Rail Overhang
Tributary Width (max):	3 ft	Portrait, 72" Length
Tributary Area (Zone 1):	12 ft^2	
Tributary Area (Zone 2):	12 ft^2	
Tributary Area (Zone 3):	12 ft^2	

Framing Capacity Checks (NDS 3.3.1 / NDS 4.3.1)

Section Modulus:	2x4	3.0625 in^3
Max. Unsupported Span:		72 in

	Applied Stress		Allowable Stress	
Snow + Dead (D+S)	1290.7102 psi	<	1735.78 psi	OK
Snow+Dead+Wind (D+0.75(0.6W+S))	1773.11699 psi	<	2415 psi	OK
Uplift (0.6D+0.6W):	629.102928 psi	<	2415 psi	OK
Downforce (D+0.6W)	1390.83354 psi	<	2415 psi	OK

Gilliland ENGINEERING

2333 N Williams St.
Denver, CO 80205
330-612-3756

Fastener Checks - NDS 2018 Table 11.3.1, Table 12.2A

Attachment spacing (Zone 1):	4 ft	
Attachment spacing (Zone 2):	4 ft	
Attachment spacing (Zone 3):	4 ft	12" Max Rail Overhang
Tributary Width (max):	3 ft	Portrait, 72" Length

		Applied Load
Uplift on Middle Attachments	=	-289.669746 lbs
Uplift on Ridge Attachemnts	=	-433.332706 lbs
Uplift on Corner Attachments	=	-409.974836 lbs

Fastener Type: 5/16" Lag Bolt

Lag Screw Capacity
(NDS 2015 / 2018 Table 11.3.1, Table 12.2A)

W'	=	W*CD*(CM^2)*Ct*Ceg*Ctn	
W	=	266	lb/in (DF #2, SG = 0.50)
CD	=	1.6	Wind Load - CD = 1.6
CM	=	1	Lag Bolts are in Dry Conditions
Ct	=	0.8	Temps >100F
Ceg	=	1	No End Grain
Ctn	=	1	No Toenailing
W'	=	340.48	lb/in

Embedment = 2.5 in

Fasteners Per Attachment = 1

Total Allowable Load Per Attachment = 851.2 lbs

Gilliland ENGINEERING

2333 N Williams St.
Denver, CO 80205
330-612-3756

Fastener Checks - NDS 2018 Table 11.3.1, Table 12.2A (Cont.)

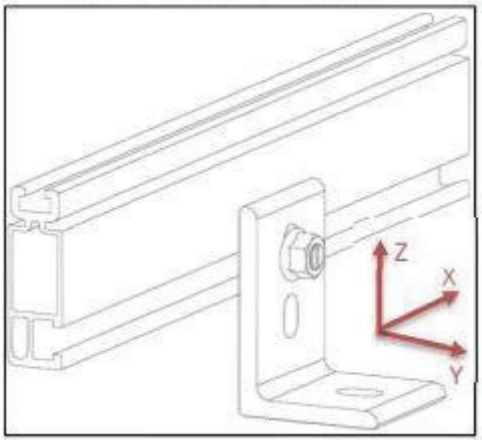
		Actual Load (lbs)		Allowable Load (lbs)
Uplift on Middle Attachments	=	-289.669746 lbs	<	851.2 OK
Uplift on Ridge Attachemnts	=	-433.332706 lbs	<	851.2 OK
Uplift on Corner Attachments	=	-409.974836 lbs	<	851.2 OK

Attachment Checks

Attachment Type: UniRac SolarMount L-Foot (LT)

SOLARMOUNT UNIRAC

SOLARMOUNT L-FOOT



L-Foot with 3/8" T-Bolt				
Direction	Allowable Load (lbs)		Design Load (lbs)	
	SM/SM HD	SM LT	SM/SM HD	SM LT
X ±, Sliding	565	594	854	898
Y ±, Transverse	146	172	220	261
Z +, Tension	938	603	1419	911
Z -, Compression	1357	1297	2052	1962

Part No. 304001C, 304001D
L-Foot material: 6000 Series Aluminum Alloys
Ultimate Tensile: 38 ksi, Yield: 35 ksi
Finish: Clear or Dark Anodized
L-Foot Weight: 0.215 lbs (98g)

		Actual Load (lbs)		Load (lbs)
Uplift on Middle Attachments	=	-289.669746 lbs	<	603 OK
Uplift on Ridge Attachemnts	=	-433.332706 lbs	<	603 OK
Uplift on Corner Attachments	=	-409.974836 lbs	<	603 OK