

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

CERTIFICATE OF APPROPRIATENESS – Minor Alteration (No Application Required) ISSUED: October 13, 2020 EXPIRATION: October 13, 2021

Colleen McKee and John Parks 224 E. Elizabeth Street Fort Collins, CO 80524

Dear Ms. McKee and Mr. Parks:

This letter provides you with certification that proposed work to your designated historic property, the D.C. Coulton House at 224 E. Elizabeth Street, a duplex and contributing property to the Laurel School Historic District, listed in the National Register of Historic Places in 1980, has been approved without an application by the City's Historic Preservation Division (HPD) because the proposed work appears to have minimal effects to the historic resource and meets the requirements of Chapter 14, <u>Article IV</u> of the Fort Collins Municipal Code.

The alterations reviewed include:

• Rooftop solar installation on south slope of non-historic (2003) garage at rear of lot.

Notice of the approved application has been provided to building and zoning staff to facilitate the processing of any permits that are needed for the work. Please consider National Park Service guidance on <u>solar panels</u> as you complete this project.

Please note that work beyond that indicated in your permit application/correspondence requires additional approval. If the approved work is not completed prior to the expiration date noted above, you may apply for an extension by contacting staff at least 30 days prior to expiration. Extensions may be granted for up to 12 additional months, based on a satisfactory staff review of the extension request.

If you have any questions regarding this approval, or if I may be of any assistance, please do not hesitate to contact me. I may be reached at <u>jbertolini@fcgov.com</u> or 970-416-4250.

Sincerely,

Jim Bertolini Historic Preservation Planner

Planning, Development & Transportation Services



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

970.416.2740 970.224.6134- fax *fcgov.com*

Roof Mounted Photovoltaic Systems Residential Installation Standards

Roof Access, Walking Pathways, and Spacing Criteria

Roof access points.

- Shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors,
- Located at strong points of building construction locations
- Where the access point does not conflict with overhead obstructions such as tree limbs, wires or signs.

Hip roof layouts.

- Panels and modules shall be located in a manner that provides a clear access pathway not less than 3 feet (914 mm) in width from the eave to the ridge on each roof slope where panels and modules are located.
- 18" of access pathway required at the top of ridge/hip where someone can stand on opposite roof plane.
- The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

Single ridge roofs.

- Panels and modules shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels or modules are located.
- A single shed roof must provide 36" access pathway along the top of the roof.

Roofs with hips and valleys.

- Panels and modules shall not be located less than 18 inches (457 mm) from a hip or valley where panels or modules are to be placed on both sides of a hip or valley.
- Where panels are to be located on one side only of a hip or valley that is of equal length, the 18-inch (457 mm) clearance does not apply.

Exceptions

- Detached, non-habitable Group U Occupancies
- Roof Structures with a slope of less than 2:12
- Panels may be placed adjacent to the roof ridge if an alternate fire-fighting smoke ventilation method is approved by the Building Official.

Russ Hovland CBO 11/2017



September 17, 2020

To:	Blue Raven Solar
	1403 North Research Way, Building J
	Orem, UT. 84097

Subject: Certification Letter Parks Residence 224 East Elizabeth St Fort Collins, CO. 80524

To Whom It May Concern,

A jobsite observation of the condition of the existing framing system was performed by an audit team of Blue Raven Solar as a request from Domus Structural Engineering. All review is based on these observations and the design criteria listed below and only deemed valid if provided information is true and accurate.

On the above referenced project, the roof structural framing has been reviewed for additional loading due to the installation of the solar PV addition to the roof. The structural review only applies to the section of the roof that is directly supporting the solar PV system and its supporting elements. The observed roof framing is described below. If field conditions differ, contractor to notify engineer prior to starting construction.

The roof structure of (MP1) consists of composition shingle on roof plywood that is supported by pre-manufactured trusses that are spaced at @ 24"o.c.. The top chords, sloped at 40 degrees, are 2x6 sections, the bottom chords are 2x6 sections and the web members are 2x4 sections. The truss members are connected by steel gusset plates. The max unsupported projected horizontal top chord span is approximately 7'-0".

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 72" o.c. for landscape and 48" o.c. for portrait orientation, with a staggered pattern to ensure proper distribution of loads.

The scope of this report is strictly limited to an evaluation of the fastener attachment, underlying framing and supporting structure only. The attachment's to the existing structure are required to be in a staggered pattern to ensure proper distribution of loading. All panels, racking and hardware shall be installed per manufacturer specifications and within specified design limitations. All waterproofing shall be provided by the manufacturer. Domus Structural Engineering assumes no responsibility for misuse or improper installation of the solar PV panels or racking.

Note: Seismic check is not required since Ss<.4g and Seismic Design Category (SDC) < B

Design Criteria:

- Applicable Codes = 2018 IBC/IRC, ASCE 7-16
- Roof Dead Load = 8 psf (MP1)
- Roof Live Load = 20 psf
- Wind Speed = 140 mph (Vult), Exposure B
- Roof Snow Load = 30 psf
- Attachments: 1 5/16" dia. lag screw with 2.5 inch min embedment depth, at spacing shown above.

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

Sincerely,



Domus

STRUCTURAL

ENGINEERING, LLC

Domus Structural Engineering, LLC P.O. Box 6986 Broomfield, CO 80021 530-864-7055 Domusstructural@gmail.com

Gravity Loading

Roof Snow Load Calculations		
p _g = Ground Snow Load =	30 psf	_
$p_f = 0.7 \ C_e \ C_t \ I \ p_g$		(ASCE7 - Eq 7-1)
C_e = Exposure Factor =	1	(ASCE7 - Table 7-2)
Ct = Thermal Factor =	1	(ASCE7 - Table 7-3)
I = Importance Factor =	1	
p _f = Flat Roof Snow Load =	30.0 psf	
$p_s = C_s p_f$		(ASCE7 - Eq 7-2)
Cs = Slope Factor =	1	
p _s = Sloped Roof Snow Load =	30.0 psf	

PV Dead Load = 3 psf (Per Blue Raven Solar)				
DL Adjusted to 40 Degree Slope	3.92 psf			
PV System Weight				
Weight of PV System (Per Blue Raven Solar)	3.0 psf			
X Standoff Spacing =	4.00 ft			
Y Standoff Spacing =	5.50 ft			
Standoff Tributary Area =	22.00 sft			
Point Loads of Standoffs	66 lb			

Note: PV standoffs are staggered to ensure proper distribution of loading

Roof Live Load = 20 psf

Note: Roof live load is removed in area's covered by PV array.

Roof Dead Load (MP1)		
Composition Shingle	4.00	-
Roof Plywood	2.00	
2x6 Top Chords @ 24"o.c.	1.15	
Vaulted Ceiling	0.00	(Ceiling Not Vaulted)
Miscellaneous	0.85	
Total Roof DL (MP1)	8.0 psf	
DL Adjusted to 40 Degree Slope	10.4 psf	

Wind Calculations Per ASCE 7-16 Components and Cladding

Wind Speed	140 mph	-			
	140 111011				
Exposure Category	В				
Roof Shape	Gable Roof				
Roof Slope	40 degrees				
Mean Roof Height	20 ft				
Effective Wind Area	19.3 ft				
Ground Elevation	0 ft				
Desian Wir	d Pressure Calc	ulations			
qh = 0.00256 * Kz *	Kzt * Kd * Ke * V	^2	(Eq. 26.10-1)		
× 1	sure Coefficient) =		(Table 30.3-1)		
• •	ographic factor) =		(Fig. 26.8-1)		
•	ionality Factor) =		(Table 26.6-1)		
	evation Factor) =				
V (Desię	gn Wind Speed) =	•	(Fig. 26.5-1A)		
	Risk Category =		(Table 1.5-1)		
	qh =	26.61			
Stan	doff Uplift Calcu	lations Dortra	ait .		
Stan	Zone 1	Zone 2	Zone 3	Positive	
y _a =	0.68	0.79	0.80	0.68	
GCp =	-1.46	-1.97	-2.63	0.76	(Fig. 30.3)
Uplift Pressure =	-26.6 psf	-41.2 psf	-56.0 psf	13.9 psf	(Fig. 30.3) (Eq. 29.4-7)
ASD Uplift Pressure =	-15.9 psf	-24.7 psf	-33.6 psf	9.6 psf	(Lq. 2).+-/)
X Standoff Spacing =	4.00	4.00	2.67	9.0 psi	
Y Standoff Spacing =	5.50	2.75	2.75		
Tributary Area =	22.00	11.00	7.33		
Dead Load on attachment =	66 lb	33 lb	22 lb		
Footing Uplift (0.6D+0.6W) =	-285 lb	-239 lb	-224 lb		
Stando	off Uplift Calcula	tions-Landsc	ape		
	Zone 1	Zone 2	Zone 3	Positive	-
y _a =	0.69	0.79	0.80	0.69	
GCp =	-1.48	-1.98	-2.65	0.77	(Fig. 30.3)
Uplift Pressure =	-27.2 psf	-41.9 psf	-56.4 psf	14.2 psf	(Eq. 29.4-7)
ASD Uplift Pressure (0.6W)=	-16.3 psf	-25.1 psf	-33.8 psf	9.6 psf	
X Standoff Spacing =	6.00	6.00	4.00		
Y Standoff Spacing =	3.50	1.75	1.75		
Tributary Area =	21.00	10.50	7.00		
	63.00	31.50	21.00		
Dead Load on attachment =	03.00	51.50	21.00		

Standoff Uplift Check

Maximum Design Uplift = -285 lb

Standoff Uplift Capacity = 450 lb

450 lb capacity > 285 lb demand Therefore, OK

Fastener Capacity Check					
Fastener = 1 - 5/16" dia Lag					
Number of Fasteners = 1					
Embedment Depth = 2.5					
Pullout Capacity Per Inch = 250 lb					
Fastener Capacity = 625 lb					
w/ F.S. of 1.5 & DOL of 1.6= 667 lb					
667.2 lb capacity > 285 lb demand Therefore, OK					



Allowed > Actual -- 21% Stressed -- Therefore, OK

GENERAL NOTES

CODES AND STANDARDS

1. ALL WORK SHALL COMPLY WITH 2020 NATIONAL ELECTRIC CODE (NEC), 2018 INTERNATIONAL BUILDING CODE (IBC), 2018 INTERNATIONAL RESIDENTIAL CODE (IRC), 2018 INTERNATIONAL PLUMBING CODE (IPC), AND ALL STATE AND LOCAL BUILDING, ELECTRICAL, AND PLUMBING CODES

2. DRAWINGS HAVE BEEN DETAILED ACCORDING TO UL LISTING REQUIREMENTS.

SITE NOTES / OSHA REGULATION

1. A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS 2. THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES

3. THE SOLAR PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS

4. ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SHALL SERVE TO PROTECT THE BUILDING OR STRUCTURE.

SOLAR CONTRACTOR

1. MODULE CERTIFICATIONS WILL INCLUDE UL1703, IEC61646, IEC61730.

2. IF APPLICABLE, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE MARKED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.

3. AS INDICATED BY DESIGN, OTHER NRTL LISTED MODULE GROUNDING DEVICES MAY BE USED IN PLACE OF STANDARD GROUNDING LUGS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AH.I

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

5. CONDUIT POINT OF PENETRATION FROM EXTERIOR TO INTERIOR TO BE INSTALLED AND SEALED WITH A SUITABLE SEALING COMPOUND.

6. DC WIRING LIMITED TO MODULE FOOTPRINT W/ ENPHASE AC SYSTEM

7. ENPHASE WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.

8. MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC UNLESS NOT AVAILABLE.

9. ALL INVERTERS, MOTOR GENERATORS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AC PHOTOVOLTAIC MODULES, DC COMBINERS, DC-TO-DC CONVERTERS, SOURCE CIRCUIT COMBINERS, AND CHARGE CONTROLLERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4 (B).

10. ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

11. TERMINALS AND LUGS WILL BE TIGHTENED TO MANUFACTURER TORQUE SPECIFICATIONS (WHEN PROVIDED) IN ACCORDANCE WITH NEC CODE 110.14(D) ON ALL ELECTRICAL CONNECTIONS.

EQUIPMENT LOCATIONS

1. PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION INEC 110.261.

2. EQUIPMENT INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY [NEC 690.31 (A)] AND [NEC TABLE 310.15 (B)].

3. ADDITIONAL AC DISCONNECTS SHALL BE PROVIDED WHERE THE INVERTER IS NOT ADJACENT

TO THE UTILITY AC DISCONNECT, OR NOT WITHIN SIGHT OF THE UTILITY AC DISCONNECT. 4. ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES

5. ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE

224 East Elizabeth Street

DESIGN CRITERIA WIND SPEED: 140 MPH **GROUND SNOW LOAD: 30 PSF** WIND EXPOSURE FACTOR: B SEISMIC DESIGN CATEGORY: B

SITE SPECIFICATIONS CONSTRUCTION - V-B ZONING: RESIDENTIAL

SHEET INDEX **PV1 - COVER SHEET PV2 - PROPERTY PLAN** PV3 - SITE PLAN (IF NEEDED) **PV8 - LABELS & LOCATIONS**

SCOPE OF WORK

INSTALLATION OF UTILITY INTERACTIVE PHOTOVOLTAIC SOLAR SYSTEM

3.575 kW DC PHOTOVOLTAIC SOLAR ARRAY **ROOF TYPE: Comp Shingle** MODULES: (11) REC Solar REC325TP3M INVERTER(S): Enphase IQ7-60-2-US,----**RACKING: Unirac SFM Infinity**

AERIAL VIEW





LEGEND INV INVERTER & DC DISCONNECT SUB (E) SUBPANEL LC (N) LOAD CENTER AC AC DISCONNECT M UTILITY METER MSP MAIN SERVICE PANEL B JUNCTION BOX TRANSFER SWITCH COMBINER BOX/AGGREGATOR PV PV REVENUE METER FIRE SETBACK EMIC CONDUIT RUN (TO BE DETERMINED IN FIELD) PV WIRE STRING PROPERTY LINE SCALE: 1/16" = 1'-0" SCALE: 1/16" = 1'-0" SCALE: 1/16" = 1'-0" ST CONTRACTOR: BRS FIELD OPS 385.498.6700
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