



BLUE RAVEN SOLAR



Charles Gast

450 Cokesbury Park Ln , Fuquay Varina, North Carolina 27526
NC Crew1 Raleigh
Eli, Thomas

Report Created:08/08/2020

Job Setup

Deal ID (Base ID) 75016795

Customer Name Charles Gast

ADDRESS 450 Cokesbury Park Ln , Fuquay Varina, North Carolina 27526

TIME of Arrival 7:00

CREW NAME NC Crew1 Raleigh

CREW - Crew Lead & Uniform pics Eli, Thomas



INITIAL CONTACT w/homeowner - Greet, job review and walk through completed? Note any initial homeowner concerns/issues? Yes

PRE-EXISTING - issues, damages? No

Pre-existing issues notes and pictures

Pre-existing issues: Homeowner notified?

REVIEW REQUEST invite sent to homeowner? Yes

explain why not sent?

JHA: Job Hazard Analysis photo (take a clear picture and make sure its all legible)



RAZ - Restricted area zones, safety cones and hazard tape.



LADDER: set up and secured



BRS SIGN: step back of installed sign to show location



MID POINT inspection required? No

Type of midpoint inspection?

Midpoint inspection outcome? (include photo of verification)

PLEASE ENTER THE DELIVERY TIME AND ANY SHIPMENT INFORMATION IN THE BLUE RAVEN APP

PLEASE ENTER THE DELIVERY TIME AND ANY SHIPMENT INFORMATION IN THE BLUE RAVEN AP No Answer Needed

Photo of at least one module label



Screen shot of material checklist filled out before installation



Thermostat

THERMOSTAT installed? Yes

WHY was the Thermostat NOT installed?

Ecobee wire compatibility (screen shot required)

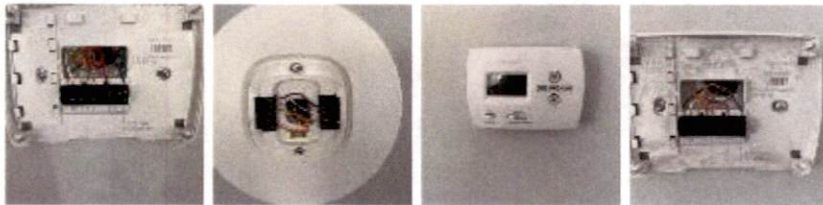
Picture of existing thermostat

Detailed photos showing wiring or reason HVAC company is needed.

Detailed description explaining Ecobee installation issue that requires an HVAC Tech.

Did you make an attempt to get an Ecobee on site?

Photos of thermostat wiring before and after



Was a PEK required?

No

Picture of PEK furnace wiring before and after

Serial Number (from the side of the box).

Serial Number (from the side of the box). Include even if the Ecobee is being left on site with the homeowner.

Thermostat turned on



Thermostat set up, ac/heat tested and explained how to use to homeowner? Yes

Take the ecobee with crew.

Roof

FALL PRO - Every crew member working on the roof with a harness, rope and anchor.



Design Error - Layout

No

Design Error - Layout Notes

Layout issue:

DESIGN CHANGES - any array layout changes? No

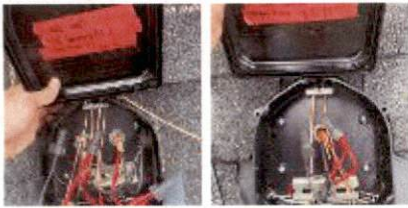
Designer that approved change?

Upload design change form completed and approved by homeowner

ATTACHMENT LAYOUT - showing COMPLETE layouts, staggered attachments, and span measurement pic (2 pics per array min)



SOLADEK(s) wiring - EGC path to array, attic penetration, entries & exits



ARRAY(s) COMPLETED: showing COMPLETE overview of arrays multiple pics and location of soladek (3 pics per array min.) (no close up pics)



WIRE MANAGEMENT Quality pics (2 pics per array min) (absolutely no dangles)



ROOF CONDUIT - Is there roof conduit? No

Roof conduit photos

Additional roof notes, AHJ requirement or other

Is this installation taking place in North Carolina? Yes

Close up photos showing inside of every Soladeck



Picture showing Micro inverter label. Must show model type.



The lowest point of the trim rail must be at least 2.5 inches off the roof surface. Take a photo with a ruler showing the rail is at least 2.5 inches off the roof surface.



Grounding wire photos for each array. 1) Lift the panel and take a photo showing the panel label and ground lug attachment in one photo.



Grounding wire photos for each array. 2) Step back and take a photo of the ground wire attached to the panel and open soladeck also including landmarks in the background (e.g. neighbors house, scenery, play sets) to prove the photo is on site



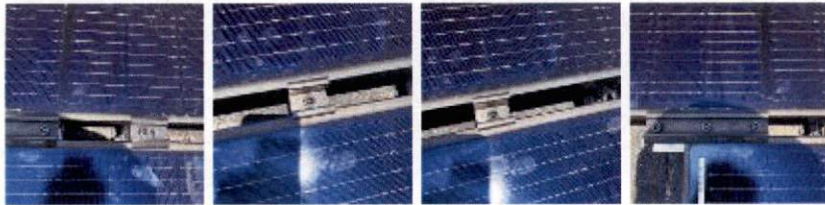
N - S Grounding: 1) Up close photo of N-S bonding clamp.



N - S Grounding. 2) photo of both panel labels that are grounded by the displayed clamp.



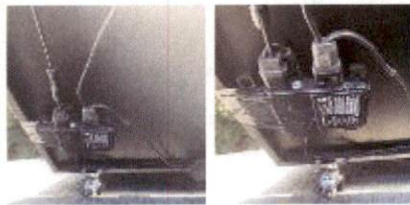
N - S Grounding. 3) take a step back and take a photo of the same clamp with landmarks in the background to prove the photo is from site



E - W Grounding: 1) Up close photo of a splice bar with the row of splices aligned in the background.



E - W Grounding: 2) Lift the two panels the splice bar grounded and take a photo of the labels.



E - W Grounding: 3) Take a step back and take a photo of the splice with landmarks in the background to prove the photo is from on site.



Trim Rail Grounding: 1) Take an up close photo of the trim rail bonding lug.



Trim Rail Grounding: 2) Take a step back and take a photo of the trim rail bonding lug with landmarks in the background to prove the photo is from onsite



Attic

WIRE RUN - first support from roof penetration, full wire run pics, penetration from attic leading outside to combiner/inverter



WIRE SIZE - Is it different than original design? No



Wire size and type installed:

Engineering Error - Structure

No

Engineering Error - Structure Notes

Structural Issue:

STRUCTURAL UPGRADES - required?

No

Type of structural upgrade performed?

Did you confirm scope of work required using the engineering letter guidelines?

Multiple photos of completed upgrade closeup and pulled back overview

Electrical

Electrician

Eli

Picture showing electrical PPE in use (face shield, insulated gloves, hard hat, etc..)



PLANS on-site?

Yes

Any red-line changes from the AHJ on physical plans? Not on site

What do the redline changes call out for? (a readable picture of the redlines is sufficient)

Photo of redline alteration work completed.

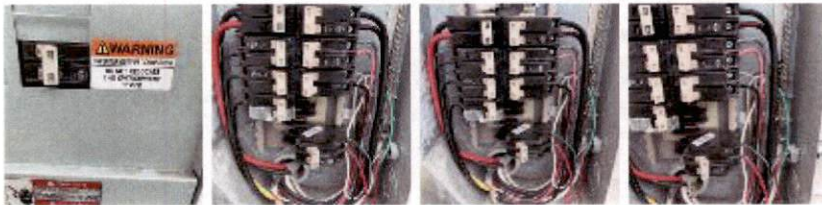
ANY ISSUES? code violations, clearance issues, No design issues, material issues, etc.,

List issues:

GROUND: main GEC (photo of MSP overview if none found)



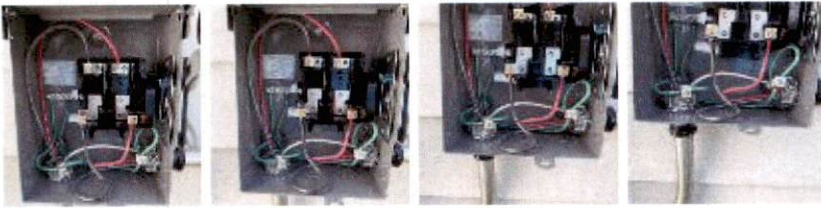
MSP: Detailed photos of breaker installed



SERIAL NUMBERS: clear photos of combiner/inverter and communication device serial numbers



PV EQUIPMENT: all pv equipment installed and completed, wiring, EGC, entries/exits, open & closed boxes, completed overview.



PV EQUIPMENT: Photos of fuse sizes and wire sizes



PATH TO ARRAY ROOF/ATTIC: conduit run, j-box inside and out, sealed penetration, etc.,



LABELS: photo of all labels installed, close up and overview (note if missing any)



DIRECTORY PLACARD required? No

Photos of required placard installed, closeup and pulled back showing location.

Is the utility Pacific Power or Rocky Mountain Power? No

Picture of Utility Placard

Photo of location of plans left on site



ANY ELECTRICAL CHANGES from physical on site plans? No

Design Error - Electrical No

Design Error - Electrical Notes Electrical Issue:

Electrical changes approved? (note name of who approved)

Please explain if not approved

Explain electrical changes and upload photos if applicable

SPECIFIC AHJ REQUIREMENT NOTE

Completion

Is it Monday? No

Weekly OSHA Topic

What was learned through the training?

Who lead the safety training?

Crew Lead Signature

Crew Member Signature

Crew Member Signature

Crew Member Signature

Job Completed? Yes

Why not?

Detailed list of what needs to be done to finish:

Does customer need to be home?

Why?

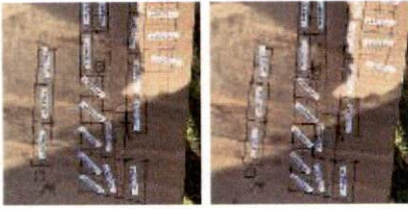
Do you have enough material on site to finish the job?

Please list materials needed in itemized format

Picture of materials left on site

What state is the installation taking place in North Carolina

STICKER MAP: Optimizer/micro-inverter stickers and sticker map showing layout and string map to j-box



explained why stickers not scanned in: N/A

SYSTEM COMMISSIONED? Did you commission Yes
and send production report or verified
production with ops?

Was a Wi-Fi connection achieved between the Yes
envoy and home network?

Screenshot showing Wi-Fi connection



Two screenshots showing failed Wi-Fi
connection (one using password one using
WPS)

Clear picture showing cell unit serial number

Explain if not commissioned, no report sent, or
production not verified

Did you install the system as originally Yes
designed?

Design change forms completed, uploaded and
approved?

Did any damage occur to the home during installation? Create separate Incident Report in Site Capture.

No

Catalog all damage in detail and inform Install Ops and the homeowner right away

Final walk through complete? (Job site left super clean, gates closed all tools picked up) Absolutely

explain why no final walk through

Did you complete a homeowner completion review and walk through?

yes

Review and or review request completed?

Yes

ETO checklist Complete? please include a photo.

Photo of completed Pre-Inspection Checklist



Photo of completed Pre-Inspection Checklist

Photo of completed Pre-Inspection Checklist

Photo of completed Pre-Inspection Checklist

Were there any materials or parts you needed that were not on the BOM and should have been to complete the job? (e.g. low material qty, incorrect materials, missing materials)

N/A

Job notes, issues, concerns, and any feed back?

Office Feedback

Feedback for Surveyor

Feedback Notes

Scheduling Issue

Scheduling Issue notes

Data Base Update

Data Base Update Notes



BLUE RAVEN SOLAR, LLC
Firm License No. D-0396
1403 North Research Way
Building J
Orem, UT 84097

April 3, 2020

To: Blue Raven Solar
1403 N. Reasearch Way, Bldg. J
Orem, UT. 84097

Subject: Certification Letter
Gast Residence
450 Cokesbury Park Lane
Fuquay-Varina, NC. 27526

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. All attached structural calculations are based on these observations and the design criteria listed below.

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, including the plans and calculations only apply 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.

The roof structure of (MP1&2) consists of composition shingle on roof plywood that is supported by 2x8 rafters @ 16" o.c. with ceiling joists acting as rafter ties. The rafters have a max projected horizontal span of 16'-0", with a slope of 34 degrees. The rafters are connected at the ridge to a ridge board and are supported at the eave by a load bearing wall.

The existing roof framing system of (MP1&2) 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 64" 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.

Design Criteria:

- Applicable Codes = 2018 North Carolina State Building Code (NCSBC), ASCE7-10, and NDS-12
- Roof Dead Load = 9 psf (MP1&2)
- Roof Live Load = 20 psf
- Wind Speed = 115 mph, Exposure C
- Ground Snow Load = 15 psf - Roof Snow Load = 10.5 psf
- Attachments: (1) 5/16" dia lag screw with 2.5" min embedment depth, at spacing shown above.

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

Sincerely,

John Calvert, P.E.
Project Engineer

Digitally signed
by John Calvert
Date: 2020.04.03
15:07:07 -06'00'





BLUE RAVEN SOLAR, LLC
 Firm License No. D-0396
 1403 North Research Way
 Building J
 Orem, UT 84097

Gravity Loading

Roof Snow Load Calculations		
p_g = Ground Snow Load =	15 psf	
$p_r = 0.7 C_e C_t I p_g$		(ASCE7 - Eq 7-1)
C_e = Exposure Factor =	1	(ASCE7 - Table 7-2)
C_t = Thermal Factor =	1	(ASCE7 - Table 7-3)
I = Importance Factor =	1	
p_r = Flat Roof Snow Load =	10.5 psf	
$p_s = C_s p_r$		(ASCE7 - Eq 7-2)
C_s = Slope Factor =	1	
p_s = Sloped Roof Snow Load =	10.5 psf	

PV Dead Load = 3 psf (Per Blue Raven Solar)	
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&2)		
Composition Shingle	4.00	
Roof Plywood	2.00	
2x8 Rafters @ 16"o.c.	2.27	
Vaulted Ceiling	0.00	(Ceiling Not Vaulted)
Miscellaneous	0.73	
Total Roof DL (MP1&2)	9.0 psf	
DL Adjusted to 34 Degree Slope	10.9 psf	

Wind Calculations

Per ASCE7-10 Components and Cladding

Input Variables	
Wind Speed	115 mph
Exposure Category	C
Roof Shape	Gable/Hip
Roof Slope	34 degrees
Mean Roof Height	20 ft
Effective Wind Area	19.3 ft

Design Wind Pressure Calculations	
Wind Pressure P = $q_h \cdot G \cdot C_n$	
$q_h = 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2$	(Eq. 30.3-1)
K_z (Exposure Coefficient) = 0.9	(Table 30.3-1)
K_{zt} (topographic factor) = 1	(Fig. 26.8-1)
K_d (Wind Directionality Factor) = 0.85	(Table 26.6-1)
V (Design Wind Speed) = 115 mph	(Fig. 26.5-1A)
Risk Category = II	(Table 1.5-1)
$q_h = 25.90$	
$0.6 \cdot q_h = 15.54$	

Standoff Uplift Calculations-Portrait				
	Zone 1	Zone 2	Zone 3	Positive
$G_Cp =$	-0.92	-1.12	-1.12	0.86
Uplift Pressure =	-14.36 psf	-17.47 psf	-17.47 psf	22.3 psf
X Standoff Spacing =	4.00	4.00	2.67	
Y Standoff Spacing =	5.50	2.75	2.75	
Tributary Area =	22.00	11.00	7.33	
Footing Uplift =	-316 lb	-192 lb	-128 lb	

(Fig. 30.4-1)

Standoff Uplift Calculations-Landscape				
	Zone 1	Zone 2	Zone 3	Positive
$G_Cp =$	-0.92	-1.12	-1.12	0.86
Uplift Pressure =	-14.36 psf	-17.47 psf	-17.47 psf	10.0 psf
X Standoff Spacing =	5.33	5.33	3.56	
Y Standoff Spacing =	3.50	1.75	1.75	
Tributary Area =	18.67	9.33	6.22	
Footing Uplift =	-268 lb	-163 lb	-109 lb	

(Fig. 30.4-1)
(Minimum)

Standoff Uplift Check	
Maximum Design Uplift =	-316 lb
Standoff Uplift Capacity =	450 lb
450 lb capacity > 316 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 > 316 lb demand Therefore, OK	

APPENDIX G

DESIGN PROFESSIONAL INSPECTION FORM

RECORD OF THE INSPECTION OF A COMPONENT OR ELEMENT BY A NC LICENSED ARCHITECT OR ENGINEER

Project Information:

Residential Single-Family Project: <input checked="" type="radio"/> Y <input type="radio"/> N	Commercial Project: <input type="radio"/> Y <input checked="" type="radio"/> N
Code Enforcement Project No:	Permit No: ERES2006-0009
Project Name: Charles Gast	Owner: Charles Gast
Project Address: 450 Cokesbury Park Ln Fuquay Varina, North Carolina 27526	Suite No:
Date Inspected: 8/7/2020	Contractor Name: BLUE RAVEN SOLAR
Component Inspected: Residential rooftop PV installation	

Responsible Licensed NC Architect or NC Engineer

Name:	JOHN A. CALVERT
Firm Name:	BLUE RAVEN SOLAR
Phone Numbers:	Office:(385) 498-6700 Mobile:
Email Address:	ENGINEERING@BLUERAVENSOLAR.COM
Mailing Address:	1403 N. RESEARCH WAY, BUILDING J. OREM, UT 84097

APPLICABLE CODE: 2018 NCRC

2018 NCBC = 2018 NC Building Code; 2018 NCRC = 2018 NC Residential Code

Describe Element/Component/Type of Inspection: *

A field inspection of the installation has been performed by myself (a North Carolina registered design professional) or a person under my direct supervision. The PV equipment's structural installation has been designed and inspected. The equipment will not create a negative impact on the building's structural design, including any additional loads imposed (dead, snow, wind) and the installation is in compliance with the North Carolina Residential Code

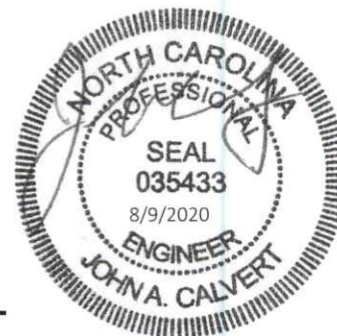
*(subgrade form/letter may also be required)

Attestation/Signature:

By signing below, I certify that the component and/or element of the building as identified on this form has been inspected by me or someone under my direct supervision per subsection (b2) of NC G.S. 153A-352 and is in compliance with the approved plans & specifications for the project. This inspection is in compliance with all of the requirements of the above referenced code. Attach any additional documents if needed.

Digitally signed by John Calvert
Date: 2020.08.09 10:23:07
-06'00'

Licensed Architect or Engineer



Inspection Department disclaimer:

Upon the receipt of a signed written document as required under subsection (a) of Article 160A-413.5., Code Enforcement shall be discharged and released from any liabilities, duties and responsibilities imposed by this article or in common law from any claim arising out of or attributed to the component or element in the construction of the building for which the signed written document was submitted. Be aware that this inspection will be noted in all inspection records including the Certificate of Occupancy or Certificate of Compliance. This inspection does not address any local ordinances or zoning requirements.

4/2019

Charles Gast
450 Cokesbury Park Lane
Fuquay-Varina, NC 27526
ID # 75016795



STRUCTURAL OBSERVATION of SOLAR PANEL INSTALLATION

To the Harnett County Inspector:

August 9, 2020

Blue Raven Solar installed new roof-mounted solar panels at this residence. This letter documents the structural observation of the solar panel installation and structural work by a licensed Professional Engineer.

The work referenced herein was performed under the direction of the Blue Raven Solar Engineering Department and was supervised by the Blue Raven Solar Professional Engineer in Responsible Charge of the structural certification with a scope of work pursuant to NCGS 89C-20 & 21 NCAC 56.0701.(c).(3) operating out-of-state for this specific project, pursuant to NCGS 89C-24 & 21 NCAC 56.0901.(A), and as authorized by a Certificate of Authorization issued by *The North Carolina State Board of Examiners for Engineers and Surveyors*

Installation: Installation was completed and documented by Installation Technicians from Blue Raven Solar.

Observations: Location, configuration and orientation of panels on the roof, location and attachment of standoffs to existing roof structure and the other structural specification of the Permit Pack.

Observed For: Compliance with the 2018 North Carolina Residential Code and with the structural specifications of the Permit Pack that was submitted and approved for building permit, and that was previously certified for compliance with the structural provisions of the locally adopted building code.

If the installation deviated from the structural specifications of the approved Permit Pack, then the following corrections are required for compliance:

Deviations: None.

Corrections: None required.

Observed By: **John Calvert, PE**

Based on these observations, and on my professional experience and judgment, the design and installation of the PV System meets the 2018 NC Residential Code, is installed per the PV System's manufacturers' installation requirements, and substantially complies with the structural specifications of the Permit Pack.



Digitally signed by John Calvert
Date: 2020.08.09 10:25:02 -06'00'

NC Certificate of Authorization #0396