

June 1, 2020

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

Subject: Certification Letter  
Wilkins Residence  
180 Dexterfield Dr.  
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) consists of composition shingle on roof plywood that is supported by 2x8 rafters @ 16" o.c., paired with nominal -- ceiling joists @ 16" o.c.. The rafters are supported by vertical struts which transfer gravity loads to the ceiling joists below. The rafters have a max projected horizontal span of 12'-0", with a slope of 40 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) 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 = 13 psf (MP1)
- 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: 2020.06.01 16:35:12 -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	
$p_f$ = Flat Roof Snow Load =	10.5 psf	
$p_s = C_s p_f$		(ASCE7 - Eq 7-2)
$C_s$ = Slope Factor =	1	
<b><math>p_s</math> = Sloped Roof Snow Load =</b>	<b>10.5 psf</b>	

**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 sf

**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	
2x8 Rafters @ 16"o.c.	2.27	
Vaulted Ceiling	4.00	(Enclosed Attic)
Miscellaneous	0.73	
<b>Total Roof DL (MP1)</b>	<b>13.0 psf</b>	
DL Adjusted to 40 Degree Slope	17.0 psf	

**Wind Calculations**

**Per ASCE7-10 Components and Cladding**

Input Variables	
Wind Speed	115 mph
Exposure Category	C
Roof Shape	Gable/Hip
Roof Slope	40 degrees
Mean Roof Height	20 ft
Effective Wind Area	19.3 ft

Design Wind Pressure Calculations	
<b>Wind Pressure <math>P = qh \cdot G \cdot C_n</math></b>	
$qh = 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2$	(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)
$qh = 25.90$	
$0.6 \cdot qh = 15.54$	

Standoff Uplift Calculations-Portrait					
	Zone 1	Zone 2	Zone 3	Positive	
$G_{Cp} =$	-0.92	-1.12	-1.12	0.86	(Fig. 30.4-1)
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		

Standoff Uplift Calculations-Landscape					
	Zone 1	Zone 2	Zone 3	Positive	
$G_{Cp} =$	-0.92	-1.12	-1.12	0.86	(Fig. 30.4-1)
Uplift Pressure =	-14.36 psf	-17.47 psf	-17.47 psf	10.0 psf	(Minimum)
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		

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	

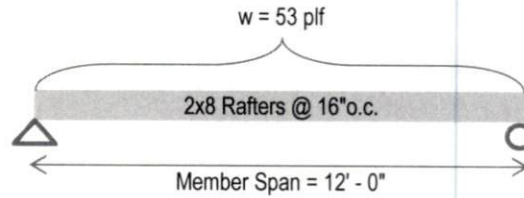
**Framing Check**

(MP1)

PASS

Dead Load 17.0 psf  
PV Load 3.0 psf  
Live Load 20.0 psf

Governing Load Combo = DL + LL  
**Total Load 40.0 psf**



Member Properties				
Member Size	S (in <sup>3</sup> )	I (in <sup>4</sup> )	Lumber Sp/Gr	Member Spacing
2x8	13.14	47.63	DF#2	@ 16"o.c.

Check Bending Stress							
Fb (psi) =	fb	x	Cd	x	Cf	x	Cr
	900	x	1.25	x	1.2	x	1.15
(NDS Table 4.3.1)							
Allowed Bending Stress = 1552.5 psi							

Maximum Moment =  $(wL^2) / 8$   
 $= 959.287 \text{ ft}\#$   
 $= 11511.4 \text{ in}\#$   
 Actual Bending Stress = (Maximum Moment) / S  
 $= 876.1 \text{ psi}$

Allowed > Actual -- 56.5% Stressed -- Therefore, OK

Check Deflection		
Allowed Deflection (Total Load) =	L/180	(E = 1600000 psi Per NDS)
	= 0.8 in	
Deflection Criteria Based on =	Continuous Span	
Actual Deflection (Total Load) =	$(w * L^4) / (185 * E * I)$	
	= 0.136 in	
	= L/1059 > L/180	Therefore OK

Allowed Deflection (Live Load) =	L/240	
	0.6 in	
Actual Deflection (Live Load) =	$(w * L^4) / (185 * E * I)$	
	0.068 in	
	L/2118 > L/240	Therefore OK

Check Shear		
Member Area = 10.9 in <sup>2</sup>	Fv (psi) = 180 psi	(NDS Table 4A)
Allowed Shear = Fv * A = 1958 lb	Max Shear (V) = w * L / 2 =	320 lb

Allowed > Actual -- 16.4% Stressed -- Therefore, OK



**Katherine Wilkins**

180 Dexterfield Dr. , Fuquay Varina, North Carolina  
27526  
NC Raleigh crew 3  
Jonathan Atherley

**Job Setup**

Deal ID (Base ID):	72115532	CREW - Crew Lead & Uniform pics:	Jonathan Atherley
Customer Name:	Katherine Wilkins	INITIAL CONTACT w/homeowner - Greet, job review and walk through completed? Note any initial homeowner concerns/issues?:	Yes
ADDRESS:	180 Dexterfield Dr. , Fuquay Varina, North Carolina 27526	PRE-EXISTING - issues, damages?:	No
TIME of Arrival:	9am	REVIEW REQUEST invite sent to homeowner?:	Yes
CREW NAME:	NC Raleigh crew 3	MID POINT inspection required?:	No

**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
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**Thermostat**

THERMOSTAT installed?:	Yes	Thermostat set up, ac/heat tested and explained how to use to homeowner?:	Yes
Was a PEK required?:	No		

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**Roof**

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Design Error - Layout: No

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DESIGN CHANGES - any array layout changes?: No

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ROOF CONDUIT - Is there roof conduit?: No

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Additional roof notes, AHJ requirement or other:

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Is this installation taking place in North Carolina? Yes

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**Attic**

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WIRE SIZE - Is it different than original design?: No

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Engineering Error - Structure: No

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STRUCTURAL UPGRADES - required?: No

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**Electrical**

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Electrician: Dylan Sirry

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PLANS on-site?: Yes

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

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ANY ISSUES? code violations, clearance issues, design issues, material issues, etc.,: Yes

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List issues:: Wire size from Ac disconnect to sub panel , 10/3 wire used called for #10 awg

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DIRECTORY PLACARD required?: No

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Is the utility Pacific Power or Rocky Mountain Power?: No

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ANY ELECTRICAL CHANGES from physical on site plans?: Yes

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Design Error - Electrical: No

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Electrical changes approved? (note name of who approved): Yes

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Explain electrical changes and upload photos if applicable: Ran romex 10/3 to a 20 amp breaker in subpanel to a 30 amp ac disconnect,

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SPECIFIC AHJ REQUIREMENT NOTE:

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**Completion**

Is it Monday?:	No	Did you install the system as originally designed?:	Yes
Job Completed?:	Yes	Did any damage occur to the home during installation? Create separate Incident Report in Site Capture.:	No
What state is the installation taking place in:	North Carolina	Final walk through complete? (Job site left super clean, gates closed all tools picked up):	Absolutely
explained why stickers not scanned in.:	Na	Did you complete a homeowner completion review and walk through?:	yes
SYSTEM COMMISSIONED? Did you commission and send production report or verified production with ops?:	Yes	Review and or review request completed?:	Yes
Was a Wi-Fi connection achieved between the envoy and home network?:	Yes	Job notes, Issues, concerns, missing material from BOM, and any feed back?:	

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**Office Feedback**

Feedback for Surveyor:	Data Base Update:
Scheduling Issue:	

**Photos**

**Job Setup - CREW - Crew Lead & Uniform pics**



**NC Raleigh Crew 3**  
 Location: 35.9579, -78.8282  
 Azimuth: 64.5851, Elevation angle: -13.298, Altitude: 388.8091 ft.

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



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



**NC Raleigh Crew 3**  
 Location: 35.5034, -78.8195  
 Azimuth: 21.4984, Elevation angle: -10.847, Altitude: 325.339 ft.



**NC Raleigh Crew 3**  
 Location: 35.5034, -78.8195  
 Azimuth: 310.6236, Elevation angle: -8.7163, Altitude: 325.1398 ft.



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



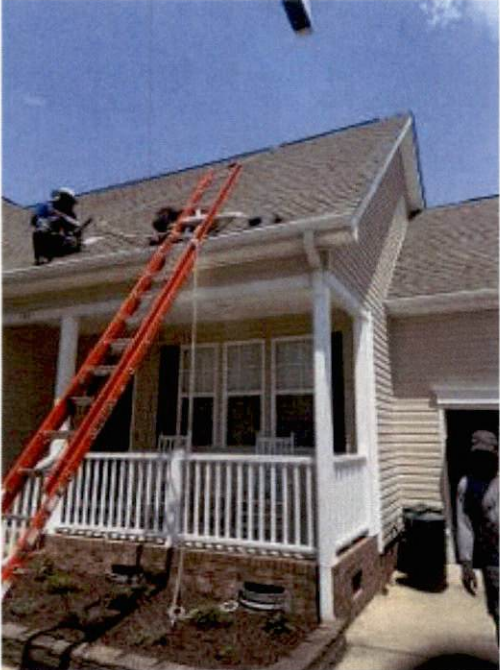
NC Raleigh Crew 3  
Location: 35.5033, -78.8196  
Azimuth: 348.7391, Elevation angle: -9.4905, Altitude: 331.0955 ft.

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



NC Raleigh Crew 3  
Location: 35.5033, -78.8197  
Azimuth: 14.7295, Elevation angle: -12.0597, Altitude: 323.4022 ft.

Job Setup - LADDER: set up and secured



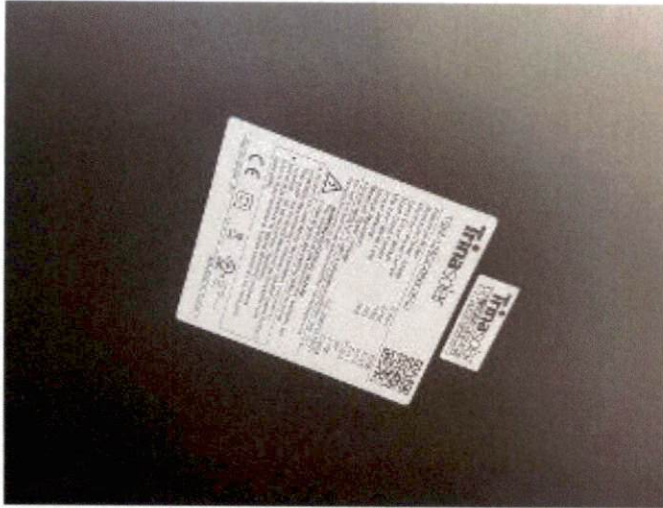
NC Raleigh Crew 3  
Location: 35.5035, -78.8195  
Azimuth: 323.6901, Elevation angle: 12.5794, Altitude: 322.5904 ft.

Job Setup - BRS SIGN: step back of installed sign to show location



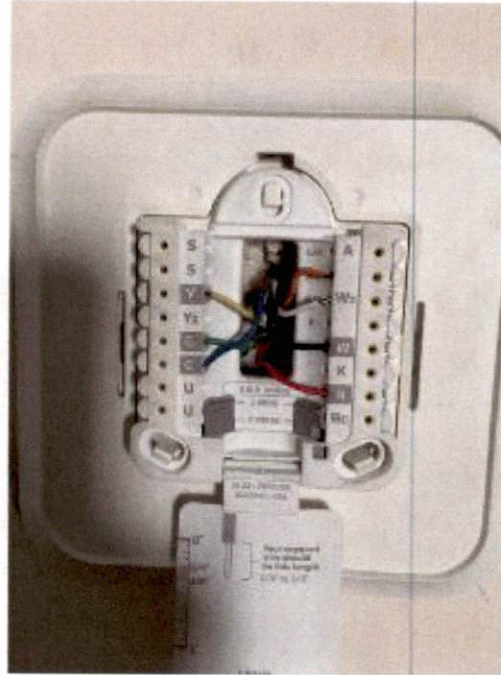
NC Raleigh Crew 3  
Location: 35.5034, -78.8196  
Azimuth: 0, Elevation angle: 0, Altitude: 328.328 ft.

PLEASE ENTER THE DELIVERY TIME AND ANY SHIPMENT INFORMATION IN THE BLUE RAVEN APP - Photo of at least one module label



NC Raleigh Crew 3  
Azimuth: 0, Elevation angle: 0, Altitude: 0 ft.

Thermostat - Photos of thermostat wiring before and after



NC Raleigh Crew 3  
Azimuth: 0, Elevation angle: 0, Altitude: 0 ft.

Thermostat - Photos of thermostat wiring before and after



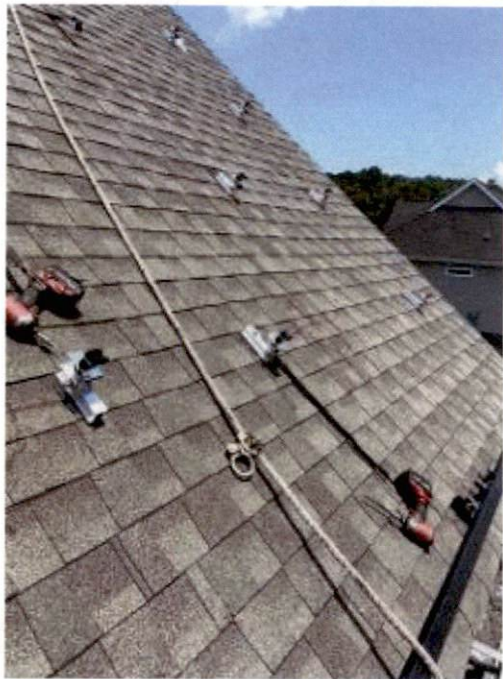
NC Raleigh Crew 3  
Azimuth: 0, Elevation angle: 0, Altitude: 0 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 307.4831, Elevation angle: 27.0863, Altitude: 321.3537 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 101.7182, Elevation angle: -11.8523, Altitude: 331.2213 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 85.9202, Elevation angle: 5.598, Altitude: 332.1216 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 72.5493, Elevation angle: 10.1055, Altitude: 332.6531 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 257.2228, Elevation angle: -79.2138, Altitude: 355.104 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 153.2503, Elevation angle: -111.0408, Altitude: 359.6404 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 152.4137, Elevation angle: -110.6067, Altitude: 358.171 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 254.2505, Elevation angle: -87.6192, Altitude: 354.2816 ft.

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



NC Raleigh Crew 3  
Azimuth: 0, Elevation angle: 0, Altitude: 0 ft.

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



NC Raleigh Crew 3  
Azimuth: 0, Elevation angle: 0, Altitude: 0 ft.

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



NC Raleigh Crew 3  
Azimuth: 0, Elevation angle: 0, Altitude: 0 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 34.9189, Elevation angle: -118.8108, Altitude: 333.5327 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 145.7944, Elevation angle: -45.1962, Altitude: 336.0663 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 131.386, Elevation angle: -40.1111, Altitude: 336.6124 ft.

Roof - Close up photos showing inside of every Soladeck



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 251.5181, Elevation angle: -85.5635, Altitude: 353.164 ft.

Roof - Close up photos showing inside of every Soladeck



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 255.7656, Elevation angle: -77.1647, Altitude: 349.4853 ft.

Roof - Close up photos showing inside of every Soladeck



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 343.6571, Elevation angle: -77.0374, Altitude: 348.4325 ft.

Roof - Close up photos showing inside of every Soladeck



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 340.5877, Elevation angle: -82.9722, Altitude: 344.8386 ft.

Roof - Picture showing Micro inverter label. Must show model type.



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 152.5038, Elevation angle: -3.8171, Altitude: 340.3128 ft.

Roof - 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.



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 50.05, Elevation angle: -51.4207, Altitude: 346.7043 ft.

Roof - 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.



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 192.4792, Elevation angle: -43.2857, Altitude: 335.927 ft.

Roof - 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.



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 194.5298, Elevation angle: -39.3736, Altitude: 336.7302 ft.

Roof - 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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 197.7243, Elevation angle: -24.0455, Altitude: 336.2235 ft.

Roof - 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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 196.2762, Elevation angle: -24.6156, Altitude: 336.3935 ft.

Roof - 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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 193.213, Elevation angle: -15.6289, Altitude: 336.6335 ft.

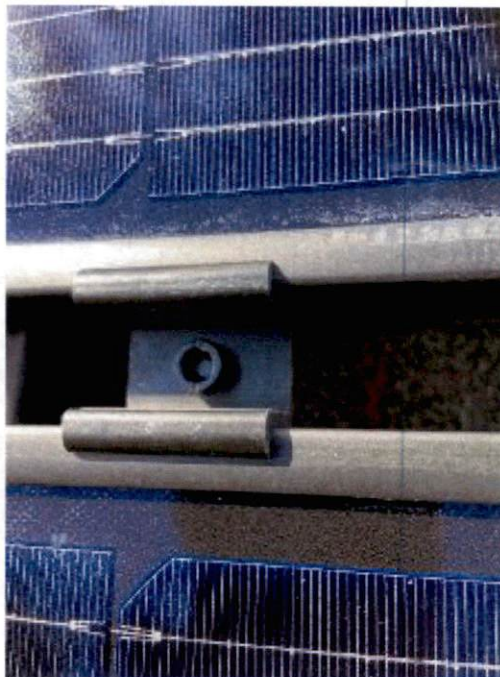


Roof - Grounding wire photos for each array. 2) Step back and take a photo of the ground wire attached to the panel and open soladeck also including landmarks in the background (e.g. neighbors house, scenery, play sets) to prove the photo is on site



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 179.0937, Elevation angle: -26.7387, Altitude: 336.9178 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 331.5933, Elevation angle: -41.1965, Altitude: 335.9109 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 329.4178, Elevation angle: -41.728, Altitude: 337.832 ft.

Roof - 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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 153.7317, Elevation angle: -153.1298, Altitude: 341.2775 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 160.6084, Elevation angle: -89.3298, Altitude: 334.8097 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 162.1672, Elevation angle: -68.0637, Altitude: 338.9169 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 180.3598, Elevation angle: -22.9057, Altitude: 356.9351 ft.

Roof - 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.



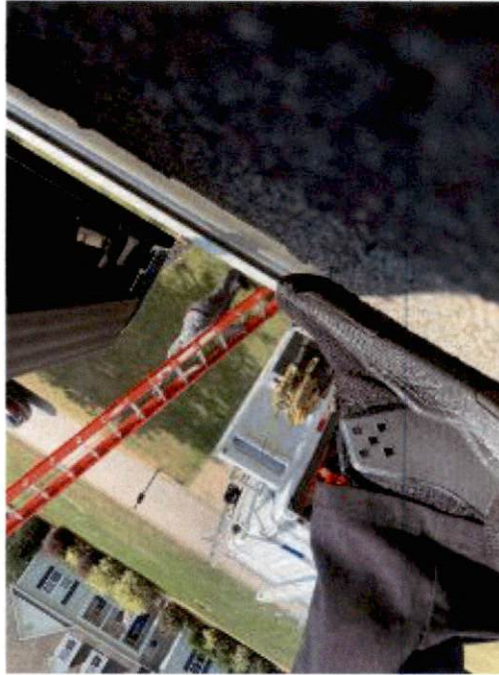
NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 171.8833, Elevation angle: -20.8292, Altitude: 352.005 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 267.6255, Elevation angle: -74.5809, Altitude: 332.5712 ft.

Roof - 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



NC Raleigh Crew 3  
Location: 35.5034, -78.8196  
Azimuth: 320.2425, Elevation angle: -135.8107, Altitude: 335.2784 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 170.6728, Elevation angle: -6.3912, Altitude: 328.8195 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 156.3545, Elevation angle: -18.8014, Altitude: 329.1462 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 170.5117, Elevation angle: -23.8483, Altitude: 329.1688 ft.

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



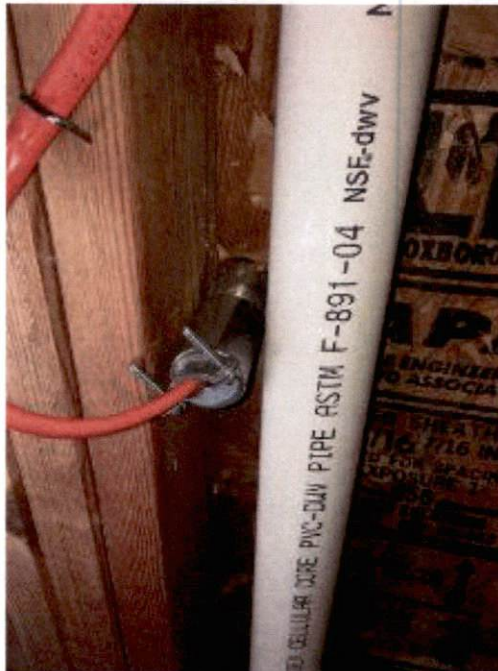
NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 176.6196, Elevation angle: -7.7734, Altitude: 328.1952 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 237.5547, Elevation angle: -40.4958, Altitude: 362.7382 ft.

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



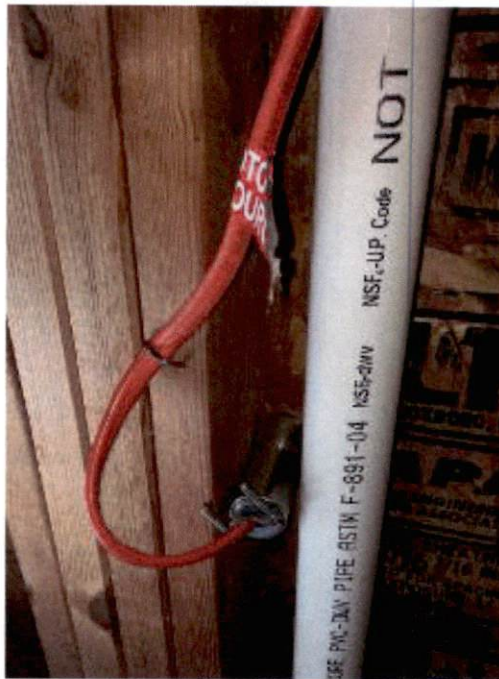
NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 230.2769, Elevation angle: -34.6937, Altitude: 357.9102 ft.

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



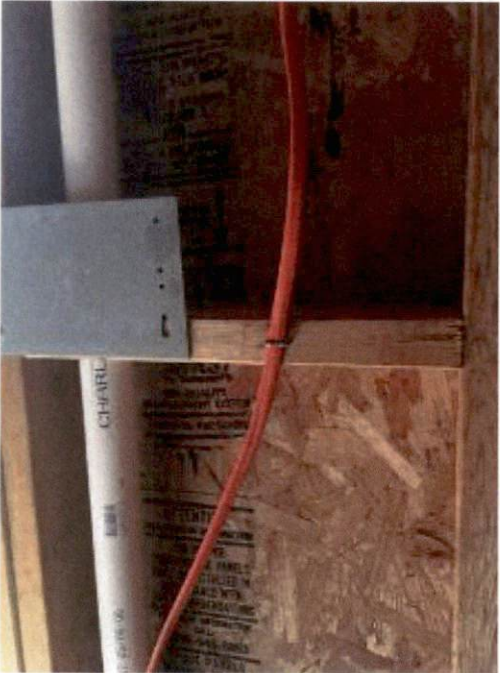
NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 233.4768, Elevation angle: -33.1454, Altitude: 358.3021 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 229.2646, Elevation angle: -27.7317, Altitude: 353.4109 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 235.8186, Elevation angle: -20.8016, Altitude: 344.9875 ft.

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



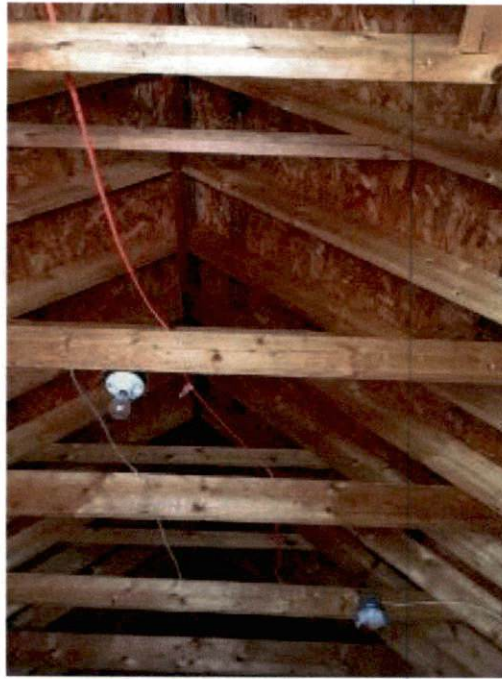
NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 241.7026, Elevation angle: -13.8545, Altitude: 343.1841 ft.

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



NC Raleigh Crew 3  
Location: 35.5036, -78.8197  
Azimuth: 222.9569, Elevation angle: 46.1652, Altitude: 342.8568 ft.

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



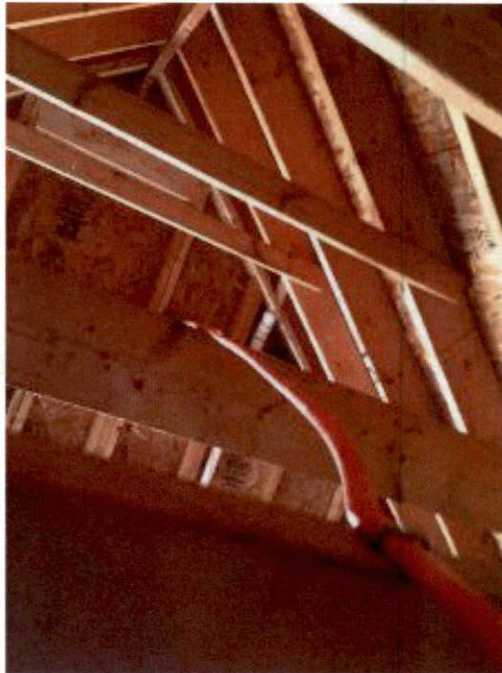
NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 43.2176, Elevation angle: 38.8634, Altitude: 342.3943 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 262.5373, Elevation angle: 16.346, Altitude: 348.1259 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 254.5703, Elevation angle: -17.2065, Altitude: 347.7135 ft.

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



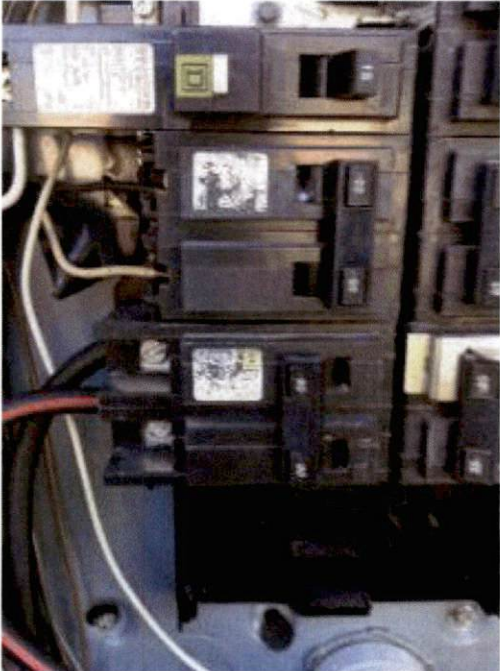
NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 80.5497, Elevation angle: -19.8363, Altitude: 341.0366 ft.

Attic - WIRE SIZE - Is it different than original design?



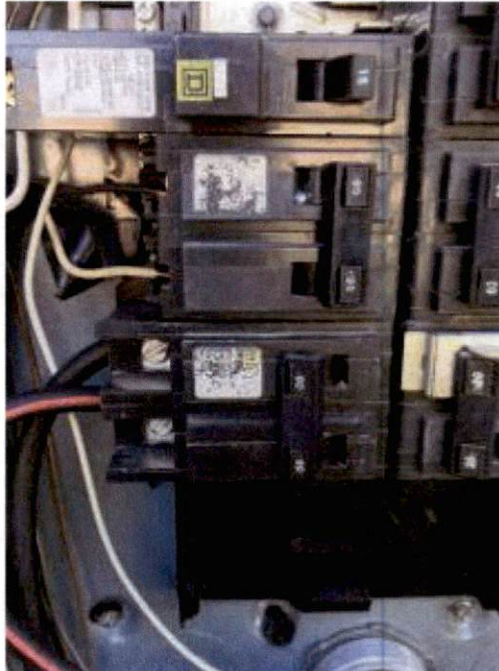
NC Raleigh Crew 3  
Location: 35.5035, -78.8196  
Azimuth: 179.7601, Elevation angle: -40.0876, Altitude: 329.2413 ft.

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



NC Raleigh Crew 3  
Azimuth: 0, Elevation angle: 0, Altitude: 0 ft.

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



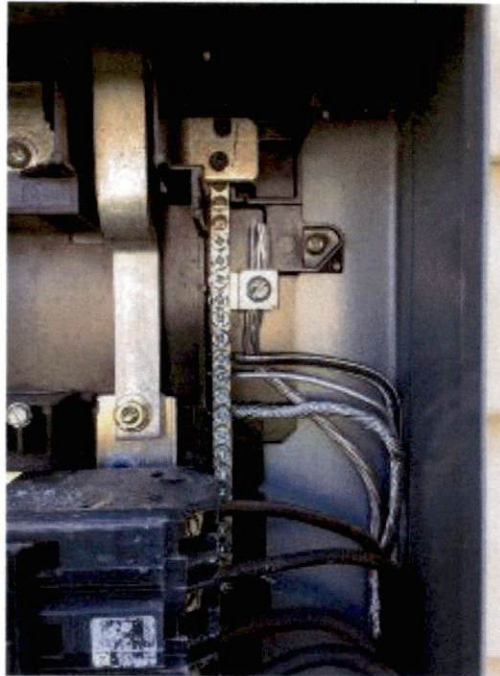
NC Raleigh Crew 3  
Azimuth: 0, Elevation angle: 0, Altitude: 0 ft.

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



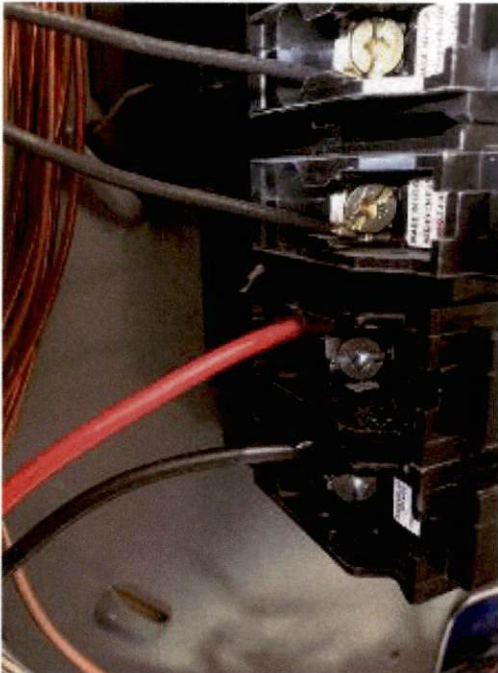
NC Raleigh Crew 3  
Azimuth: 0, Elevation angle: 0, Altitude: 0 ft.

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



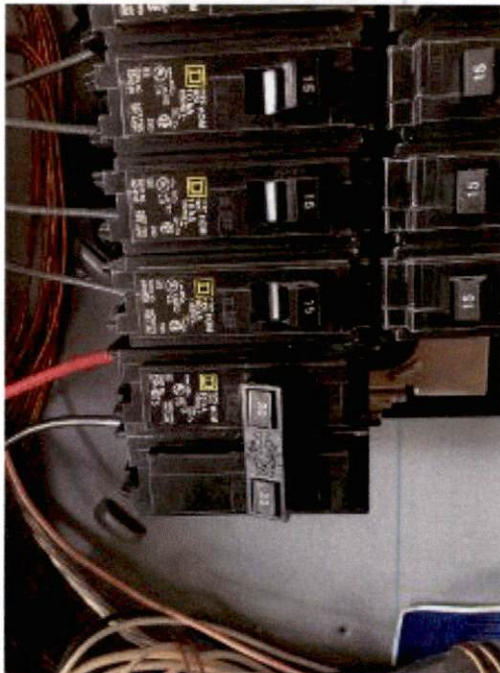
NC Raleigh Crew 3  
Azimuth: 0, Elevation angle: 0, Altitude: 0 ft.

Electrical - MSP: Detailed photos of breaker installed



NC Raleigh Crew 3  
Location: 35.5036, -78.8196  
Azimuth: 261.0722, Elevation angle: -15.5155, Altitude: 330.7055 ft.

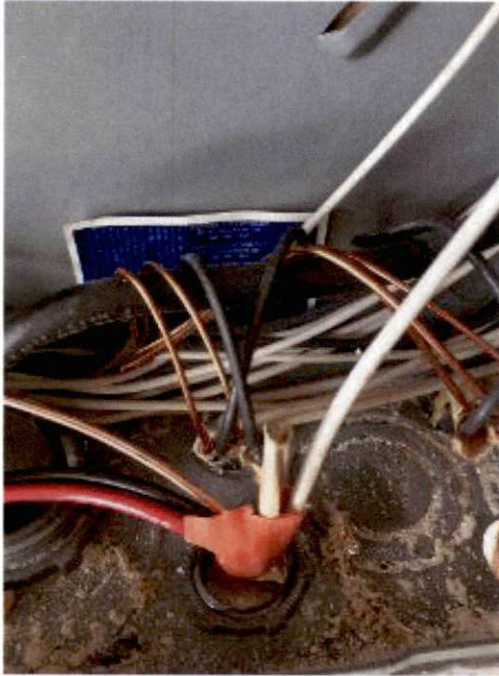
Electrical - MSP: Detailed photos of breaker installed



NC Raleigh Crew 3  
Location: 35.5036, -78.8196  
Azimuth: 237.6964, Elevation angle: -15.7279, Altitude: 330.6549 ft.

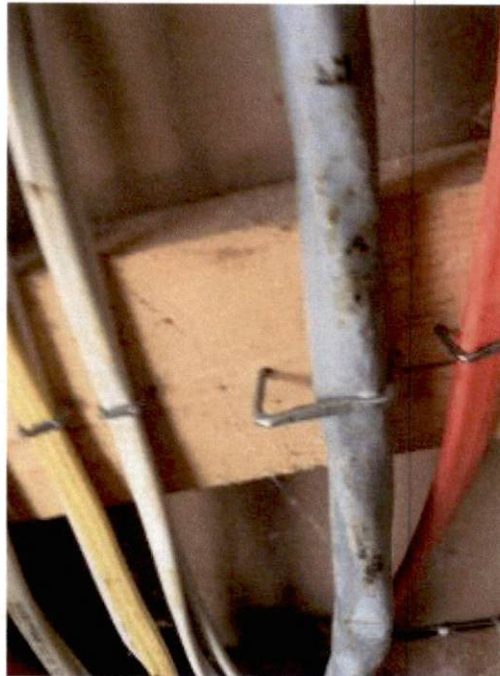


Electrical - MSP: Detailed photos of breaker installed



NC Raleigh Crew 3  
Location: 35.5036, -78.8196  
Azimuth: 239.2264, Elevation angle: -42.1323, Altitude: 330.6455 ft.

Electrical - MSP: Detailed photos of breaker installed



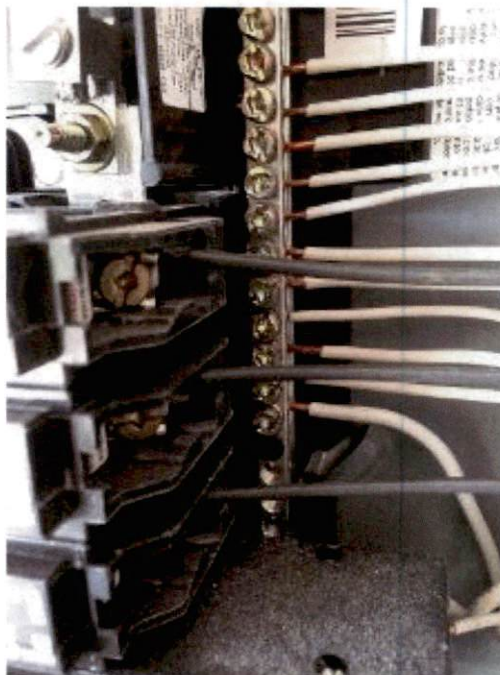
NC Raleigh Crew 3  
Location: 35.5036, -78.8196  
Azimuth: 239.7111, Elevation angle: -33.884, Altitude: 330.6973 ft.

Electrical - MSP: Detailed photos of breaker installed



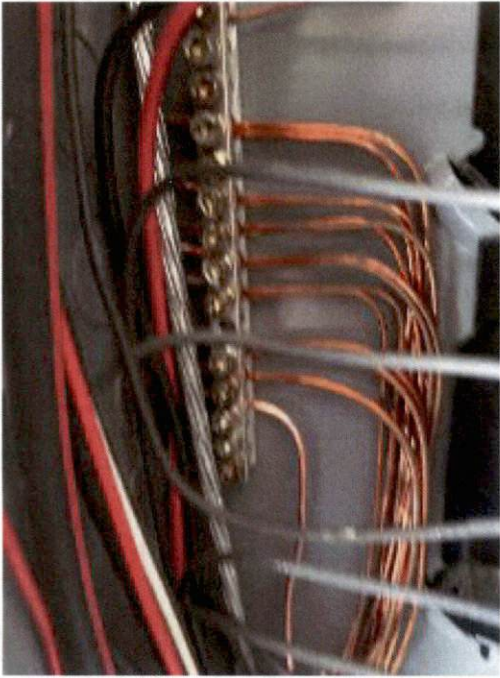
NC Raleigh Crew 3  
Location: 35.5036, -78.8196  
Azimuth: 245.8992, Elevation angle: -64.0039, Altitude: 330.7216 ft.

Electrical - MSP: Detailed photos of breaker installed



NC Raleigh Crew 3  
Location: 35.5036, -78.8196  
Azimuth: 223.2063, Elevation angle: -20.156, Altitude: 330.6699 ft.

Electrical - MSP: Detailed photos of breaker installed



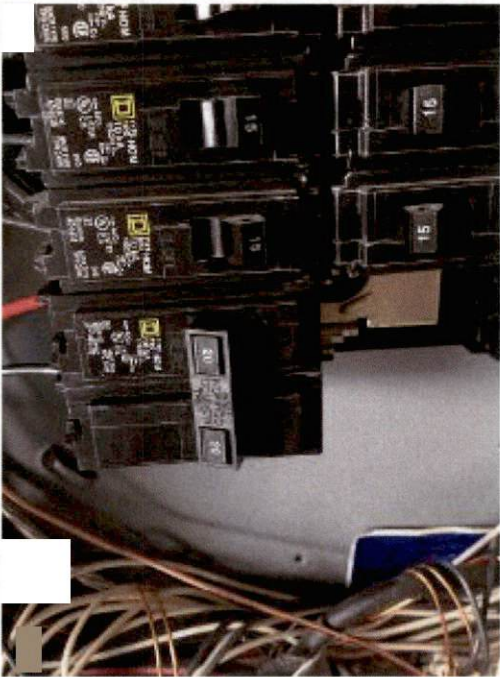
NC Raleigh Crew 3  
 Location: 35.5036, -78.8196  
 Azimuth: 225.9145, Elevation angle: -29.2794, Altitude: 330.7316 ft.

Electrical - MSP: Detailed photos of breaker installed



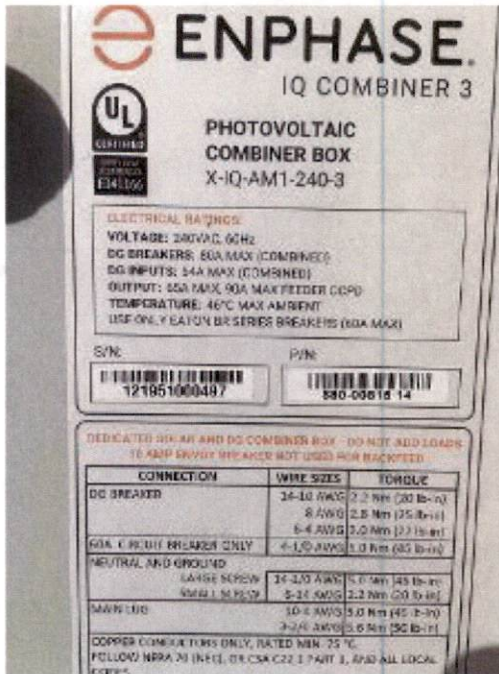
NC Raleigh Crew 3  
 Location: 35.5036, -78.8196  
 Azimuth: 248.4556, Elevation angle: -21.2223, Altitude: 331.7429 ft.

Electrical - MSP: Detailed photos of breaker installed



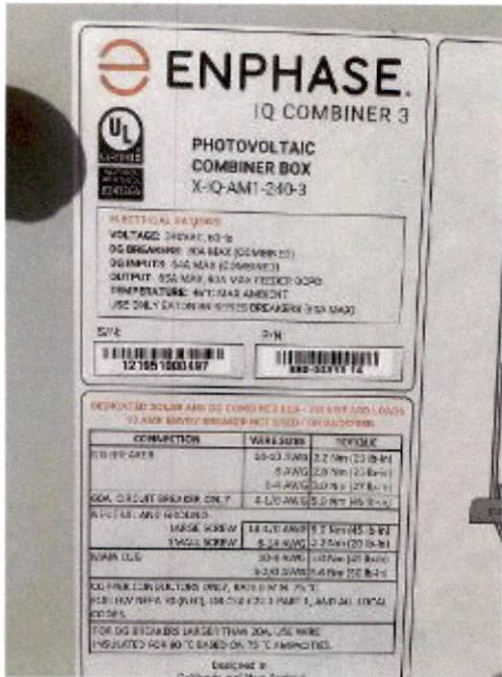
NC Raleigh Crew 3  
 Location: 35.5036, -78.8196  
 Azimuth: 239.5266, Elevation angle: -22.9242, Altitude: 330.8681 ft.

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



NC Raleigh Crew 3  
 Location: 35.5035, -78.8197  
 Azimuth: 324.2393, Elevation angle: -83.2123, Altitude: 312.3815 ft.

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



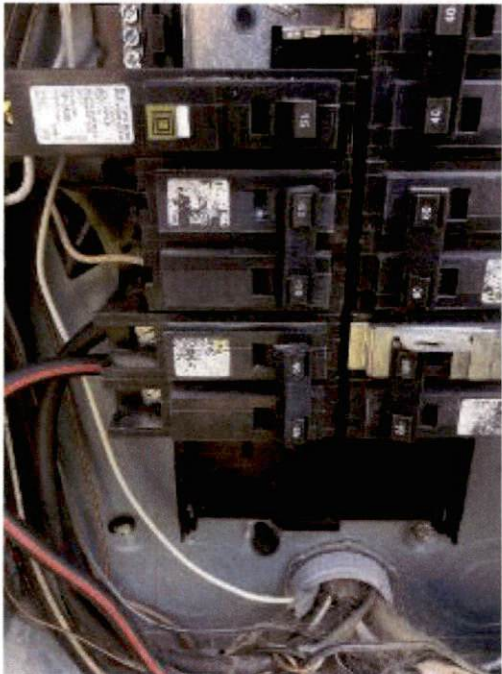
NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 321.3336, Elevation angle: -82.587, Altitude: 312.969 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 75.6898, Elevation angle: -24.4706, Altitude: 322.9611 ft.

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



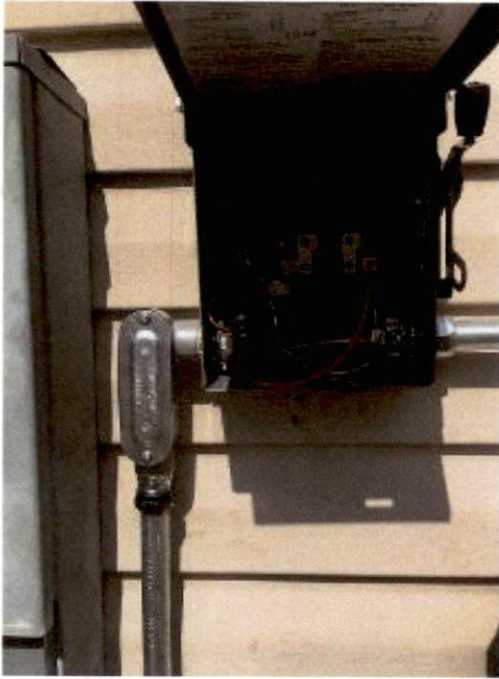
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 75.8804, Elevation angle: -23.4862, Altitude: 323.3532 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 68.1615, Elevation angle: -36.0754, Altitude: 315.7399 ft.

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



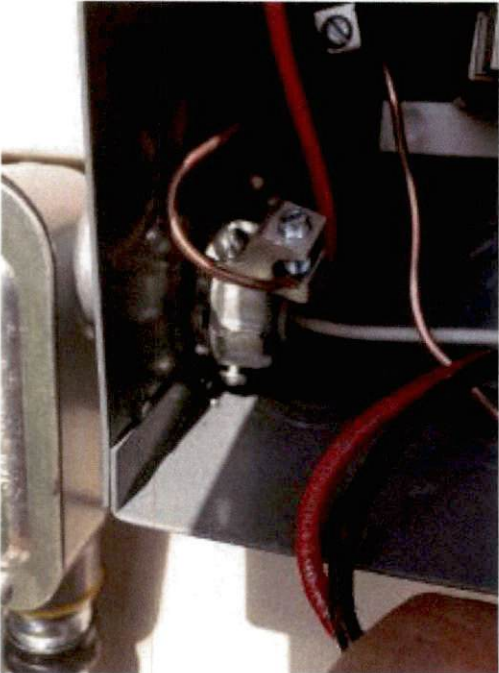
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 71.7782, Elevation angle: -5.0641, Altitude: 315.6831 ft.

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



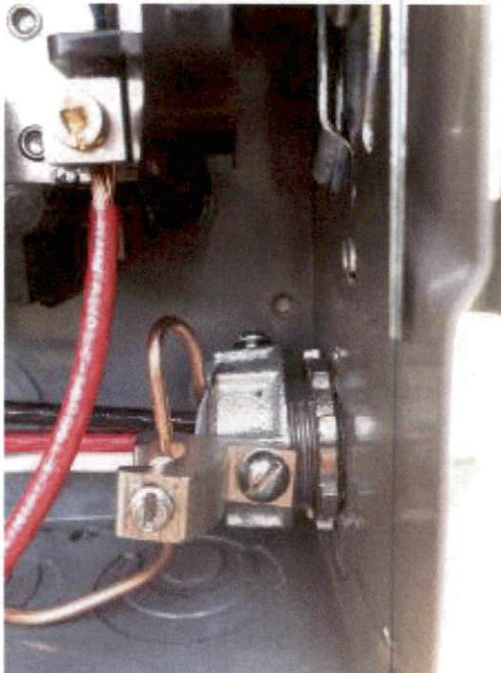
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 54.1352, Elevation angle: -17.2693, Altitude: 316.7139 ft.

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



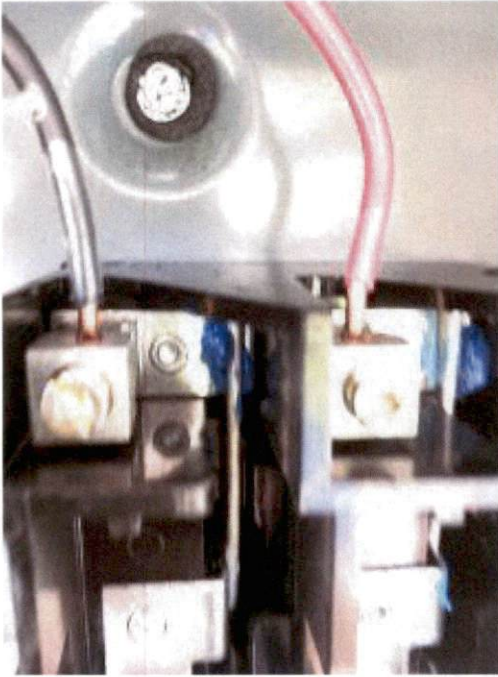
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 55.7527, Elevation angle: -20.2079, Altitude: 317.0792 ft.

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



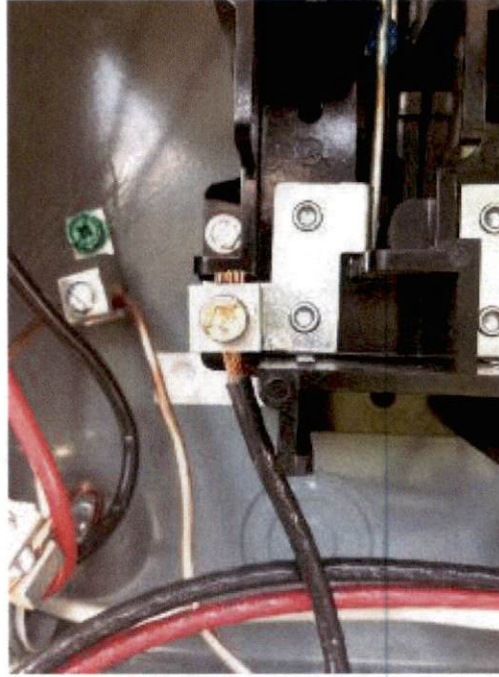
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 70.7512, Elevation angle: -10.5623, Altitude: 317.7115 ft.

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



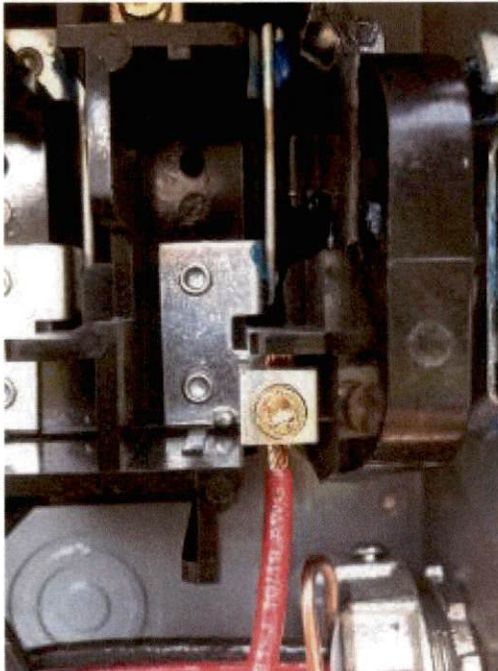
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 80.4259, Elevation angle: -8.8042, Altitude: 329.3195 ft.

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



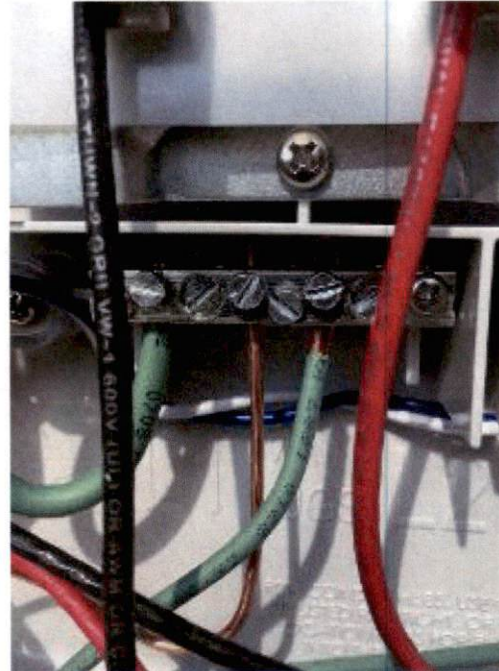
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 71.6854, Elevation angle: -1.1358, Altitude: 332.2859 ft.

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



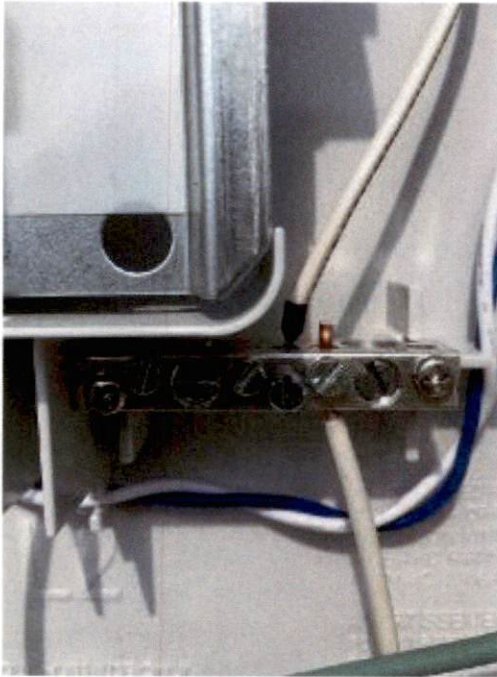
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 73.8859, Elevation angle: -3.011, Altitude: 332.2234 ft.

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



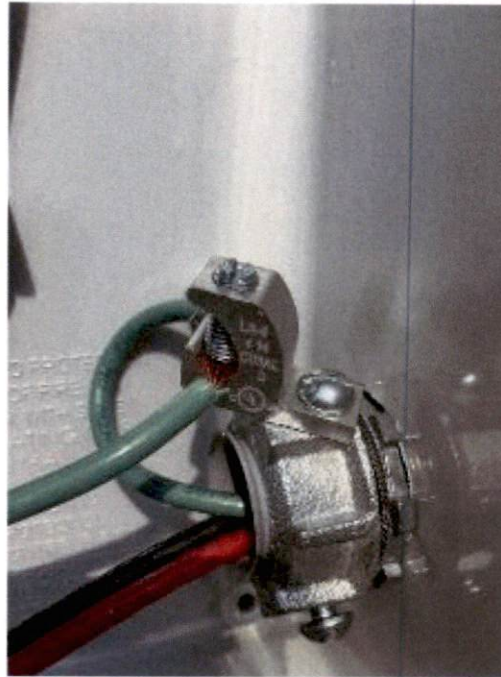
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 97.4887, Elevation angle: -10.5834, Altitude: 333.4214 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 104.4422, Elevation angle: -8.1176, Altitude: 333.4218 ft.

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



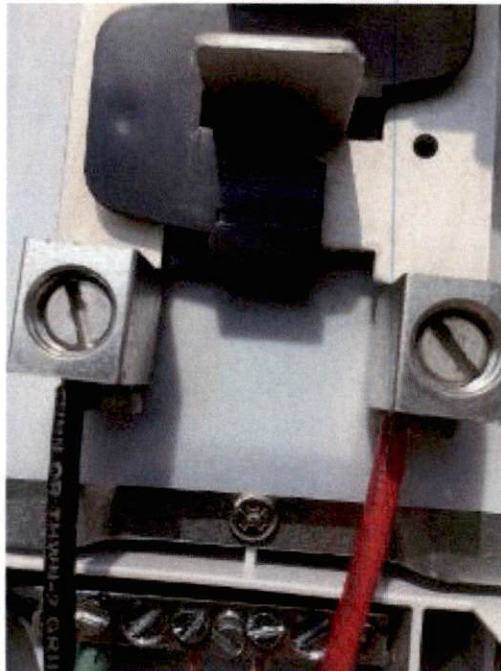
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 105.1513, Elevation angle: -17.6281, Altitude: 334.4612 ft.

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



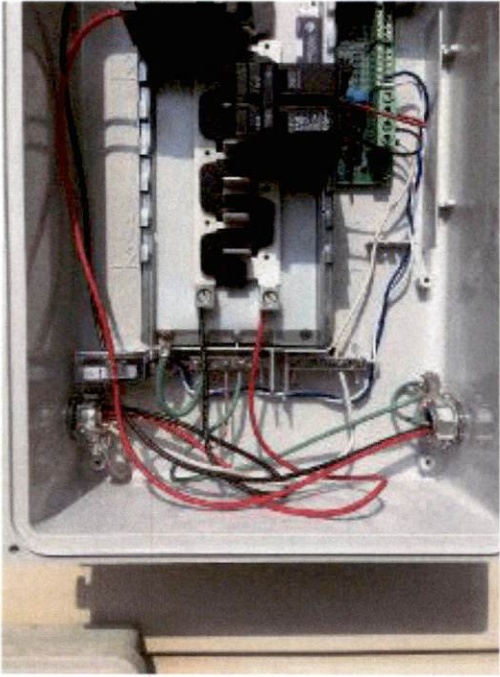
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 63.2745, Elevation angle: -22.8834, Altitude: 334.6798 ft.

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



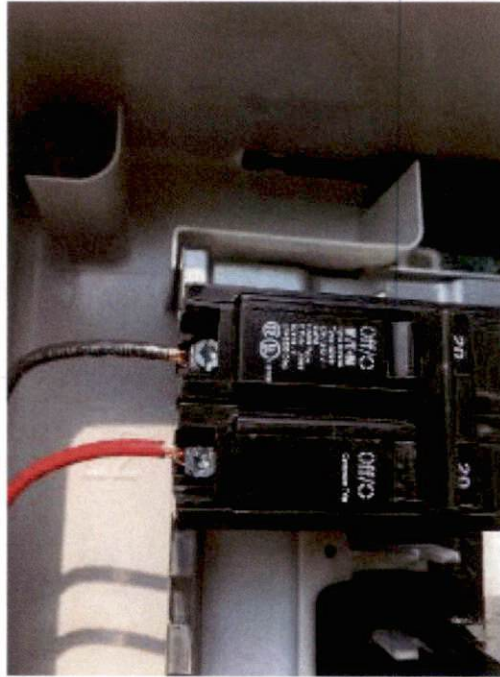
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 86.0691, Elevation angle: 3.7495, Altitude: 334.6618 ft.

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



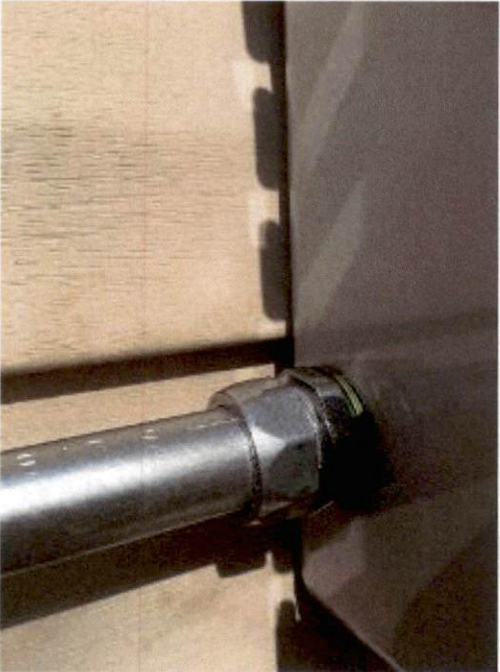
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 88.594, Elevation angle: -2.4067, Altitude: 338.2435 ft.

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



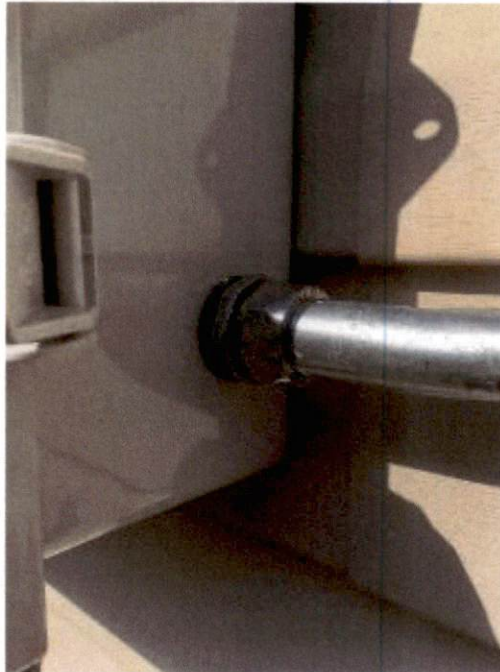
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 96.5417, Elevation angle: 8.5445, Altitude: 338.0789 ft.

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



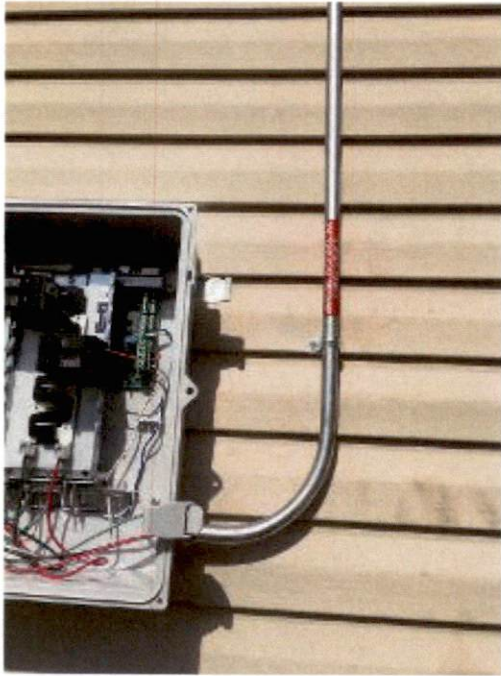
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 115.0789, Elevation angle: -11.4953, Altitude: 337.0501 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 45.8283, Elevation angle: -8.9239, Altitude: 348.252 ft.

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



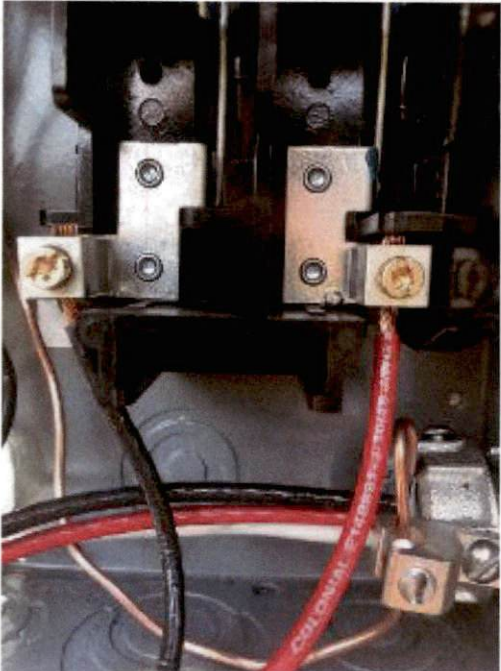
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 73.5943, Elevation angle: 12.187, Altitude: 345.5674 ft.

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



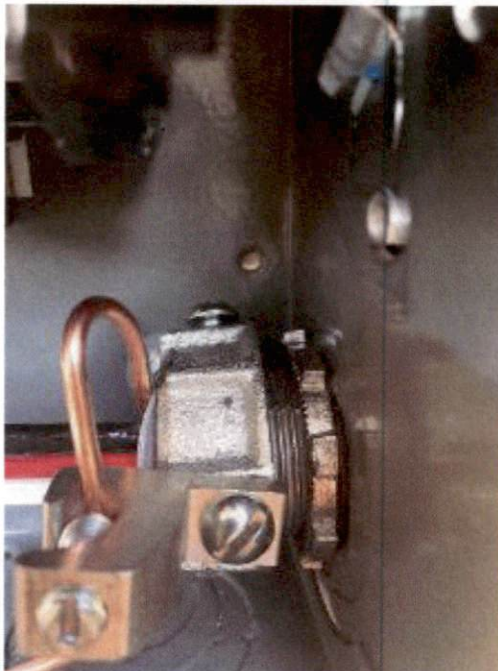
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 74.794, Elevation angle: -3.7792, Altitude: 350.24 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 74.2069, Elevation angle: -5.1492, Altitude: 351.5669 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 82.7735, Elevation angle: -17.6953, Altitude: 352.5302 ft.



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



NC Raleigh Crew 3  
Azimuth: 0, Elevation angle: 0, Altitude: 0 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 128.4449, Elevation angle: 24.4258, Altitude: 282.772 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



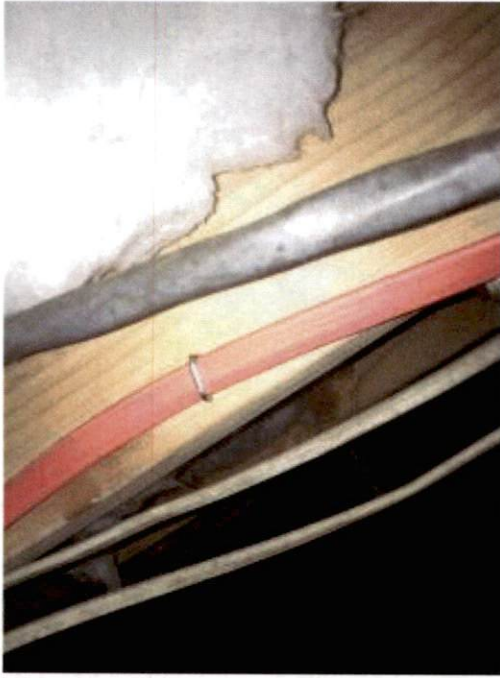
NC Raleigh Crew 3  
Location: 35.5037, -78.8196  
Azimuth: 218.2149, Elevation angle: 18.1577, Altitude: 291.7307 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5037, -78.8197  
Azimuth: 225.937, Elevation angle: 33.3159, Altitude: 287.2988 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5036, -78.8197  
Azimuth: 185.9783, Elevation angle: 35.4213, Altitude: 279.508 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



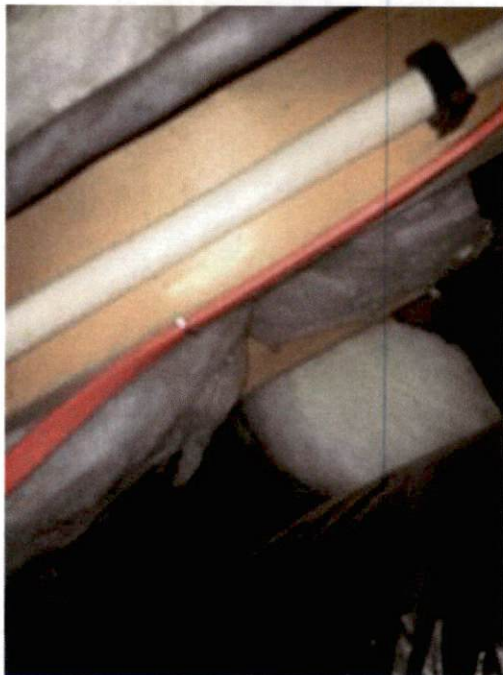
NC Raleigh Crew 3  
Location: 35.5036, -78.8198  
Azimuth: 90.3978, Elevation angle: 15.9539, Altitude: 289.2541 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



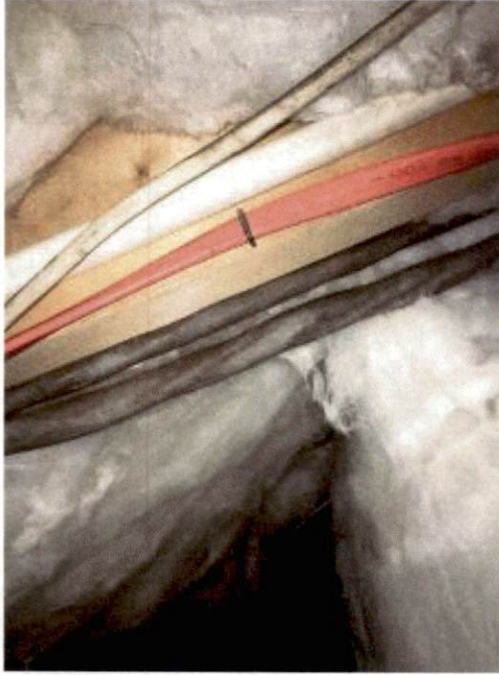
NC Raleigh Crew 3  
Location: 35.5036, -78.8197  
Azimuth: 211.5647, Elevation angle: 23.088, Altitude: 304.3256 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5036, -78.8197  
Azimuth: 196.2656, Elevation angle: 31.3631, Altitude: 301.6228 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



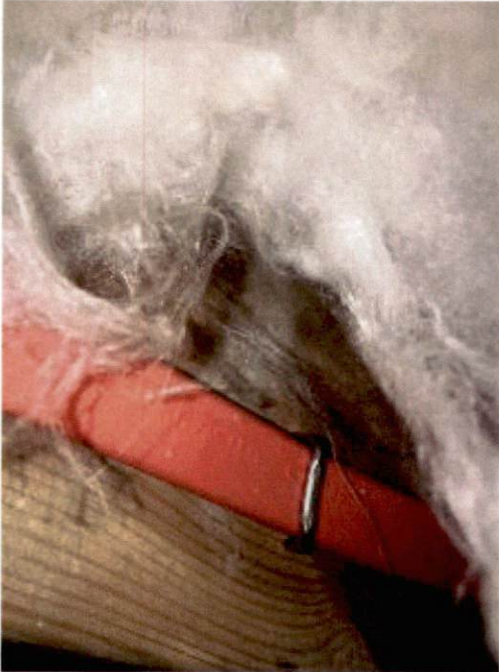
NC Raleigh Crew 3  
Location: 35.5034, -78.8197  
Azimuth: 193.0554, Elevation angle: 34.8793, Altitude: 301.0384 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 254.6976, Elevation angle: 43.0141, Altitude: 288.9364 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5036, -78.8197  
Azimuth: 5.704, Elevation angle: 31.7907, Altitude: 300.9529 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 9.0507, Elevation angle: 23.1885, Altitude: 309.488 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



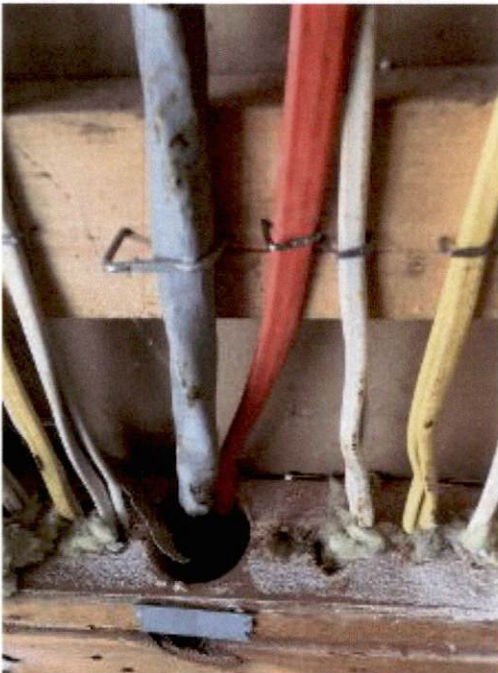
NC Raleigh Crew 3  
Location: 35.5035, -78.8199  
Azimuth: 291.6581, Elevation angle: 17.9455, Altitude: 310.5793 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 289.3698, Elevation angle: 22.2621, Altitude: 322.8439 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



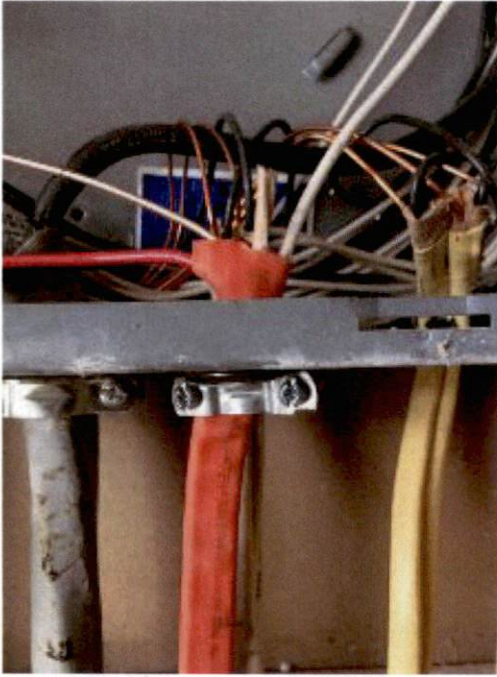
NC Raleigh Crew 3  
Location: 35.5036, -78.8195  
Azimuth: 229.6409, Elevation angle: -37.6735, Altitude: 307.1816 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



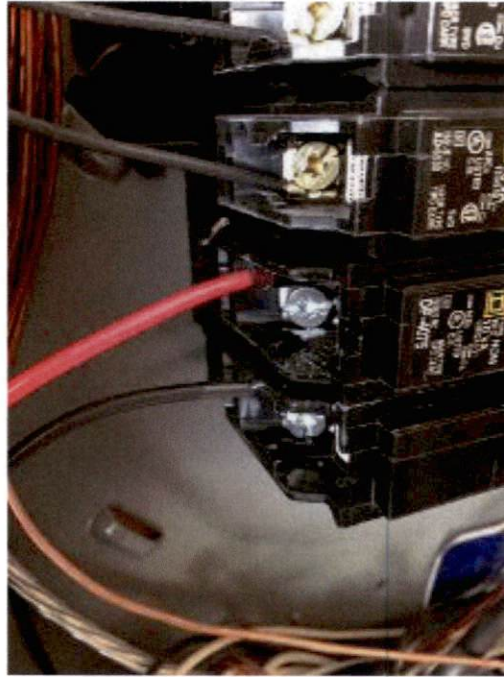
NC Raleigh Crew 3  
Location: 35.5036, -78.8196  
Azimuth: 234.5673, Elevation angle: -41.8413, Altitude: 309.5891 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



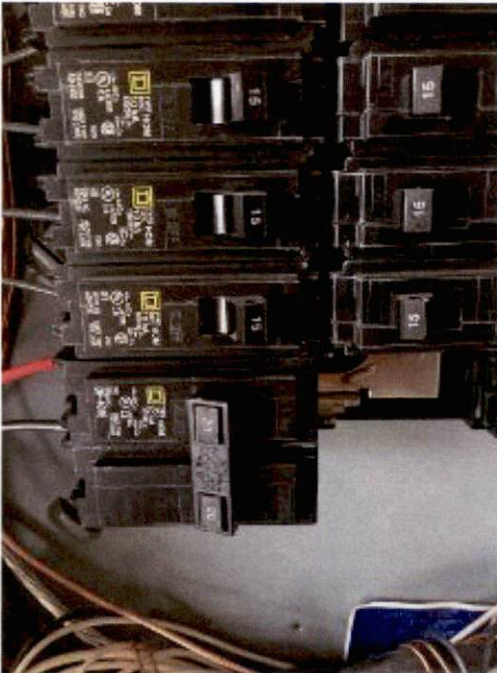
NC Raleigh Crew 3  
Location: 35.5036, -78.8196  
Azimuth: 234.2363, Elevation angle: -4.9343, Altitude: 324.3898 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



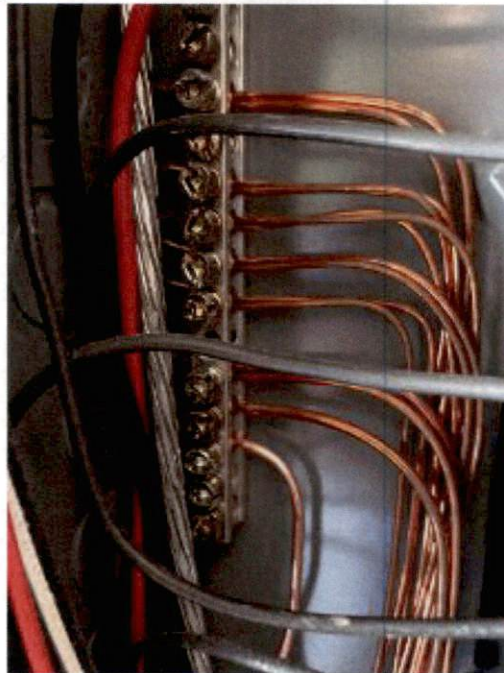
NC Raleigh Crew 3  
Location: 35.5036, -78.8196  
Azimuth: 254.4075, Elevation angle: -20.4816, Altitude: 319.4524 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



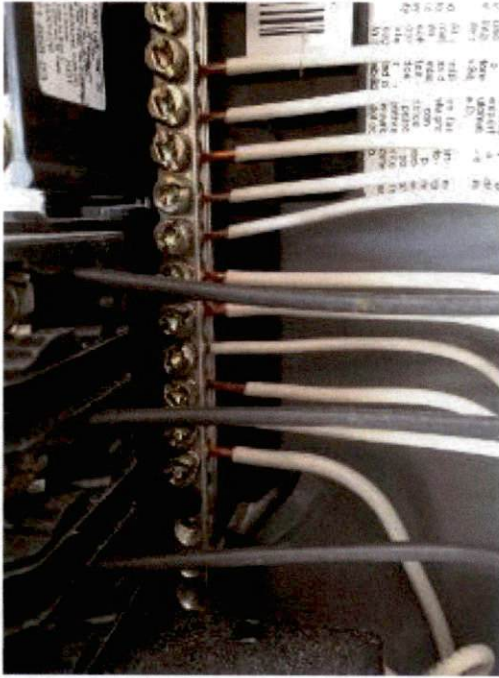
NC Raleigh Crew 3  
Location: 35.5036, -78.8196  
Azimuth: 237.0236, Elevation angle: -17.6157, Altitude: 327.1773 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



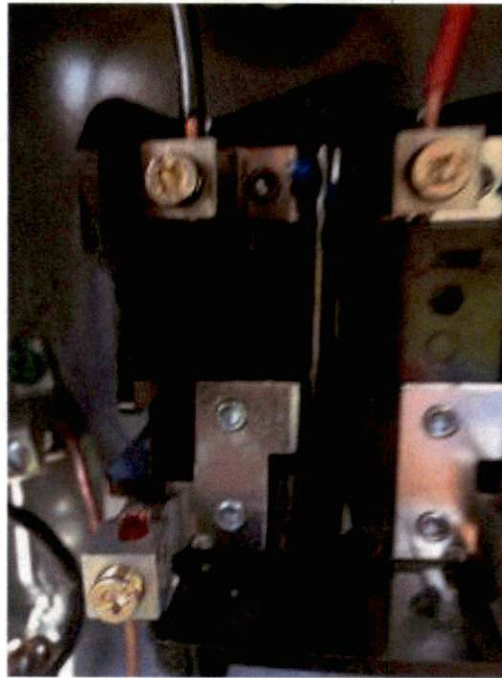
NC Raleigh Crew 3  
Location: 35.5036, -78.8196  
Azimuth: 215.5754, Elevation angle: -15.2711, Altitude: 330.632 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5036, -78.8196  
Azimuth: 223.6011, Elevation angle: -15.7053, Altitude: 330.6298 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



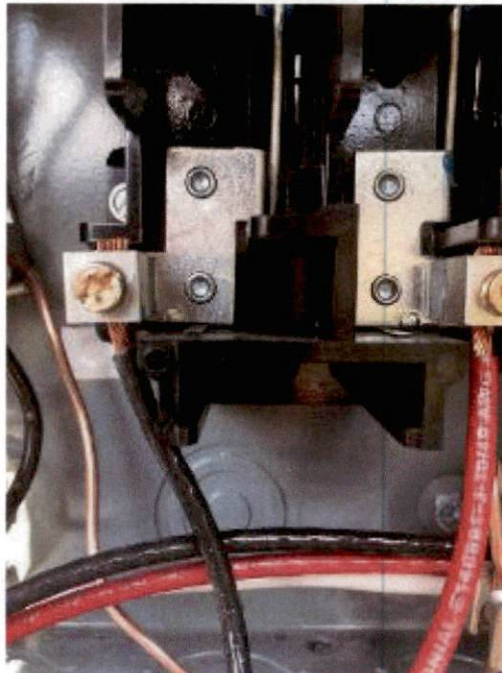
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 67.3867, Elevation angle: -6.7092, Altitude: 331.5692 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 64.9282, Elevation angle: -7.4035, Altitude: 332.0316 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 70.6933, Elevation angle: -2.9395, Altitude: 332.1517 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



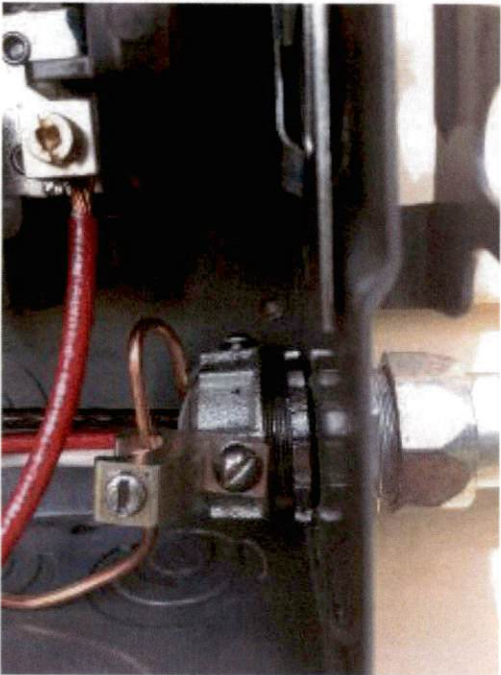
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 50.4957, Elevation angle: -18.5446, Altitude: 335.5102 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



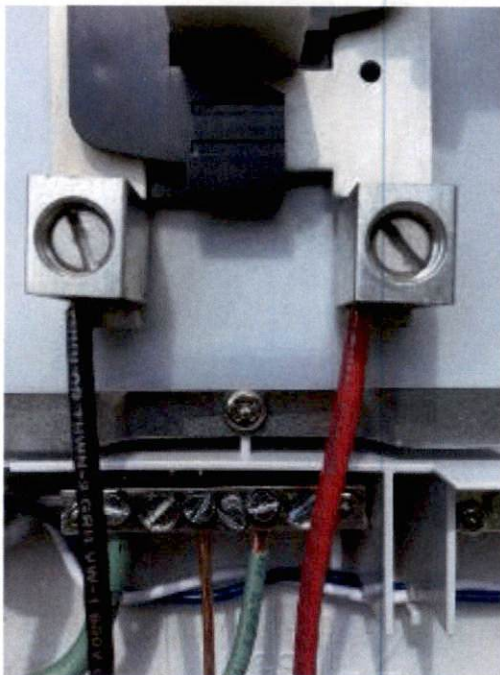
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 68.4213, Elevation angle: -5.493, Altitude: 335.7322 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



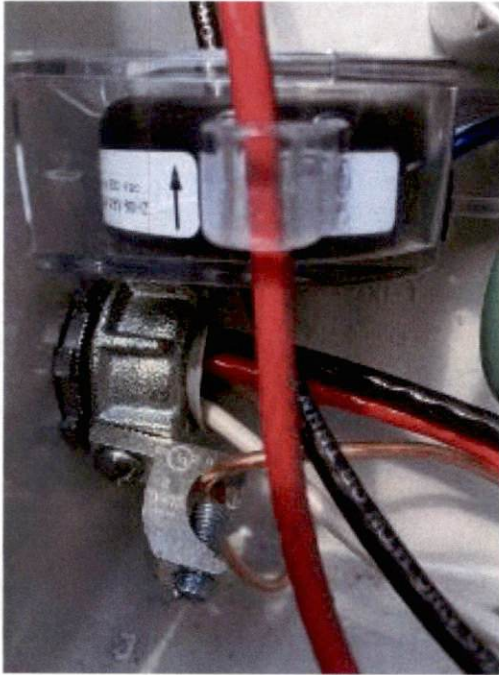
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 71.278, Elevation angle: -9.1008, Altitude: 336.0169 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



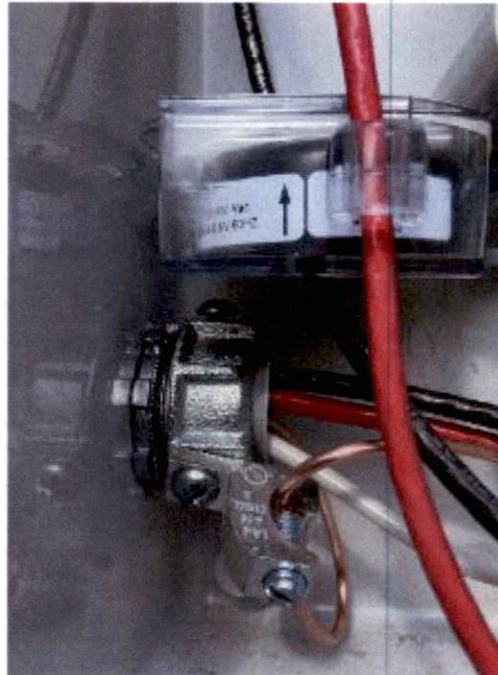
NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 88.1279, Elevation angle: -4.3999, Altitude: 337.491 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



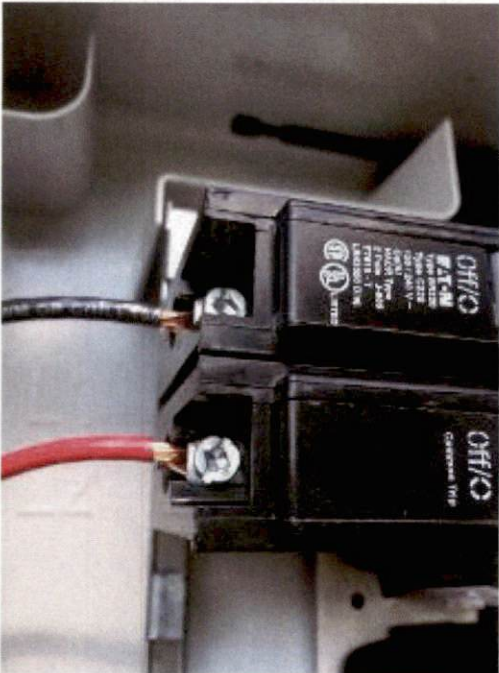
NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 73.2686, Elevation angle: -22.0703, Altitude: 336.6347 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 80.0425, Elevation angle: -7.5549, Altitude: 337.4058 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 99.2508, Elevation angle: 14.2761, Altitude: 337.4058 ft.

Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 75.8414, Elevation angle: 9.8912, Altitude: 337.4058 ft.

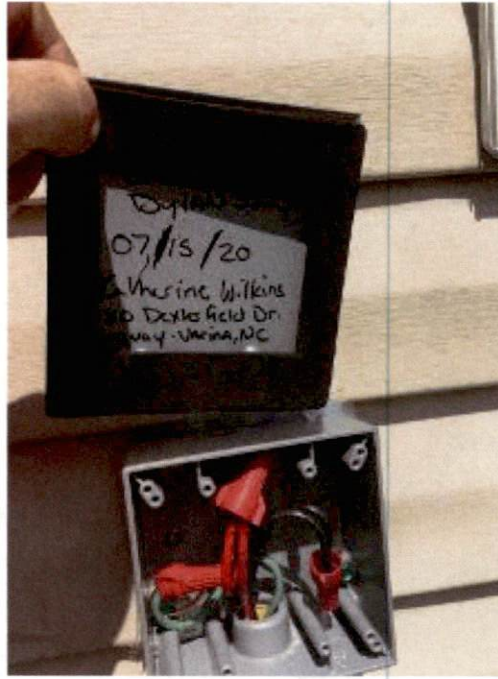


Electrical - PV EQUIPMENT: Photos of fuse sizes and wire sizes



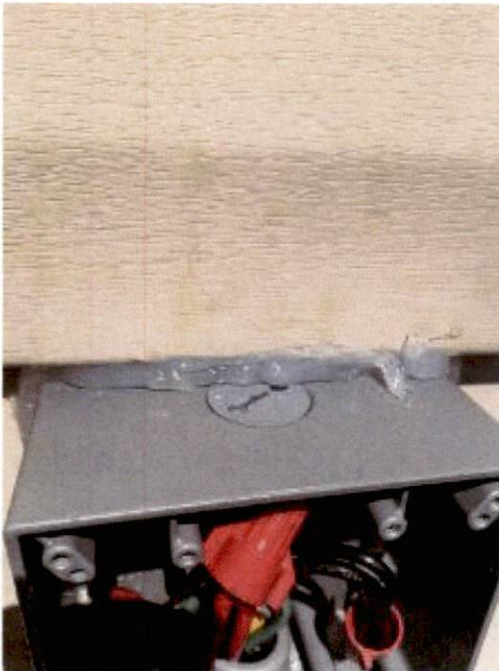
NC Raleigh Crew 3  
Azimuth: 0, Elevation angle: 0, Altitude: 0 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 90.4847, Elevation angle: -9.8172, Altitude: 323.2705 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 98.319, Elevation angle: -30.5699, Altitude: 321.1658 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 94.7302, Elevation angle: -27.8304, Altitude: 321.9736 ft.

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



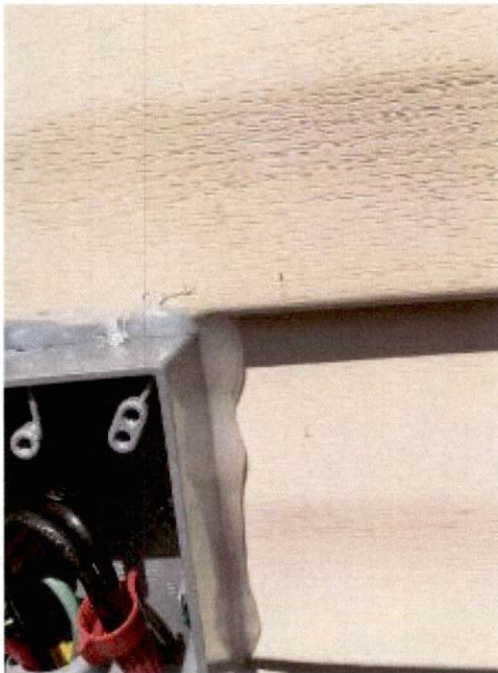
NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 64.7806, Elevation angle: -20.6044, Altitude: 321.5472 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 100.871, Elevation angle: -37.1858, Altitude: 321.293 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 76.0578, Elevation angle: -15.7617, Altitude: 321.2219 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 72.4701, Elevation angle: -21.1108, Altitude: 322.2108 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 89.2953, Elevation angle: -15.3807, Altitude: 317.872 ft.

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



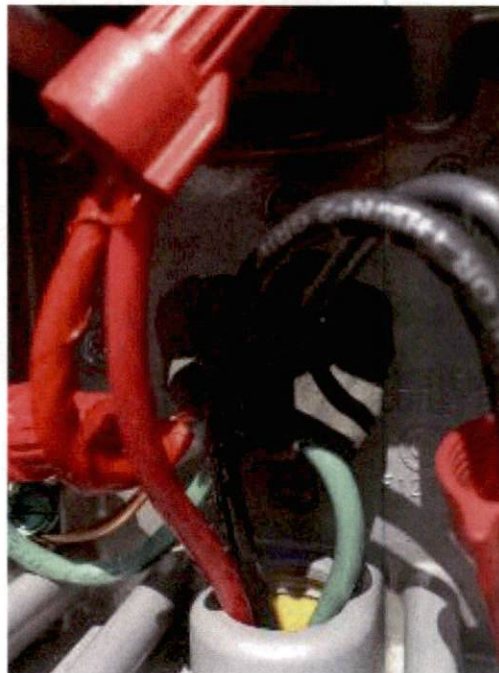
NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 96.9484, Elevation angle: -41.944, Altitude: 323.3261 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 88.6225, Elevation angle: -12.8958, Altitude: 325.4146 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 68.1762, Elevation angle: -7.9728, Altitude: 310.1569 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 95.8158, Elevation angle: -21.2433, Altitude: 311.4968 ft.

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



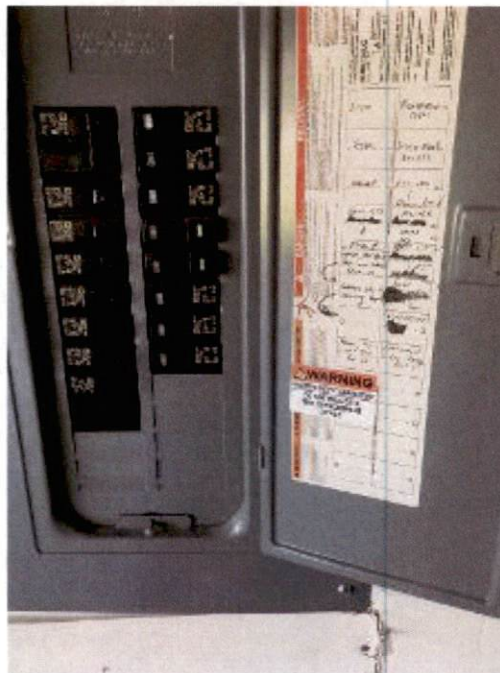
NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 92.9572, Elevation angle: 17.1836, Altitude: 310.1799 ft.

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



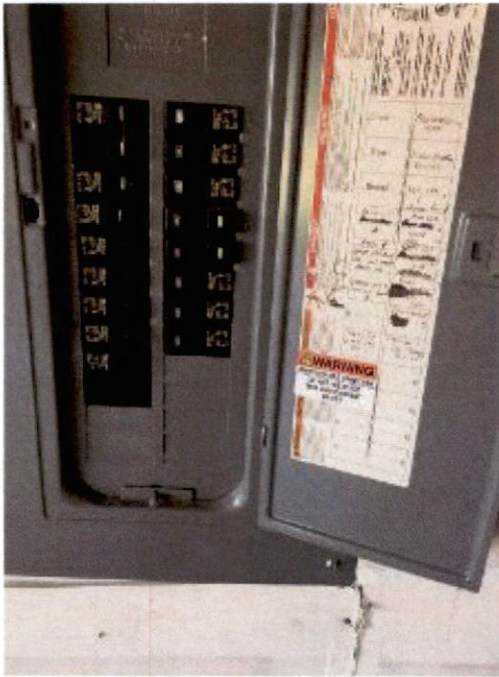
NC Raleigh Crew 3  
Location: 35.5217, -78.8682  
Azimuth: 241.3875, Elevation angle: -35.915, Altitude: 0 ft.

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



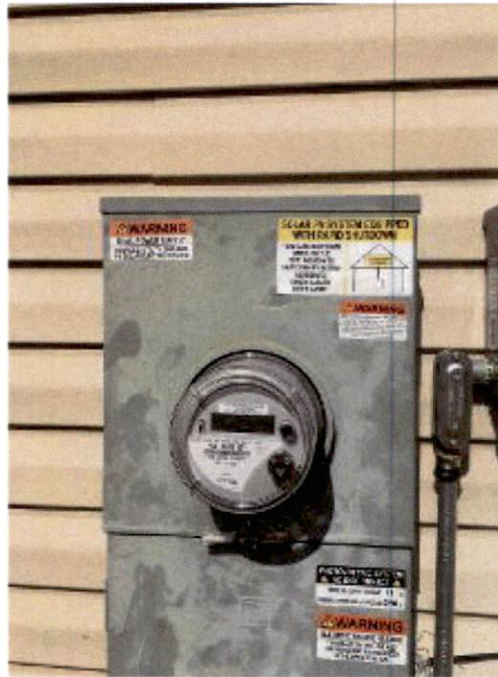
NC Raleigh Crew 3  
Location: 35.5036, -78.8195  
Azimuth: 256.4445, Elevation angle: -19.8452, Altitude: 334.8089 ft.

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



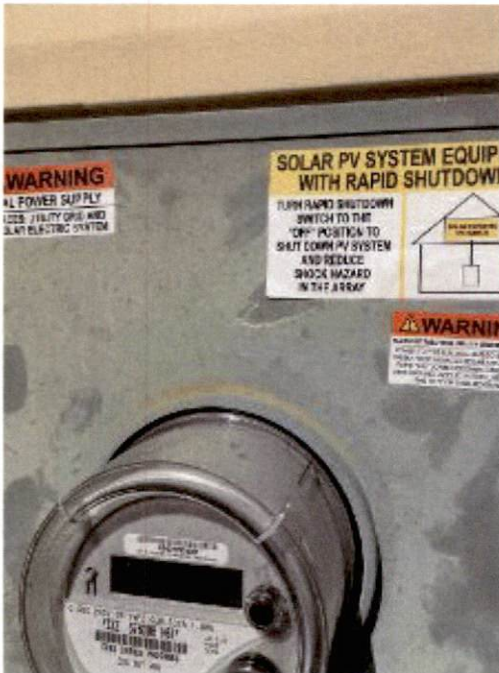
NC Raleigh Crew 3  
Location: 35.5036, -78.8195  
Azimuth: 248.0895, Elevation angle: -20.1413, Altitude: 338.8401 ft.

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



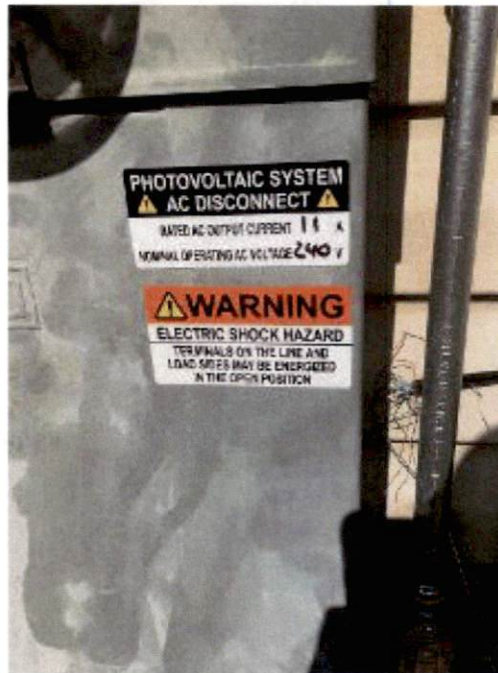
NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 59.9054, Elevation angle: -2.4525, Altitude: 319.4604 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 51.8834, Elevation angle: -3.6142, Altitude: 320.0485 ft.

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



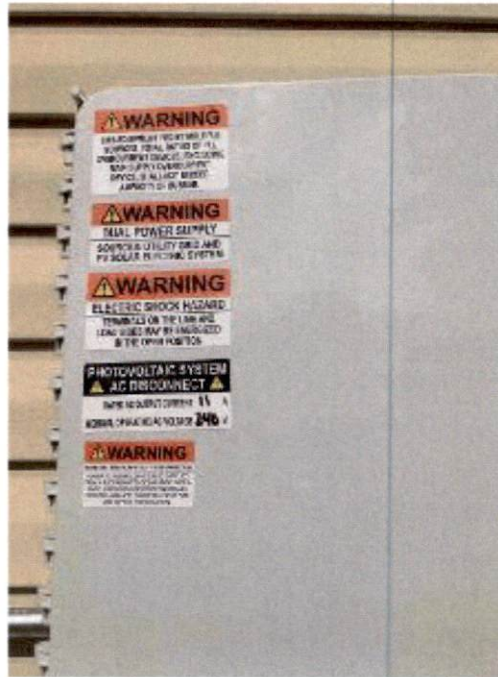
NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 57.8265, Elevation angle: -25.4208, Altitude: 324.4987 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 60.0628, Elevation angle: -2.7272, Altitude: 328.3458 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 75.706, Elevation angle: 7.721, Altitude: 333.7435 ft.

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



NC Raleigh Crew 3  
Location: 35.5035, -78.8197  
Azimuth: 93.2165, Elevation angle: 8.399, Altitude: 338.3606 ft.

Electrical - Photo of location of plans left on site



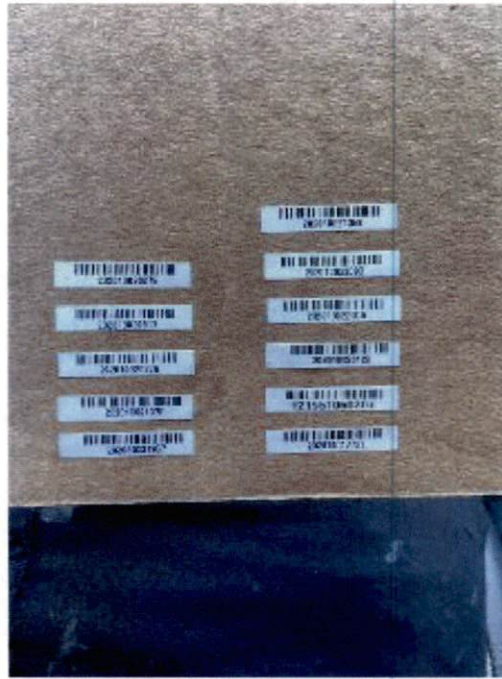
NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 29.9634, Elevation angle: -49.1865, Altitude: 343.5965 ft.

Electrical - Photo of location of plans left on site



NC Raleigh Crew 3  
Location: 35.5035, -78.8198  
Azimuth: 61.0044, Elevation angle: -21.0399, Altitude: 346.2615 ft.

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



NC Raleigh Crew 3  
Location: 35.5034, -78.8195  
Azimuth: 233.2483, Elevation angle: -56.4949, Altitude: 321.4068 ft.

Completion - Screenshot showing Wi-Fi connection



Completion - Photo of completed Pre-Inspection Checklist



NC Raleigh Crew 3  
Azimuth: 0, Elevation angle: 0, Altitude: 0 ft.



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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: Y <input checked="" type="radio"/> N
Code Enforcement Project No:	Permit No: ERES2006-0010
Project Name: Katherine Wilkins	Owner: Katherine Wilkins
Project Address: 180 Dexterfield Dr. Fuquay Varina, North Carolina 27526	Suite No:
Date Inspected: 7/15/2020	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 accordance with all of the requirements of the above referenced code. Attach any additional documents if needed.

Digitally signed by John Calvert  
Date: 2020.07.16 07:31:17 -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

Katherine Wilkins  
180 Dexterfield Dr.  
Fugquay-Varina. NC 27526  
ID # 72115532



## STRUCTURAL OBSERVATION of SOLAR PANEL INSTALLATION

To the Harnett County Inspector:

July 16, 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: 2020.07.16 07:33:11 -06'00'

NC Certificate of Authorization #0396