

CERTIFICATE OF **A**PPROPRIATENESS **P**LACARD

for Raleigh Historic Resources

Project Description:

Install solar panels

Oakwood

Historic District

Address

Historic Property

COA-0110-2023

Certificate Number

9/6/2023

Date of Issue

3/6/2024

Expiration Date

This card must be kept posted in a location within public view until all phases of the described project are complete. The work must conform with the code of the City of Raleigh and laws of the state of North Carolina. When your project is complete, you are required to ask for a final zoning inspection in a historic district area. Telephone the RHDC office at 832-7238 and commission staff will coordinate the inspection with the inspections Department. If you do not call for this final inspection, your Certificate of Appropriateness is null and void.



Raleigh Historic Development Commission

Pending the resolution of appeals, commencement of work is at your own risk.

	Type or print t	the f	ollowing:
Applicant name:			
Mailing address:			
City:	y: State: Zip code:		
Date: Dayt		/time phone #:	
Email address:			
Applicant signature:			
Minor work (staff review) –	one copy		Office Use Only
Major work (COA committee review) – ten			Transaction #:
copies			File #:
Additions > 25% of building sq. footage		e	Fee:
New buildings			Amount paid:
Demolition of building or structure			Received date:
All other			Received by:
Post approval re-review of conditions of			
approval			
Property street address:			
Historic district:			
Historic property/Landmark name (if applicable):			
Owner name:			
Owner mailing address:			

For applications that require review by the COA Committee (major work), provide addressed and stamped envelopes for owners for all properties with 100 feet on all sides of the property, as well as the property owner.

Property Owner Name & Address	Property Owner Name & Address

I understand that all major work applications that require review by the Raleigh Historic Development Commission's COA Committee must be submitted by 4 p.m. on the date of the application deadline; otherwise, consideration will be delayed until the following committee meeting. An incomplete application will not be accepted.

Will you be applying for rehabilitation tax credits for this project?	Office Use Only
Yes No	Type of work: <u>50</u>
Did you consult with staff prior to filing the application?	
Yes No	

Design Guidelines: please cite the applicable sections of the design guidelines (<u>www.rhdc.org</u>).		
Section/Page	Торіс	Brief description of work (attach additional sheets as needed).
99/pg 16	work item not listed	installation of solar panels to roof of home.

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Upon being signed and dated below by the Planning Director or designee, this application becomes the Minor Work Certificate of Appropriateness. It is valid until

Please post the enclosed placard form of the certificate as indicated at the bottom of the card. Issuance of a Minor Work Certificate shall not relieve the applicant, contractor, tenant, or property owner from obtaining any other permit required by City Code or any law. Minor Works are subject to an appeals period of 30 days from the date of approval.

Signature (City of Raleigh)

06/23

Date

August 28, 2023

Dear Sir or Ma'am,

I am submitting a COA application for a minor work at 616 North Boundary St. to have solar panels added to the home. The solar panels will be installed onto the rear-facing roof of the house and would not be visible from the street. I have included the material data sheets and design/layout for the solar panel system. Please let me know if you have any questions, and I appreciate your time.

Cordially,

Dan Chaksupa



IAL SUMMARY: DI	STRIBUTOR
<	11
	11
	1
	13
	2
	1
	2
	3
	4
	24
1	4
	1
	34
	11
Sealant	2
5B	1
GE SCREEN 8" X 100'	1
	66







PV MODULES

MAKE	REC
MODEL	REC400NP3 BLACK
WIDTH	40.90 IN
LENGTH	74.80 IN
THICKNESS	30 MM
WEIGHT	47.00 LBS.
ARRAY AREA	234 SQFT.
ARRAY WEIGHT	584 LBS.

ROOF SUMMARY

STRUCTURE:	
TYPE	RAFTERS
MATERIAL	SOUTHERN PINE #2
SIZE	2 X 4
SPACING	16 IN O.C.
EFFECTIVE SPAN	100 IN
PITCH	12/12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	COMPOSITE
THICKNESS	7/16 IN
WEIGHT	1.60 LBS/SQFT
ROOFING:	
TYPE	ASPHALT SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.30 LBS./SQFT.

ROOF MOUNT SUMMARY

	-	
MAXIMUM (IN)	MOUNT SPACING	RAIL OVERHANG
WIND ZONE 1	64 IN	19 IN
WIND ZONE 2	48 IN	19 IN
WIND ZONE 3	32 IN	19 IN

ROOF LO	DADING
GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD	20 LBS./SQFT.
DEAD LOAD	
ROOFING	3.9 LBS/SQFT.
PV ARRAY	2.5 LBS./SQFT.
TOTAL	6.4 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-26.9 LBS./SQFT.
UPLIFT ZONE 2	-32.4 LBS./SQFT.
UPLIFT ZONE 3	-32.4 LBS./SQFT.
DOWNWARD	24.7 LBS./SQFT.
FASTENER LOAD:	
UPLIFT ZONE 1	-443 LBS.
UPLIFT ZONE 2	-401 LBS.
UPLIFT ZONE 3	-267 LBS.
DOWNWARD	407 LBS.

ROOF MOUNT & FASTENER		
ROOF MOUNT:		
MAKE	QUICKBOLT	
MODEL	4 IN QB1	
MATERIAL	STAINLESS / EPDM	
FASTENER:		
MAKE	QUICK SCREWS	
MODEL	HANGER BOLT	
MATERIAL	304 SS	
SIZE	5/16-18 X 5-1/4"	
GENERAL:		
WEIGHT	0.56 LBS.	
FASTENERS PER MOUNT	1	
MAX. PULL-OUT FORCE	960.0 LBS.	
SAFETY FACTOR	2	
DESIGN PULL-OUT FORCE	480.0 LBS.	

MOUNTING RAILS

MAKE	IRONRIDGE
MODEL	XR10
MATERIAL	ALUMINUM
WEIGHT	0.425 LBS/IN
SPACING	37 IN



CONDUCTOR SCHEDULE

											. –
TAC	CURRENT CARRYING CONDUCTORS			GROUNDING CONDUCTORS			CONDUIT/RACEWAY			NOTES	Ļ
IAU	QTY.	SIZE	INSULATION	QTY.	SIZE	INSULATION	QTY.	SIZE	LOCATION	NOTES	Ļ
C1	2	12 AWG	DG CABLE	1	6 AWG	BARE	-	-	FREE AIR	1	L
C2	2	10 AWG	THWN	1	10 AWG	THWN	1	3/4"	EXT/INT	2,4	L
C3	3	12 AWG	THWN	1	12 AWG	THWN	1	3/4"	EXTERIOR	2,4	L
XC	-	-	-	-	-	-	-	-	-	3	

NOTES:

MANUFACTURER PROVIDED, UL LISTED WIRING HARNESS FOR USE ON EXPOSED ROOFS 1

CONDUIT SIZE SHOWN IS CODE MINIMUM. LARGER SIZES ARE ALLOWED. 2.

EXISTING CONDUCTORS, FIELD VERIFY 3.

EQUIPMENT TERMINAL RATING SHALL BE A MINIMUM OF 75°C AT BOTH END OF CONDUCTOR 4.

PV MODULE				
MAKE	REC			
MODEL	REC400NP3 BLACK			
NOM. POWER (PNOM)	400 WATTS			
NOM. VOLT. (VMPP)	37.6 VOLTS			
O.C. VOLT (VOC)	45.0 VOLTS			
MAX. SYS. VOLT.	1000 VOLTS			
NOM. CURR. (IMPP)	10.6 AMPS			
S.C. CURR. (ISC)	11.4 AMPS			
TEMP. COEF. (PMPP)	-0.34 %/C			
TEMP. COEF. (Voc)	-0.26 %/C			
MAX SERIES FUSE	25 AMPS			
UL COMPLIANT (Y/N)	YES			

PV COMBINER PANEL

MAKE	ENPHASE
MODEL	X2-IQ-AM1-240-4
INPUT:	
MAX BRANCH CIRCUITS	4 TOTAL
BRANCH CIRCUIT OCPD	50 AMPS
OUTPUT:	
MAX POWER	15600 WATTS
NOM. VOLTAGE	240 VOLTS
BUS RATING	125 AMPS
MAIN BREAKER Y/N	NO
ENCL. RATING	NEMA TYPE 3R
UL LIST. (Y/N)	YES

JUNCTION BOX					
MAKE	SOLADECK				
PROTECT. RATING	NEMA TYPE 3R				
UL LIST. (Y/N)	YES				

MD PANEL (EXISTING)		
MAKE	WESTINGHOUSE	
MODEL	B20 2040OG	
ENCL. RATING	NEMA TYPE 1	
VOLT. RATING	240	
BUS RATING	200 AMPS	
UL LIST. (Y/N)	YES	
MAIN BREAKER (Y/N)	YES	
MAIN BREAKER RATING	200 AMPS	

- BACK-FEED SOLAR OUTPUT VIA 20A BREAKER . AT THE OPPOSITE END OF THE BUS BAR FROM EXISTING POWER SOURCE
- MAIN BREAKER SERVES AS SERVICE DISCONNECT SWITCH
- USE QUAD/TWIN BREAKERS AS NEEDED TO CREATE SPACE FOR PV BREAKER

TWISTED PAIR CT CONDUCTORS **PV COMBINER PANEL** MD PANEL JUNCTION BOX 200A AC DISCONNECT М 11 PV MODULES W/ MICROINVERTERS L1 XC 20A 20A L2 L2 12 Ν Ν N N N EGC EGC EGC GND -GND GND GND (3) (4) Ċ3 Ċ3 Ċ1 Ċ2

DC / AC INVERTER			
MAKE	ENPHASE		
MODEL	IQ8PLUS-72-2-US		
DC INPUT:			
POWER RANGE (WATTS)	235-440		
MIN/MAX START VOLT.	30 / 58		
OPERATING VOLT. RANGE	25-58		
MAX. CURRENT	15 AMPS		
MODULE COMPATIBILITY	60 & 72 CELL		
AC OUTPUT:			
CEC EFFICIENCY	1 WATTS		
NOM. POWER	290 WATTS		
NOM. VOLT.	211-240-264		
MAX. CURR.	1.21 AMPS		
DC DISC. (Y/N)	NO		
RAPID SHUTDOWN (Y/N)	YES		
PROTECT. RATING	NEMA TYPE 6		
UL LIST. (Y/N)	YES		
MAX BRANCH CIRCUIT	YES		

AC DISCONNECT

MAKE	GENERIC
MODEL	NA
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
AMP RATING	30 AMPS
UL LIST. (Y/N)	YES
FUSED (Y/N)	NO
FUSE RATING	N/A

- LOAD-BREAK RATED
- VISIBLE OPEN ٠
- LOCKABLE IN OPEN POSITION ٠
- INSTALL ADJACENT TO METER ٠
- DISCONNECT TO BE READILY ACCESSIBLE . TO UTILITY COMPANY PERSONNEL AT ALL TIMES

UTILITY METER







CONSTRUCTION NOTES

ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH THE NEC, STATE,

FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS, BEST

ENSURE REQUIRED MAINTENANCE ACCESS AND CLEARANCES ARE

WIRES SHALL BE RATED AND LABELED "SUNLIGHT RESISTANT" WHERE EXPOSED TO AMBIENT CONDITIONS.

FUSES 0 - 600 AMPS SHALL BE UL CLASS "RK-1" LOW PEAK DUAL ELEMENT TIME DELAY WITH 200,000 AMPERE INTERRUPTING RATING AS MANUFACTURED BY BUSSMANN, UNLESS NOTED OTHERWISE. ALL TERMINALS/LUGS SHALL BE 75° RATED. ALL TERMINALS, SPLICING CONNECTORS, LUGS, ETC SHALL BE IDENTIFIED FOR USE WITH THE MATERIAL (CU/AL) OF THE CONDUCTOR AND SHALL BE PROPERLY

PROVIDE A PULLWIRE IN ALL EMPTY CONDUITS.

ALL PENETRATIONS THROUGH EXTERIOR ROOFS SHALL BE FLASHED IN A

ALL PENETRATIONS THROUGH ATTIC FIRE BARRIERS SHALL BE SEALED WITH FIRE-BARRIER SEALANT CAULK.

10. SUPPORT ALL CONDUIT AND EQUIPMENT IN ACCORDANCE W/ NEC. ANY SUSPENDED MATERIALS SHALL BE DIRECTLY SUPPORTED BY THE

11. METAL CONDUIT COUPLINGS CAN BE COMPRESSION TYPE, THREADED, OR BE SET-SCREW TYPE. PLASTIC CONDUIT COUPLINGS TO BE SOCKET

12. A COMPLETE GROUNDING SYSTEM SHALL BE PRESENT OR PROVIDED AND INSTALLED IN ACCORDANCE WITH ARTICLE 250 OF THE NEC, AND

13. EACH ELECTRICAL APPLIANCE SHALL BE PROVIDED WITH A NAMEPLATE GIVING THE IDENTIFYING NAME AND THE RATING IN VOLTS AND AMPERES, OR VOLTS AND WATTS. IF THE APPLIANCE IS TO BE USED ON A SPECIFIC FREQUENCY OR FREQUENCIES, IT SHALL BE SO MARKED. WHERE MOTOR OVERLOAD PROTECTION EXTERNAL TO THE APPLIANCES IS REQUIRED, THE APPLIANCE SHALL BE SO MARKED.

14. WHERE APPLICABLE, GROUNDING ELECTRODE CONDUCTOR TO BE CONTINUOUS. GROUNDING CRIMPS TO BE IRREVERSIBLE. 15. PHOTOVOLTAIC SYSTEMS SHALL BE PERMANENTLY MARKED AT VARIOUS EQUIPMENT LOCATIONS TO IDENTIFY THAT A PHOTOVOLTAIC SYSTEM IS INSTALLED AND THAT VARIOUS DANGERS ARE PRESENT.

16. EACH PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS SHALL BE PERMANENTLY MARKED TO IDENTIFY IT AS A PHOTOVOLTAIC SYSTEM

17. WHERE ALL TERMINALS OF A DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION, A WARNING SIGN SHALL BE MOUNTED ON OR ADJACENT TO THE DISCONNECT.

18. A PERMANENT LABEL FOR THE DIRECT-CURRENT PHOTOVOLTAIC POWER SOURCE SHALL BE PROVIDED AT THE DC DISCONNECT MEANS.

19. A PERMANENT PLAQUE OR DIRECTORY, DENOTING ALL ELECTRIC POWER SOURCES SERVING THE PREMISES. SHALL BE INSTALLED AT EACH SERVICE EQUIPMENT LOCATION AND AT LOCATIONS OF ALL POWER

20. ALL MODULE GROUND CONNECTIONS SHALL BE MADE IN ACCORDANCE

21. A NORTH CAROLINA REGISTERED DESIGN PROFESSIONAL WILL BE REQUIRED TO SEAL THE STRUCTURAL DESIGN AT THE TIME OF PERMIT APPLICATION IF ANY OF THE FOLLOWING EXIST AND ARE ATTESTED TO

I. THE WEIGHT OF THE PV SYSTEM EXCEEDS THREE (3) POUNDS PER

II. THE ROOF POSSESSES MORE THAN ONE (1) LAYER OF ASPHALT

III. THE ROOFING MATERIAL CONSISTS OF A TYPE OTHER THAN ASPHALT SHINGLES OR METAL

IV. THE ROOF IS LOCATED IN A 140 MPH OR GREATER WIND ZONE













Cut Sheet

XR10[®] Rail

Clear Part	Black Part	Description / Length	Material	Weight	
Number	Number	,			
XR-10-132A	XR-10-132B	XR10, Rail 132'' (11 Feet)	4000 Sarias	4.67 lbs.	
XR-10-168A	XR-10-168B	XR10, Rail 168" (14 Feet)	Aluminum	5.95 lbs.	
XR-10-204A	XR-10-204B	XR10, Rail 204'' (17 Feet)	AIOTHITIOTT	7.22 lbs.	

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XR Rail[®] Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails[®] are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails[®] is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs

XR Rails[®] are compatible with FlashFoot[®] and other pitched roof attachments.

IronRidge[®] offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails[®] are made of 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.

XR Rail[®] Family

The XR Rail[®] Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail[®] to match.

XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 6 feet, while remaining light and economical.

- 6' spanning capability
- · Moderate load capability
- Clear & black anodized finish
- Internal splices available

XR100

XR100 is a residential and commercial mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 10 feet.

- · 10' spanning capability
- Heavy load capability
- · Clear & black anodized finish
- Internal splices available

XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans up to 12 feet for commercial applications.

- · 12' spanning capability
- · Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

The table below was prepared in compliance with applicable engineering codes and standards.* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

Lo	ad	Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
	90						
Nana	120						
none	140	XR10		XR100		XR1000	
	160						
	90						
00	120						
20	140						
	160						
20	90						
30	160						
40	90						
40	160						
80	160						
120	160						

*Table is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.

SOLAR'S MOST TRUSTED

PREMIUM FULL BLACK MONO N-TYPE SOLAR PANELS

MONO N-TYPE: THE MOST EFFICIENT C-SI TECHNOLOGY

SUPER-STRONG FRAME UP TO 7000 PA SNOW LOAD

NO LIGHT INDUCED DEGRADATION

FLEXIBLE INSTALLATION OPTIONS

FEATURING REC'S PIONEERING TWIN DESIGN

BIFACIAL CELLS CAN PRODUCE ENERGY FROM BOTH SIDES

REC N-PEAK 3 BLACK SERIES PRODUCT SPECIFICATIONS

GENERAL DATA	
Cell type:	132 half-cut mono c-Si n-type cells 6 strings of 22 cells in series
Glass:	0.13 in solar glass with anti-reflective surface treatment in accordance with EN12150
Backsheet:	Highly resistant polymer (black)
Frame:	Anodized aluminum (black) with silver support bars
Junction box:	3-part, 3 bypass diodes, lead-free IP68 rated, in accordance with IEC 62790
Connectors:	Stäubli MC4 PV-KBT4/KST4 (4 mm²) in accordance with IEC 62852, IP68 only when connected
Cable:	12 AWG (4 mm²) PV wire, 47.2+ 47.2 in in accordance with EN 50618
Dimensions:	74.8 x 40.9 x 1.2 in (19.7 sq-ft)
Weight:	47.0 lbs
Origin:	Made in Singapore

ELECTRICAL DATA	Product Code*: I	RECxxxNP3 Black
Power Output - P _{MAX} (Wp)	390	400
Watt Class Sorting - (W)	0/+10	0/+10
Nominal Power Voltage - $V_{_{MPP}}(V)$	36.8	37.6
Nominal Power Current - I _{MPP} (A)	10.60	10.64
Open Circuit Voltage - V _{oc} (V)	44.8	45.0
Short Circuit Current - I _{sc} (A)	11.31	11.39
Panel Efficiency (%)	19.8	20.3
Power Output - P _{MAX} (Wp)	295	302
Nominal Power Voltage - $V_{_{MPP}}(V)$	34.4	35.2
Nominal Power Current - I _{MPP} (A)	8.56	8.59
Open Circuit Voltage - V _{oc} (V)	41.9	42.1
Short Circuit Current - I _{sc} (A)	9.13	9.20

Values at standard test conditions (STC: air mass AM 1.5, irradiance 10.75 W/sq ft (1000 W/m²), temperature 77°F (25°C), based on a production spread with a tolerance of $P_{MAW} V_{oc} \& I_{sc} \pm 3\%$ within one watt class. Nominal module operating temperature (NMOT: air mass AM 1.5, irradiance 800 W/m², temperature 68°F (20°C), windspeed 3.3 ft/s (1 m/s). *Where xxx indicates the nominal power class (P_{MAW}) at STC above.

MAXIMUM RATINGS	
Operational temperature:	-40+185°F
Maximum system voltage:	1000 V
Maximum test load (front):	+ 7000 Pa (146 lbs/sq-ft)*
Maximum test load (rear):	- 4000 Pa (83.5 lbs/sq-ft)*
Max series fuse rating:	25 A
Max reverse current:	25 A
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*See installation manual for mounting instructions. Design load = Test load / 1.5 (safety factor)

Available from:

STC

NMOT

-	

	Standard	REC	ProTrust	
Installed by an REC Certified Solar Professional	No	Yes	Yes	
System Size	All	≤25 kW	25-500 kW	
Product Warranty (yrs)	20	25	25	
Power Warranty (yrs)	25	25	25	
Labor Warranty (yrs)	0	25	10	
Power in Year 1	98%	98%	98%	
Annual Degradation	0.25%	0.25%	0.25%	
Power in Year 25	92%	92%	92%	
See warranty documents for details. Conditions apply				

CERTIFICATIONS (F				
IEC 61215:2016, IEC 61730:2016, UL 61730				
IEC 62804	PID			
IEC 61701	Salt Mist			
IEC 62716	Ammonia Resistance			
UL 61730	Fire Type Class 2			
IEC 62782	Dynamic Mechanical Load			
IEC 61215-2:2016	Hailstone (1.37in)			
ISO 14001, ISO 9001, IEC 45001, IEC 62941				

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TEMPERATORE RATINGS				
Nominal Module Operating Temperature:	44.3°C (±2°C)			
Temperature coefficient of P _{MAX} :	-0.34 %/°C			
Temperature coefficient of V _{oc} :	-0.26 %/°C			
Temperature coefficient of I _{sc} :	0.04 %/°C			
*The temperature coefficients stated are linear values				

DELIVERY INFORMATION	
Panels per pallet:	33
Panels per 40 ft GP/high cube container:	792 (24 pallets)
Panels per 53 ft truck:	TBD

LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC:

Ref:

Founded in 1996, REC Group is an international pioneering solar energy company dedicated to empowering consumers with clean, affordable solar power. As Solar's Most Trusted, REC is committed to high quality, innovation, and a low carbon footprint in the solar materials and solar panels it manufactures. Headquartered in Norway with operational headquarters in Singapore, REC also has regional hubs in North America, Europe, and Asia-Pacific.

