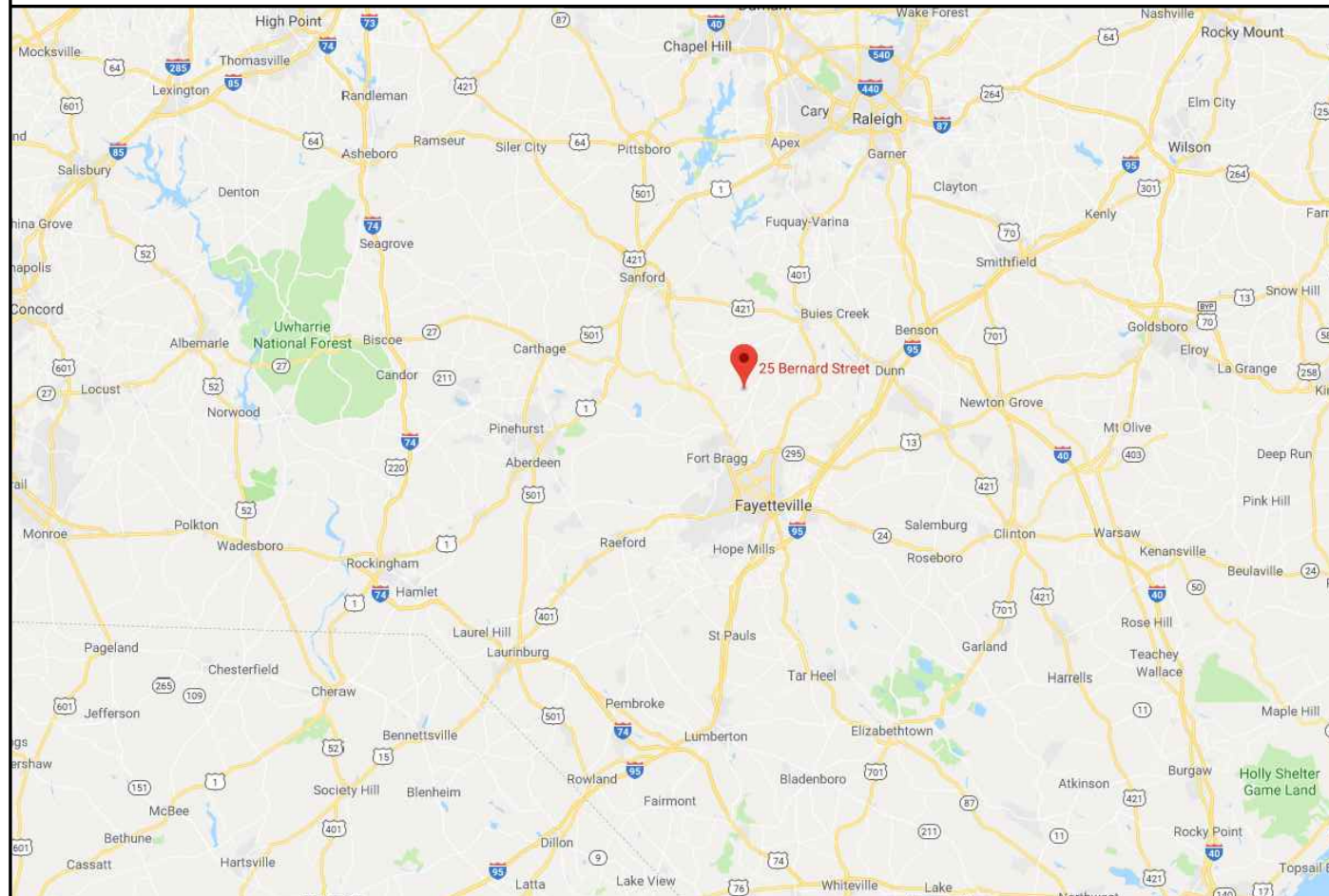


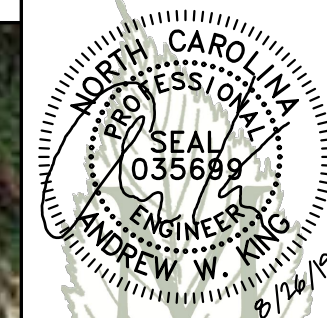
## VICINITY MAP



## PROPERTY MAP



ENGINEER:



**MODEL ENERGY**

300 FAYETTEVILLE ST.  
#1430  
RALEIGH, NC 27602  
919-274-9905  
MODELENERGY.COM

P-1194

JOB TITLE:

**NEW SOLAR PV SYSTEM**  
3.78 kW DC INPUT  
3.80 kW AC EXPORT

**George Jackobs**  
25 Bernard Street  
Spring Lake, NC 28390

CLIENT:



ISSUED FOR:	DATE:
CONSTRUCTION	08/23/19

PROJECT INFORMATION

# PV1.1

## CONSTRUCTION NOTES

- ALL WORK AND EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST NATIONAL, STATE, AND LOCAL CODES AND ORDINANCES
- FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS, BEST PRACTICES, AND SPECIFICATIONS
- WIRES SHALL BE RATED AND LABELED "SUNLIGHT RESISTANT" WHERE EXPOSED TO AMBIENT CONDITIONS
- THE PHOTOVOLTAIC SYSTEM SHALL NOT EXCEED 600 VOLTS OR 800 AMPS
- 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
- WHERE APPLICABLE, GROUNDING ELECTRODE CONDUCTOR TO BE CONTINUOUS. GROUNDING CRIMPS TO BE IRREVERSIBLE
- GROUNDING DC PHOTOVOLTAIC ARRAYS SHALL BE PROVIDED WITH DC GROUND-FAULT PROTECTION THAT MEETS THE REQUIREMENTS OF NEC SECTION 690.5. UNGROUNDED DC PHOTOVOLTAIC ARRAYS SHALL COMPLY WITH NEC SECTION 690.35
- IN ONE- AND TWO-FAMILY DWELLINGS, LIVE PARTS IN PHOTOVOLTAIC SOURCE CIRCUITS AND PHOTOVOLTAIC OUTPUT CIRCUITS OVER 150 VOLTS TO GROUND, SHALL ONLY BE ACCESSIBLE TO QUALIFIED PERSONS WHILE ENERGIZED.
- PHOTOVOLTAIC SYSTEMS SHALL BE PERMANENTLY MARKED AT VARIOUS EQUIPMENT LOCATIONS TO IDENTIFY THAT A PHOTOVOLTAIC SYSTEM IS INSTALLED AND THAT VARIOUS DANGERS ARE PRESENT.
- EACH PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS SHALL BE PERMANENTLY MARKED TO IDENTIFY IT AS A PHOTOVOLTAIC SYSTEM DISCONNECT
- 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
- A PERMANENT LABEL FOR THE DIRECT-CURRENT PHOTOVOLTAIC POWER SOURCE SHALL BE PROVIDED BY THE INSTALLED AT THE DC DISCONNECT MEANS
- 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 PRODUCTION SOURCES.
- A PERMANENT PLAQUE OR DIRECTORY SHALL BE PROVIDED DENOTING THE LOCATIONS OF THE SERVICE DISCONNECT MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECT MEANS IF THEY ARE NOT LOCATED AT THE SAME LOCATION.
- ALL MODULE GROUND CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH NEC SECTION 690.4 (C)

## ABBREVIATIONS

A	AMPERE
AC	ALTERNATING CURRENT
DC	DIRECT CURRENT
EGC	EQUIPMENT GROUNDING CONDUCTOR
EMT	ELECTRICAL METAL TUBING
GALV	GALVANIZED
GEC	GROUNDING ELECTRODE CONDUCTOR
GND	GROUND
I	CURRENT
IMP	CURRENT AT MAXIMUM POWER
ISC	SHORT-CIRCUIT CURRENT
KVA	KILOVOLT AMPERE
KW	KILOWATT
MAX	MAXIMUM
MIN	MINIMUM
MCB	MAIN CIRCUIT BREAKER
MLO	MAIN LUG ONLY
NOM	NOMINAL
NTS	NOT TO SCALE
P <sub>NOM</sub>	NOMINAL POWER
PV	PHOTOVOLTAIC
PVC	POLYVINYL CHLORIDE
SN	SOLAR NOON
STC	STANDARD TEST CONDITIONS
TYP	TYPICAL
V	VOLT
V <sub>MP</sub>	VOLTAGE AT MAXIMUM POWER
V <sub>oc</sub>	OPEN-CIRCUIT VOLTAGE
W	WATT

## CODE REFERENCES

2017 NATIONAL ELECTRIC CODE  
2018 NORTH CAROLINA BUILDING CODE  
2018 NORTH CAROLINA RESIDENTIAL CODE  
2018 NORTH CAROLINA FIRE CODE

## SHEET INDEX

PV1.1 - PROJECT INFORMATION  
PV2.1 - SITE & STRUCTURAL INFORMATION  
PV3.1 - ELECTRICAL INFORMATION  
PV4.1 - EQUIPMENT LABELS

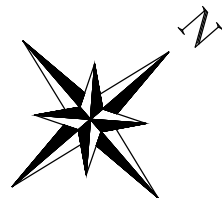
## SITE CONDITIONS

ASCE 7-10 WIND SPEED - 115 MPH  
EXPOSURE CATEGORY - B  
RISK CATEGORY - II

## LEGEND

	DISCONNECT SWITCH
	FUSE
	CIRCUIT BREAKER
	EQUIP. GROUND





ROOF MOUNT & FASTENER	
ROOF MOUNT:	
MAKE	SOLAR ROOF HOOK
MODEL	L-FOOT
MATERIAL	ALUMINUM
FASTENER	
MAKE	SOLAR ROOF HOOK
MODEL	QUICKBOLT
MATERIAL	304 SS
SIZE	5/16-18 X 5.25"
GENERAL	
WEIGHT	1 LBS
FASTENERS PER MOUNT	1
MAX. PULL-OUT FORCE	960 LBS. / MOUNT
SAFETY FACTOR	2.0
DESIGN PULL-OUT FORCE	480 LBS. / MOUNT

ARRAY SUMMARY	
# MODULES	12
MOD. ATT. MID	14
MOD. ATT. END	20
ROOF MOUNTS	35
RAIL LENGTH	138 FT.
ARRAY AREA	217 sqft.
ARRAY WEIGHT	640 LBS.
AZIMUTH @ SN	221°
TILT ANGLE	32°

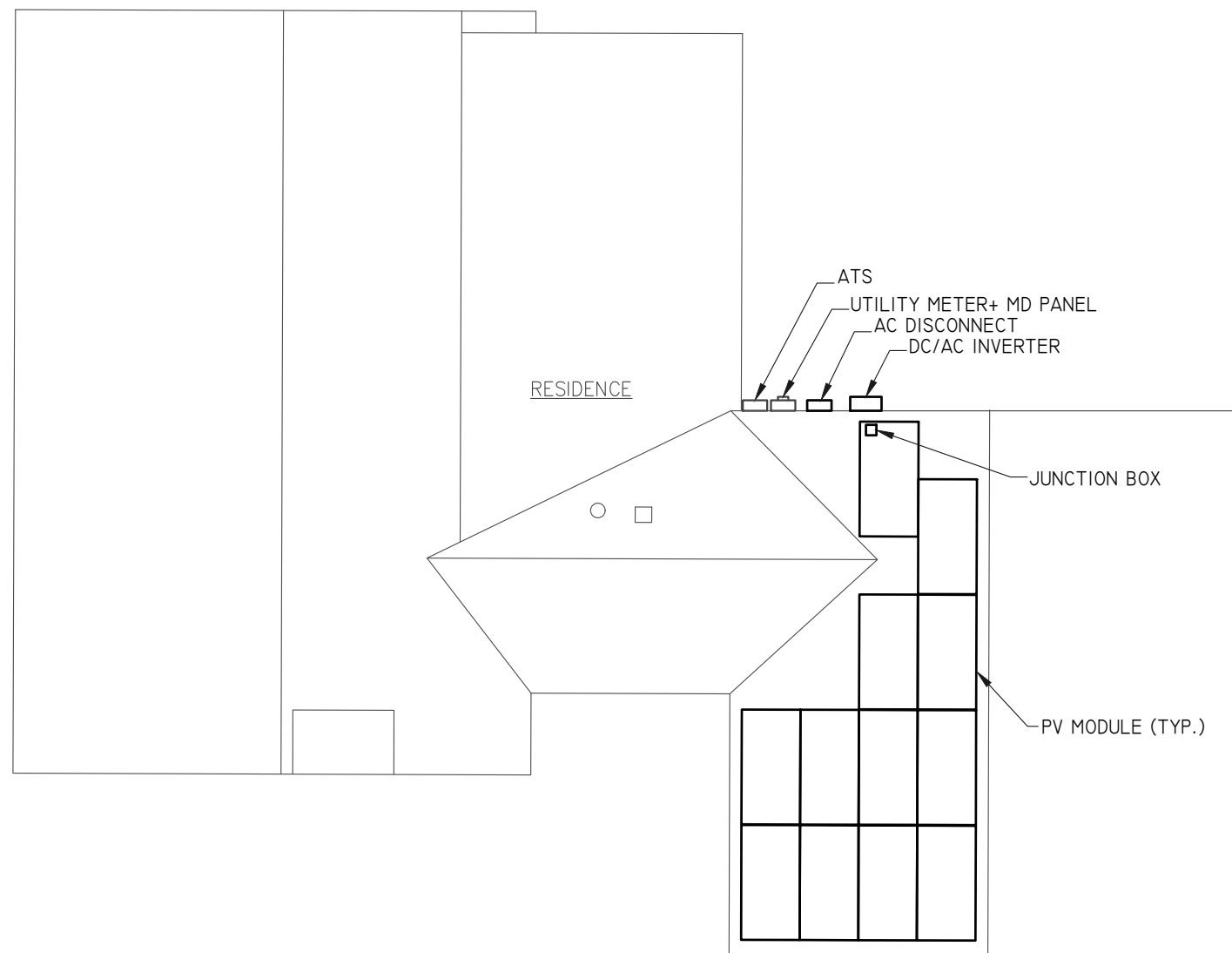
ROOF SUMMARY	
STRUCTURE:	
TYPE	RAFTERS
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 8"
SPACING	24" o.c.
EFF. SPAN	12'-4"
PITCH	7 / 12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	7/16"
WEIGHT	1.6 LBS./sqft.
ROOFING:	
TYPE	ARCH SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.3 LBS./sqft.

PV MODULES	
MAKE	REC
MODEL	REC315NP
WIDTH	39.3"
LENGTH	66.0"
THICKNESS	1.2"
WEIGHT	39.7 LBS

MOUNTING RAILS	
MAKE	IRONRIDGE
MODEL	XR10
MATERIAL	ALUMINUM
WEIGHT	1.25 LBS./sqft.
SPACING	34 IN.


ROOF LOADING	
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	-24.6 LBS./sqft.
UPLIFT ZONE 2	-29.0 LBS./sqft.
UPLIFT ZONE 3	-29.0 LBS./sqft.
DOWNWARD	23.0 LBS./sqft.
FASTENER LOAD:	
UPLIFT ZONE 1	-242 LBS.
UPLIFT ZONE 2	-190 LBS.
UPLIFT ZONE 3	-95 LBS.
DOWNWARD	226 LBS.

ROOF ZONES:	
ALL ZONES	MAX. OVERHANG = 16"
ZONE 1	MAX. FASTENER SPAN ZONE 1 = 72"
ZONE 2	MAX. FASTENER SPAN ZONE 2 = 48"
ZONE 3	MAX. FASTENER SPAN ZONE 3 = 24"



**STATEMENT OF STRUCTURAL COMPLIANCE**


THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PURPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING ARRANGEMENT DETAILED WITHIN THESE DRAWINGS.

SIGNED: 

NAME: ANDREW W. KING, PE

TITLE: PROFESSIONAL ENGINEER

ENGINEER:




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SITE & STRUCTURAL INFORMATION

**PV2.1**

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PV MODULES	
MAKE	REC
MODEL	REC315NP
TECHNOLOGY	MONO-CRYST.
NOM. POWER (P <sub>nom</sub> )	315 WATTS
NOM. VOLT. (V <sub>mp</sub> )	33.9 VOLTS
O.C. VOLT. (V <sub>oc</sub> )	40.5 VOLTS
MAX. SYS. VOLT.	1000 V (UL)
TEMP. COEF. (V <sub>tc</sub> )	-0.27 %/°C
NOM. CURR. (I <sub>mp</sub> )	9.31 AMPS
S.C. CURR. (I <sub>sc</sub> )	10.09 AMPS
MAX. SERIES FUSE	25 AMPS

DC/AC INVERTER	
MAKE	SOLAREEDGE
MODEL	SE3800H-US
TECHNOLOGY	TRANS-LESS
DC INPUT:	
MAX. POWER	5900 WATTS
MAX. VOLT	480 VOLTS
NOM. VOLT.	380 VOLTS
MAX. CURRENT	10.5 AMPS
MAX. SCC	45 AMPS
STRINGS INPUTS	2 STRINGS
AC OUTPUT:	
RATED POWER	3800 WATTS
MAX. POWER	3800 WATTS
NOM. VOLT.	240 VOLTS
MAX. CURR.	16 AMPS
GFP (Y/N)	YES
RPP (Y/N)	YES
GFCI (Y/N)	YES
AFCI (Y/N)	YES
DC DISC. (Y/N)	YES
RAPID SHUTDOWN	AUTOMATIC
FUSE RATING	15 AMPS
PROTECT. RATING	NEMA 4X

MODULE OPTIMIZER	
MAKE	SOLAREEDGE
MODEL	P320
DC INPUT:	
RATED POWER	320 WATTS
VOLT. RANGE	8-48
MAX. SCC	11.0 AMPS
MAX. DC INPUT CURRENT	13.75 AMPS
DC OUTPUT:	
MAX. CURRENT	15 AMPS
MAX. VOLT.	60 VOLTS
MAX. SYSTEM VOLT.	1000 VOLTS
MIN. STRING	8 OPTIMIZERS
MAX. STRING	25 OPTIMIZERS
MAX. POWER	
INVERTERS: SE3000H-SE6000H	5700 WATTS
INVERTERS: SE7600H-SE10000H	6000 WATTS

JUNCTION BOX	
MAKE	SOLADECK
MODEL	0783-3R
PRO. RATING	NEMA 3R
VOLT. RATING	600 VOLTS
AMP RATING	120 AMPS
UL LISTING	UL 50

CONDUCTOR SCHEDULE													
TAG	CURRENT CARRYING CONDUCTORS				GROUNDING CONDUCTORS				CONDUIT/RACEWAY				NOTES
	QTY.	SIZE	MATERIAL	INSULATION	QTY.	SIZE	MATERIAL	INSULATION	QTY.	SIZE	MATERIAL	LOCATION	
C1	2	10 AWG	COPPER	PV WIRE	1	6 AWG	COPPER	PV WIRE	-	-	-	FREE AIR	1
C2	2	10 AWG	COPPER	THWN-2	1	10 AWG	COPPER	THWN-2	1	1/2"	FMC/EMT/MC	EXT/INT	2,4
C3	3	12 AWG	COPPER	THWN	1	12 AWG	COPPER	THWN	1	1/2"	NOTE 5	EXT	2,4,5
XC	-	-	-	-	-	-	-	-	-	-	-	-	3

NOTES:

1. MANUFACTURER PROVIDED, UL LISTED WIRING HARNESS FOR USE ON EXPOSED ROOFS
2. CONDUIT SIZE SHOWN IS CODE MINIMUM. LARGER SIZES ARE ALLOWED
3. EXISTING CONDUCTORS, FIELD VERIFY
4. EQUIPMENT TERMINAL RATING SHALL BE A MINIMUM OF 75°C AT BOTH END OF CONDUCTOR
5. PVC, EMT, ROMEX, LFNMC & FMC ARE ACCEPTABLE WHEN USED IN ACCORDANCE WITH ARTICLES 330, 334, 348, 350, 352, 356, & 358 OF THE 2017 NEC

AC DISCONNECT	
MAKE	GENERIC
MODEL	N/A
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
AMP RATING	30 AMPS
UL LIST. (Y/N)	YES
FUSED (Y/N)	YES
FUSE RATING	20 AMPS

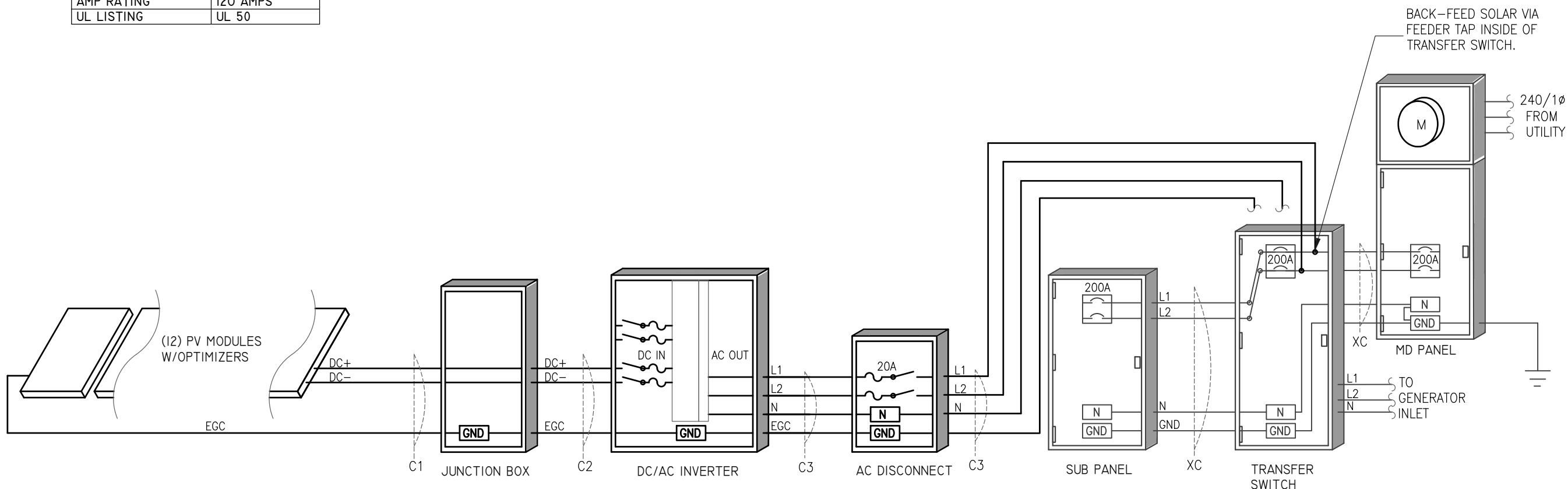
SUB PANEL (EXISTING)	
MAKE	SQUARE D
MODEL	HOMC42UC
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
BUS RATING	225 AMPS
UL LIST. (Y/N)	YES
MAIN BREAKER (Y/N)	YES
BREAKER RATING	200 AMPS

MD PANEL (EXISTING)	
MAKE	SQUARE D
MODEL	RC816F200C
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
BUS RATING	200 AMPS
UL LIST. (Y/N)	YES
MAIN BREAKER (Y/N)	YES
BREAKER RATING	200 AMPS

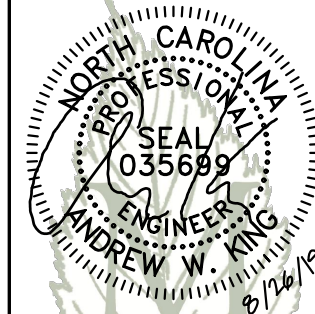
NOTES:

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

TRANSFER SWITCH	
MAKE	GENERAC
MODEL	N/A
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
BUS RATING	200 AMPS
UL LIST. (Y/N)	YES
MAIN BREAKER (Y/N)	YES
BREAKER RATING	200 AMPS



ENGINEER:



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ELECTRICAL INFORMATION

**PV3.1**

**! WARNING**

ELECTRIC SHOCK HAZARD  
TERMINALS ON THE LINE AND  
LOAD SIDES MAY BE ENERGIZED  
IN THE OPEN POSITION

NEC 690.13 (B)  
PLACE ON PV SYSTEM DISCONNECTING MEANS.

**! WARNING**

POWER SOURCE  
OUTPUT CONNECTION  
DO NOT RELOCATE THIS  
OVERCURRENT DEVICE

NEC 705.12 (B)(2)(3)(b)  
PLACE ADJACENT TO BACK-FED BREAKER

**! WARNING**

DUAL POWER SUPPLY  
SOURCES: UTILITY GRID AND  
PV SOLAR ELECTRIC SYSTEM

NEC 705.12 (B)(3)  
PLACE ON ALL EQUIPMENT THAT IS SUPPLIED  
BY BOTH POWER SOURCES

**RAPID SHUTDOWN  
SWITCH FOR  
SOLAR PV SYSTEM**

NEC 690.56 (C)(3)  
PLACE ON RAPID SHUTDOWN SWITCH OR EQUIPMENT  
WITH INTEGRATED RAPID SHUTDOWN \*REFLECTIVE\*

PHOTOVOLTAIC POWER SOURCE

OPERATING AC VOLTAGE 240 V

MAXIMUM OPERATING  
AC OUTPUT CURRENT 16.0 A

NEC 690.54  
PLACE ON INTERCONNECTION  
DISCONNECTING MEANS

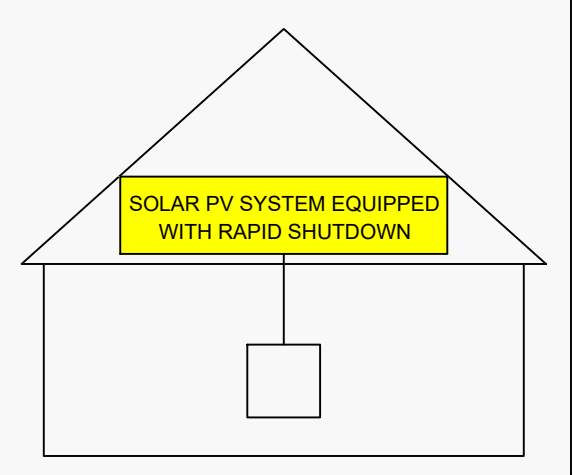
DIRECT CURRENT  
PHOTOVOLTAIC POWER SOURCE

MAXIMUM VOLTAGE 600 VDC  
MAX CIRCUIT CURRENT 15.0 AMPS

NEC 690.53  
PLACE ON ALL DC DISCONNECTING MEANS

**SOLAR PV SYSTEM EQUIPPED  
WITH RAPID SHUTDOWN**

TURN RAPID SHUTDOWN  
SWITCH TO THE  
"OFF" POSITION TO  
SHUT DOWN PV SYSTEM  
AND REDUCE  
SHOCK HAZARD  
IN THE ARRAY



NEC 690.56 (C)(1)(a)  
PLACE WITHIN 3FT OF SERVICE DISCONNECTING MEANS TO  
WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL  
INDICATE THE LOCATIONS OF RAPID SHUTDOWN SWITCHES

**WARNING: PHOTOVOLTAIC  
POWER SOURCE**

NEC 690.31 (G)(3)&(4)  
PLACE ON ALL JUNCTION BOXES, EXPOSED RACEWAYS, AND OTHER  
WIRING METHODS EVERY 10' AND ON EVERY SECTION SEPARATED BY  
ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.

**PV SYSTEM  
DISCONNECT**

NEC 690.13 (B)  
PLACE ON PV SYSTEM DISCONNECTING MEANS.

*EQUIPMENT LABEL NOTES*

- LABELS SHOWN ARE THEIR ACTUAL  
REQUIRED SIZE.
- LABEL MATERIAL SHALL BE SUITABLE FOR  
THE EQUIPMENT ENVIRONMENT.
- CONDUIT SHALL BE MARKED WITH  
REQUIRED LABEL EVERY 10 FEET.

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EQUIPMENT  
LABELS

**PV4.1**

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