

76 North Meadowbrook Drive Alpine, UT 84004 office (201) 874-3483 swyssling@wysslingconsulting.com

May 29, 2025

Southern Energy Management 5908 Triangle Drive, Raleigh, NC, 27617



Re: Engineering Services Szabo Residence 213 Windswept Way, Fuquay-Varina NC 12.880 kW System

To Whom It May Concern:

We have received information regarding solar panel installation on the roof of the above referenced structure. Our evaluation of the structure is to verify the existing capacity of the roof system and its ability to support the additional loads imposed by the proposed solar system.

A. Site Assessment Information

- Site visit documentation identifying attic information including size and spacing of framing for the existing roof structure.
- Design drawings of the proposed system including a site plan, roof plan and connection details for the solar panels. This information will be utilized for approval and construction of the proposed system.

B. Description of Structure:

Roof Framing: Prefabricated wood trusses at 24" on center. The top chord truss members

are constructed of 2x6 dimensional lumber and all other members of 2x4

dimensional lumber.

Roof Material: Composite Asphalt Shingles

Roof Slopes: 27 degrees
Attic Access: Accessible
Foundation: Permanent

C. Loading Criteria Used

- Dead Load
 - Existing Roofing and framing = 7 psf
 - New Solar Panels and Racking = 3 psf
 - o TOTAL = 10 PSF
- Live Load = 20 psf (reducible) 0 psf at locations of solar panels
- Ground Snow Load = 15 psf
- Wind Load based on ASCE 7-10
 - Ultimate Wind Speed = 116 mph (based on Risk Category II)
 - Exposure Category C

Analysis performed of the existing roof structure utilizing the above loading criteria is in accordance with the 2018 North Carolina Residential Code. This analysis indicates that the existing framing will support the additional panel loading without damage, if installed correctly.

D. Solar Panel Anchorage

- 1. The solar panels shall be mounted in accordance with the most recent IronRidge installation manual. If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation.
- 2. The maximum allowable withdrawal force for a #14 lag screw is 194 lbs per inch of penetration as identified in the National Design Standards (NDS) of timber construction specifications. Based on two screws with a minimum penetration depth of 2", the allowable capacity per connection is greater than the design withdrawal force (demand). Considering the variable factors for the existing roof framing and installation tolerances, the connection using two #14 lag screw with a minimum of 2" embedment will be adequate and will include a sufficient factor of safety.
- 3. Considering the wind speed, roof slopes, size and spacing of framing members, and condition of the roof, the panel supports shall be placed no greater than 48" on center.

Based on the above evaluation, this office certifies that with the racking and mounting specified, the existing roof system will adequately support the additional loading imposed by the solar system. This evaluation is in conformance with the 2018 North Carolina Residential Code, current industry standards and practice, and is based on information supplied to us at the time of this report.

Should you have any questions regarding the above or if you require further information do not hesitate to contact me.

Leve Ph.

North Carolina License No. 46546 North Carolina Firm No. P-2308



Wyssling Consulting, PLLC 76 N Meadowbrook Drive Alpine UT 84004 North Carolina COA # P-2308

Signed 5/29/2025

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PHOTOVOLTAIC ROOF MOUNT SYSTEM 12.880kWDC.11.500kWAC 13.500kWh ENERGY STORAGE SYSTEM 213 WINDSWEPT WAY, FUQUAY-VARINA, NC 27526

AHJ:

TOWN OF FUQUAY-VARINA

UTILITY:

DUKE ENERGY PROGRESS

GOVERNING CODES WITH NC AMENDMENTS: (N) (1) 200A/175A NON SECURE PANEL

2018 NORTH CAROLINA BUILDING CODE 2018 NORTH CAROLINA RESIDENTIAL CODE 2018 NORTH CAROLINA FIRE CODE 2017 NORTH CAROLINA ELECTRICAL CODE

WIND SPEED:116 MPH SNOW LOAD: 15 PSF

SCOPE OF WORK

(N) 12.880kWDC.(N) 11.500kWAC ROOF MOUNTED PV SYSTEM

(N) 13.500kWh ENERGY STORAGE SYSTEM

(N) (28) REC SOLAR REC460AA PURE-RX SOLAR MODULES

(N) (16) MID-CIRCUIT INTERRUPTER

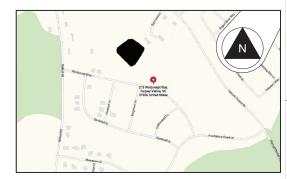
(N) (1) TESLA POWERWALL 3 - 1707000-XX-Y (240V) BATTERY

WITH INTEGRATED INVERTER

(N) (1) TESLA BACKUP SWITCH

(N) (1) ESS DISCONNECT SWITCH

VICINITY MAP



SHEET INDEX

PV-1 COVER SHEET

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PV-3 PROPERTY PLAN

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PV-5 ATTACHMENT DETAIL

PV-6 SINGLE LINE DIAGRAM

PV-7 ELECTRICAL CALC. AND NOTES

PV-8 LABELS & PLACARD

PV-9 TO PV-16 SPEC SHEETS

CONTRACTOR INFORMATION



SOUTHERN ENERGY MANAGEMENT

5908 TRIANGLE DR. RALEIGH, NC 27617

PHONE: +1 919 306 9537

LICENSE#

TYPE-ELECTRICAL

PHOTOVOLTAIC ROOF **MOUNT SYSTEM & ENERGY** STORAGE SYSTEM

12.880 kWDC, 11.500 kWAC PV SYSTEM

13.500kWh ENERGY STORAGE STEVE SZABO RESIDENCE 213 WINDSWEPT WAY.



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SCALE	NTS

COVER SHEET

PV-1

GENERAL NOTES

- 1. MODULES ARE LISTED UNDER UL 61730 / UL 1703 AND CONFORM TO THE STANDARDS.
- 2. INVERTERS ARE LISTED UNDER UL 1741 AND CONFORM TO THE STANDARDS.
- 3. DRAWINGS ARE DIAGRAMMATIC, INDICATING GENERAL ARRANGEMENT OF THE PV SYSTEM AND THE ACTUAL SITE CONDITIONS MAY VARY.
- 4. WORKING CLEARANCES AROUND THE NEW PV ELECTRICAL EQUIPMENT SHALL BE MAINTAINED IN ACCORDANCE WITH NEC 110.26.
- 5. ALL GROUND WIRING CONNECTED TO THE MAIN SERVICE GROUNDING IN MAIN SERVICE PANEL/ SERVICE
- 6. ALL CONDUCTORS SHALL BE 600V, 90°C STANDARD COPPER UNLESS OTHERWISE NOTED.
- 7. WHEN REQUIRED, A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
- 8. THE SYSTEM WILL NOT BE INTERCONNECTED BY THE CONTRACTOR UNTIL APPROVAL FROM THE UTILITY IS RECEIVED.
- 9. ROOF ACCESS POINT SHALL BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREES. WIRES OR SIGNS.
- 10. PV ARRAY COMBINER/JUNCTION BOX PROVIDES TRANSITION FROM ARRAY WIRING TO CONDUIT WIRING.
- 11. RACKING SYSTEM SHALL BE LISTED TO UL 2703.
- 12. FIRE RATING OF EXISTING ROOF ASSEMBLY SHALL BE MAINTAINED WITH ADDITION OF PHOTOVOLTAIC SYSTEM.

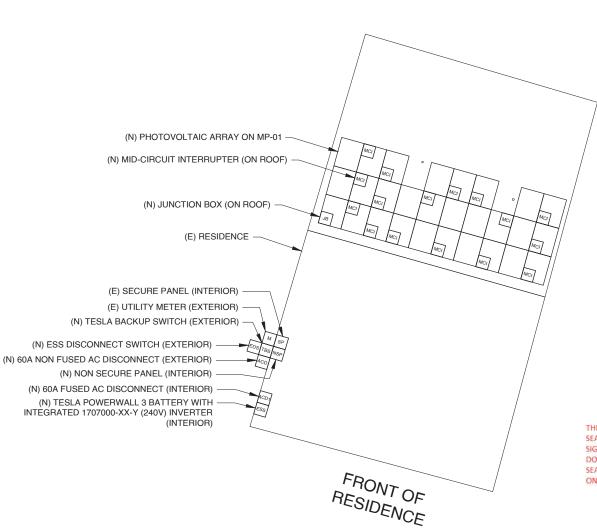
LEGEND (E) UTILITY METER М (E) 225A SECURE PANEL SP (E) 200A MAIN BREAKER (N) TESLA POWERWALL 3 -1707000-XX-Y (240V) ENERGY ESS STORAGE SYSTEM, EQUIPMENT WITH INTEGRATED INVERTER (N) 200A NON SECURE PANEL NSP (N) 175A MAIN BREAKER (N) 60A NON FUSED AC DISCONNECT ACD VISIBLY OPEN. LOCKABLE 240V NEMA-3R (N) 60A FUSED AC DISCONNECT ACD1 VISIBLY OPEN, LOCKABLE 240V NEMA-3R (N) ESS DISCONNECT SWITCH EDS (N) TESLA BACKUP SWITCH TBS (N) JUNCTION BOX



(N) 16 MID-CIRCUIT INTERRUPTER

240V, NEMA 4X (ON ROOF)

(E) ROOF OBSTRUCTIONS



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12.880 kWDC, 11.500 kWAC **PV SYSTEM**

13.500kWh **ENERGY STORAGE** STEVE SZABO RESIDENCE 213 WINDSWEPT WAY.

FUQUAY-VARINA. NC 27526



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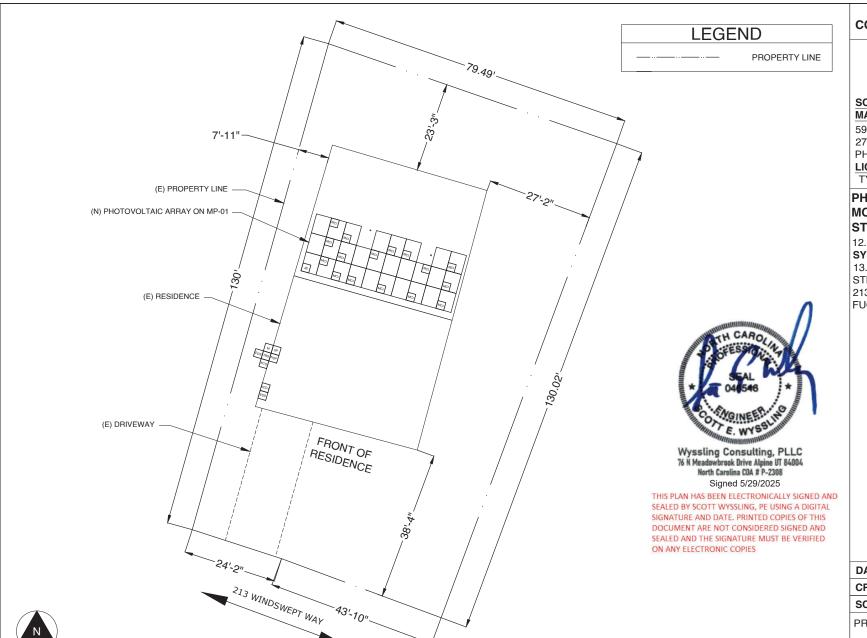
SITE PLAN

PV-2



JB

MCI



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DATE	5/24/2025		
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PROPERTY PLAN

MODULE TYPE, DIMENSION & WEIGHT

NUMBER OF MODULES = 28 MODULES
MODULE TYPE = REC SOLAR: REC460AA PURE-RX MODULES
MODULE WEIGHT = 51.2 LBS / 23.22KG
MODULE DIMENSIONS = 68.0"X 48.1" = 22.71 SF

66 ATTACHMENTS INSTALLED @ 48" O.C. MAX (TYP) TOTAL RAIL LENGTH: 224'-4" NOTE: ATTACHMENTS ARE STAGGERED.

ARRAY & ROOF AREA CALC'S						
TOTAL PV	TOTAL ROOF					
ARRAY AREA	AREA	COVERED BY				
(Sq. Ft.)	(Sq. Ft.)	ARRAY (%)				
635.99	3300.5	19.27				

ROOF DESCRIPTION							
ROOF LAYER 1 LAYER							
ROOF	ROOF # OF MODULES PITCH AZIMUTH TRUSS TRUSS SPACING ROOF TYPE						
1 28 27° 16° 2" X 6" 24" COMPOSITION SHINGLE							

М

0 48.1" **REC SOLAR** REC460AA PURE-RX MODULES

LEGEND

(E) UTILITY METER

(E) 225A SECURE PANEL (E) 200A MAIN BREAKER

(N) TESLA POWERWALL 3 -1707000-XX-Y (240V) ENERGY STORAGE SYSTEM, EQUIPMENT WITH INTEGRATED INVERTER

(N) 200A NON SECURE PANEL (N) 175A MAIN BREAKER

(N) 60A NON FUSED AC DISCONNECT VISIBLY OPEN, LOCKABLE 240V NEMA-3R

(N) 60A FUSED AC DISCONNECT VISIBLY OPEN, LOCKABLE 240V NEMA-3R

EDS (N) ESS DISCONNECT SWITCH

TBS (N) TESLA BACKUP SWITCH

JB (N) JUNCTION BOX 240V, NEMA 4X (ON ROOF)

(N) 16 MID-CIRCUIT INTERRUPTER

(N) 28 REC SOLAR REC460AA PURE-RX SOLAR MODULES

(E) ROOF OBSTRUCTIONS

(N) ROOF ATTACHMENTS

---- (E) TRUSS

MCI

(N) RAIL

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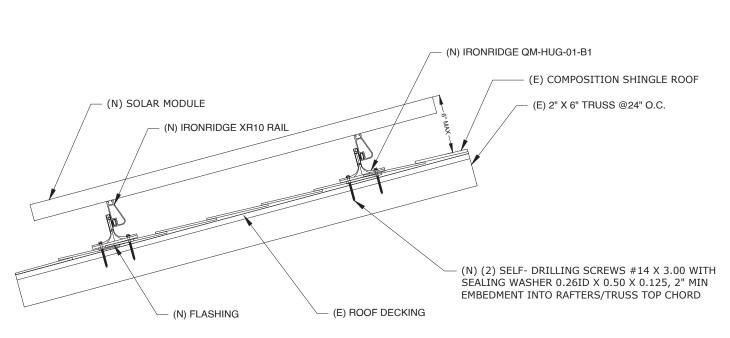


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ROOF PLAN



DEA	D LOAD CAL	COLATION	TOTAL		
ВОМ	QUANTITY LBS/UNIT ,		WEIGHT (LE	38	
MODULES	28	28 51.2			
MID-CLAMP	46	0.09	4.14		
END-CLAMP	20	0.15	3.00	TI SI	
RAIL LENGTH	224.47	224.47 0.68			
SPLICE BAR	6	3.00	D		
IRONRIDGE QM HUG	66 0.57		37.62	O	
MCI	16	4.16			
TOTAL WEIGHT OF T	1638.16				
TOTAL ARRAY AREA	635.99				
WEIGHT PER SQ. FT	2.58				
WEIGHT PER PENET	24.82				

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ATTACHMENT DETAIL

PV-5

ATTACHMENT DETAIL: SCALE: NTS

WIRE SIZE CALCULATION

MAX BRANCH DC REQUIRED CONDUCTOR AMPACITY (17)(1.25) = 21.25A

AWG #10, DERATED AMPACITY: (40)x(0.91)x(0.7) = 25.48A

FROM TABLE 310.15(B)(16).90°C COLUMN

25.48A>21.25A, THEREFORE DC WIRE SIZE IS VALID

COMBINED SYSTEM AC REQUIRED CONDUCTOR AMPACITY (1)(48)(1.25) = 60.00A PER NEC §690.8(A)

AWG #6, DERATED AMPACITY: 65,00A

FROM TABLE 310.15(B)(16),75°C COLUMN

65.00A>60.00A, THEREFORE AC WIRE SIZE IS VALID

NOTE: CONDUIT SHALL BE INSTALLED MIN 7/8" ABOVE ROOF SURFACE

OCPD CALCULATION

ALLOWABLE BACKFEED:

MAIN SERVICE PANEL RATING = 200A MAIN BREAKER RATING = 175A

120% = (MAIN SERVICE PANEL RATING * 1.2) - MAIN BREAKER RATING

= (200x1.2) - 175 = 65A ALLOWABLE BACKFEED = 65A

INVERTER OVERCURRENT PROTECTION:

INVERTER OVERCURRENT PROTECTION = INVERTER O/P CURRENT * CONTINUOUS LOAD(1.25)

= 48.00 * 1.25

= 60.00 A PV OVERCURRENT PROTECTION = 60A

ALLOWABLE BACKFEED 65 A ≥ 60A PV OVERCURRENT PROTECTION

THE DESIGNED INTERCONNECTION MEETS THE 705.12(B)(2)(3)(b) REQUIREMENTS.

ASHRAE 2021 -

HIGHEST MONTHLY 2% D.B. DESIGN TEMP.: 35.9°C LOWEST MIN. MEAN EXTREME D.B.: -8.5°C

INTERCONNECTION NOTES:

- 1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12], AND [NEC 690.64].
- 2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95] AND [NEC 690.5]
- 3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
- 4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

DISCONNECT NOTES:

- 1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS)
- 2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH

RACKING NOTE:

1. BOND AND GROUND RACKING AND MODULES IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. MINIMUM ONE CONNECTION PER ARRAY

GROUNDING & GENERAL NOTES:

- 1. A SECOND FACILITY GROUNDING ELECTRODE IS NOT REQUIRED PER [NEC 690.47(C)(3)]
- 2. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
- 3. DC GEC AND AC EGC TO REMAIN UNSPLICED, OR SPLICED TO EXISTING ELECTRODE
- 4. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
- 5. SOLADECK OR JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD SOLADECK OR JUNCTION BOX DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
- 6. AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT
- 7. RACEWAYS AND CABLES EXPOSED TO SUNLIGHT ON ROOFTOPS SHOULD BE INSTALLED MORE THAN 7/8" ABOVE THE ROOF USING CONDUIT SUPPORTS.
- 8. TEMPERATURE RATINGS OF ALL CONDUCTORS, TERMINATIONS, BREAKERS, OR OTHER DEVICES ASSOCIATED WITH THE SOLAR PV SYSTEM SHALL BE RATED FOR AT LEAST 75 DEGREE C.
- 9. WIRE IS SIZED PER NEC 310.15(B)(16), 310.15(B)(2)(a) and NEC 310.15(B)(3)(a)
- 10. ALL ROOF CONDUIT WILL HAVE A HEIGHT OF 7/8"

CONTRACTOR INFORMATION



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VDE ELECT

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12.880 kWDC, 11.500 kWAC **PV SYSTEM**

13.500kWh **ENERGY STORAGE**STEVE SZABO RESIDENCE
213 WINDSWEPT WAY,
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ELECTRICAL CALC. AND NOTES

DC SYSTEM SIZE: 12.880kW DC AC SYSTEM SIZE: 11.500kW AC

ENERGY STORAGE SYSTEM SIZE: 13.500kWh AC

(28) REC SOLAR: REC460AA PURE-RX MODULES

(16) MID-CIRCUIT INTERRUPTER

(1) TESLA POWERWALL 3 - 1707000-XX-Y (240V) BATTERY WITH INTEGRATED 11500W INVERTER EQUIPPED WITH RAPID

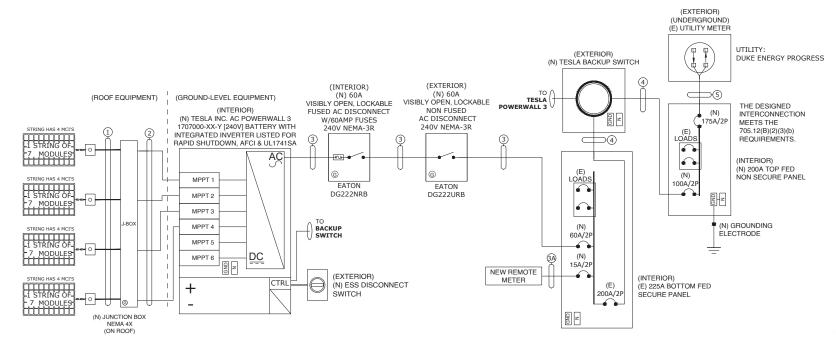
SHUTDOWN

BRANCHES

(4) BRANCH CIRCUIT OF 7 MODULES CONNECTED IN SERIES

INVERTER SPEC					
TESLA POWERWALL 3 BATTERY WITH MODEL: INTEGRATED 1707000-XX-Y (240V) INVERTER EQUIPPED WITH RAPID SHUTDOWN					
MAX O/P VOLTAGE:	240V				
MAX O/P CURRENT:	48A				
DISCHARGE POWER:	11500W CHARGE POWER: 5000W				5000W
CEC EFF:	97.5%		QTY.	1	

MODULE SPEC					
MODEL: REC460AA PURE-RX					
QTY: 28 WATT. : 460					
Voc: 65.3	Isc: 8.88				
Vmp: 54.9	Imp: 8.38				



CONDUCTOR SCHEDULE							
TAG ID	CONDUIT SIZE	SIZE CONDUCTOR NEUTRA		GROUND			
1	OPEN AIR	(8) 10 AWG PV WIRE	NONE	(1) 6 AWG BARE COPPER, EGC			
2	3/4"EMT	(8) 10 AWG THHN/THWN-2, Cu	NONE	(1) 10 AWG THHN/THWN-2, EGC			
3	3/4"EMT	(2) 6 AWG THHN/THWN-2, Cu	(1) 6 AWG THHN/THWN-2, Cu	(1) 10 AWG THHN/THWN-2, EGC			
3A	3/4"EMT	(2) 14 AWG THHN/THWN-2, Cu	(1) 14 AWG THHN/THWN-2, Cu	(1) 14 AWG THHN/THWN-2, EGC			
4	N/A	(2) 1 AWG (1-1-1-3 SER CABLE) THHN/THWN-2, AI	(1) 1 AWG (1-1-1-3 SER CABLE) THHN/THWN-2, AI	(1) 3 AWG, EGC (1-1-1-3 SER CABLE)			
5	2" EMT	(2) 4/0 AWG XHHW, AL	(1) 4/0 AWG XHHW, AL	NONE			

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SINGLE LINE DIAGRAM

WARNING:PHOTOVOLTAIC **POWER SOURCE**

AT DIRECT-CURRENT EXPOSED RACEWAYS, CABLE TRAYS, COVERS AND ENCLOSURES OF JUNCTION BOXES, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10FT SECTION OR WHERE SEPARATED BY ENCLOSURES. WALLS, PARTITIONS, CEILINGS, OR FLOORS. NEC 690.31(G)(3&4)

PHOTOVOLTAIC

AT EACH PV DISCONNECTING MEANS NEC 690.13(B)

DC DISCONNECT

MAXIMUM VOLTAGE 600V MAXIMUM CIRCUIT CURRENT 68.00A MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER INSTALLED)

LABEL 3 AT DC PV SYSTEM DISCONNECTING **MEANS NEC 690.53**

> RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

PHOTOVOLTAIC

LABEL 1 AT AC DISCONNECT MEANS NEC 690.13(B) LABEL 8 AT AC DISCONNECT NEC 690.56(C)(3)

AC DISCONNECT

PHOTOVOLTAIC AC DISCONNECT NOMINAL OPERATING AC VOLTAGE: 240V LABEL 5 (FOR TESLA 1707000-XX-Y (240V) INVERTER) AT AC DISCONNECTING MEANS NEC 690.54

1 INVERTER X 48 AMP/INVERTER = 48.00AMP

WARNING

INVERTER OUTPUT CONNECTION

DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL 3

PLACED ADJACENT TO THE BACK-FED BREAKER FROM THE INVERTER IF TIE IN CONSISTS OF LOAD SIDE CONNECTION TO BUSBAR. NEC 705.12(B)(2)(3)(b)

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



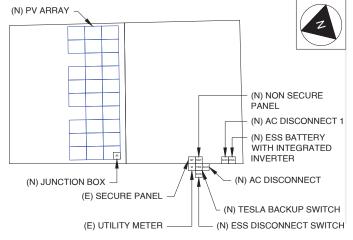
PHOTOVOLTAIC POWER SOURCE

OPERATING AC VOLTAGE: 240 V MAXIMUM OPERATING AC OUTPUT **CURRENT: 48.00 AMPS**

LABEL FOR MAIN SERVICE PANEL COVER

CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM MULTIPLE SOURCES OF POWER WITH SAFETY DISCONNECTS AS SHOWN:



213 WINDSWEPT WAY, FUQUAY-VARINA, NC 27526

DIRECTORY

PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM. (ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN: NEC 690.56(B)&(C), [NEC 705.10])

THIS IS THE COMBINED

AMPERAGE OF

INVERTER AND

BATTERY

FOR PV SYSTEMS THAT SHUT DOWN THE ARRAY AND CONDUCTORS LEAVING THE ARRAY: SIGN TO BE LOCATED ON OR NO MORE THAN 3 FT AWAY FROM SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL INDICATE THE LOCATION OF ALL IDENTIFIED RAPID SHUTDOWN SWITCHES IF NOT AT THE SAME LOCATION. [NEC 690.56(C)(1)(A)]

ENERGY STORAGE SYSTEM

NOMINAL ESS VOLTAGE: 240 VAC **OPERATING CURRENT: 48.00 AAC**

> LABEL FOR ESS BATTERY . QTY-1

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PHONE: +1 919 306 9537 LICENSE#

TYPE-ELECTRICAL

PHOTOVOLTAIC ROOF **MOUNT SYSTEM & ENERGY** STORAGE SYSTEM

12.880 kWDC, 11.500 kWAC PV SYSTEM

13.500kWh ENERGY STORAGE STEVE SZABO RESIDENCE 213 WINDSWEPT WAY. FUQUAY-VARINA, NC 27526



Wyssling Consulting, PLLC 76 N Meadowbrook Drive Alpine UT 84004 North Carolina COA # P-2308

Signed 5/29/2025

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DATE	5/24/2025
CREATED BY	ART
SCALE	NTS

LABELS AND PLACARD

