September 23, 2021

Astra v.1.52
CAT COA

Subject : Structural Certification for Proposed Residential Solar Installation.
Job Number: 212R-113COOP; Rev A
Client: Greg Cooper
Address: 113 Castle Heights Ave, Nyack, NY, 10960

Attn: To Whom It May Concern

A field observation of the existing structure at the address indicated above was performed by a site survey team from Sunrun. Structural evaluation of the loading was based on the site observations and the design criteria listed below.

Design Criteria:

- 2020 NYS Code Books w/ 2018 IRC/IBC/IEBC, 7-16 ASCE & 2018 NDS
- Basic Wind Speed V = 114 mph, Exposure B
- Ground Snow Load = 30 psf

Based on this evaluation, I certify that the alteration to the existing structure by the installation of the PV system meets the requirements of the applicable existing and/or new building code provisions referenced above.

Additionally, I certify that the PV module assembly including all attachments supporting it have been reviewed to be in accordance with the manufacturer's specifications.

Results Summary (Hardware Check Includes Uplift Check on Attachments/Fastener, Structure Check Considers Main Structure)					
	Orientation	Attachment Spacing/Cantilever	Configuration	Governing DCR	Result
AR-01	Landscape	72 / 28	Staggered	45%	Pass
	Portrait	48 / 24	Staggered	59%	Pass
	Roofing Material		Pitch		Structure Check
	Comp Shingle		33°		Pass

Paul Zacher, P.E.
Professional Engineer
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AERIAL VIEW (RIGHT)

FRONT VIEW (LEFT)

NOTE: MODULES ARE NOT VISIBLE FROM THE STREET

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CUSTOMER RESIDENCE:
GREG COOPER
113 CASTLE HEIGHTS AVE,
NYACK, NY, 10960

PROJECT NUMBER:
212R-113COOP


Left

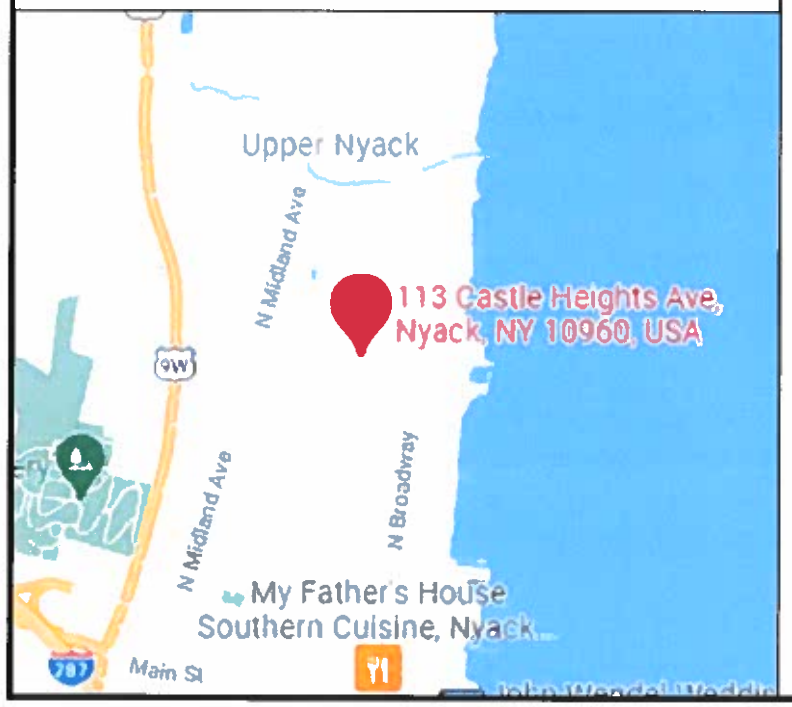

Right

SCOPE OF WORK

- SYSTEM SIZE: 5780W DC, 4800W AC
- MODULES: (17) JA SOLAR: JAM60S10-340/MR
- INVERTERS: (1) DELTA ELECTRONICS: M5-TL-US
- RACKING: SNAPNRACK RLU; RL UNIVERSAL, SPEEDSEAL TRACK ON COMP, SEE DETAIL SNR-DC-00436
- ENERGY STORAGE SYSTEM: (1) TESLA: POWERWALL, 13.5 KWh, 5KW INVERTER OUTPUT, LITHIUM-ION BATTERY (WEIGHT: 251.3LB EACH).
- BACKUP GATEWAY: (1) 200A TESLA POWERWALL CONTROL PANEL

- RAPID SHUTDOWN: (17) APSMART RSD-S-PLC ROOFTOP MODULE LEVEL RAPID SHUTDOWN DEVICE

VICINITY MAP



GENERAL NOTES

- ALL WORK SHALL COMPLY WITH 2020 NYS Code Books w/ 2018 IRC/IBC/IEBC, MUNICIPAL CODE, AND ALL MANUFACTURERS' LISTINGS AND INSTALLATION INSTRUCTIONS.
- PHOTOVOLTAIC SYSTEM WILL COMPLY WITH NEC 2017.

- ELECTRICAL SYSTEM GROUNDING WILL COMPLY WITH NEC 2017.

- PHOTOVOLTAIC SYSTEM IS UNGROUNDED. NO CONDUCTORS ARE SOLIDLY GROUNDED IN THE INVERTER. SYSTEM COMPLIES WITH 690.35.

- MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.

- INVERTER CONFORMS TO AND IS LISTED UNDER UL 1741.

- RACKING CONFORMS TO AND IS LISTED UNDER UL 2703.

- SNAPNRACK RACKING SYSTEMS, IN COMBINATION WITH TYPE I, OR TYPE II MODULES, ARE CLASS A FIRE RATED.

- RAPID SHUTDOWN REQUIREMENTS MET WHEN INVERTERS AND ALL CONDUCTORS ARE WITHIN ARRAY BOUNDARIES PER NEC 690.12(1).

- CONSTRUCTION FOREMAN TO PLACE CONDUIT RUN PER 690.31(G).

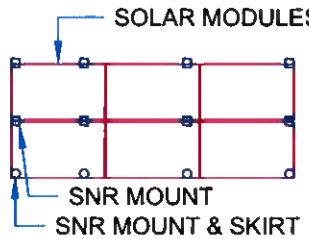
- ARRAY DC CONDUCTORS ARE SIZED FOR DERATED CURRENT.

- 10.46 AMPS MODULE SHORT CIRCUIT CURRENT.

- 16.34 AMPS DERATED SHORT CIRCUIT CURRENT [690.8 (a) & 690.8 (b)].
- ESS SHALL BE INSTALLED 3FT FROM DOORS AND WINDOWS IN ACCORDANCE WITH R327.4
- ESS SUBJECT TO VEHICLE IMPACT WILL BE PROTECTED BY A 4" DIAMETER BY 36" TALL PARKING POLE NO LESS THAN 6 FT FROM THE ESS OR BY ELEVATING THE ESS 36" ABOVE THE FLOOR IN ACCORDANCE WITH R327.9
- ESS LOCATION SHALL BE FINISHED WITH NOT LESS THAN 5/8 INCH TYPE X GYPSUM BOARD OR EQUIVALENT IN ACCORDANCE WITH TABLE R302.6
- ENERGY STORAGE SYSTEM CONFORMS TO AND IS LISTED UNDER UL 9540.
- ENERGY STORAGE SYSTEM LIVE PARTS ARE NOT ACCESSIBLE DURING ROUTINE MAINTENANCE. SYSTEM VOLTAGE IN ACCORDANCE WITH NEC 706.30 AND EXCEPTION 1 NEC 706.30 (A).
- ADDITIONAL DISCONNECTING MEANS SHALL BE INSTALLED WHERE ENERGY STORAGE DEVICE INPUT AND OUTPUT TERMINALS ARE MORE THAN 5 FT FROM CONNECTED EQUIPMENT, OR WHERE THE CIRCUITS FROM THESE TERMINALS PASS THROUGH A WALL OR PARTITION PER 706.7(E).
- LISTED, COMBINATION TYPE AFCI SHALL BE INSTALLED WHERE BACKED UP CIRCUIT WIRING IS EXTENDED MORE THAN 6FT AND DOES NOT INCLUDE ANY ADDITIONAL OUTLETS OR DEVICES PER NEC 210.12(D).
- THE CAPACITY OF THE STANDALONE SYSTEM SUPPLY SHALL BE EQUAL TO OR GREATER THAN THE LOAD POSED BY THE SINGLE LARGEST UTILIZATION EQUIPMENT CONNECTED TO THE SYSTEM PER NEC ARTICLE 710.15(A)
- ALL PASS-THROUGH CONDUCTORS MUST COMPLY WITH NEC 312.8

LEGEND AND ABBREVIATIONS

SE	SERVICE ENTRANCE
MP	MAIN PANEL
SP	SUB-PANEL
LC	PV LOAD CENTER
SM	SUNRUN METER
PM	DEDICATED PV METER
INV	INVERTER(S)
AC	AC DISCONNECT(S)
DC	DC DISCONNECT(S)
CB	IQ COMBINER BOX
	POWERWALL ENERGY STORAGE SYSTEM (ESS)
BG	BACKUP GATEWAY
GP	GENERATION PANEL
1	COMMUNICATION WIRES



CHIMNEY
ATTIC VENT
FLUSH ATTIC VENT
PVC PIPE VENT
METAL PIPE VENT
T-VENT
SATELLITE DISH
FIRE SETBACKS
HARDSCAPE
— PL— PROPERTY LINE
INTERIOR EQUIPMENT SHOWN AS DASHED

SCALE: NTS

A	AMPERE
AC	ALTERNATING CURRENT
AFCI	ARC FAULT CIRCUIT INTERRUPTER
AZIM	AZIMUTH
COMP	COMPOSITION
DC	DIRECT CURRENT
(E)	EXISTING
ESS	ENERGY STORAGE SYSTEM
EXT	EXTERIOR
INT	INTERIOR
MAG	MAGNETIC
MSP	MAIN SERVICE PANEL
(N)	NEW
NTS	NOT TO SCALE
OC	ON CENTER
PRE-FAB	PRE-FABRICATED
PSF	POUNDS PER SQUARE FOOT
PV	PHOTOVOLTAIC
RSD	RAPID SHUTDOWN DEVICE
TL	TRANSFORMERLESS
TYP	TYPICAL
V	VOLTS
W	WATTS

REV	NAME	DATE	COMMENTS

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392001-060-017-0002-041-000-0000

PROJECT NUMBER:
212R-113COOP

DESIGNER: (415) 580-6920 ex3
RAGHUL EKAMBARAM

SHEET
COVER SHEET

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SITE PLAN DETAIL - SCALE = 1/16" = 1'-0"

	ARRAY PITCH	TRUE AZIM	MAG AZIM	PV AREA (SQFT)
AR-01	33°	190°	202°	307.8

NOTE: ROOFTOP MODULE LEVEL RAPID SHUTDOWN DEVICE INSTALLED ON EACH MODULE PER NEC 690.12

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SHEET
SITE PLAN

REV: A1 9/23/2021

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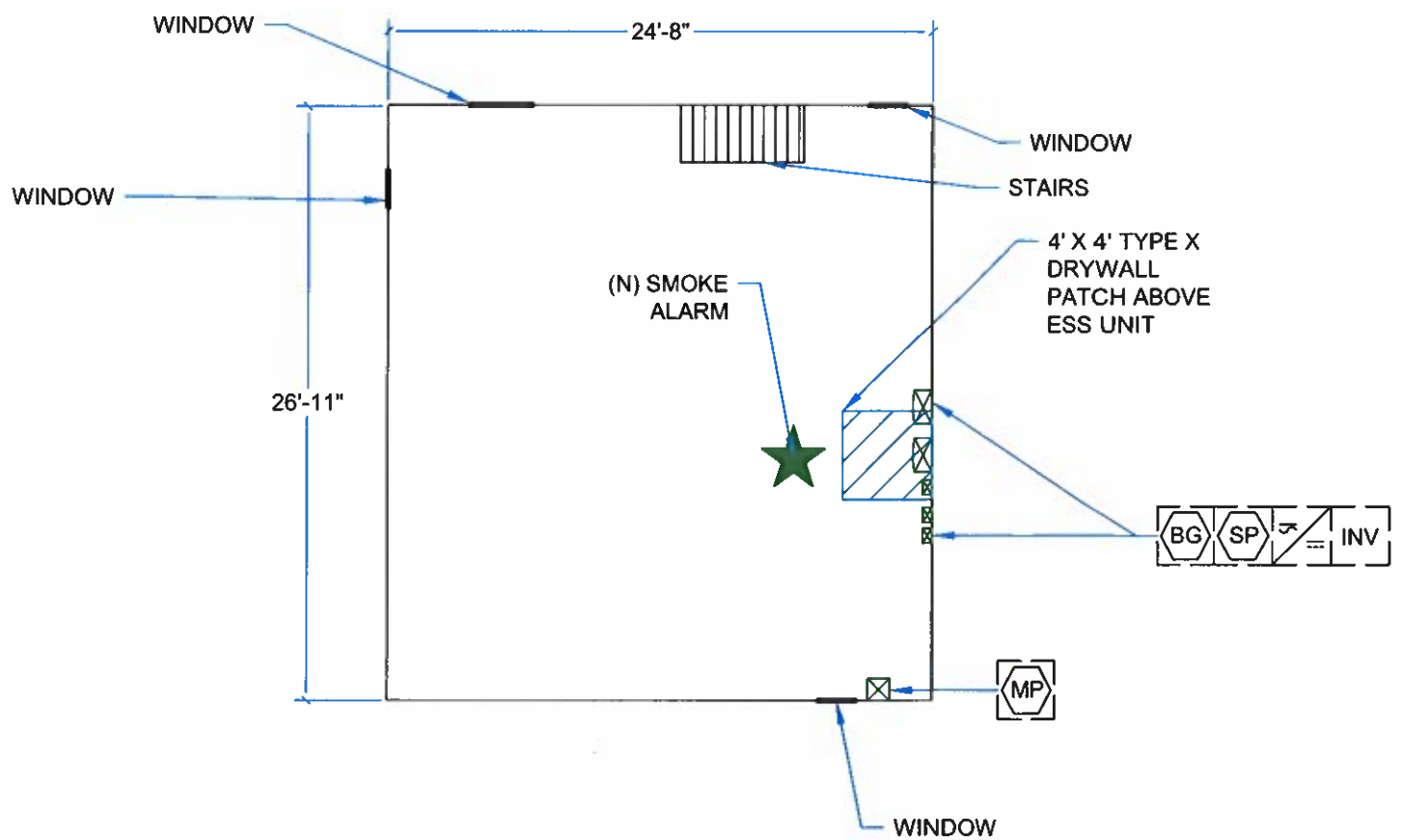
SITE PLAN - SCALE = NTS

	ARRAY PITCH	TRUE AZIM	MAG AZIM	PV AREA (SQFT)
AR-01	33°	190°	202°	307.8

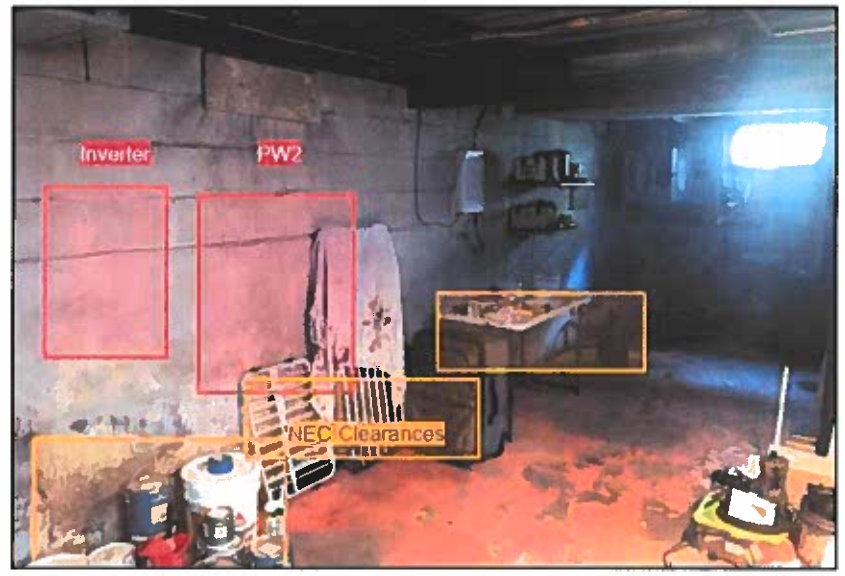
BASEMENT PLAN VIEW - SCALE = NTS



NOTE:

1. ROOMS AND AREAS CONTAINING ENERGY STORAGE SHALL BE PROTECTED ON THE SYSTEM SIDE BY FIRE-RESISTANT CONSTRUCTION IN ACCORDANCE WITH IRC SECTION R302
2. WALLS ADJACENT TO THE ESS LOCATION SHALL BE FINISHED WITH NOT LESS THAN 1/2 INCH GYPSUM WALLBOARD PER TABLE 302.6
3. INTERIOR ESS LOCATION SHALL BE FINISHED WITH NOT LESS THAN 5/8 INCH TYPE X GYPSUM BOARD OR EQUIVALENT IN ACCORDANCE WITH TABLE R302.6

ESS LOCATION



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SHEET BASEMENT FLOOR PLAN

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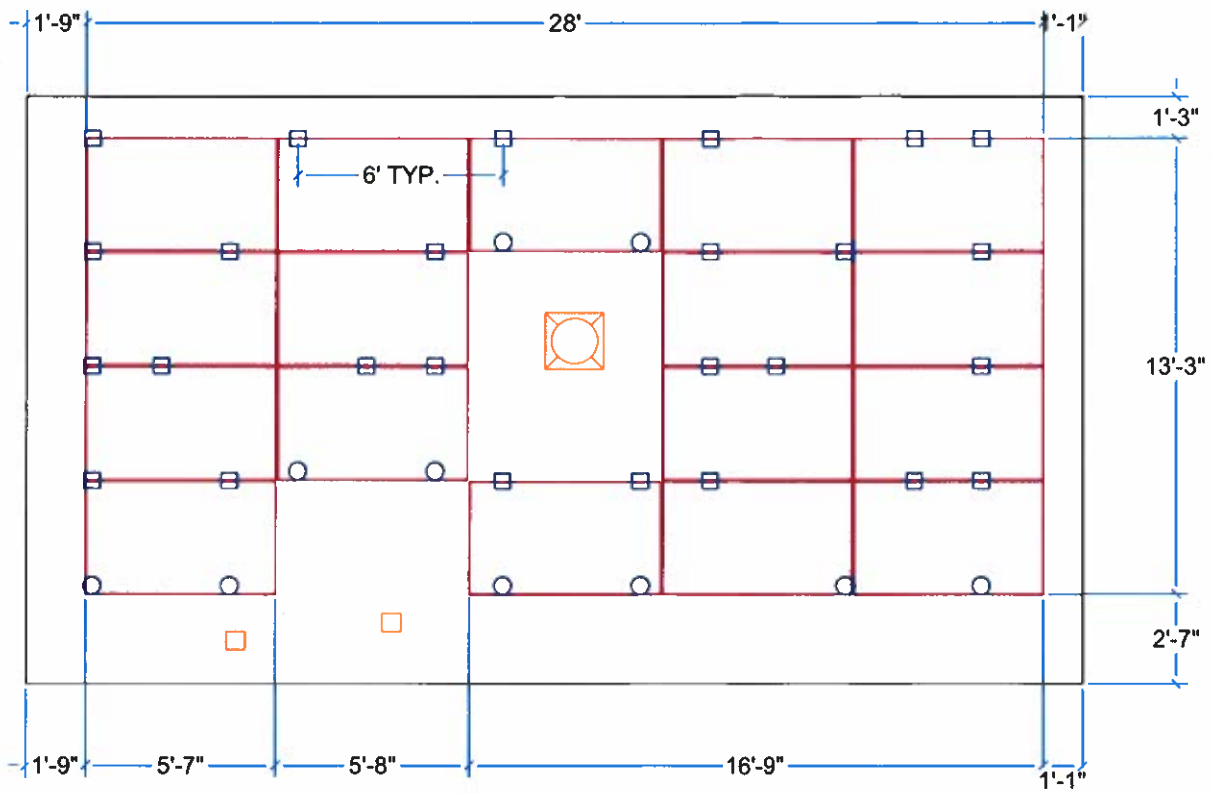
ROOF INFO			FRAMING INFO			ATTACHMENT INFORMATION					
Name	Type	Height	Type	Max Span	OC Spacing	Detail	Max Landscape OC Spacing	Max Landscape Overhang	Max Portrait OC Spacing	Max Portrait Overhang	Configuration
AR-01	COMP SHINGLE - RLU	2-Story	2X8 RAFTERS	16' - 1"	24"	RL UNIVERSAL, SPEEDSEAL TRACK ON COMP, SEE DETAIL SNR-DC-00436	6' - 0"	2' - 4"	4' - 0"	2' - 0"	STAGGERED

D1 - AR-01 - SCALE: 3/16" = 1'-0"
PITCH: 33°
AZIM: 190°



SEE THE SITE PLAN FOR NORTH ARROW

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DESIGN CRITERIA

MAX DISTRIBUTED LOAD: 3 PSF
SNOW LOAD: 30 PSF
WIND SPEED:
114 MPH 3-SEC GUST.
S.S.LAG SCREWS:
5/16": 2.5" MIN EMBEDMENT
STRUCTURAL NOTES:

- INSTALLERS SHALL NOTIFY ENGINEER OF ANY POTENTIAL STRUCTURAL ISSUES OBSERVED PRIOR TO PROCEEDING W/ INSTALLATION.
- IF ARRAY (EXCLUDING SKIRT) IS WITHIN 12" BOUNDARY REGION OF ANY ROOF PLANE EDGES (EXCEPT VALLEYS), THEN ATTACHMENTS NEED TO BE ADDED AND OVERHANG REDUCED WITHIN THE 12" BOUNDARY REGION ONLY AS FOLLOWS:
  - ALLOWABLE ATTACHMENT SPACING INDICATED ON PLANS TO BE REDUCED BY 50%
  - ALLOWABLE OVERHANG INDICATED ON PLANS TO BE 1/5TH OF ALLOWABLE ATTACHMENT SPACING INDICATED ON PLANS

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SHEET
LAYOUT

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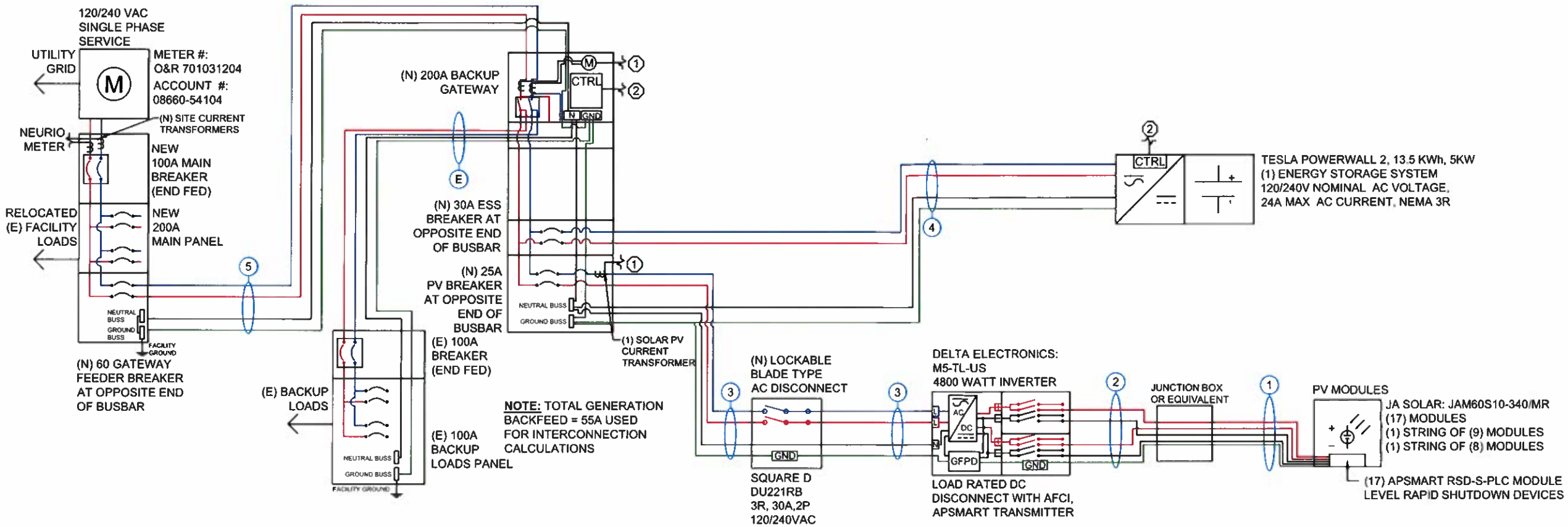

CONDUIT SCHEDULE

#	CONDUIT	CONDUCTOR	NEUTRAL	GROUND
1	NONE	(2) 10 AWG PV WIRE	NONE	(1) 6 AWG BARE COPPER
2	3/4" EMT OR EQUIV.	(4) 10 AWG THHN/THWN-2	NONE	(1) 8 AWG THHN/THWN-2
3	3/4" EMT OR EQUIV.	(2) 10 AWG THHN/THWN-2	(1) 10 AWG THHN/THWN-2	(1) 8 AWG THHN/THWN-2
4	3/4" EMT OR EQUIV.	(2) 10 AWG THHN/THWN-2	(1) 10 AWG THHN/THWN-2	(1) 8 AWG THHN/THWN-2
5	3/4" EMT OR EQUIV.	(2) 6 AWG THHN/THWN-2	(1) 6 AWG THHN/THWN-2	(1) 8 AWG THHN/THWN-2
E	EXISITNG			

MODULE CHARACTERISTICS

JA SOLAR: JAM60S10-340/MR:	340 W
OPEN CIRCUIT VOLTAGE:	41.55 V
MAX POWER VOLTAGE:	34.73 V
SHORT CIRCUIT CURRENT:	10.46 A

SYSTEM CHARACTERISTICS - INVERTER 1

SYSTEM SIZE:	5780 W
SYSTEM OPEN CIRCUIT VOLTAGE:	417 V
SYSTEM OPERATING VOLTAGE:	313 V
MAX ALLOWABLE DC VOLTAGE:	600 V
SYSTEM OPERATING CURRENT:	19.58 A
SYSTEM SHORT CIRCUIT CURRENT:	26.15 A

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ELECTRICAL

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⚠WARNING

ELECTRICAL SHOCK HAZARD

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

LABEL LOCATION:
INVERTER(S), AC DISCONNECT(S), AC COMBINER PANEL (IF APPLICABLE).
PER CODE(S): CEC 2019: 690.13(B), NEC 2017: 690.13(B)

⚠WARNING

POWER SOURCE OUTPUT CONNECTION

DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
ADJACENT TO PV BREAKER (IF APPLICABLE).
PER CODE(S): CEC 2019: 705.12(B)(2)(3)(b), NEC 2017: 705.12(B)(2)(3)(b)

⚠WARNING

PHOTOVOLTAIC SYSTEM COMBINER PANEL

DO NOT ADD LOADS

LABEL LOCATION:
PHOTOVOLTAIC AC COMBINER (IF APPLICABLE).
PER CODE(S): CEC 2019: 705.12(B)(2)(3)(c), NEC 2017: 705.12(B)(2)(3)(c)

⚠WARNING

DUAL POWER SUPPLY

SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

LABEL LOCATION:
UTILITY SERVICE METER AND MAIN SERVICE PANEL.
PER CODE(S): CEC 2019: 705.12(B)(3), NEC 2017: 705.12(B)(3)

INVERTER 1

PHOTOVOLTAIC DC DISCONNECT

MAXIMUM SYSTEM VOLTAGE:	600	VDC
MAXIMUM CIRCUIT CURRENT:	26.15	ADC
MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER (IF INSTALLED):	N/A	ADC

LABEL LOCATION:
INVERTER(S), DC DISCONNECT(S).
PER CODE(S): NEC 2017: 690.53

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION:
INSTALLED WITHIN 3' OF RAPID SHUT DOWN SWITCH PER CODE(S): CEC 2019: 690.56(C)(3), NEC 2017: 690.56(C)(3), IFC 2012: 605.11.1, IFC 2018: 1204.5.3, CFC 2019: 1204.5.3

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION:
INTERIOR AND EXTERIOR DC CONDUIT EVERY 10 FT, AT EACH TURN, ABOVE AND BELOW PENETRATIONS, ON EVERY JB/PULL BOX CONTAINING DC CIRCUITS.
PER CODE(S): CEC 2019: 690.31(G)(3), 690.31(G)(4), NEC 2017: 690.31(G)(3), 690.31(G)(4) IFC 2012: 605.11.1.4

PHOTOVOLTAIC AC DISCONNECT

MAXIMUM AC OPERATING CURRENT: 20.00 AMPS
NOMINAL OPERATING AC VOLTAGE: 240 VAC

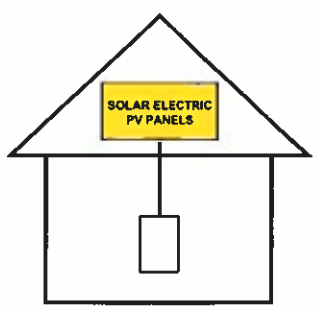
LABEL LOCATION:
AC DISCONNECT(S), PHOTOVOLTAIC SYSTEM POINT OF INTERCONNECTION.
PER CODE(S): CEC 2019: 690.54, NEC 2017: 690.54

4"

3"

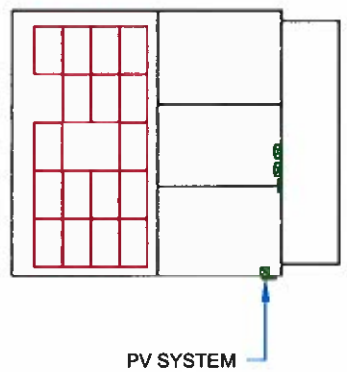
SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



LABEL LOCATION:
ON OR NO MORE THAT 1 M (3 FT) FROM THE SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED.
PER CODE(S): CEC 2019: 690.56(C)(1)(a), NEC 2017: 690.56(C)(1)(a)

BUILDING SUPPLIED BY UTILITY GRID AND PHOTOVOLTAIC SYSTEM



LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC690.56(B), NEC705.10, 225.37, 230.2(E))

NOTES AND SPECIFICATIONS:
- SIGNS AND LABELS SHALL MEET THE REQUIREMENTS OF THE NEC 2017 ARTICLE 110.21(B), UNLESS SPECIFIC INSTRUCTIONS ARE REQUIRED BY SECTION 690, OR IF REQUESTED BY THE LOCAL AHJ.
- SIGNS AND LABELS SHALL ADEQUATELY WARN OF HAZARDS USING EFFECTIVE WORDS, COLORS AND SYMBOLS.
- LABELS SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN.
- LABEL SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
- SIGNS AND LABELS SHALL COMPLY WITH ANSI Z535.4-2011, PRODUCT SAFETY SIGNS AND LABELS, UNLESS OTHERWISE SPECIFIED.
- DO NOT COVER EXISTING MANUFACTURER LABELS.

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SIGNAGE

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