

## Addendum-01 Narrative

PROJECT: SPS Linwood Elementary – Solar Addition  
PROJECT #: 2021.028.01  
DATE PREPARED: 04/05/2023  
PREPARED BY: Josh Lauderdale

### DRAWINGS

- E1 – ROOF PLAN – ELECTRICAL
  - REVISED key note #4 regarding routing and details.
  - REVISED conduit routing along roof to exterior.
  - REVISED combiner box, inverter, and circuit breaker location.
- E2 – ENLARGED FLOOR PLANS – ELECTRICAL
  - ADDED general note #4 regarding exterior façade mounted conduit.
  - REVISED key notes #1, #3, and #7.
  - ADDED detail #2.
  - REVISED detail numbering.
  - REVISED combiner box, inverter, and circuit breaker location.
  - REVISED conduit routing from Electrical 242A to exterior of building.
  - REVISED conduit routing from TELECOM 142A to exterior of building.
  - REVISED Avista meter and disconnect location.
- E3 – DETAILS – ELECTRICAL
  - ADDED general note #4 regarding exterior façade mounted conduit.

#	ADDITION #1	REVISIONS	DATE
1			04/05/2023

## SYMBOLS & ABBREVIATIONS

### GENERAL SYMBOLS

	KEY NOTE		ROOM NAME AND NUMBER
	EQUIPMENT IDENTIFIER		CONNECTION TO EXISTING (#) INDICATES EXISTING SIZE)
	DETAIL NUMBER		REVISION NUMBER
	DETAIL REFERENCE		SECTION NUMBER
	SHEET NUMBER		SECTION REFERENCE
	MATCHED SHEET NUMBER		SHEET NUMBER
	CURRENT SHEET NUMBER		NORTH ARROW
	MATCH LINE REFERENCE		CENTER LINE
	MATCHED SHEET NUMBER		

NOTE:  
SYMBOLS AND ABBREVIATIONS ON THE DRAWINGS SHALL BE INTERPRETED IN ACCORDANCE WITH THE LEGENDS WHEREVER APPLICABLE. NOT ALL SYMBOLS AND ABBREVIATIONS IN THE LEGENDS ARE NECESSARILY USED FOR THE PROJECT. ALL SIZES ARE IN INCHES, UNLESS OTHERWISE NOTED.

### LINEWEIGHT LEGEND

	NEW WORK
	EXISTING TO REMAIN OR NOT IN CONTRACT
	DEMOLITION
	FUTURE WORK

### ABBREVIATIONS

Ø	DIAMETER	LSI	INDICATES A BREAKER WITH FULLY ADJUSTABLE LONG TIME, SHORT TIME AND INSTANTANEOUS TRIP CHARACTERISTICS
ABV	ABOVE	LSIA	INDICATES A BREAKER WITH FULLY ADJUSTABLE LONG TIME, SHORT TIME, INSTANTANEOUS AND GROUND FAULT ALARM TRIP CHARACTERISTICS
AFB	ABOVE FINISH FLOOR	LSIG	INDICATES A BREAKER WITH FULLY ADJUSTABLE LONG TIME, SHORT TIME, INSTANTANEOUS AND GROUND FAULT TRIP CHARACTERISTICS
AFG	ABOVE FINISH GRADE	MAX	MAXIMUM
AL	ALUMINUM	MFR	MANUFACTURER
AR	AS REQUIRED	MIN	MINIMUM
ATS	AUTOMATIC TRANSFER SWITCH	MMS	MANUAL MOTOR STARTER
BLDG	BUILDING	MNT	MOUNT(ED)
C	CONDUIT	(N)	NEW
CCT	CIRCUIT	N	NEUTRAL
CKT	CIRCUIT	NL	NIGHT LIGHT
CLG	CEILING	N.C.	NORMALLY CLOSED
CO	CONDUIT ONLY WITH 1/4" POLYPROPYLENE PULL ROPE	NIC	NOT IN CONTRACT
CP	CHROME PLATED	N.O.	NORMALLY OPEN
CT	CURRENT TRANSFORMER	NORM	NORMAL
CU	COPPER	UNO	UNLESS NOTED OTHERWISE
DIA	DIAMETER	PNL	PANEL
DISC	DISCONNECT	QIG	QUAD ISOLATED GROUND
DIST	DISTRIBUTION	REQ'D	REQUIRED
DIV	DIVISION	RM	ROOM
DWG	DRAWING	SIM	SIMILAR
DX	DUPLEX	SPST	SINGLE POLE/SINGLE THROW SWITCH
(E)	EXISTING TO REMAIN	SS	STAINLESS STEEL
EA	EACH	SW	SWITCH
EM	EMERGENCY	T	TAMPER PROOF RECEPTACLE
FLR	FLOOR, OR FLOOR MOUNTED	TYP	TYPICAL
FT	FEET	W	WIDE
G	GROUND	W/	WITH
GA	GAUGE	WIN	WITHIN
GFI	GROUND FAULT INTERRUPT	W/O	WITHOUT
GND	GROUND	WP	WEATHERPROOF RECEPTACLES TO BE GFI EXISTING DEVICE TO BE REPLACED WITH NEW DEVICE AT SAME LOCATION
H	HIGH	X	TRANSFORMER
HT	HEIGHT		
IG	ISOLATED GROUND		
IN	INCHES		
L	LONG		
LI	INDICATES A BREAKER WITH FULLY ADJUSTABLE LONG TIME AND INSTANTANEOUS TRIP CHARACTERISTICS		

### ANNOTATION

*XX*	MOUNTING HEIGHT (AFF OR AFG) (n)x(C-a)@b@r@G
	n = QUANTITY OF CONDUIT
	x = SIZE OF CONDUIT
	a = QUANTITY OF CONDUCTORS
	b = CONDUCTOR WIRE SIZE
	c = QUANTITY OF GROUND
	d = GROUND WIRE SIZE

### SCHEMATIC SYMBOLS

	AMP METER		FUSIBLE SWITCH
	AUTOMATIC TRANSFER SWITCH		GENERATOR
	AUTOMATIC TRANSFER SWITCH (4-POLE BYPASS ISOLATION)		GROUND
	CIRCUIT BREAKER		GROUNDING WYE
	CIRCUIT BREAKER (GFI)		INDUCTOR
	CONTACT (N.C.)		LINE TAP
	CONTACT (N.O.)		METER
	CONTACT (REMOTE, N.C.)		MOTOR
	CONTACT (REMOTE, N.O.)		PANELBOARD (# INDICATES NAME)
	DISCONNECT SWITCH		PANEL OR CABINET
	ELECTRONIC INTERLOCK		SEPARABLE CONNECTIONS
	ENCLOSED CIRCUIT BREAKER		SPACE IN PANELBOARD
	FEEDER IDENTIFICATION		SWITCH
	FUSE		SURGE PROTECTION DEVICE
			TRANSFORMER
			VOLT METER

### POWER SYMBOLS

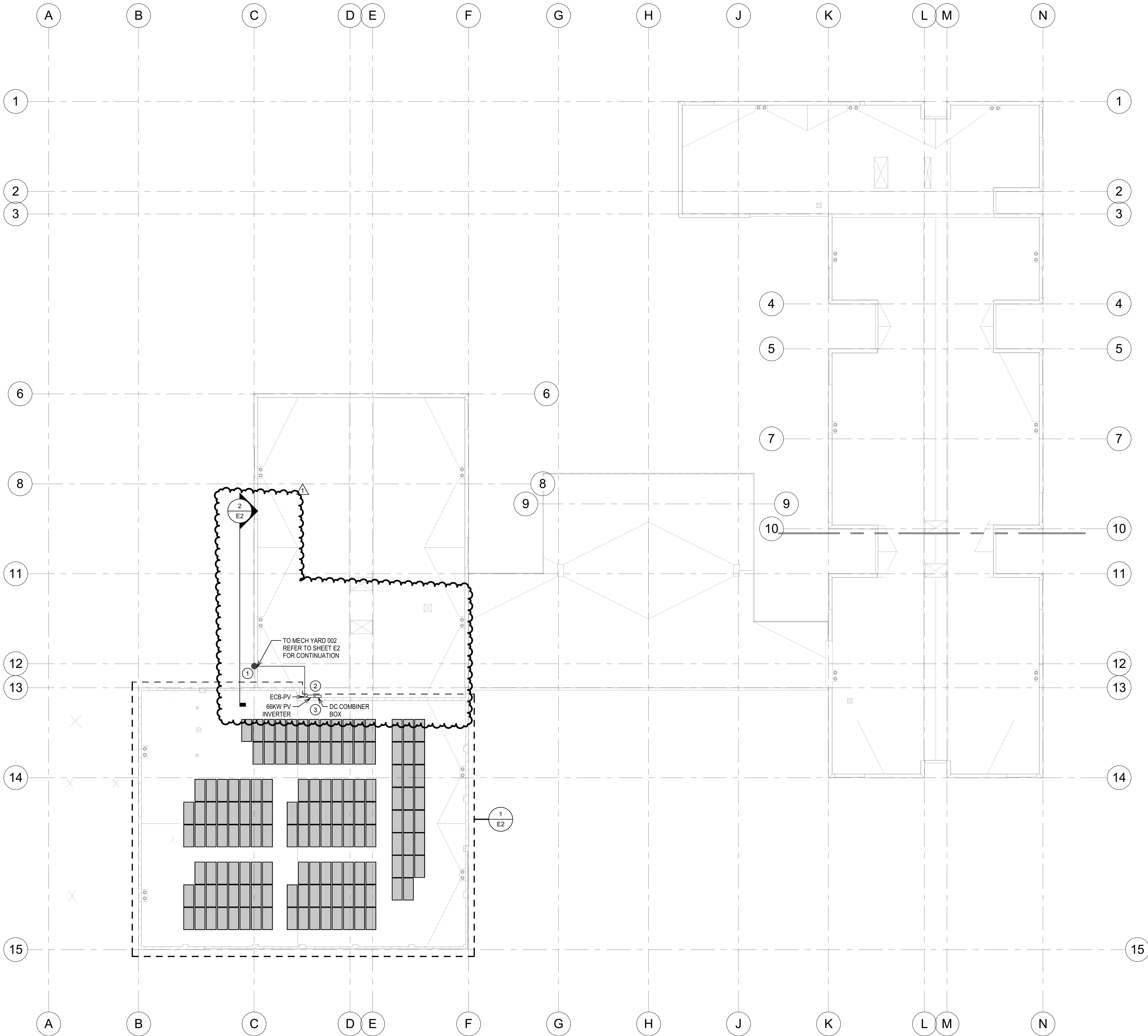
	CONDUIT DROP		RECEPTACLE, DUPLEX
	CONDUIT RISE		RECEPTACLE, DUPLEX FLOOR MOUNTED
	DISCONNECT SWITCH		RECEPTACLE, DUPLEX GFI
	DISTRIBUTION PANEL		RECEPTACLE, DUPLEX ISOLATED GROUND
	ELECTRICAL PANEL		RECEPTACLE, DUPLEX SWITCHED
	JUNCTION BOX		RECEPTACLE, DUPLEX STANDBY POWER
	METER		RECEPTACLE, DUPLEX UPS BACKED
	MOTOR		RECEPTACLE, DUPLEX WITH USB
	MOTOR STARTER		RECEPTACLE, QUAD
	MOTOR STARTER (MANUAL)		RECEPTACLE, QUAD FLOOR MOUNTED
	PUSH TYPE SWITCH		RECEPTACLE, FLOORBOX. 'X' INDICATES THE QUANTITY OF DUPLEX OUTLETS TO BE INSTALLED. 'Y' INDICATES THE FLOORBOX TYPE. REFER TO SHEET XXXX FOR DETAILS ON EACH TYPE.
	RECEPTACLE, 20 AMP DUPLEX		RECEPTACLE, SINGLE
	RECEPTACLE, CEILING MOUNTED		RECEPTACLE, SPECIAL
	RECEPTACLE, CEILING 20 AMP DUPLEX		RECEPTACLE, SPECIAL FLOOR MOUNTED
	RECEPTACLE, CEILING DUPLEX STANDBY POWER		TRANSFORMER
	RECEPTACLE, CEILING DUPLEX UPS BACKED		CONCEALED CONDUIT: UNLESS OTHERWISE INDICATED, DENOTES 3/4"C-2#12+1#12G
			SURFACE MOUNTED RACEWAY

GENERAL NOTES:

1. SOLAR PV ARRAY TO MAINTAIN MINIMUM CLEARANCE OF 5' OFF ALL PARAPET WALLS AND MECHANICAL ROOF TOP EQUIPMENT.
2. CONDUIT PATHWAYS NOT SHOWN FOR CLARITY. ROUTE CONDUITS ABOVE ROOF PER NEC STANDARDS AND TO MINIMIZE TRIPPING HAZARDS.
3. COORDINATE STRING ARRANGEMENT PRIOR TO ROUGH-IN.

KEY NOTES:

1. ROUTE CONDUIT FOR PV SYSTEM TO MECH YARD 002. REFER TO SHEET E2 DETAIL #2-4 FOR EQUIPMENT LOCATION AND ROUTING. SEE PV SINGLE LINE DIAGRAM ON SHEET E3 FOR DETAILS.
2. PROVIDE UNISTRUT SUPPORT STRUCTURE FOR DC COMBINER BOX, PV INVERTER, AND ECB-PV EQUIPMENT LOCATED ON LOWER ROOF.
3. COORDINATE EXPOSED ROOF CONDUIT FROM UPPER ROOF TO LOWER ROOF AND COMBINER BOX.



04-04-2023

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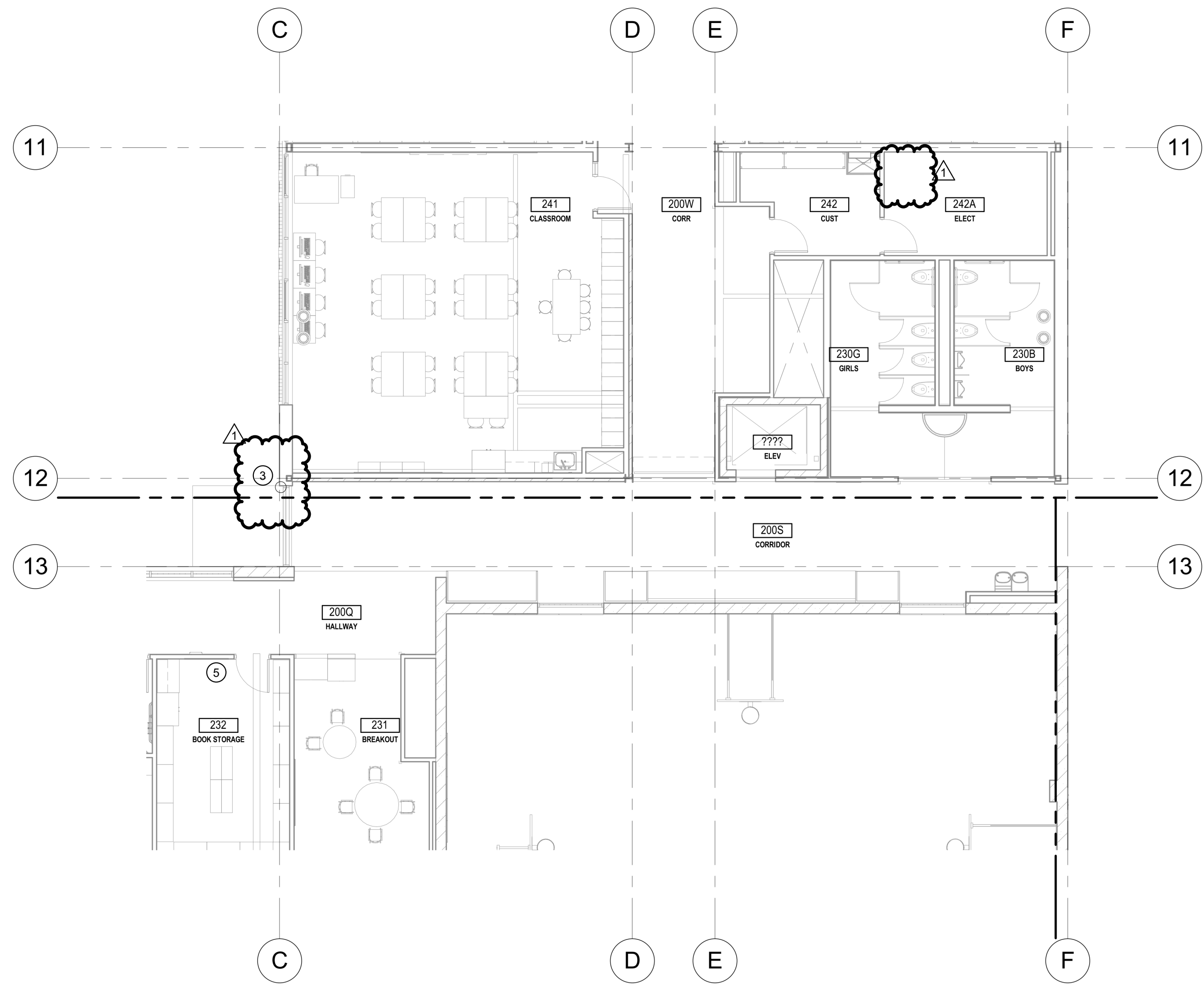


**LINWOOD ELEMENTARY - SOLAR ADDITION**  
906 W Weile Ave, Spokane, WA 99208

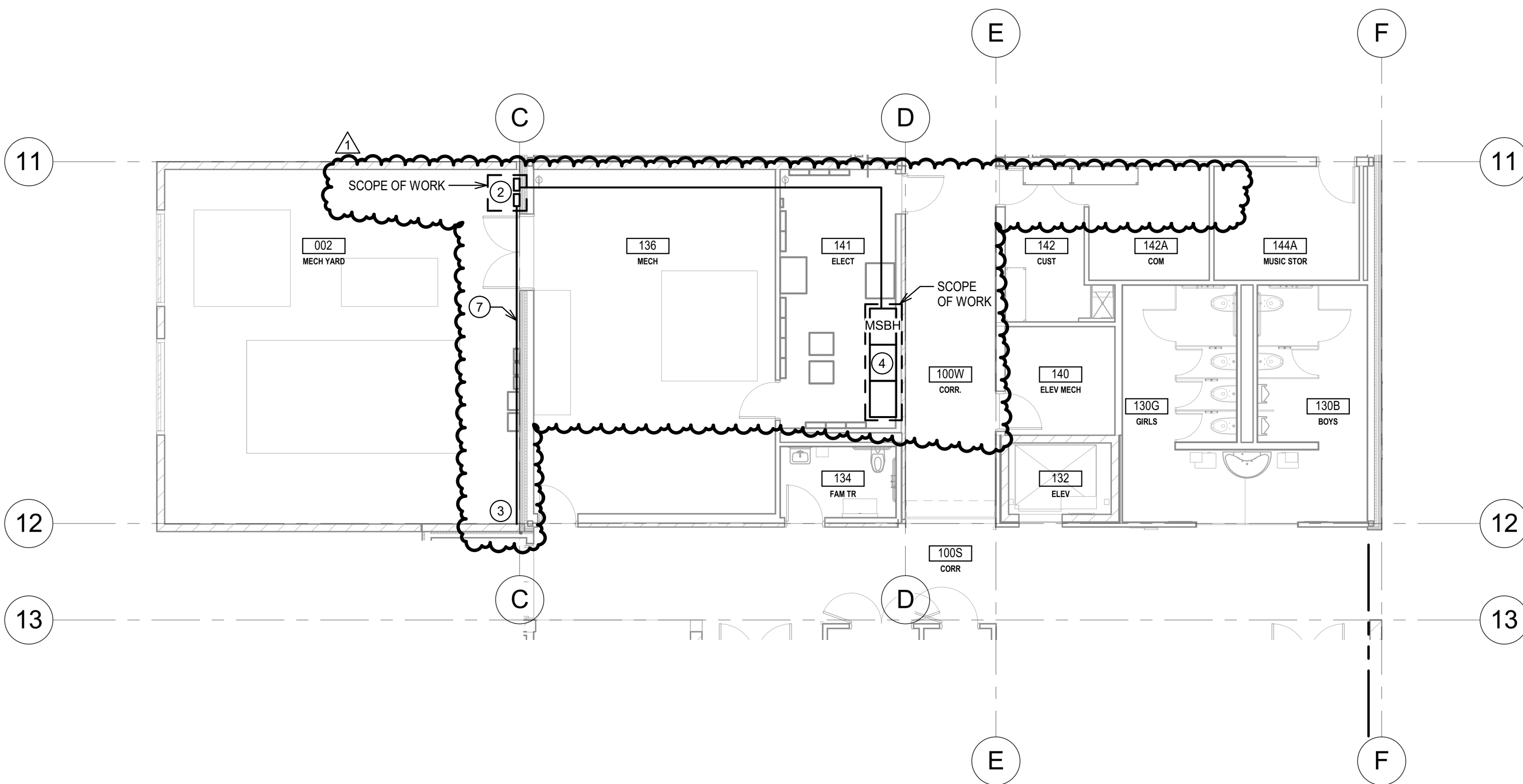
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ROOF PLAN - ELECTRICAL

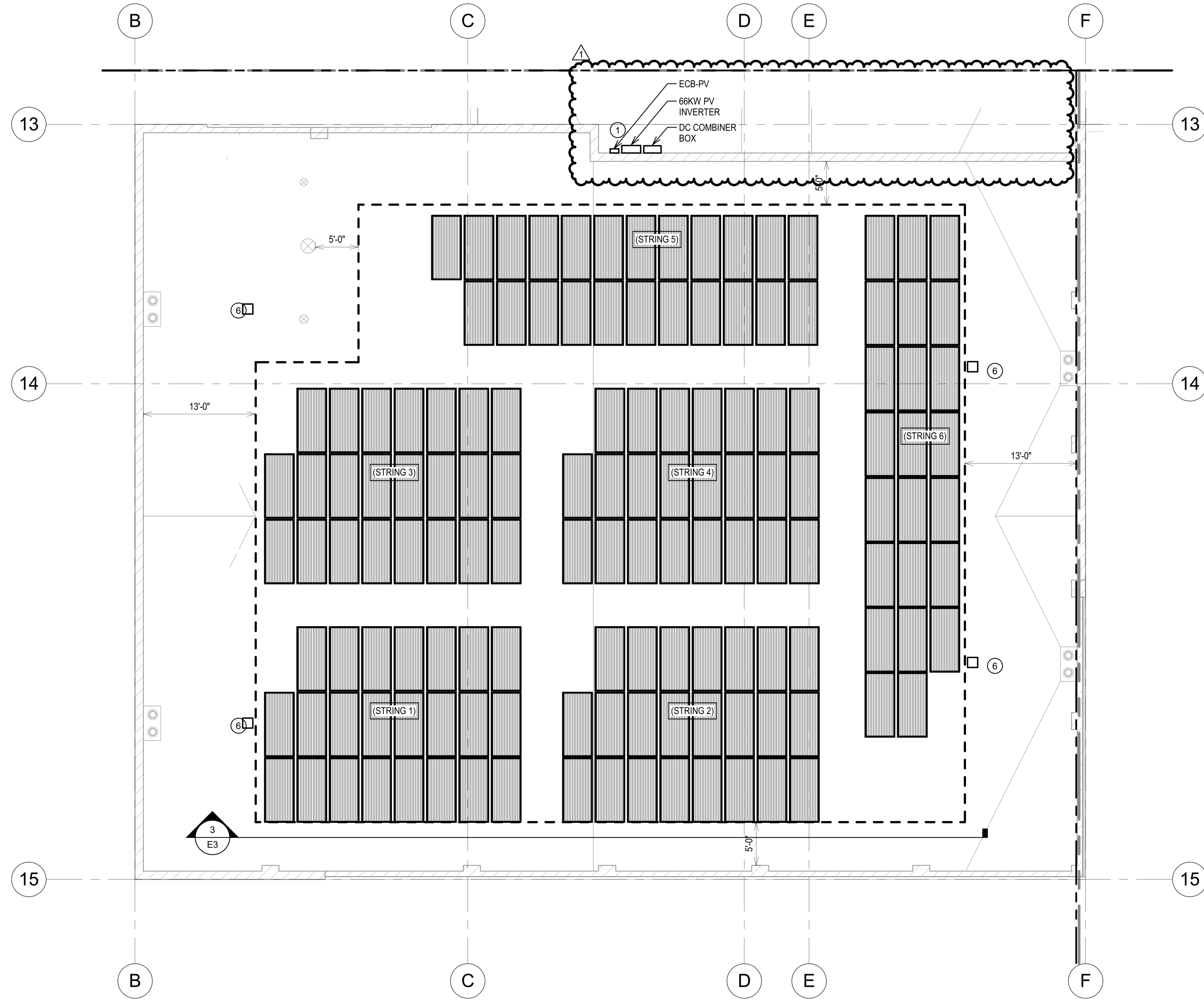
DWN BY: JEL  
CHK BY: JRE  
SCALE: AS NOTED  
DATE: 04-04-2023



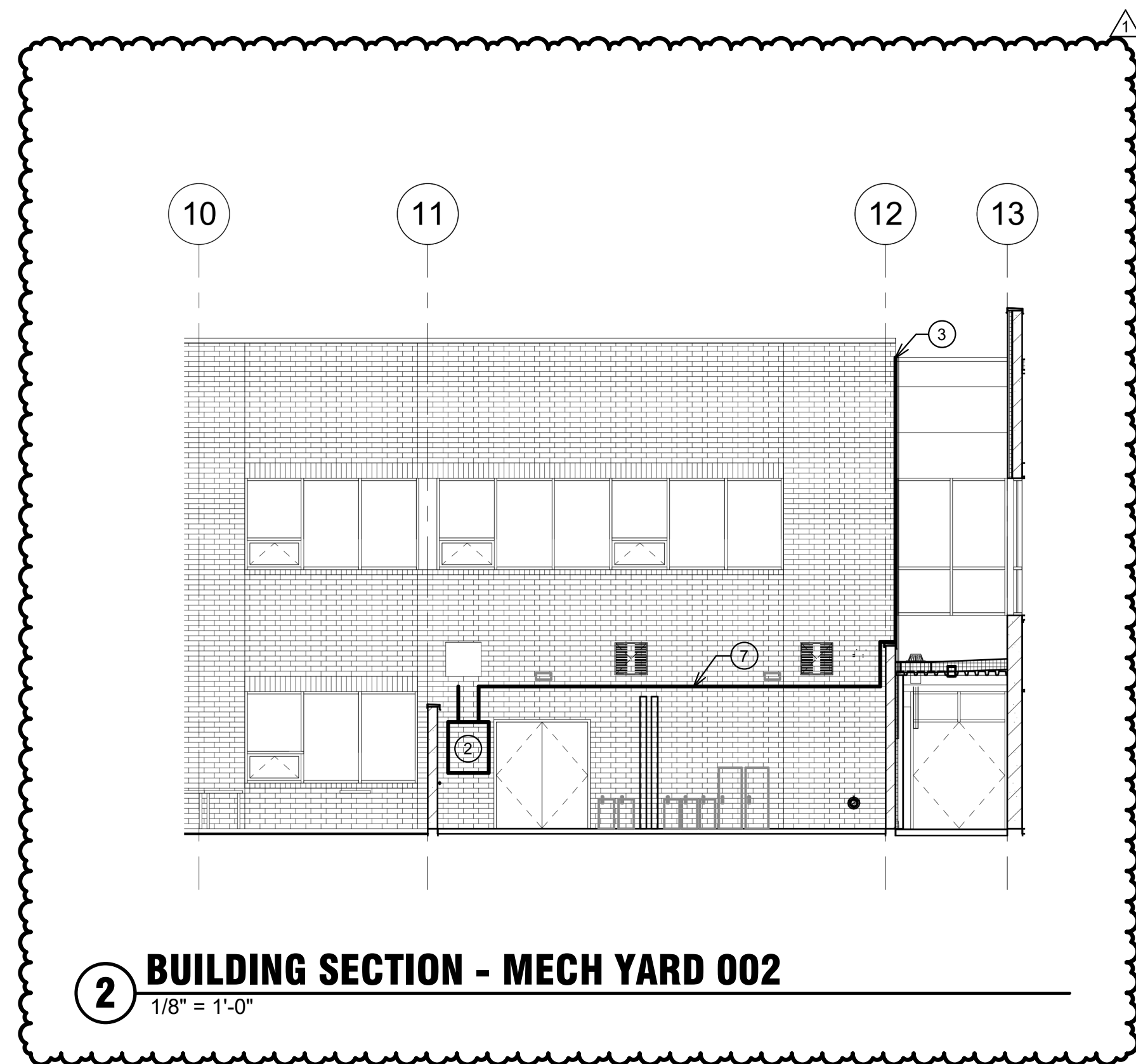
**3 LEVEL 2 - PARTIAL FLOOR PLAN - ELECTRICAL**  
1/8" = 1'-0"



**4 LEVEL 1 - PARTIAL FLOOR PLAN - ELECTRICAL**  
1/8" = 1'-0"

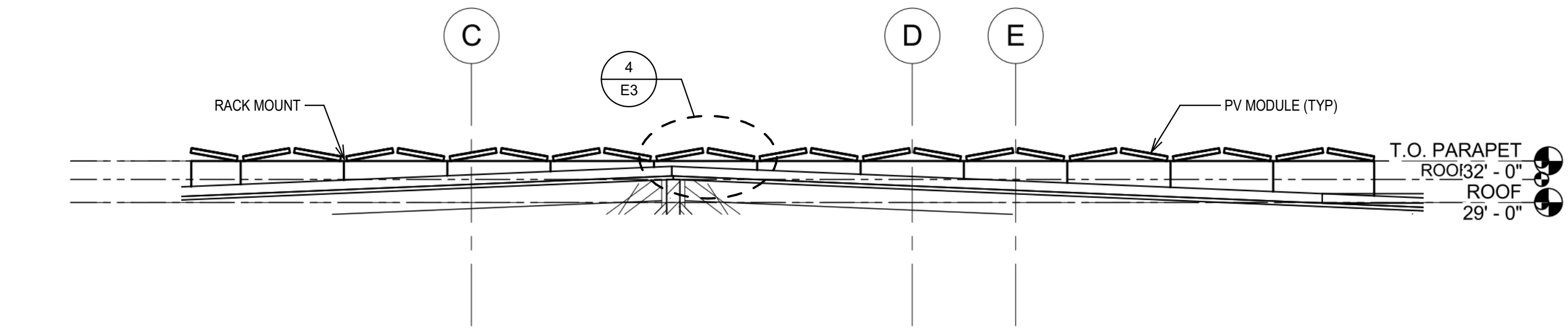


**1 ENLARGED ROOF PLAN**  
1/8" = 1'-0"

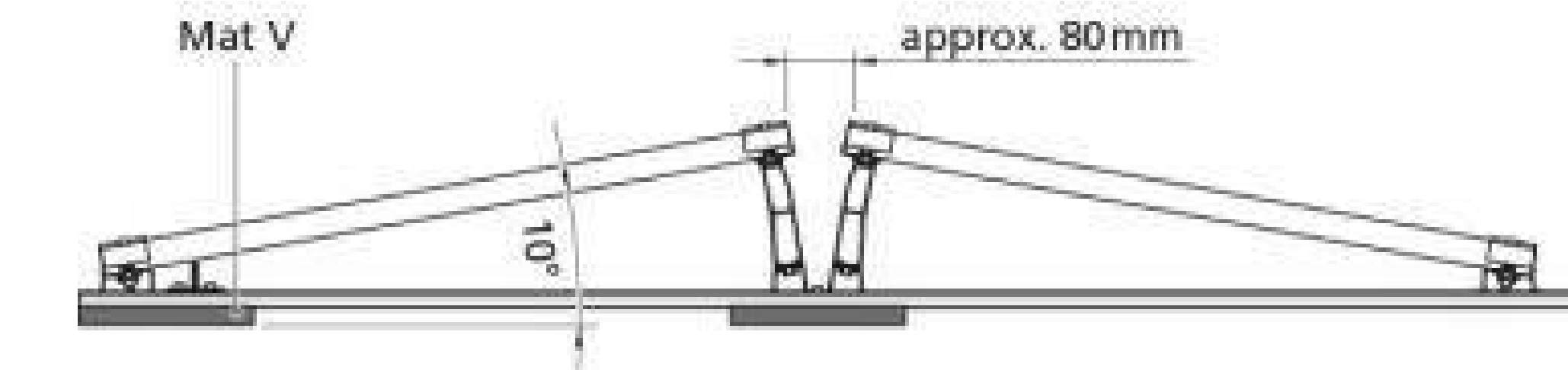


**2 BUILDING SECTION - MECH YARD 002**  
1/8" = 1'-0"

- GENERAL NOTES:**
- SOLAR PV ARRAY TO MAINTAIN MINIMUM CLEARANCE OF 5' OFF ALL PARAPET WALLS AND MECHANICAL ROOF TOP EQUIPMENT.
  - CONDUIT PATHWAYS NOT SHOWN FOR CLARITY. ROUTE CONDUITS ABOVE ROOF PER NEC STANDARDS AND TO MINIMIZE TRIPPING HAZARDS.
  - COORDINATE STRING ARRANGEMENT PRIOR TO ROUGH-IN.
  - ALL EXTERIOR FACADE CONDUIT ROUTING TO BE FIELD COORDINATED AND APPROVED BY OWNER PRIOR TO ROUGH-IN. CONDUIT TO BE ROUTED TO BE AS LEAST VISIBLE AS POSSIBLE. CONDUIT TO BE PAINTED TO MATCH EXISTING BUILDING FACADE COLOR.
- KEY NOTES:**
- PROVIDE UNISTRUT SUPPORT STRUCTURE FOR DC COMBINER BOX, PV INVERTER, AND ECB-PV EQUIPMENT LOCATED ON LOWER ROOF.
  - SOLAR PV DISCONNECT SWITCH TO BE A LOCKABLE BLADE TYPE. VISUAL OPEN. DISCONNECT SWITCH. PROVIDE SEPARATE METER BASE FOR NET METERING BY AVISTA UTILITIES. REFER TO AVISTA BLUE BOOK FOR DETAILS AND ADDITIONAL REQUIREMENTS.
  - ROUTE CONDUIT FROM ROOF ALONG EXTERIOR OF BUILDING TO MECH YARD 002. SEE SINGLE-LINE DIAGRAM ON E3 FOR ADDITIONAL DETAILS. SEE GENERAL NOTE #4.
  - SEE SINGLE-LINE DIAGRAM ON SHEET E3 FOR ADDITIONAL DETAILS.
  - PROVIDE 1" CONDUIT FOR DATA FROM INVERTER TO BOOK STORAGE 232 FOR PV ARRAY MONITORING AND DATA EXPORT. ROUTE TO EXISTING PHONE 2NB 284D 4-PORT POE+ OPTICAL NETWORK TERMINAL MOUNTED TO WALL ABOVE ACCESSIBLE CEILING SPACE FOR CONNECTION TO BUILDING NETWORK. SEE MANUFACTURER INSTALLATION INSTRUCTIONS FOR DETAILS.
  - EXISTING ROOF FALL RESTRAINT. MAINTAIN CLEARANCE AROUND RESTRAINT.
  - ROUTE CONDUITS ACROSS MECH YARD 002 WALL AS LOW AS POSSIBLE AVOIDING EXISTING EQUIPMENT.



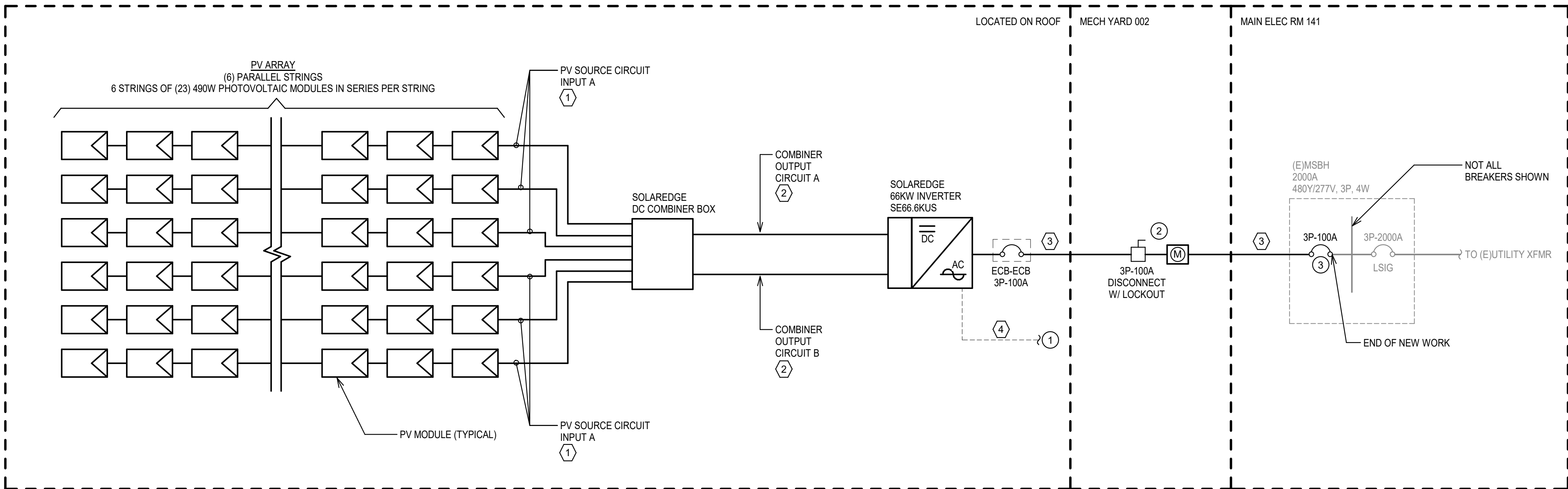
3 TYPICAL PV ARRAY - SECTION  
N.T.S.



4 TYPICAL ENLARGED PV RACKING - SECTION  
N.T.S.



5 TYPICAL ENLARGED PV RACKING - ISOMETRIC  
N.T.S.



1 PV SYSTEM - SINGLE LINE DIAGRAM  
N.T.S.

WIRE SCHEDULE		
FEEDER MARK	DESCRIPTION	CONDUIT AND WIRE
①	STRING ARRAY FEED	6#10 (USE 2) + #6G BARE CU
②	DC FEED FOR COMBINER	1-1/4" - 2H4 THWN-2 + #6G
③	THREE PHASE AC FEED	2" - 4H1 THWN-2 + #6G
④	DATA/DAS	3/4" - CAT6 ETHERNET CABLE WITH RJ45 CONNECTORS

NOTES:  
1. INDICATED WIRE SIZES ARE AWG.  
2. DATA CABLE TO BE INDOOR/OUTDOOR RATED.

INVERTER SPECIFICATION	
BASIS OF DESIGN	SOLAREDGE SE66.6KUS
MAXIMUM DC POWER	90000 KW
MAXIMUM INPUT VOLTAGE	1000 V
MINIMUM INPUT VOLTAGE	180 V
NUMBER OF INDEPENDENT MPP INPUTS/ STRING PER MPP INPUT	2/2
NOMINAL AC VOLTAGE	480/277 V
AC POWER FREQUENCY / RANGE	50 Hz, 60 Hz/-6 Hz +5 Hz
MAXIMUM OUTPUT CURRENT	80 A
EFFICIENCY (%)	98.5%
DC DISCONNECT DEVICE	INTEGRATED
DATA EXPORT/DISPLAY	SEE SPECS

PHOTOVOLTAIC MODULE SPECIFICATION	
BASIS OF DESIGN	SILFAB SIL-490 HN STC
NOMINAL POWER (Wp)	490 W
VOLTAGE @ PEAK POWER (Vmp)	45.23 V
CURRENT @ PEAK POWER (Imp)	10.83 A
OPEN CIRCUIT VOLTAGE (Voc)	53.96 V
SHORT CIRCUIT CURRENT (Iscc)	11.36 A
MAXIMUM SYSTEM VOLTAGE	1500 V

2 PV SYSTEM - BASIS OF DESIGN, SYSTEM CALCULATIONS  
N.T.S.

ESTIMATED SOLAR RADIATION AND AC ENERGY OUTPUT SUMMARY (BASE BID)		
MONTH	SOLAR RADIATION (kWh / m <sup>2</sup> / DAY)	AC ENERGY (kWh)
JAN	1.04	1786
FEB	2.02	3076
MAR	3.15	5524
APR	4.81	7667
MAY	6.15	10,024
JUN	6.50	10,060
JUL	7.37	11,228
AUG	6.27	9551
SEP	4.53	6838
OCT	2.61	4236
NOV	1.22	1950
DEC	0.89	1443
AVERAGE	3.88	6115
TOTAL FOR YEAR	46.56	73,363

NEC SAMPLE CALCULATION:

- ADJUSTING Voc (NEC ARTICLE 690.7)
  - MINIMUM HISTORICAL TEMPERATURE = -17 °C
  - PV MODULE VOLTAGE TEMPERATURE COEFFICIENT 8/(%°C) = -0.28
  - PV MODULE OPEN CIRCUIT VOLTAGE (Voc) = 53.96 V
  - TEMPERATURE CORRECTION FACTOR (α) = 1.18 PER NEC TABLE 690.7
  - ADJUSTED Voc = α x Voc = 1.18 X 53.96 = 63.67 V DC
- STRING ANALYSIS
  - MAXIMUM NUMBER OF MODULES IN SERIES = MAXIMUM ALLOWABLE SYSTEM VOLTAGE / ADJUSTED Voc = 1500 / 63.67 = 23.56
  - USE MAXIMUM OF (23) MODULES IN SERIES PER STRING
  - a. NUMBER OF PV MODULES ON ROOF = 138 MODULES
  - b. PROVIDE (2) SUB-ARRAYS
    - SUB-ARRAY (A): (3) PARALLEL STRINGS OF (23) MODULES
    - SUB-ARRAY (B): (3) PARALLEL STRINGS OF (23) MODULES
- PV SOURCE CIRCUITS
  - PV MODULE SHORT CIRCUIT CURRENT (Iscc) = 11.36 A
  - NUMBER OF MODULES WIRED IN PARALLEL PER SOURCE CIRCUIT (STRING) = 1
  - MAXIMUM PV SOURCE CIRCUIT CURRENT (Imax) (NEC ARTICLE 690.8(A)(1)) = NUMBER OF MODULES WIRED IN PARALLEL PER STRING x Iscc x 1.25 = 1 x 11.36 x 1.25 = 14.2 A
  - OC PD SIZE / SOURCE CIRCUIT = Imax x 1.25 (NEC ARTICLE 690.8(B)(1)(a)) = 14.2 x 1.25 = 17.75 A
  - CONDUCTOR AMPACITY / SOURCE CIRCUIT = Imax x 1.25 (NEC ARTICLE 690.8(B)(2)) = 14.2 x 1.25 = 17.75 A
  - PROVIDE #10AWG USE-2 CABLE, 90 °C RATED
  - MAXIMUM AMBIENT TEMPERATURE = 38 °C
  - TEMPERATURE CORRECTION FACTOR FOR 38 °C = 0.91 (NEC TABLE 690.31(E))
  - CORRECTED AMPACITY = 30 x 0.91 = 27.3 A > 17.75 A
- INVERTER OUTPUT CIRCUIT
  - OC PD FOR 66.6 KW INVERTER OUTPUT CIRCUIT = INVERTER AC OUTPUT CURRENT x 1.25 (NEC ARTICLE 690.8(B)(1)(a)) = 80 A x 1.25 = 100 A
  - PROVIDE 100 A BACKFEED RATED CIRCUIT BREAKER

GENERAL NOTES:

- SCOPE OF WORK IS INDICATED IN SINGLE LINE DIAGRAM. CONTRACTOR IS RESPONSIBLE FOR ALL WORK DEPICTED IN DRAWINGS.
  - THE SYSTEM SHALL INCLUDE A RAPID SHUTDOWN SYSTEM PER NEC 690.12. SOLAREEDGE 66.6LUS INVERTER PROVIDED WITH INTEGRAL RAPID SHUTDOWN.
  - CONDUIT PATHWAYS NOT SHOWN FOR CLARITY. ROUTE CONDUITS ABOVE ROOF PER NEC STANDARDS AND TO MINIMIZE TRIPPING HAZARDS.
  - ALL PV ARRAYS MUST BE BONDED TOGETHER WITH AN EQUIPMENT GROUND CONDUCTOR.
  - ALL EXTERIOR FACADE CONDUIT ROUTING TO BE FIELD COORDINATED AND APPROVED BY OWNER PRIOR TO ROUGH-IN. CONDUIT TO BE ROUTED TO BE AS LEAST VISIBLE AS POSSIBLE. CONDUIT TO BE PAINTED TO MATCH EXISTING BUILDING FACADE COLOR.
- KEY NOTES:
- PROVIDE 1" CONDUIT FOR DATA FROM INVERTER TO BOOK STORAGE 232 FOR PV ARRAY MONITORING AND DATA EXPORT. ROUTE TO EXISTING PHONE 2ND 2804D 4-PORT POE+ OPTICAL NETWORK TERMINAL MOUNTED TO WALL ABOVE ACCESSIBLE CEILING SPACE FOR CONNECTION TO BUILDING NETWORK. SEE MANUFACTURER INSTALLATION INSTRUCTIONS FOR DETAILS.
  - SOLAR PV DISCONNECT SWITCH TO BE A LOCKABLE, BLADE TYPE, VISUAL OPEN, DISCONNECT SWITCH. PROVIDE SEPARATE METER BASE FOR NET METERING BY AVISTA UTILITIES. REFER TO AVISTA BLUE BOOK FOR DETAILS AND ADDITIONAL REQUIREMENTS.
  - PROVIDE NEW 3P-100A CIRCUIT BREAKER IN EXISTING SPACE IN (E)MSBH.



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DETAILS - ELECTRICAL

DWN BY:	JEL
CHK BY:	JRE
SCALE:	AS NOTED
DATE:	04-04-2023