

# 514205: 23.625 kWp

## J.P. MORGAN CHASE

### 6271 Perimeter Drive

### DUBLIN, OH 43017-3289

### ASSESSOR'S #: 273-005567

DRAWING INDEX	
DRAWING NUMBER	SHEET TITLE
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G21	LANDSCAPE PLAN
G22	EXTERIOR ELEVATIONS
E10	ELECTRICAL ROOF PLAN
E20	THREE LINE DIAGRAM & BILL OF MATERIALS
E21	ONE LINE DIAGRAM
E30	PLACARDS
REQUIRED STANDARD DRAWING INDEX	
DRAWING NUMBER	SHEET TITLE
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SG20	GENERAL NOTES
SG21	GENERAL NOTES
SS20	PITCHED ROOF CONNECTION DETAILS
SS21	PITCHED ROOF CONNECTION DETAILS
SE10	ELECTRICAL DETAILS
SE12	ELECTRICAL DETAILS NEC 2017
SE20	METERING AND SURGE PROTECTION DETAILS 3-PHASE
SR10	THREE PHASE SYSTEM CUTSHEETS
SR26	ELECTRICAL DATA CUTSHEETS
SR30	STRUCTURAL COMPONENT CUTSHEETS

**AUTHORITIES HAVING JURISDICTION**  
 BUILDING: CITY OF DUBLIN  
 ZONING: CITY OF DUBLIN  
 UTILITY: AEP/24418-COLUMBUS SOUTHERN POWER

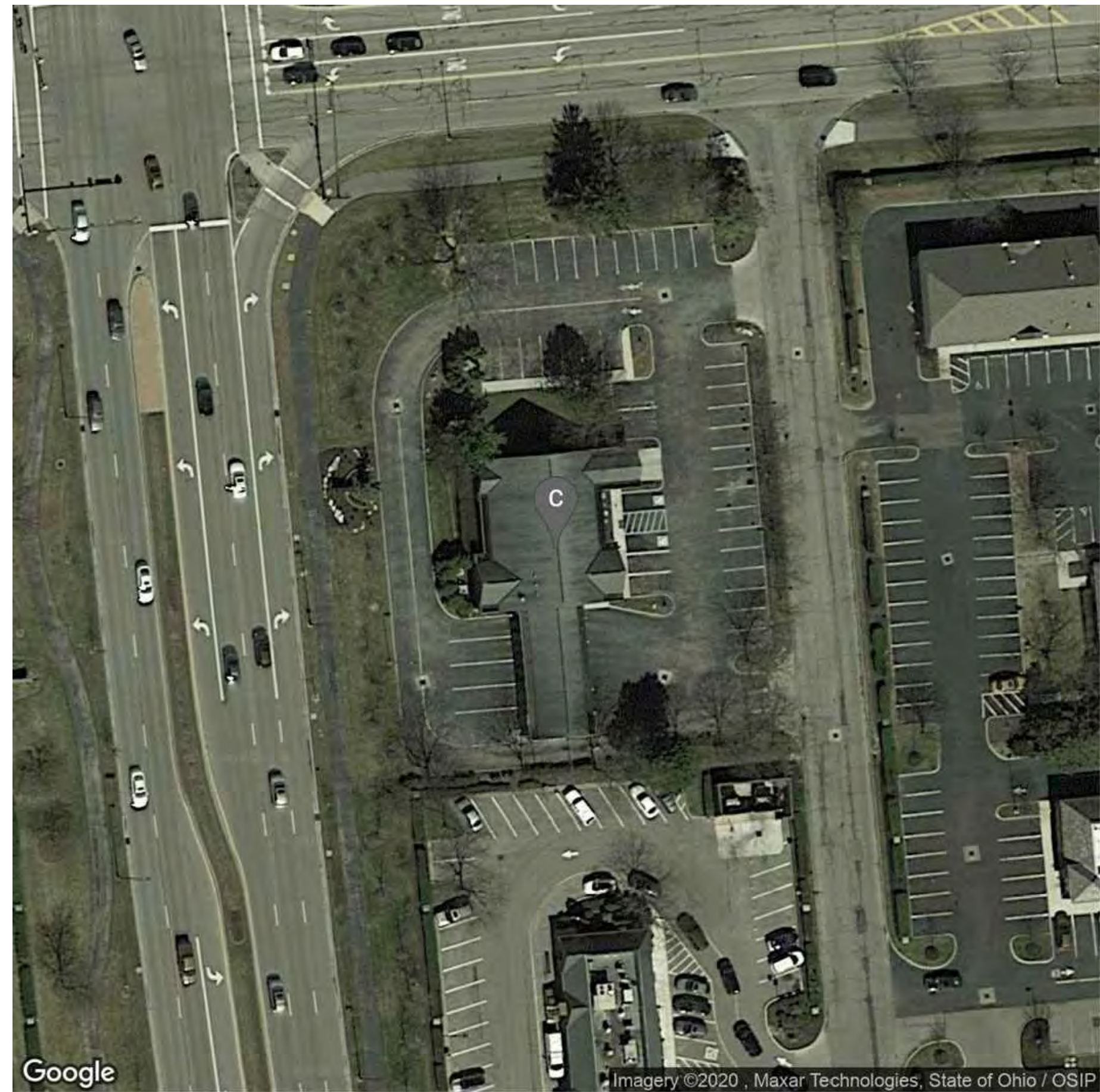
**DESIGN SPECIFICATIONS**  
 OCCUPANCY: B  
 CONSTRUCTION: COMMERCIAL / INDUSTRIAL  
 GROUND SNOW LOAD: 20 PSF  
 WIND SPEED: 108 MPH

**PROJECT INFORMATION**

**DESIGN SPECIFICATIONS**  
 RISK CATEGORY: II  
 SITE CLASS: D (DEFAULT)  
 SEISMIC IMPORTANCE FACTOR: 1.0  
 SEISMIC DESIGN CATEGORY: B  
 SS: 0.122  
 S1: 0.06  
 SDS: 0.131  
 SD1: 0.096  
 ANALYSIS PROCEDURE: NONSTRUCTURAL COMPONENTS

**DESIGN CODES & STANDARDS**  
 BUILDING: 2018 IBC (SEE NOTE 1)  
 ELECTRICAL: 2017 NEC  
 FIRE: 2018 IFC (SEE NOTE 2)

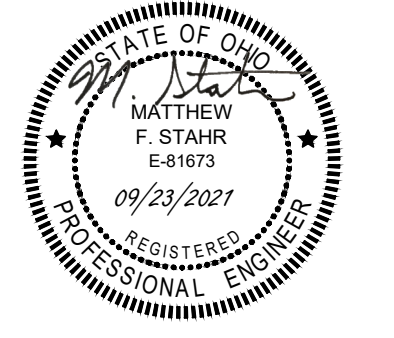
**NOTE 1:** IBC 2018 REFERENCES THE MOST CURRENT DESIGN PRACTICES RELATED TO STRUCTURAL ANALYSIS AND DESIGN OF ROOFTOP SOLAR MODULE SYSTEMS. ANALYSIS AND DESIGN OF ROOFTOP SOLAR MODULE SYSTEMS WAS PERFORMED IN ACCORDANCE WITH IBC 2018 AND MEETS 2017 OHIO BUILDING CODE REQUIREMENTS.  
**NOTE 2:** IFC 2018 REFERENCES THE MOST CURRENT DESIGN PRACTICES RELATED TO DESIGN OF ROOFTOP SOLAR MODULE SYSTEMS. ANALYSIS AND DESIGN OF ROOFTOP SOLAR MODULE SYSTEMS WAS PERFORMED IN ACCORDANCE WITH IFC 2018 AND MEETS 2017 OHIO FIRE CODE REQUIREMENTS.



**01 AERIAL PHOTO**  
NOT TO SCALE

**02 VICINITY MAP**  
NOT TO SCALE

**ISSUED FOR PERMITTING**  
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NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
3	23/SEP/21	ISSUED FOR PERMITTING - REVISED PER AHJ AND UTILITY COMMENTS	WS	WS	SAS	MFS	MFS
2	25/MAR/21	ISSUED FOR PERMITTING - REVISED PER UTILITY COMMENTS	SSM	KGf	MFS	MFS	MFS
1	14/JAN/21	ISSUED FOR PERMITTING - REVISED PER UTILITY COMMENTS	SSM	KGf	MFS	MFS	MFS
0	13/AUG/20	ISSUED FOR PERMITTING	SSM	KGf	MFS	MFS	MFS

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF OHIO.	
SIGNED	MATTHEW F. STAHR
DATE	13/AUG/20 REG. NO. PE-81673

<b>BLACK &amp; VEATCH</b>	
DESIGNER	DRAWN
KGf	SSM
CHECKED	DATE
MFS	13/AUG/20

J.P. MORGAN CHASE 6271 PERIMETER DRIVE, DUBLIN, OH 43017-3289		PROJECT DRAWING NUMBER OH-514205-G10	REV 3
COVER PAGE		CODE AREA	

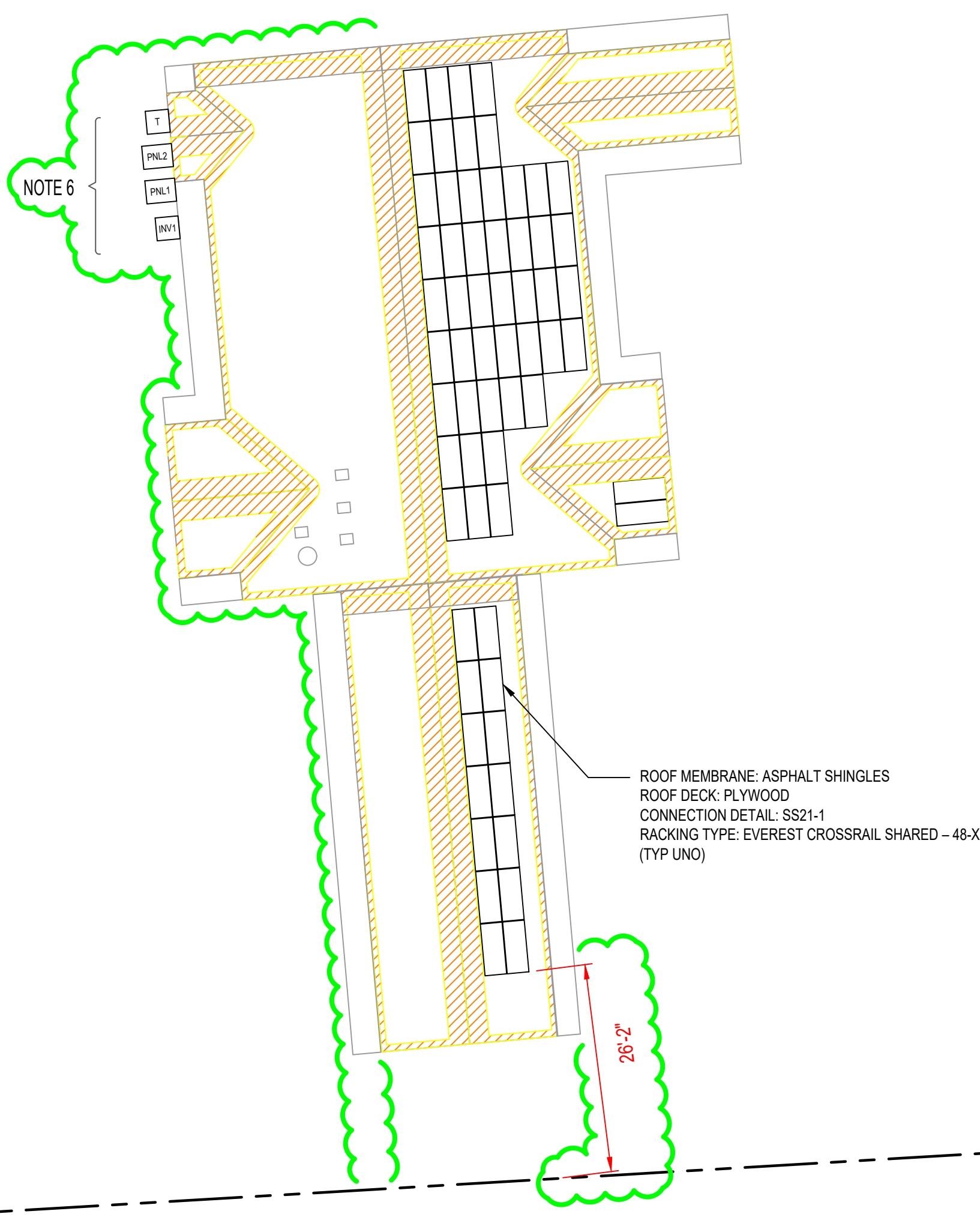
ROOF DESIGN CLEARANCE TABLE (SEE LEGEND FOR APPLICABLE HATCH)	
ITEM	MINIMUM CLEARANCE DIMENSIONS
FLAT ROOF	4'-0"
PITCHED ROOF: ALONG RIDGE	6'-0" (3'-0" MINIMUM EACH SIDE)
PITCHED ROOF: ALONG HIPS/VALLEY	3'-0" (18" MINIMUM EACH SIDE)
PITCHED ROOF: ALONG EAVE/FREE EDGE	0'-10"
PITCHED ROOF: OTHER CLEARANCE ON ROOF PLANE	3'-0"

NOTES:

1. THE PROVISIONS OF THE INTERNATIONAL FIRE CODE 2018, SEC. 1204.2.1 PERTAINING TO GROUP R-3 BUILDINGS (ONE OR TWO FAMILY DWELLINGS) SPECIFIES SETBACKS AND PATHWAYS FOR PITCHED ROOFS. EXCEPTION TO SEC. 1204.3 STATES THAT IF THE FIRE CODE OFFICIAL DETERMINES THAT THE ROOF CONFIGURATION FOR A BUILDING OTHER THAN GROUP R-3 IS SIMILAR TO THAT OF A GROUP R-3 OCCUPANCY, THE RESIDENTIAL ACCESS REQUIREMENTS IN SEC. 1204.2.1 ARE A SUITABLE ALTERNATIVE. THEREFORE, CONSIDERING FIREFIGHTING OPERATIONS, BUILDINGS WITH A PITCHED ROOF HAVE BEEN CONSIDERED SIMILAR TO THAT OF A GROUP R-3 BUILDING AND THE PROVISIONS OF SEC. 1204.2.1 WERE USED.

ROOF CONNECTION DETAIL TABLE					
DRAWING	DETAIL	ROOF SLOPE	FRAMING TYPE	ROOF TYPE	CONNECTION LOCATION NOTES
SS10	1	FLAT	ROOF DECK	VARIES SEE SITE PLAN	SEE RACKING SITE SPECIFIC DRAWING PACKAGE IF APPLICABLE.
SS10	2	FLAT	ROOF DECK	LOOSE GRAVEL	
SS21	1	PITCHED	WOOD MEMBERS	ASPHALT SHINGLE	SEE DRAWING SS20
SS21	2	PITCHED	ROOF DECK	SINGLE-PLY MEMBRANE	SEE DRAWING SS20
SS21	3	PITCHED	NA	METAL STANDING SEAM	SEE DRAWING SS20
SS21	4	PITCHED	WOOD MEMBERS	CORRUGATED METAL	SEE DRAWING SS20
SS21	5	PITCHED	STEEL MEMBERS	ASPHALT SHINGLE	SEE DRAWING SS20
SS22	1	PITCHED	WOOD MEMBERS	TILE	SEE DRAWING SS20
SS22	2	PITCHED	WOOD MEMBERS	TILE	SEE DRAWING SS20
SS22	3	PITCHED	WOOD MEMBERS	TILE	SEE DRAWING SS20
SS22	4	PITCHED	WOOD MEMBERS	TILE	SEE DRAWING SS20
SS22	5	PITCHED	WOOD MEMBERS	TILE	SEE DRAWING SS20

NOTES:  
 1. ROOFS WITH SLOPE LESS THAN 7 DEGREES ARE CONSIDERED "FLAT". ROOFS WITH SLOPE GREATER THAN 7 DEGREES ARE CONSIDERED "PITCHED". REFER TO SITE SPECIFIC DWG E10 FOR ROOF SLOPE.  
 2. FRAMING TYPE AND ROOF TYPE SHALL BE VERIFIED ON SITE PRIOR TO INSTALLATION.



- LEGEND:
- [Hatched Box] FLAT ROOF CLEARANCE AREA
  - [Hatched Box] PITCHED ROOF CLEARANCE AREA
  - (E) EXISTING
  - (E) PROPERTY LINE

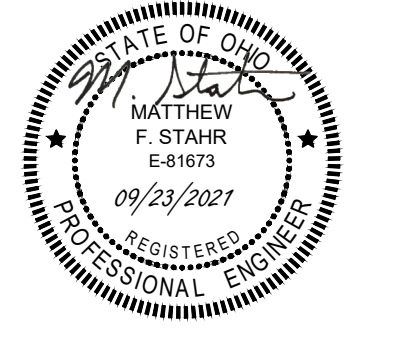
- NOTES:
- CONTRACTORS SHALL FIELD VERIFY ALL DIMENSIONS AND ROOF SLOPES AND COORDINATE WITH ALL REFERENCE DRAWINGS AS REQUIRED. IF THE CONTRACTOR ENCOUNTERS CONDITIONS OTHER THAN WHAT IS SHOWN ON THE DRAWINGS, CONTRACTOR SHALL NOTIFY THE ENGINEER OF RECORD PRIOR TO START OF CONSTRUCTION.
  - SEE SHEET SG20 AND SG21 FOR GENERAL NOTES, LEGEND AND SYMBOLS.
  - EVEREST RACKING RAIL MAXIMUM ALLOWABLE SPAN SHALL BE 4'-0" UNLESS NOTED OTHERWISE.
  - OBSTRUCTIONS IN CLEARANCE AREA PATHWAYS SHALL BE KEPT TO A MINIMUM.
  - SOLAR ASSEMBLY DOES NOT INCREASE EXISTING BUILDING HEIGHT FOR PITCHED ROOFS. FOR FLAT ROOFS, SOLAR ASSEMBLY EXTENDS 11 3/8" MAXIMUM ABOVE ROOF SURFACE WITH UNIRAC RMDT RACKING AND EXTENDS 1'-1 7/8" MAXIMUM ABOVE ROOF SURFACE WITH IRONRIDGE BX RACKING.
  - SEE G21 FOR LANDSCAPING DETAILS.

01 SITE PLAN  
 NOT TO SCALE

PARCEL DATA FROM LANDGRID.COM

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3	23/SEP/21	ISSUED FOR PERMITTING - REVISED PER AHJ AND UTILITY COMMENTS	WS	WS	SAS	MFS	MFS	I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF OHIO  MATTHEW F. STAHR 13/AUG/20 REG. NO. PE-81673	KGf	SSM	MFS	13/AUG/20	J.P. MORGAN CHASE 6271 PERIMETER DRIVE, DUBLIN, OH 43017-3289	OH-514205-G20	3		
2	25/MAR/21	ISSUED FOR PERMITTING - REVISED PER UTILITY COMMENTS	SSM	KGf	MFS	MFS	SSM		KGf	SSM	MFS						
1	14/JAN/21	ISSUED FOR PERMITTING - REVISED PER UTILITY COMMENTS	SSM	KGf	MFS	MFS	SSM		KGf	SSM	MFS						
0	13/AUG/20	ISSUED FOR PERMITTING	SSM	KGf	MFS	MFS	SSM		KGf	SSM	MFS						
			DRN	DES	CHK	PDE	APP										

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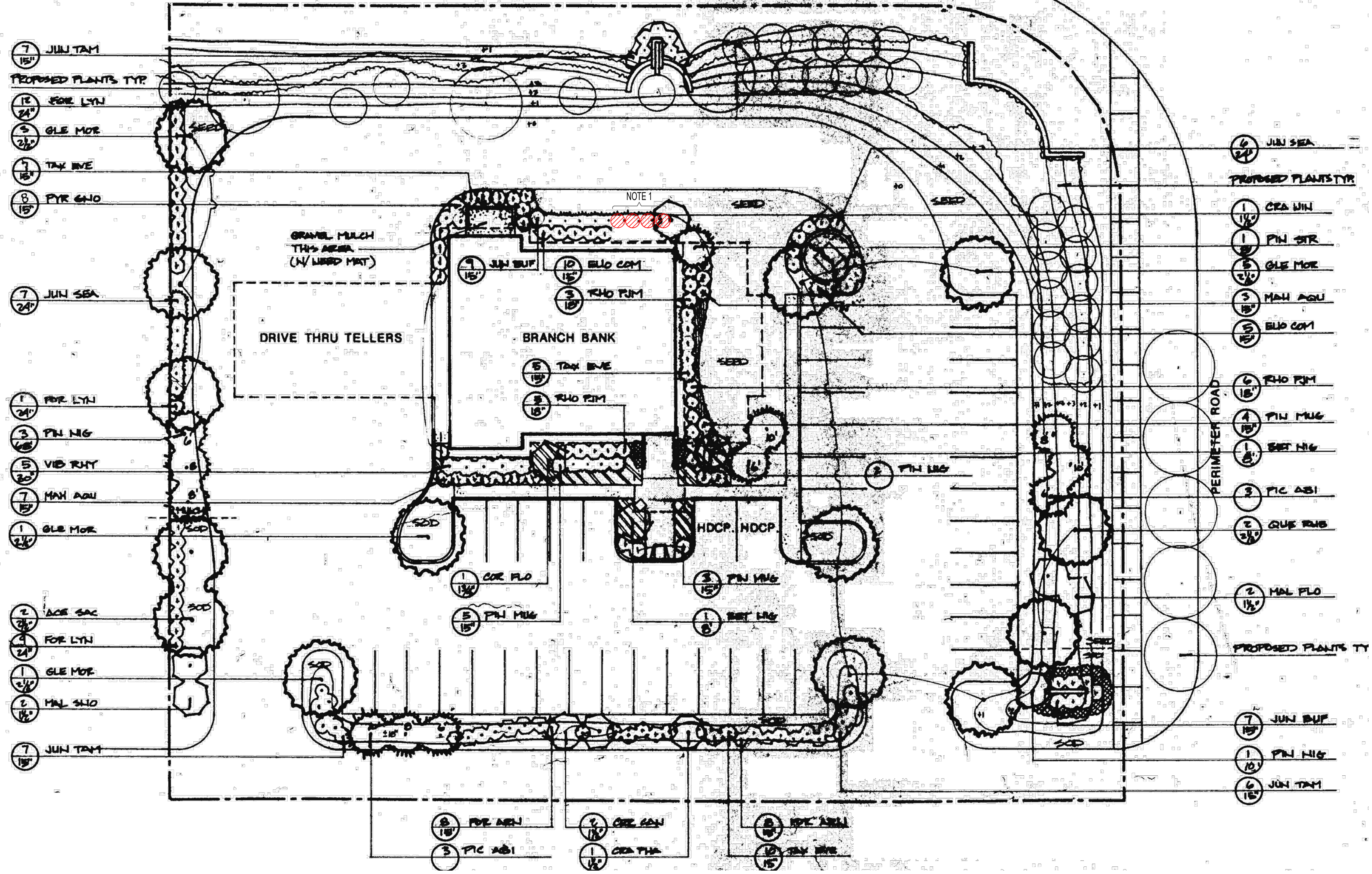
DESIGNER: KGf DRAWN: SSM  
 CHECKED: MFS DATE: 13/AUG/20

J.P. MORGAN CHASE  
 6271 PERIMETER DRIVE, DUBLIN, OH 43017-3289

SITE PLAN

PROJECT: J.P. MORGAN CHASE  
 DRAWING NUMBER: OH-514205-G20  
 REV: 3

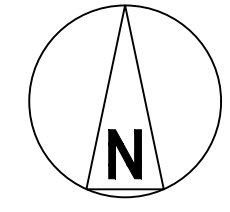
AVERY ROAD



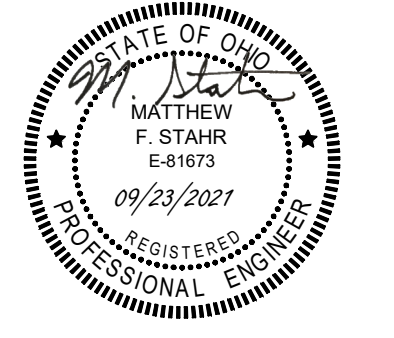
LEGEND:  
 NEW PLANTS

NOTES:  
 1. REMOVE EXISTING LANDSCAPING AND REPLACE WITH (4) NEW PLANTS THAT SHALL BE PLANTED A DISTANCE AWAY FROM THE BUILDING TO ALLOW FOR PROPER EQUIPMENT WORKING CLEARANCES AND STILL SCREEN EQUIPMENT. PLANTS SHALL BE THE SAME AND ONE OF THE FOLLOWING OPTIONS BASED ON AVAILABILITY:  
 ARBORVITAE (THUJA OCCIDENTALIS): EMERALD GREEN (EMERA), NIGRA, JANED GOLD, TECHNY  
 JUNIPER (JUNIPERUS CHINENSIS): BLUE POINT, FAIRVIEW, SPARTAN, MT. BATTEN  
 JUNIPER (JUNIPERUS VIRGINIANA): TAYLOR  
 PLANTS SHALL BE A MINIMUM 6 FEET TALL.

01 LANDSCAPE PLAN  
 1"=20'-0"



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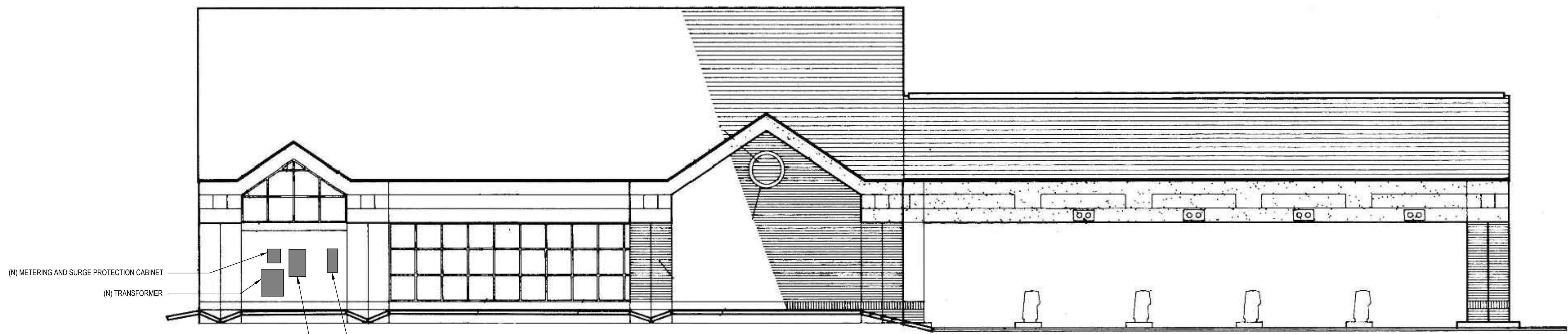
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0	13/AUG/20	ISSUED FOR PERMITTING	SSM	KGf	MFS	MFS	MFS

DESIGNER	KGf
CHECKED	MFS
DRAWN	SSM
DATE	23/SEP/21

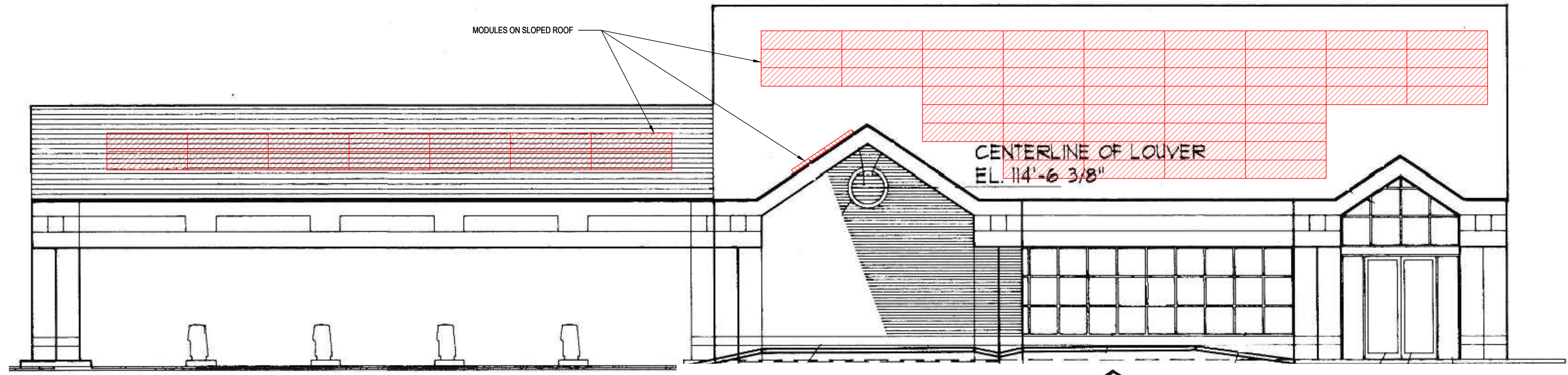
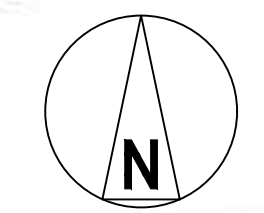
J.P. MORGAN CHASE  
 6271 PERIMETER DRIVE, DUBLIN, OH 43017-3289  
 LANDSCAPE PLAN

PROJECT	DRAWING NUMBER	REV
	OH-514205-G21	3
CODE	AREA	

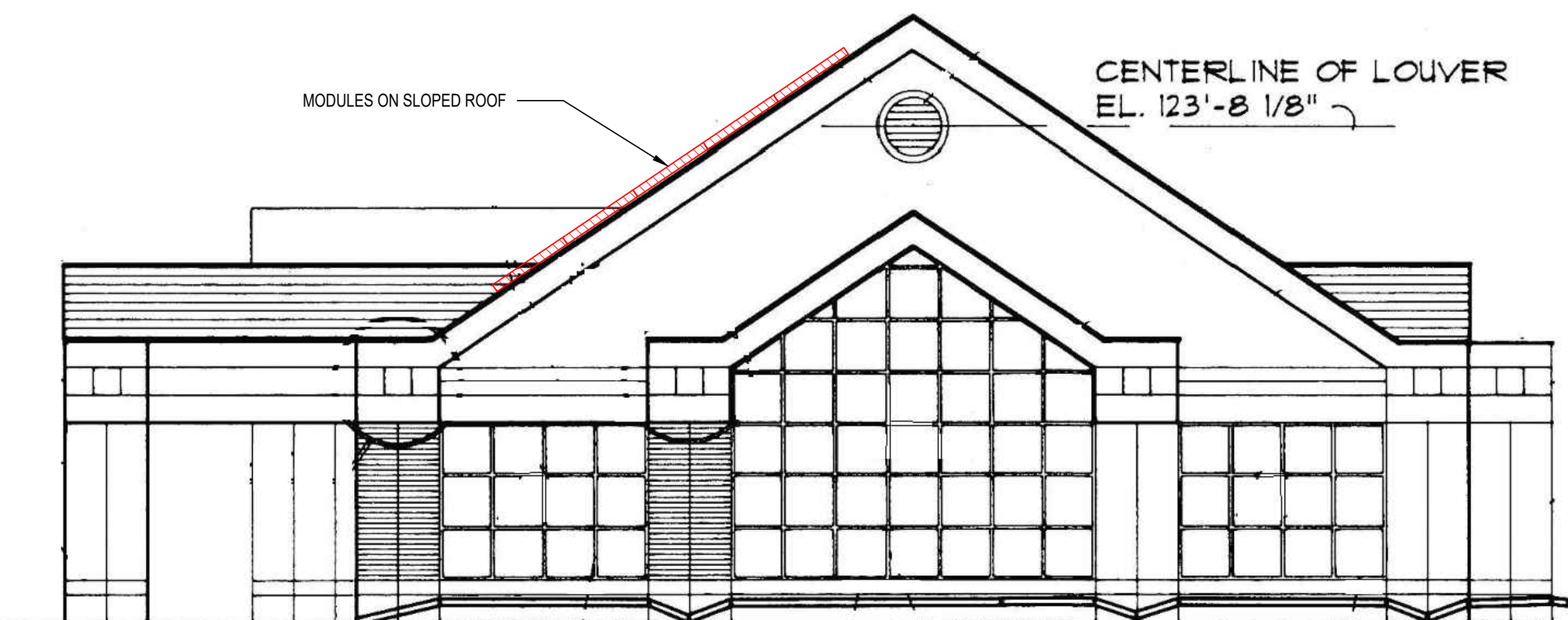
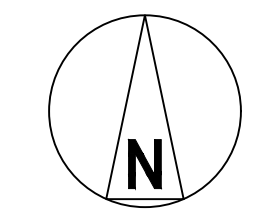
A  
B  
C  
D  
E  
F



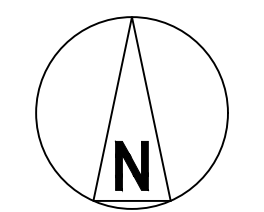
01 WEST ELEVATION PLAN  
NOT TO SCALE



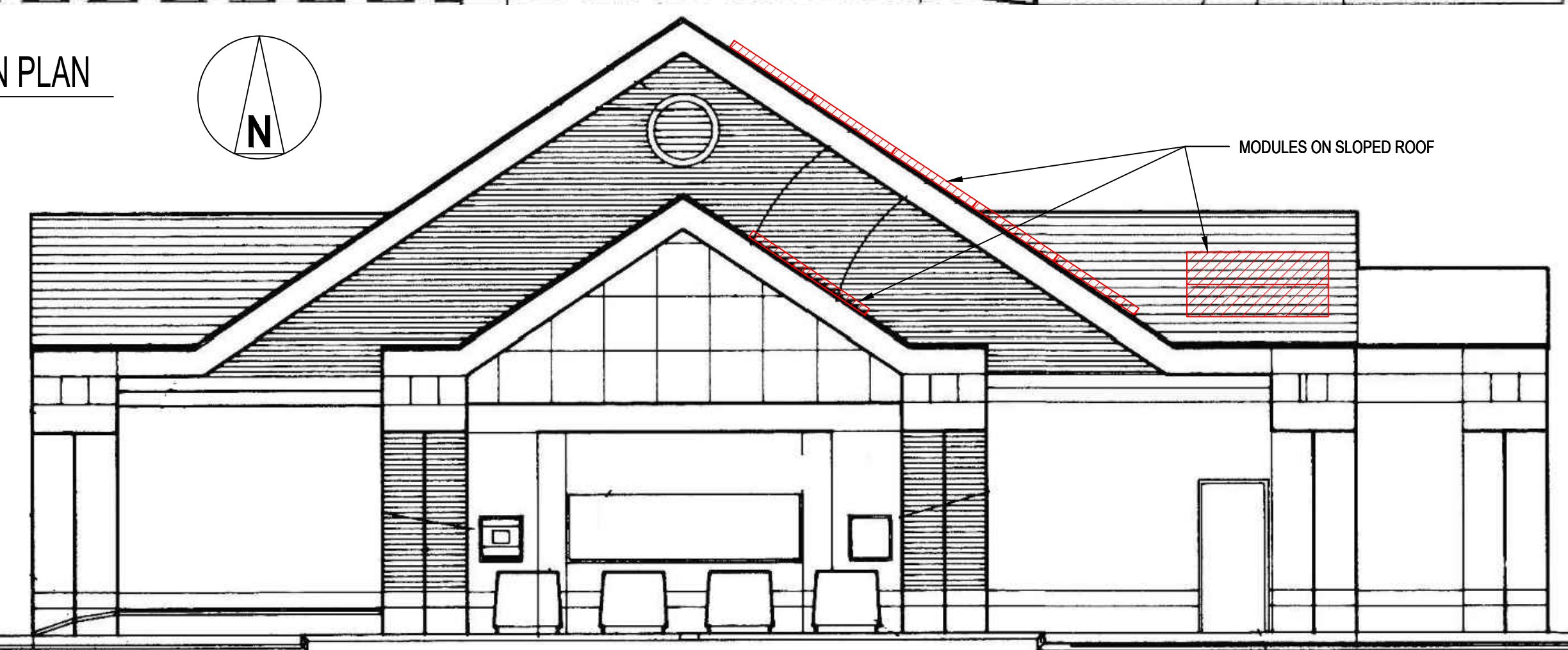
02 EAST ELEVATION PLAN  
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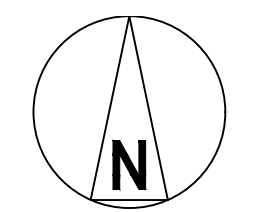
03 NORTH ELEVATION PLAN  
NOT TO SCALE



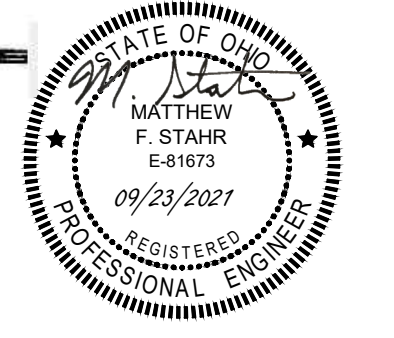
FF EL. 100'-0"



03 SOUTH ELEVATION PLAN  
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 SIGNED: MATTHEW F. STAHR  
 DATE: 23/SEP/21 REG. NO. PE-81673

**BLACK & VEATCH**

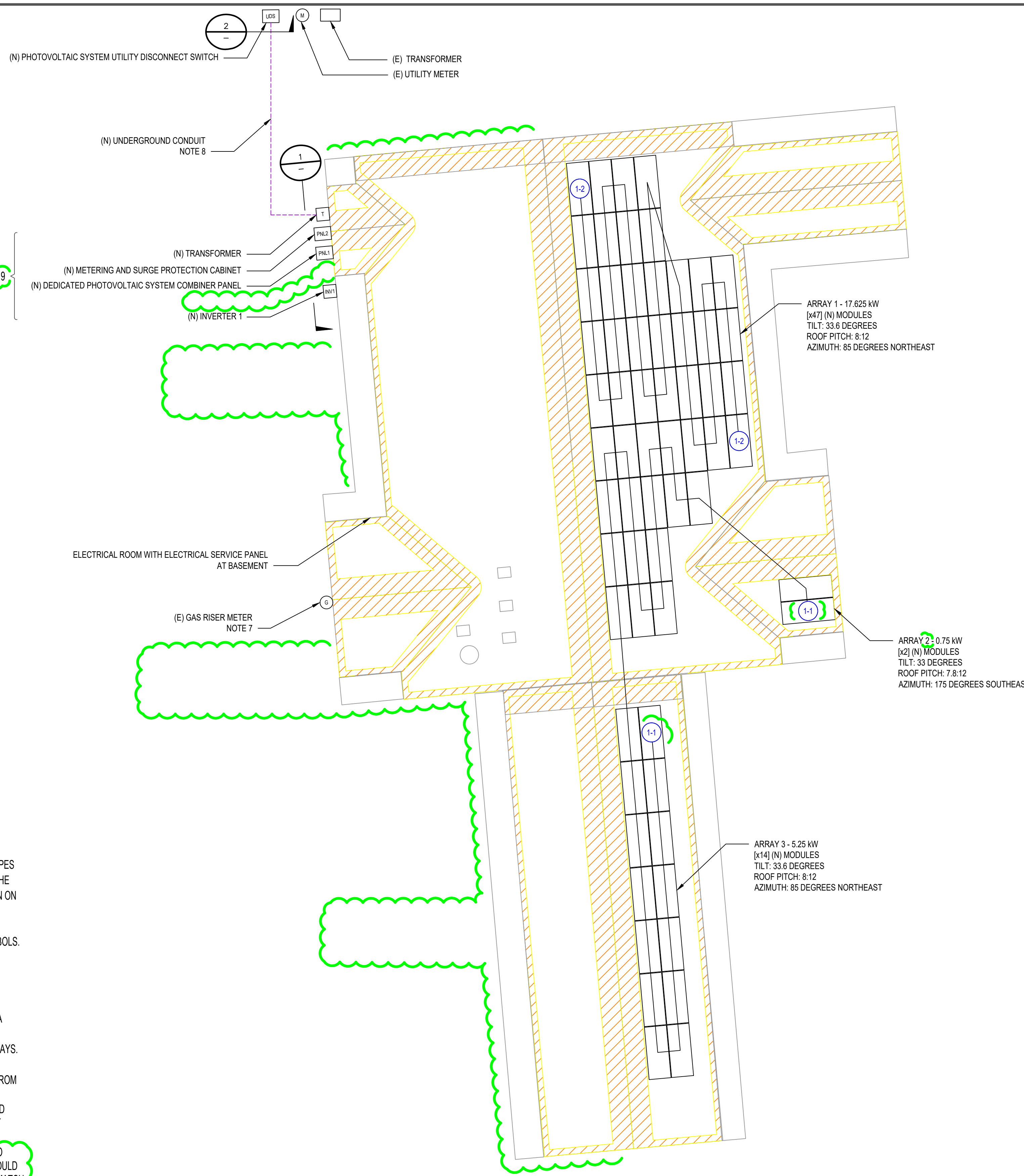
DESIGNER: KGF DRAWN: SSM  
 CHECKED: MFS DATE: 23/SEP/21

J.P. MORGAN CHASE  
 6271 PERIMETER DRIVE, DUBLIN, OH 43017-3289

EXTERIOR ELEVATION PLAN

PROJECT	DRAWING NUMBER	REV
6271 PERIMETER DRIVE, DUBLIN, OH 43017-3289	OH-514205-G22	3

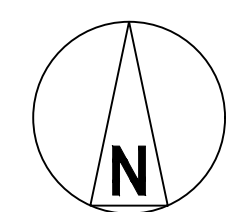
ROOF DESIGN CLEARANCE TABLE (SEE LEGEND FOR APPLICABLE HATCH)	
ITEM	MINIMUM CLEARANCE DIMENSIONS
FLAT ROOF	4'-0"
PITCHED ROOF: ALONG RIDGE	6'-0" (3'-0" MINIMUM EACH SIDE)
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PITCHED ROOF: OTHER CLEARANCE ON ROOF PLANE	3'-0"



- LEGEND:
- FLAT ROOF CLEARANCE AREA
  - PITCHED ROOF CLEARANCE AREA
  - (E) EXISTING

- NOTES:
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  - SEE SHEET SG20 AND SG21 FOR GENERAL NOTES, LEGEND AND SYMBOLS.
  - SEE SHEETS SE10 AND SE11 FOR ELECTRICAL DETAILS.
  - FOR THREE PHASE SYSTEMS, MODULES OF SIMILAR ORIENTATION SHALL BE PAIRED WITH ONE OPTIMIZER WHERE POSSIBLE.
  - OBSTRUCTIONS IN CLEARANCE AREA PATHWAYS SHALL BE KEPT TO A MINIMUM. WHERE CONDUIT INTERSECTS CLEARANCE AREA PATHWAYS, CONDUIT SHALL BE PLACED TRANSVERSE TO CLEARANCE AREA PATHWAYS.
  - SEE G21 FOR LANDSCAPING DETAILS.
  - SUBCONTRACTOR SHALL MAINTAIN MINIMUM 3' RADIAL CLEARANCE FROM GAS RISER METER.
  - SUBCONTRACTOR SHALL HYDROVAC TO INSTALL NEW UNDERGROUND CONDUIT RUN. EXACT ROUTING SHALL BE DETERMINED IN THE FIELD BY SUBCONTRACTOR.
  - SUBCONTRACTOR SHALL PAINT CONDUIT, IF VISIBLE FROM GRADE, TO MATCH THE BUILDING SURFACE IT IS ATTACHED TO (EAVE PORTION SHOULD BE PAINTED TO MATCH EAVE; BRICK PORTION SHOULD BE PAINTED TO MATCH BRICK). SUBCONTRACTOR SHALL PAINT TRANSFORMER ENCLOSURE, METERING AND SURGE PROTECTION CABINET, DEDICATED PHOTOVOLTAIC SYSTEM COMBINER PANEL ENCLOSURE, IF VISIBLE FROM GRADE, TO MATCH THE BUILDING SURFACE IT IS ATTACHED TO. SUBCONTRACTOR SHALL ENSURE THAT EQUIPMENT NAMEPLATES AND LABELS ARE NOT PAINTED. THE INVERTERS SHALL REMAIN UNPAINTED.

01 ELECTRICAL ROOF PLAN  
NOT TO SCALE



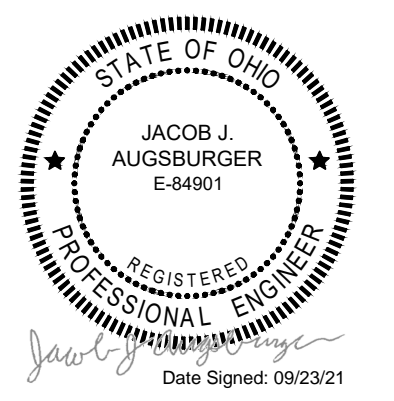
02 ELEVATION 1  
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03 ELEVATION 2  
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1	14/JAN/21	ISSUED FOR PERMITTING - REVISED PER UTILITY COMMENTS	SSM	SSM	PK	JJA	JJA
0	13/AUG/20	ISSUED FOR PERMITTING	SSM	SSM	PK	JJA	JJA

**BLACK & VEATCH**

DESIGNER: SSM  
CHECKED: PK

DRAWN: SSM  
DATE: 13/AUG/20

J.P. MORGAN CHASE  
6271 PERIMETER DRIVE, DUBLIN, OH 43017-3289

ELECTRICAL ROOF PLAN

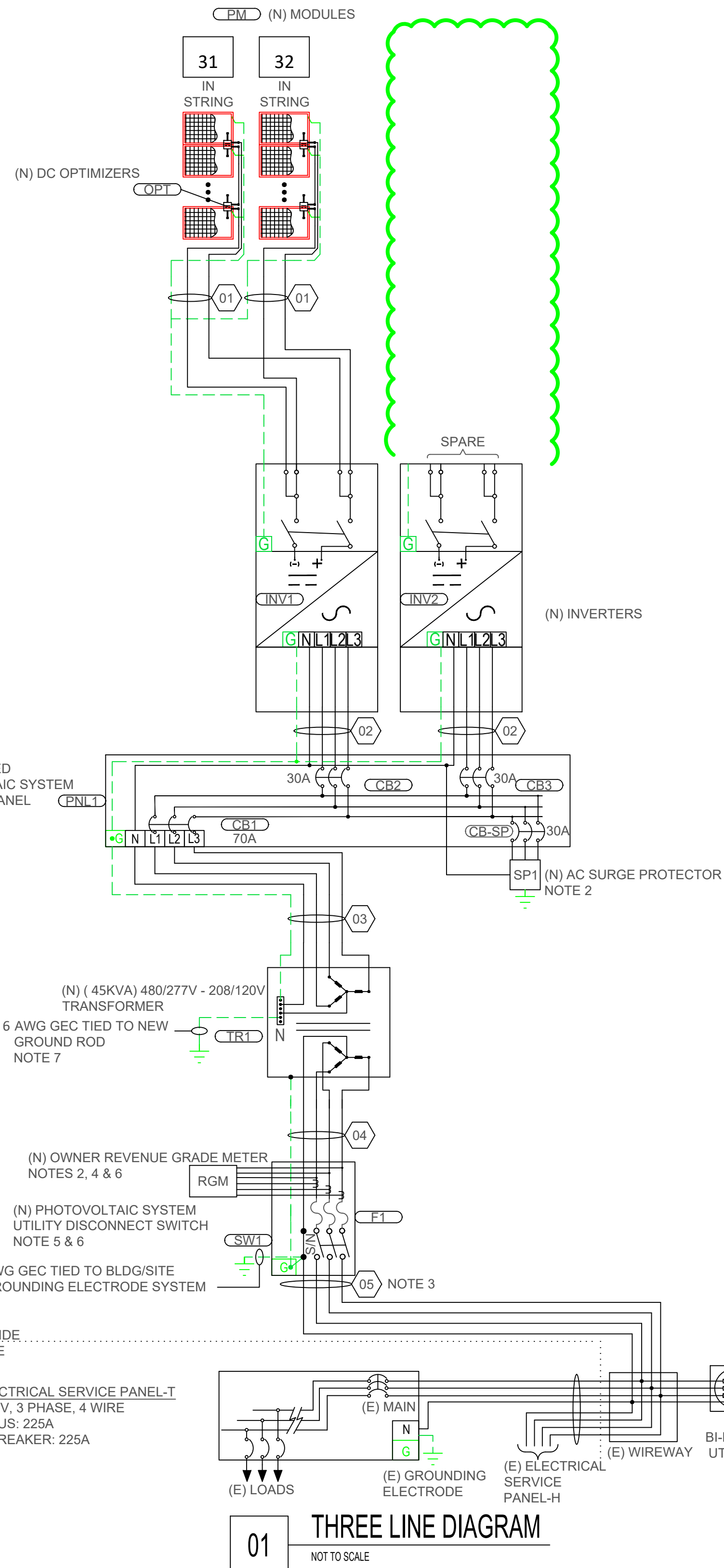
PROJECT	DRAWING NUMBER	REV
	OH-514205-E10	3
CODE	AREA	

CIRCUIT ID	DESCRIPTION	NUMBER OF TYPICAL CIRCUITS	INSULATION TEMP. RATING	RACEWAY LOCATION	CONDITIONS OF USE				CONDUCTOR MINIMUM SPECIFICATION	EGC MINIMUM SPECIFICATION	CONDUIT			CIRCUIT INFORMATION																					
					MODIFIED AMBIENT TEMPERATURE	# CURRENT CARRYING CONDUCTORS	CONDUIT FILL DERATE FACTOR	TEMPERATURE DERATE FACTOR			MIN SIZE	# OF CONDUCTORS	# OF EGC	CONDUIT FILL %	CONDUCTOR AMPACITY	CONDUCTOR DERATED AMPACITY	CONT. CURRENT	MAXIMUM CURRENT	OCPD	ESTIMATED CIRCUIT LENGTH	% VOLTAGE DROP	% AVERAGE LOSSES													
01	STRING TO INVERTER (NOTE 1)	4	90 °C	< 0.88"	65 °C	2	0.8	0.58	8 AWG, COPPER, PV WIRE	10 AWG, COPPER, RHW-2	1", EMT	4	1	39%	55 A	26 A	18.0A	22.5A	25	272 FT	0.68%	0.68%													
02	20KW INVERTER TO COMBINER PANEL	2	90 °C	UNDER ROOF	32 °C	3	1	0.96	10 AWG, COPPER, THWN-2	10 AWG, COPPER, THWN-2	0.75", EMT	4	1	20%	40 A	38 A	24.0A	30.0A	30	10 FT	0.10%	0.10%													
03	COMBINER PANEL TO TRANSFORMER	1	90 °C	UNDER ROOF	32 °C	3	1	0.96	6 AWG, COPPER, THWN-2	8 AWG, COPPER, THWN-2	1", EMT	4	1	28%	75 A	72 A	24.0A	30.0A	70	10 FT	0.04%	0.04%													
04	TRANSFORMER TO UTILITY DS	1	90 °C	UNDERGROUND	32 °C	3	1	0.9	1/0 AWG, COPPER, THWN-2	6 AWG, COPPER, THWN-2	2", PVC80	4	1	28%	175 A	158 A	55.4A	69.2A	70	50 FT	0.30%	0.30%													
05	UTILITY DS TO POI	1	90 °C	UNDER ROOF	32 °C	3	1	0.96	1/0 AWG, COPPER, THWN-2	NA	1.5", RMC	4	0	36%	170 A	163 A	55.4A	69.2A	70	10 FT	0.06%	0.06%													
TOTAL																																		1.18%	1.18%

DESIGN PARAMETERS	
ASHRAE EXTREME LOW	-23.6 °C
ASHRAE 2% HIGH	32.3 °C
SERVICE VOLTAGE	208V, 3Φ
UTILITY	AEP-COLUMBUS SOUTHERN
ELECTRICAL CODE	NEC 2017

SYSTEM SUMMARY	
TOTAL DC POWER	23,625 W
TOTAL AC POWER	20,000 W
WEIGHTED ILR	1.18
INVERTER OUTPUT RATED VOLTAGE	480 V
MAX AC CURRENT (480 V)	24.0A
TRANSFORMATION VOLTAGE	208 V
MAX AC CURRENT (208 V)	55.4A

INVERTER-1	SYSTEM INFORMATION						DC WIRING LOSSES AT STC			
	STRING INPUTS	MODULES IN SERIES	DC POWER (STC)	TOTAL DC POWER (STC)	INVERTER AC POWER	ILR	INVERTER OUTPUT CURRENT	ESTIMATED CIRCUIT LENGTH	% VOLTAGE DROP	% STC LOSS
	STRING 1-1	31	11,625 W	23,625 W	20,000 W	1.18	24.0A	281	0.72%	0.72%
	STRING 1-2	32	12,000 W					241	0.64%	0.64%
	STRING 1-3	NA	NA					NA	NA	NA
WEIGHTED AVERAGE									0.68%	0.68%



- LEGEND  
 (N) - NEW EQUIPMENT  
 (E) - EXISTING EQUIPMENT
- NOTES:  
 1. THIS CABLE SIZE AND INSTALLATION ALSO APPLIES TO THE CABLE INTERCONNECTING MODULES IN THE SAME STRING WHERE IT IS NOT PROTECTED UNDERNEATH THE PV ARRAY. THE CONDUIT SIZE IS CALCULATED BASED ON THE MAXIMUM SET OF STRINGS ROUTED TO A SINGLE INVERTER.  
 2. AC SURGE PROTECTOR (SP1) AND OWNER REVENUE GRADE METER (RGM) SHOWN ON THE THREE LINE DIAGRAM ARE INSTALLED IN PNL2. REFER TO SE20 FOR TYPICAL WIRING DIAGRAM DETAILS.  
 3. SUBCONTRACTOR SHALL PURCHASE AND INSTALL POLARIS CONNECTORS OR ENGINEER APPROVED EQUIVALENT AND INTERCONNECT IN EXISTING CUSTOMER WIREWAY BELOW METER SOCKET.  
 4. REFER TO ELECTRICAL DETAILS DRAWING SE10 FOR THE COMMUNICATION DETAIL.  
 5. NEW PHOTOVOLTAIC SYSTEM UTILITY DISCONNECT SWITCH TO BE LOCATED CLOSE TO EXISTING METER PER UTILITY REQUIREMENTS.  
 6. SUBCONTRACTOR SHALL USE LOCKS PROVIDED BY DISTRIBUTOR TO LOCK THE DEDICATED PHOTOVOLTAIC SYSTEM COMBINER PANEL AND METERING AND SURGE PROTECTION CABINET AND PV SYSTEM UTILITY DISCONNECT SWITCH.  
 7. SUBCONTRACTOR SHALL INSTALL A SEPARATELY DERIVED GROUND ON 480/277V SIDE OF THE TRANSFORMER AND ENSURE THAT THE NEUTRAL IS GROUNDED ON ONLY ONE SIDE OF THE TRANSFORMER.

MODULE	
MAKE	MISSION SOLAR
MODEL	MSE375SQ9S
POWER OUTPUT	375 W
SHORT CIRCUIT I <sub>sc</sub>	9.83 A
OPEN CIRCUIT VOLTAGE V <sub>oc</sub>	48.16 V
RATED CURRENT I <sub>mp</sub>	9.43 A
RATED VOLTAGE V <sub>mp</sub>	39.76 V
TEMPERATURE COEFFICIENT OF V <sub>oc</sub>	-0.28%/C
TEMPERATURE COEFFICIENT OF I <sub>sc</sub>	0.046%/C

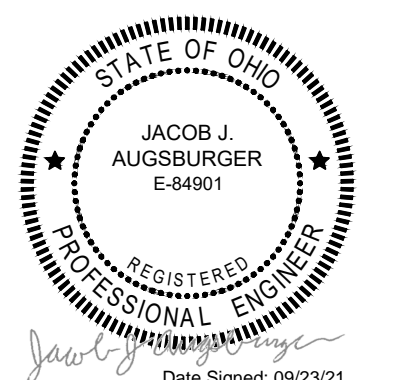
INVERTER	
MAKE	SOLAREEDGE
MODEL	SE20KUS
MAXIMUM AC POWER OUTPUT	20,000 W
AC RATED VOLTAGE	480Y/277 V
MAX CONTINUOUS OUTPUT CURRENT	24.0 A
RATED INPUT VOLTAGE	840 V
MAXIMUM INPUT CURRENT	26.5 A
MAXIMUM SHORT CIRCUIT CURRENT	45.0 A
MAXIMUM INPUT VOLTAGE	980 V
TRANSFORMER-LESS, UNGROUNDED	YES

OPTIMIZER	
MAKE	SOLAR EDGE
MODEL	P860
RATED INPUT DC POWER	860 W
MAXIMUM SYSTEM VOLTAGE	1000 V
MAXIMUM OUTPUT CURRENT	18.0 A
MAXIMUM OUTPUT VOLTAGE	85 V
MAXIMUM INPUT VOLTAGE	60 V
MAXIMUM SHORT CIRCUIT CURRENT	11.0 A
MINIMUM MODULES IN SERIES	27
MAXIMUM MODULES IN SERIES	40

DISTRIBUTOR BILL OF MATERIAL						
REF	CATEGORY	MAKE	MODEL	QTY	UNIT	DESCRIPTION
PM	MODULE	MISSION SOLAR	MSE375SQ9S	63	EA	375WP, 72 CELL SOLAR MODULE (PROVIDED BY JPMC)
OPT	DC OPTIMIZER	SOLAREEDGE	P860	32	EA	SOLAREEDGE POWER OPTIMIZER
INV1	20KW INVERTER	SOLAREEDGE	SE20KUS	1	EA	UTILITY INTERACTIVE DC-TO-AC INVERTER: 3-PHASE, 4-WIRE, 480/277VAC, NEMA 3R, NEC 2014 and 2017 RAPID SHUTDOWN COMPLIANT
CELL1	CELLULAR CDMA KIT	SOLAREEDGE	SE-CELL-B-R05-S-54	1	EA	CDMA MODEM W/SIM, INV≤33.3KVA, 5YRS, HB 15MIN
PNL2	METERING AND SURGE PROTECTION CABINET	VARIES	DETAIL 01	1	EA	REFER TO DRAWING SE20 FOR CABINET DESIGN AND BOM
PNL1	DEDICATED PV SYSTEM COMBINER PANEL	VARIES	DETAIL 01-C	1	EA	REFER TO DRAWING SE21 FOR PANEL DESIGN AND BOM
TR1	TRANSFORMER	HPS	SG3Y0045BK	1	EA	TRANSFORMER 45KVA, 480Y/277V - 208Y/120V, NEMA 3R
SW1	UTILITY DISCONNECT	EATON	DG324NRK	1	EA	240VAC, 200A, 3 POLE GENERAL-DUTY, FUSIBLE, SINGLE-THROW DISCONNECT SWITCH, NEMA 3R
F1	UTILITY DISCONNECT FUSE	BUSSMANN	FRN-R-70	3	EA	FUSE, 70A, 250VAC, SCCR 200 kA

01 THREE LINE DIAGRAM  
NOT TO SCALE

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NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
3	23/SEP/21	ISSUED FOR PERMITTING - REVISED PER AHJ AND UTILITY COMMENTS	WS	WS	JJA	JJA	JJA
2	25/MAR/21	ISSUED FOR PERMITTING - REVISED PER UTILITY COMMENTS	SSM	SSM	PK	JJA	JJA
1	14/JAN/21	ISSUED FOR PERMITTING - REVISED PER UTILITY COMMENTS	SSM	SSM	PK	JJA	JJA
0	13/AUG/20	ISSUED FOR PERMITTING	SSM	SSM	PK	JJA	JJA

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF OHIO

SIGNED: JACOB J. AUGSBURGER  
 DATE: 13/AUG/20 REG. NO. PE-84901

DESIGNER	SSM	DRAWN	SSM
CHECKED	PK	DATE	13/AUG/20

PROJECT	J.P. MORGAN CHASE	DRAWING NUMBER	OH-514205-E20
DESCRIPTION	6271 PERIMETER DRIVE, DUBLIN, OH 43017-3289	REV	3
AREA	THREE LINE DIAGRAM AND BILL OF MATERIALS		

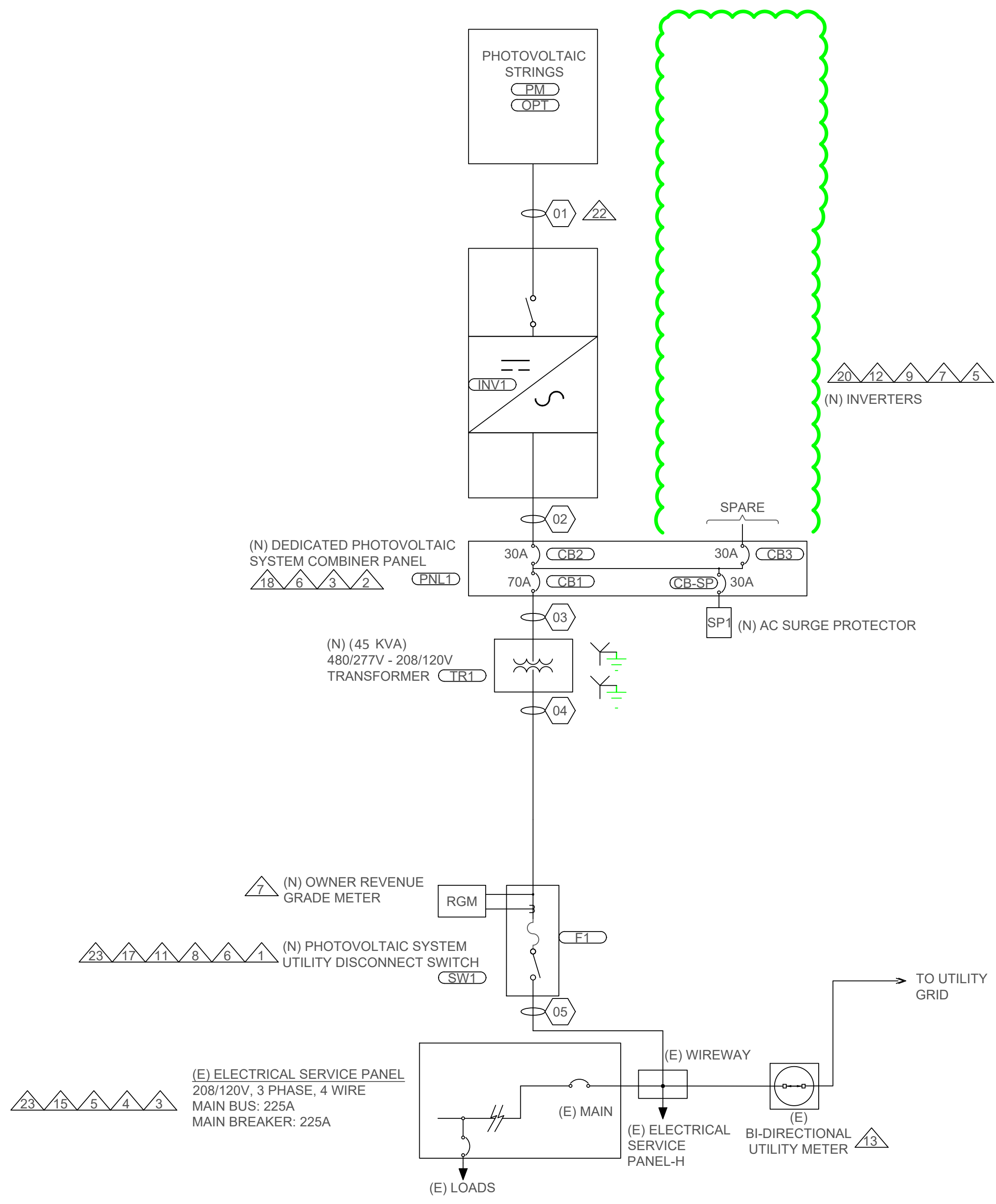
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02/14/2017 04:15 PM

CIRCUIT ID	DESCRIPTION	NUMBER OF TYPICAL CIRCUITS	CONDITIONS OF USE						CONDUCTOR		EGC	CONDUIT			CIRCUIT INFORMATION														
			INSULATION TEMP. RATING	RACEWAY LOCATION	MODIFIED AMBIENT TEMPERATURE	# CURRENT CARRYING CONDUCTORS	CONDUIT FILL DERATE FACTOR	TEMPERATURE DERATE FACTOR	MINIMUM SPECIFICATION	MINIMUM SPECIFICATION	MIN SIZE	# OF CONDUCTORS	# OF EGC	CONDUIT FILL %	CONDUCTOR AMPACITY	CONDUCTOR DERATED AMPACITY	CONT. CURRENT	MAXIMUM CURRENT	OC PD	ESTIMATED CIRCUIT LENGTH	% VOLTAGE DROP	% AVERAGE LOSSES							
01	STRING TO INVERTER (NOTE 1)	4	90 °C	< 0.88"	65 °C	2	0.8	0.58	8 AWG, COPPER, PV WIRE	10 AWG, COPPER, RHW-2	1", EMT	4	1	39%	55 A	26 A	18.0A	22.5A	25	272 FT	0.68%	0.68%							
02	20KW INVERTER TO COMBINER PANEL	2	90 °C	UNDER ROOF	32 °C	3	1	0.96	10 AWG, COPPER, THWN-2	10 AWG, COPPER, THWN-2	0.75", EMT	4	1	20%	40 A	38 A	24.0A	30.0A	30	10 FT	0.10%	0.10%							
03	COMBINER PANEL TO TRANSFORMER	1	90 °C	UNDER ROOF	32 °C	3	1	0.96	6 AWG, COPPER, THWN-2	8 AWG, COPPER, THWN-2	1", EMT	4	1	28%	75 A	72 A	24.0A	30.0A	70	10 FT	0.04%	0.04%							
04	TRANSFORMER TO UTILITY DS	1	90 °C	UNDERGROUND	32 °C	3	1	0.9	1/0 AWG, COPPER, THWN-2	6 AWG, COPPER, THWN-2	2", PVC80	4	1	28%	175 A	158 A	55.4A	69.2A	70	50 FT	0.30%	0.30%							
05	UTILITY DS TO POI	1	90 °C	UNDER ROOF	32 °C	3	1	0.96	1/0 AWG, COPPER, THWN-2	NA	1.5", RMC	4	0	36%	170 A	163 A	55.4A	69.2A	70	10 FT	0.06%	0.06%							
																			TOTAL									1.18%	1.18%

DESIGN PARAMETERS	
ASHRAE EXTREME LOW	-23.6 °C
ASHRAE 2% HIGH	32.3 °C
SERVICE VOLTAGE	208V, 3Φ
UTILITY	AEP-COLUMBUS SOUTHERN
ELECTRICAL CODE	NEC 2017

SYSTEM SUMMARY	
TOTAL DC POWER	23,625 W
TOTAL AC POWER	20,000 W
WEIGHTED ILR	1.18
INVERTER OUTPUT RATED VOLTAGE	480 V
MAX AC CURRENT (480 V)	24.0A
TRANSFORMATION VOLTAGE	208 V
MAX AC CURRENT (208 V)	55.4A

SYSTEM INFORMATION							DC WIRING LOSSES AT STC		
STRING INPUTS	MODULES IN SERIES	DC POWER (STC)	TOTAL DC POWER (STC)	INVERTER AC POWER	ILR	INVERTER OUTPUT CURRENT	ESTIMATED CIRCUIT LENGTH	% VOLTAGE DROP	% STC LOSS
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STRING 1-2	32	12,000 W					241	0.64%	0.64%
STRING 1-3	NA	NA					NA	NA	NA
WEIGHTED AVERAGE								0.68%	0.68%



01 ONE LINE DIAGRAM  
NOT TO SCALE

- LEGEND  
(N) - NEW EQUIPMENT  
(E) - EXISTING EQUIPMENT  
△ REFER TO E30 FOR PLACARD LABELING
- NOTES:  
1. THIS CABLE SIZE AND INSTALLATION ALSO APPLIES TO THE CABLE INTERCONNECTING MODULES IN THE SAME STRING WHERE IT IS NOT PROTECTED UNDERNEATH THE PV ARRAY. THE CONDUIT SIZE IS CALCULATED BASED ON THE MAXIMUM SET OF STRINGS ROUTED TO A SINGLE INVERTER.  
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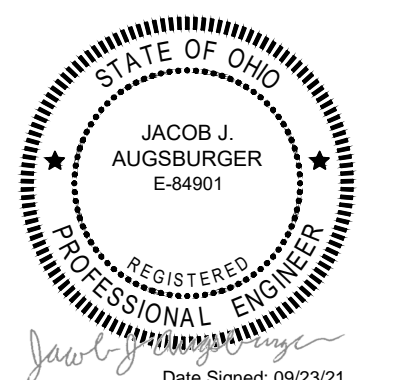
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INVERTER	
MAKE	SOLAREEDGE
MODEL	SE20KUS
MAXIMUM AC POWER OUTPUT	20,000 W
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RATED INPUT VOLTAGE	840 V
MAXIMUM INPUT CURRENT	26.5 A
MAXIMUM SHORT CIRCUIT CURRENT	45.0 A
MAXIMUM INPUT VOLTAGE	980 V
TRANSFORMER-LESS, UNGROUNDED	YES

OPTIMIZER	
MAKE	SOLAR EDGE
MODEL	P860
RATED INPUT DC POWER	860 W
MAXIMUM SYSTEM VOLTAGE	1000 V
MAXIMUM OUTPUT CURRENT	18.0 A
MAXIMUM OUTPUT VOLTAGE	85 V
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DISTRIBUTOR BILL OF MATERIAL						
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OPT	DC OPTIMIZER	SOLAREEDGE	P860	32	EA	SOLAREEDGE POWER OPTIMIZER
INV1	20KW INVERTER	SOLAREEDGE	SE20KUS	1	EA	UTILITY INTERACTIVE DC-TO-AC INVERTER: 3-PHASE, 4-WIRE, 480/277VAC, NEMA 3R, NEC 2014 and 2017 RAPID SHUTDOWN COMPLIANT
CELL1	CELLULAR CDMA KIT	SOLAREEDGE	SE-CELL-B-R05-S-54	1	EA	CDMA MODEM W/SIM, INV<=33.3KVA, 5YRS, HB 15MIN
PNL2	METERING AND SURGE PROTECTION CABINET	VARIES	DETAIL 01	1	EA	REFER TO DRAWING SE20 FOR CABINET DESIGN AND BOM
PNL1	DEDICATED PV SYSTEM COMBINER PANEL	VARIES	DETAIL 01-C	1	EA	REFER TO DRAWING SE21 FOR PANEL DESIGN AND BOM
TR1	TRANSFORMER	HPS	SG3Y0045BK	1	EA	TRANSFORMER 45kVA, 480Y/277V - 208Y/120V, NEMA 3R
SW1	UTILITY DISCONNECT	EATON	DG324NRK	1	EA	240VAC, 200A, 3 POLE GENERAL-DUTY,FUSIBLE, SINGLE-THROW DISCONNECT SWITCH, NEMA 3R
F1	UTILITY DISCONNECT FUSE	BUSSMANN	FRN-R-70	3	EA	FUSE, 70A, 250VAC, SCCR 200 kA

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1	14/JAN/21	ISSUED FOR PERMITTING - REVISED PER UTILITY COMMENTS	SSM	SSM	PK	JJA	JJA
0	13/AUG/20	ISSUED FOR PERMITTING	SSM	SSM	PK	JJA	JJA

**BLACK & VEATCH**  
DESIGNER: SSM DRAWN: SSM  
CHECKED: PK DATE: 13/AUG/20

J.P. MORGAN CHASE  
6271 PERIMETER DRIVE, DUBLIN, OH 43017-3289  
ONE LINE DIAGRAM

PROJECT	DRAWING NUMBER	REV
	OH-514205-E21	3

A  
B  
C  
D  
E  
F

**! DANGER !**  
ARC FLASH AND SHOCK HAZARD PRESENT  
DO NOT OPEN DOOR WHILE ENERGIZED  
INCIDENT ENERGY EXCEEDS MAX PPE PROTECTION

AT EACH PHOTOVOLTAIC SYSTEM SERVICE DISCONNECT SWITCH.



**! WARNING !**  
ARC FLASH HAZARD  
APPROPRIATE PPE REQUIRED.  
FAILURE TO COMPLY MAY RESULT IN INJURY OR DEATH.  
REFER TO NFPA 70 E.

AT EACH AC DEDICATED PHOTOVOLTAIC SYSTEM COMBINER PANEL AND DISCONNECT.  
[NEC 110.16]



**! WARNING !**  
TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

AT EACH BREAKER PANEL AND MAIN SERVICE DISCONNECT.  
[NEC 110.27(C)]

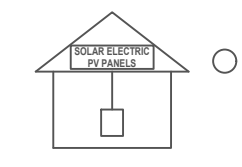


DIRECT CURRENT PHOTOVOLTAIC POWER SOURCE  
MAXIMUM VOLTAGE: 1,000 V  
MAX CIRCUIT CURRENT: 36 A

AT EACH 20 KW INVERTER DC DISCONNECTING MEANS  
[NEC 690.53]



**SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN**  
TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUTDOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN ARRAY



AT SYSTEM'S RAPID SHUTDOWN  
[NEC 690.56(C)].



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

AT EACH AC DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT  
[NEC 690.13(B)]



**! WARNING !**  
PHOTOVOLTAIC SYSTEM DATA ACQUISITION SYSTEM AUTHORIZED PERSONNEL ONLY

THE PV DAS SHALL BE LABELED WITH THE FOLLOWING INFORMATION



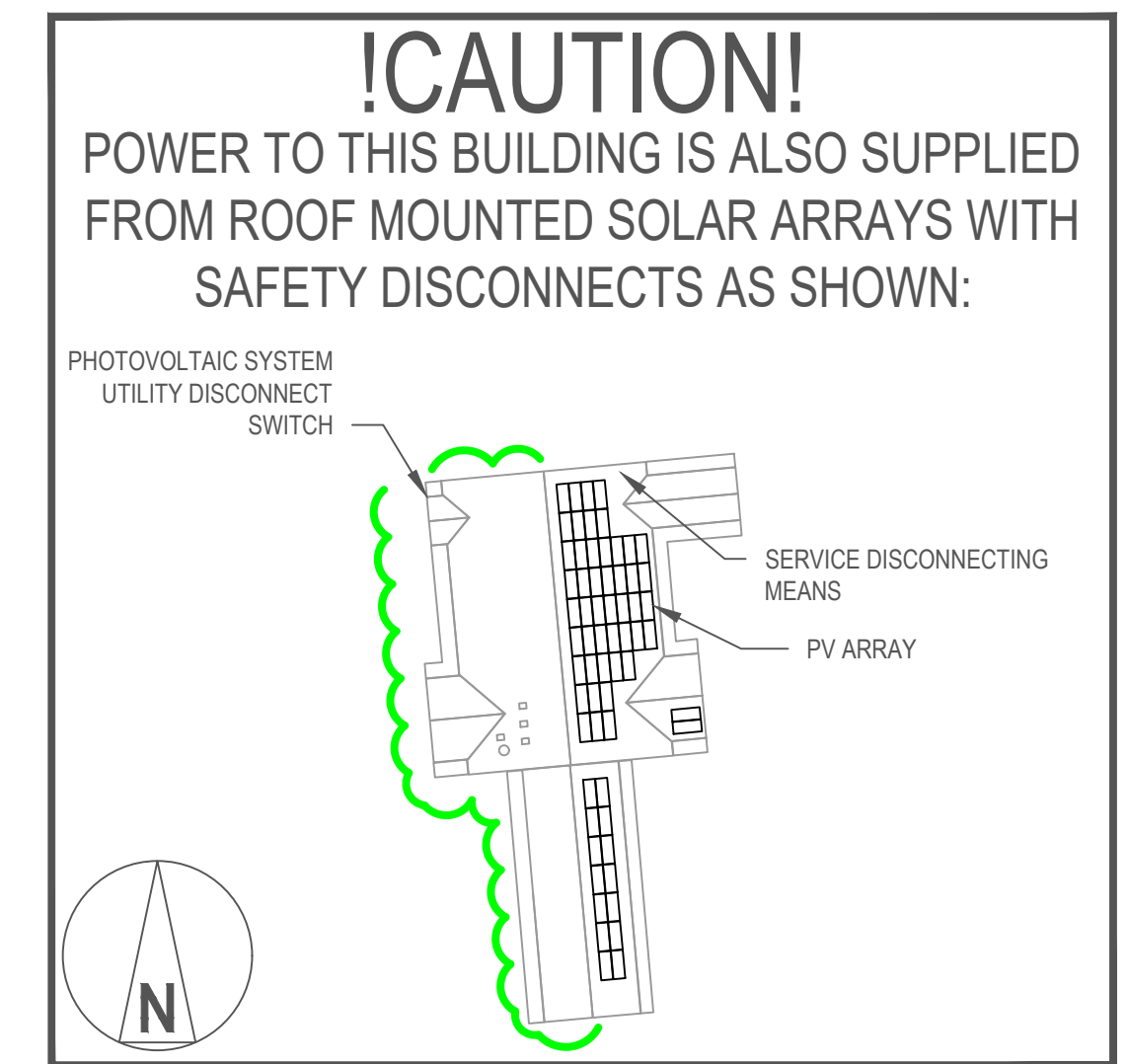
PHOTOVOLTAIC AC DISCONNECT  
RATED OPERATING AC CURRENT: 55.4A  
NOMINAL OPERATING AC VOLTAGE: 208V, 3Φ

AT POINT OF INTERCONNECTION, MARKED AT DISCONNECTING MEANS  
[NEC 690.54]



INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED  
PHOTOVOLTAIC SYSTEM DISCONNECT LOCATED NORTH SIDE OF THE BUILDING

PLAQUE



AT THE SERVICE ENTRANCE (ELECTRICAL SERVICE PANEL) AND PHOTOVOLTAIC SYSTEM DISCONNECT SWITCH

**DIRECTORY**  
PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS  
[NEC 690.56(B)]  
WHERE THE PV SYSTEMS ARE REMOTELY LOCATED FROM EACH OTHER, A DIRECTORY IN ACCORDANCE WITH 705.10 SHALL BE PROVIDED AT EACH PV SYSTEM DISCONNECTING MEANS [NEC 690.4(D)]  
PV SYSTEM EQUIPMENT AND DISCONNECTING MEANS SHALL NOT BE INSTALLED IN BATHROOMS. [NEC 690.4(E)]

**! WARNING !**  
ELECTRIC SHOCK HAZARD  
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.  
DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

AT EACH DC DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT  
[NEC 690.13(B)]



PHOTOVOLTAIC SYSTEM SERVICE DISCONNECT SWITCH

AT PHOTOVOLTAIC SYSTEM SERVICE DISCONNECT SWITCH [NEC 690.13(B)]



PHOTOVOLTAIC SYSTEM UTILITY DISCONNECT SWITCH

AT PHOTOVOLTAIC SYSTEM UTILITY DISCONNECT SWITCH [NEC 690.13(B)]



PHOTOVOLTAIC DC DISCONNECT

AT EACH DC DISCONNECTING MEANS  
[NEC 690.13(B)]



PHOTOVOLTAIC SYSTEM METER INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED

AT UTILITY METER  
[NEC 690.56(B)]



**! WARNING !**  
POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

AT EACH DISTRIBUTION EQUIPMENT ADJACENT TO THE BACK-FED BREAKER FROM THE POWER SOURCE.  
[NEC 705.12(B)(2)(3)(B)]



**! WARNING !**  
DUAL POWER SOURCES. SECOND SOURCE IS PV SYSTEM

AT POINT OF INTERCONNECTION; LABEL MUST IDENTIFY PHOTOVOLTAIC SYSTEM  
[NEC 705.12(B)(3)]



**! CAUTION !**  
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

AT POINT OF INTERCONNECTION; LABEL MUST IDENTIFY PHOTOVOLTAIC SYSTEM  
[NEC 705.12(B)(3)]



RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

AT RAPID SHUTDOWN SWITCH  
[NEC 690.56(C)]  
LETTERS AT LEAST 3/8 INCH, WHITE ON RED BACKGROUND, REFLECTIVE.  
LABEL LOCATED ON OR NO MORE THAN 1 METER (3.3 FT.) FROM THE SWITCH.



WARNING: PHOTOVOLTAIC POWER SOURCE

AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10 FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.  
[NEC 690.31(G)]  
LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE



DEDICATED PHOTOVOLTAIC SYSTEM COMBINER PANEL DO NOT ADD LOADS TO THIS PANEL

AT DEDICATED PHOTOVOLTAIC SYSTEM COMBINER PANEL (IF APPLICABLE)



NET GENERATION OUTPUT METER

AT NET GENERATION OUTPUT METER



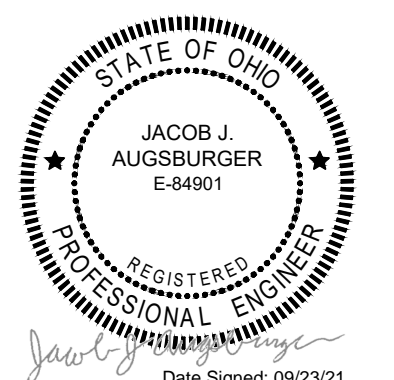
**! WARNING !**  
A GENERATION SOURCE IS CONNECTED TO THE SUPPLY (UTILITY) SIDE OF THE SERVICE DISCONNECTING MEANS. FOLLOW PROPER LOCKOUT/TAGOUT PROCEDURES TO ENSURE THE PHOTOVOLTAIC SYSTEM UTILITY DISCONNECT SWITCH IS OPENED PRIOR TO PERFORMING WORK ON THE DEVICE.

AT THE ELECTRICAL SERVICE PANEL



**LABELING NOTES**  
1.1 LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRICAL CODE, INTERNATIONAL FIRE CODE 1204, OSHA STANDARD 1910.145, ANSI Z535  
1.2 MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.  
1.3 LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT FOR WHICH THEY ARE INSTALLED.  
1.4 LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.  
1.5 ALERTING WORDS TO BE COLOR CODED. "DANGER" WILL HAVE RED BACKGROUND; "WARNING" WILL HAVE ORANGE BACKGROUND; "CAUTION" WILL HAVE YELLOW BACKGROUND. [ANSI Z535]

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2	25/MAR/21	ISSUED FOR PERMITTING - REVISED PER UTILITY COMMENTS	SSM	SSM	PK	JJA	JJA	SIGNED DATE 13/AUG/20 REG. NO. PE-84901	DESIGNER SSM					
1	14/JAN/21	ISSUED FOR PERMITTING - REVISED PER UTILITY COMMENTS	SSM	SSM	PK	JJA	JJA		CHECKED PK	DATE 13/AUG/20				
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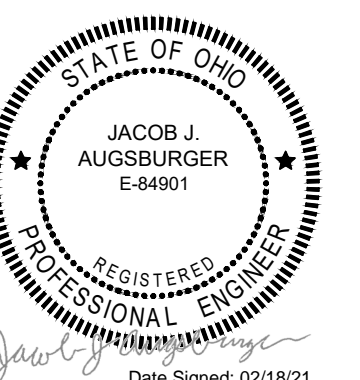


**J.P. MORGAN CHASE  
 ROOFTOP SOLAR  
 PROGRAM  
 TRANCHE 8 - OHIO**  
  
**STANDARD DRAWING PACKAGE**

A  
B  
C  
D  
E  
F

A  
B  
C  
D  
E  
F

**APPROVED FOR CONSTRUCTION**  
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*Jacob J. Augsburger*  
 Date Signed: 02/18/21

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
1	18/FEB/21	APPROVED FOR CONSTRUCTION	AWC	AWC	JJA	JJA	JJA
0	13/AUG/20	ISSUED FOR PERMITTING	AWC	RDB	JJA	JJA	JJA

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF OHIO.  
 SIGNED: JACOB J. AUGSBURGER  
 DATE: 13/AUG/20 REG. NO. PE. 84901

**BLACK & VEATCH**

DESIGNER	RDB	DRAWN	AWC
CHECKED	JJA	DATE	13/AUG/20

J.P. MORGAN CHASE TRANCHE 8 - OHIO		PROJECT OH-STNDRD-SG10	DRAWING NUMBER 1
COVER PAGE		CODE AREA	REV 1

ANS/D 3442  
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1.0 GENERAL NOTES:

- A. FOLLOWING DEFINITIONS APPLY TO THE CONSTRUCTION DRAWINGS:
1. CONTRACTOR: SUBCONTRACTOR INSTALLING PHOTOVOLTAIC (PV) SOLAR SYSTEM
2. ENGINEER: BLACK & VEATCH
3. CONSTRUCTION MANAGER: BLACK & VEATCH
4. OWNER: J.P. MORGAN CHASE
5. OWNERS REPRESENTATIVE: CBRE, JLL OR SMS
6. AUTHORITY HAVING JURISDICTION (AHJ): SEE DWG. G10
B. CONTRACTOR'S WORK SHALL INCLUDE ALL LABOR, MATERIALS, EQUIPMENT, ETC. NECESSARY AND REASONABLY INCIDENTAL TO COMPLETE PROJECT...

2.0 STRUCTURAL NOTES:

- A. INSTALL RACKING SYSTEM, PV MODULES, GROUNDING AND ACCESSORIES IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION MANUAL AND INDUSTRY BEST PRACTICES.
B. COMPLETELY FLASH AND SEAL RACKING AND CONDUIT PITCHED ROOF ATTACHMENTS WITH CHEMLINK M-1 SEALANT OR ACCEPTABLE EQUAL FOR U-ANCHOR PRODUCT APPLICATIONS...

3.0 INTERCONNECTION NOTES:

- A. SUPPLY SIDE INTERCONNECTIONS ARE PERMITTED; THESE CONNECTIONS SHALL COMPLY WITH NEC 705.12(A). SERVICE ENTRANCE CONDUCTORS FOR A SUPPLY SIDE TAP INTERCONNECTION SHALL COMPLY WITH NEC 230.42.
B. LOAD SIDE INTERCONNECTIONS ARE ALSO PERMITTED; THESE CONNECTIONS SHALL COMPLY WITH NEC 705.12(B)(1) THRU (B)(5).

4.0 ELECTRICAL DESIGN AND EQUIPMENT REQUIREMENTS

4.1 RACEWAYS

- A. DESIGN, FURNISH AND INSTALL RACEWAY COMPONENTS AS A COMPLETE ELECTRICAL SYSTEM AS REQUIRED BY APPLICABLE CODES AND AS SPECIFIED HEREIN. OWNER'S REPRESENTATIVE SHALL APPROVE ROUTE OF ANY EXPOSED RACEWAY OR CONDUIT ON BUILDING ROOF AND FACADE.
B. ELECTRICAL METALLIC TUBING (EMT) CONDUIT SHALL MEET THE FOLLOWING REQUIREMENTS:
1. GALVANIZED WITH CORROSION PROTECTION
2. LISTED TO UL 797 AND UL 514B
3. CONFORM TO ANSI C80.3
4. MINIMUM SIZE 3/4 IN.
5. ALL FITTINGS SHALL BE COMPRESSION TYPE NON-INSULATED WITH GASKETED SEALS
6. NEC ARTICLE 358
7. ALL FITTINGS TERMINATED AT EQUIPMENT/PANELS SHALL BE RAIN-TIGHT WITH LOW POINT DRAINS.

C. RIGID METAL CONDUIT (RMC) SHALL MEET THE FOLLOWING REQUIREMENTS:

- 1. GALVANIZED WITH CORROSION PROTECTION
2. LISTED TO UL 6 AND UL 514B
3. CONFORM TO ANSI C80.5
4. MINIMUM SIZE 3/4 IN.
5. ALL FITTINGS SHALL BE COMPRESSION TYPE NON-INSULATED WITH GASKETED SEALS
6. NEC ARTICLE 344
7. ALL FITTINGS TERMINATED AT EQUIPMENT/PANELS SHALL BE RAIN-TIGHT WITH LOW POINT DRAINS.

D. LIQUID TIGHT FLEXIBLE METALLIC CONDUIT (LFMC) SHALL MEET THE FOLLOWING REQUIREMENTS:

- 1. HOT DIPPED GALVANIZED STEEL CORE
2. FLAME RETARDANT PVC JACKET
3. SUNLIGHT OR UV RESISTANT
4. MOISTURE AND OIL RESISTANT
5. LISTED TO UL 360 AND UL 514B
6. MINIMUM SIZE 1/2 IN.
7. ALL FITTINGS TERMINATED AT EQUIPMENT/PANELS SHALL BE RAIN-TIGHT WITH LOW POINT DRAINS

E. ALUMINUM CONDUIT SHALL BE USED IN LOCATIONS WITHIN 2 MILES OF A BODY OF SALT WATER.

- 1. LISTED TO UL 797A AND UL 514B
2. ALL FITTINGS FOR ALUMINUM CONDUIT SHALL BE COPPER FREE ALUMINUM OR ALUMINUM ALLOY
3. SHALL NOT BE ENCASED IN CONCRETE

4.2 GROUNDING SYSTEMS

- A. DESIGN, FURNISH AND INSTALL GROUNDING SYSTEM COMPONENTS AS REQUIRED BY NEC, NESC, IEEE, LOCAL AHJ CODES AND MANUFACTURERS REQUIREMENTS.
B. ALL GROUNDING SYSTEMS SHALL COMPLY WITH THE FOLLOWING:
1. DESIGN SYSTEM, CONSISTING OF BARE COPPER CONDUCTOR TO PROTECT PERSONNEL AND EQUIPMENT AT THE FACILITY FROM HAZARDS THAT OCCUR DURING POWER SYSTEM FAULTS AND LIGHTNING STRIKES.
2. MODULE DC SYSTEM GROUNDING ELECTRODE(S) SHALL BE COMMON WITH, OR BONDED TO, AC GROUNDING ELECTRODE, AS INDICATED IN NEC 690.
3. MODULES SHALL BE GROUNDED TO MEET ALL UL 2703 STANDARDS AND APPLICABLE CODES; GROUND METAL PARTS OF MODULE FRAMES, RACKING AND ENCLOSURES THAT ARE CONSIDERED GROUNDED IN ACCORDANCE WITH NEC 250.134 AND 250.136(A). BOND EACH MODULE TO RACKING USING WEBB GROUNDING CLIPS OR OTHER RACKING SPECIFIC FEATURES AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ.

4.2.1 GROUND LUGS

- A. USE SINGLE-HOLE OR TWO-HOLE GROUND COMPRESSION LUGS, TYPE YGHA AS MANUFACTURED BY BURNDY ELECTRICAL, OR AN ENGINEER ACCEPTABLE EQUAL. LUGS SHALL BE OF THE COMPATIBLE WITH CONDUCTOR MATERIAL TO ELIMINATE DISSIMILAR METAL CORROSION ISSUE.

4.3 POWER AND CONTROL WIRING

- A. SELECT CABLES WITH AN INSULATION LEVEL APPLICABLE TO SYSTEM VOLTAGE FOR WHICH THEY ARE USED AND AMPACITIES SUITABLE FOR LOAD BEING SERVED.
B. DETERMINE TYPE OF CABLE USED BY INDIVIDUAL CIRCUIT REQUIREMENTS, TEMPERATURE AND INDIVIDUAL EQUIPMENT MANUFACTURER'S RECOMMENDATIONS.

4.3.1 DC POWER CABLE

- A. LIST AND IDENTIFY DC CONDUCTORS IN GROUNDED AND UNGROUNDED SYSTEMS AS 1,000 V RATED PV WIRE. CONDUCTORS SHALL MEET UL 4703 AND UL 854 REQUIREMENTS. CONDUCTOR SHALL BE RATED 90° C FOR WET OR DRY LOCATIONS AND BE UV RESISTANT.
B. WIRE TYPE SHALL BE RATED AS UV RESISTANT PV WIRE, INSULATED OR JACKETED WITH CROSS-LINKED POLYETHYLENE (XLPE). USE BLACK INSULATION ONLY.
C. USE STRANDED COPPER CONDUCTORS.

4.3.2 LOW VOLTAGE AC POWER CABLE

- A. USE COPPER CONDUCTORS.
B. USE UL LISTED POWER AND CONTROL CABLES.
C. LIST AND IDENTIFY AS 600 V RATED THWN-2. CONDUCTORS SHALL MEET UL 83 AND ICEA S-95-658 (NEMA WC 70) REQUIREMENTS. CONDUCTOR SHALL BE RATED 90° C FOR WET OR DRY LOCATIONS AND BE UV RESISTANT.

4.3.3 RS-485 COMMUNICATION CABLE

- A. RS-485 COMMUNICATION CABLE SHALL MEET THE FOLLOWING REQUIREMENTS:
1. UV, OIL AND GAS RESISTANT
2. INDUSTRIAL GRADE
3. STRANDED TINNED COPPER CONDUCTOR
4. POLYOLEFIN INSULATION
5. PVC JACKET, 0.03 IN.
6. UL LISTED
7. OPERATING TEMPERATURE OF -20° C TO 60° C
8. MINIMUM 3-WIRE SHIELDED TWISTED PAIR CABLE
9. WET LOCATION UV RESISTANT
10. BELDEN 3106A, OR AN EQUIVALENT APPROVED BY ENGINEER

4.3.4 CURRENT TRANSFORMER WIRE

- A. THE CT LEADS SHALL BE EXTENDED WHERE THE STANDARD CT LEADS ARE NOT LONG ENOUGH. REFER TO CONTINENTAL CONTROL SYSTEMS LLC CT WIRE EXTENSION APPLICATION NOTE. THE EXTENSION WIRES SHALL MEET THE FOLLOWING REQUIREMENTS:
1. MINIMUM 18 AWG
2. TWISTED PAIR, 1 TWIST PER INCH
3. 600V RATED
4. LISTED TO UL 1015

4.4 JUNCTION BOXES (IF REQUIRED)

- A. USE NEMA 3R OR 4 OUTDOOR BOXES, AS REQUIRED, WITH REMOVABLE INTERIOR PANEL AND REMOVABLE FRONT, FINISHED INSIDE AND OUT WITH MANUFACTURER'S STANDARD

- ENAMEL. USE NEMA 4X IN LOCATIONS WITHIN 2 MILES OF A BODY OF SALT WATER.
B. SIZE BOXES IN ACCORDANCE WITH MINIMUM NEC REQUIREMENTS.

5.0 ELECTRICAL INSTALLATION REQUIREMENTS

- A. CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTION OF A FULLY OPERATIONAL AND FUNCTIONAL FACILITY AS SHOWN ON THE DRAWINGS, UNLESS OTHERWISE APPROVED BY ENGINEER.

5.1 RACEWAYS

- A. SEPARATE CONDUCTORS BY VOLTAGE AS REQUIRED BY APPLICABLE NEC AND LOCAL AHJ CODES AND STANDARDS. CONDUCTOR SHALL BE IN CONDUIT WHEN NOT UNDER SOLAR MODULES ALONG RACKING.
B. INSTALL CONDUITS AS FOLLOWS:
1. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMAN LIKE MANNER. CONDUIT ROUTING SHALL FOLLOW DOMINATE SURFACES AND STRUCTURES. ROUTING SHALL BE AS INCONSPICUOUS AS POSSIBLE.
2. LIMIT THE NUMBER OF 90 DEGREE BENDS IN CONDUIT TO 3 FOR THE PURPOSE OF MAINTAINING ABILITY TO PULL CABLES WITHOUT DAMAGE.
3. LIMIT THE NUMBER OF TIMES THAT CONDUIT CROSSES PATHWAY BETWEEN SEPERATED ARRAYS.
4. EMT SHALL BE USED ABOVE GRADE ONLY.
5. CONCRETE ENCASE WHERE SUBJECT TO VEHICLE TRAFFIC, AS SHOWN ON DRAWINGS.
6. CONFORM SWEEPS AND RADIUS BENDS TO THE NEC FOR EACH TYPE OF CONDUIT AND SIZE, AS APPLICABLE.
7. COUPLINGS THAT TRANSITION FROM ONE TYPE OF CONDUIT TO ANOTHER SHALL BE RAIN-TIGHT AND COMPATIBLE WITH ALL MATERIALS IN CONTACT WITH COUPLINGS.
8. PROTECT CONDUCTORS WITH AN INSULATING BUSHING WHERE CONDUIT TERMINATES IN A CABINET OR BOX. INSULATING FITTING SHALL BE SUITABLE FOR BONDING TO GROUND IN ACCORDANCE WITH NEC 250.92.
9. CONDUIT FIELD CUTS SHALL BE COATED WITH ZINCLATE 810, OR AN EQUIVALENT APPROVED BY ENGINEER.
10. IN ADDITION TO PENETRATION SEALS, APPROVED FIRE STOPS SHALL BE INSTALLED TO MAINTAIN FIRE RATING OF ANY FIRE RATED FLOORS OR WALLS BEING PENETRATED, TO BE DETERMINED BY THE ENGINEER.
11. CONDUIT INSTALLED OUTDOORS OR IN HIGH HUMIDITY AREAS WHERE WATER MIGHT ENTER OR CONDENSE INSIDE THE CONDUIT SHALL BE ROUTED INTO THE BOTTOM OR SIDES OF ENCLOSURES WITH A LOW POINT DRAIN.
12. CONDUIT ON FLAT ROOFS SHALL BE SUPPORTED USING EATON DURABLOK DBM OR EQUIVALENT.
13. CONDUIT ON TILTED ASPHALT SHINGLE ROOFS SHALL BE SUPPORTED USING QUICKMOUNT QMCC OR EQUIVALENT.
14. CONDUIT ON TILTED STANDING SEAM METAL ROOF SHALL BE SUPPORTED USING S5! S-5-U MINI WITH MATERIALLAC CONDUIT HANGER OR EQUIVALENTS.
15. ALL CONDUITS SHALL BE INSTALLED PER NEC AND LOCAL AHJ CODES AND STANDARDS UNLESS NOTED OTHERWISE.
16. OUTDOOR CONDUIT RUNS SHALL NOT CONTAIN MOISTURE POCKETS. DRAINS SHALL BE INSTALLED IN OUTDOOR CONDUIT RUNS TO REMOVE MOISTURE FROM THE CONDUITS AT LOCATIONS WHERE CONDUITS TERMINATE ON EQUIPMENT OR DEVICES AND AT ALL LOCATIONS WHERE CONDUITS PENETRATE AN EXTERIOR WALL. MOISTURE IN CONDUIT SHALL NOT BE DRAINED THROUGH EQUIPMENT OR DEVICES CONTAINING ELECTRICAL CONNECTIONS.
17. CONDUIT INSTALLED IN ALL EXPOSED OUTDOOR LOCATIONS WITHIN 2 MILES OF A BODY OF SALT WATER SHALL BE PVC-COATED RIGID STEEL OR ALUMINUM, RIGIDLY SUPPORTED BY PVC-COATED OR ALUMINUM FRAMING MATERIAL, MOUNTING HARDWARE, WHICH INCLUDES NUTS, BOLTS, AND ANCHORS, SHALL BE STAINLESS STEEL. SUBCONTRACTOR SHALL REPAIR ALL DAMAGED COATINGS ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS. CONDUIT AND FRAMING MATERIAL SHALL BE COMPATIBLE TO ELIMINATE DISSIMILAR METAL CORROSION ISSUES.

5.2 GROUNDING SYSTEMS

- A. FURNISH AND INSTALL ALL COMPONENTS INCLUDING GROUND RODS, GROUND CONDUCTOR, GROUND BUS, ABOVE AND BELOW GRADE GROUNDING CONNECTIONS, GROUNDING LUGS, AND ANY OTHER HARDWARE REQUIRED FOR A COMPLETE GROUNDING SYSTEM.
B. FURNISH AND INSTALL SUITABLE GROUNDING FACILITIES ON NEW PV ELECTRICAL EQUIPMENT NOT SO EQUIPPED.
C. GROUNDING FACILITIES SHALL CONSIST OF IRREVERSIBLE COMPRESSION TYPE TERMINAL CONNECTORS BOLTED TO THE EQUIPMENT FRAME OR ENCLOSURE.
D. NO EQUIPMENT GROUNDING CONDUCTOR SHALL BE SMALLER IN SIZE THAN 12 AWG, UNLESS IT IS A PART OF PREMANUFACTURED CABLE ASSEMBLY.
E. CONNECT METALLIC EQUIPMENT TO THE EQUIPMENT GROUNDING NETWORK USING APPROPRIATE BUSHINGS OR OTHER CONNECTORS.
F. BOND METALLIC RACEWAY AT BOTH ENDS OF THE RACEWAY. RACEWAY SHALL NOT BE USED AS THE SOLE EQUIPMENT GROUND CONNECTOR.
G. CIRCUITS SHALL HAVE A GREEN OR BARE EQUIPMENT GROUND CONDUCTOR ROUTED IN THE SAME RACEWAY AND PARALLEL TO ALL POWER CONDUCTORS OPERATING ABOVE 50V.

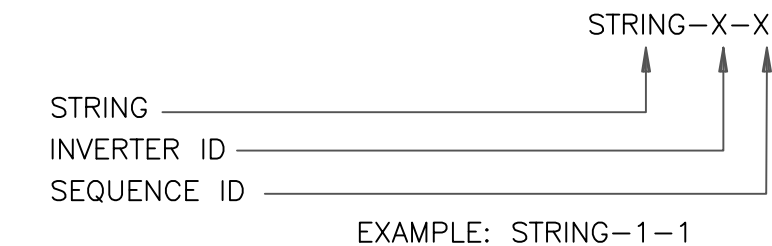
5.3 POWER AND CONTROL CABLING

5.3.1 CABLE INSTALLATION

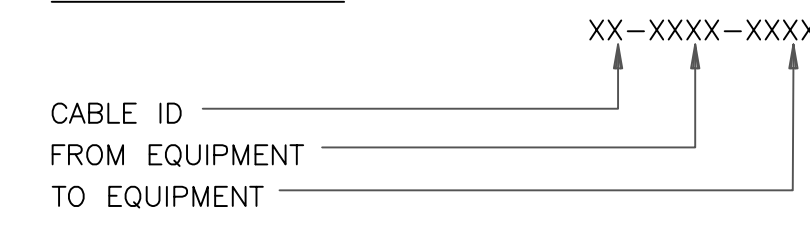
- A. CABLE INSTALLATION SHALL BE IN ACCORDANCE WITH THE FOLLOWING:
1. CABLES SHALL BE INSTALLED IN ACCORDANCE WITH CABLE MANUFACTURERS' RECOMMENDATIONS, CIRCUIT LISTS, DRAWINGS, AND THESE TECHNICAL SPECIFICATIONS. SEPARATE CABLES BY VOLTAGE AS REQUIRED BY NEC AND LOCAL AHJ CODES AND STANDARDS AND MANUFACTURERS REQUIREMENTS.
2. ROUTE CABLES IN UL LISTED WIREWAY, ABOVE GRADE EMT CONDUIT, OR DIRECT BURIED PVC CONDUIT, AS REQUIRED.
3. INSTALL CABLE SUPPORTS AND SECURING DEVICES TO PROVIDE ADEQUATE SUPPORT WITHOUT DEFORMATION OF CABLE JACKETS OR INSULATION.
4. USE OVERSIZED, UV RESISTANT NYLON WIRE TIES FOR BUNDLING CONDUCTORS FOR ALL EXPOSED WIRING. WIRE TIES SHALL BE SNUG, BUT ALLOW FOR THERMAL EXPANSION.
5. NEATLY BUNDLE AND SECURELY FASTEN ALL EXPOSED WIRING. SECURED EXPOSED WIRING TO PREVENT RUBBING AND DAMAGE FROM METAL SURFACES, BOLT THREADS, SHARP SURFACES, OR WIRE TIES.
6. SECURE WIRING AT LOCATIONS NOT SPACED MORE THAN 24 IN. ON CENTER AND SUCH THAT WIRING IS NOT FREE TO MOVE DUE TO WIND, SNOW OR OTHER ENVIRONMENTAL CONDITIONS.

7. ASSIGN EACH CIRCUIT WITH A UNIQUE NUMBER DESIGNATED AS FOLLOWS:

DC CABLE LABELING



AC CABLE LABELING



8. COLOR CODE POWER WIRING AS FOLLOWS:

Table with 2 columns: CIRCUIT and COLOR CODE. Rows include 208Y/120V CIRCUITS (BLACK - PHASE A, RED - PHASE B, BLUE - PHASE C, WHITE - NEUTRAL), 480Y/277V CIRCUITS (BROWN - PHASE A, ORANGE - PHASE B, YELLOW - PHASE C, GRAY/WHITE - NEUTRAL), DC CIRCUITS (RED - DC POSITIVE, BLACK - DC NEGATIVE), NEUTRAL (GRAY/WHITE), and GROUND (GREEN).

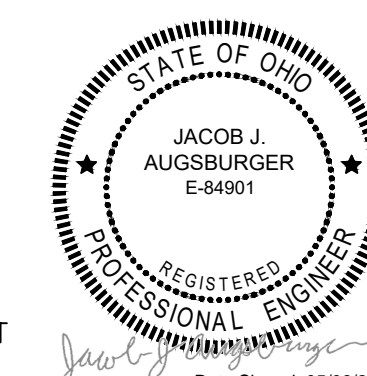
NOTE: THE HIGH LEG OF A 3-PHASE DELTA 4-WIRE SYSTEM SHALL BE ORANGE IN COLOR [NEC110.15]

B. CABLE PLACEMENT SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

- 1. DO NOT HANDLE CABLE WHEN THE TEMPERATURE IS BELOW MINIMUM TEMPERATURE RECOMMENDED BY MANUFACTURER. IF HEATING IS REQUIRED PRIOR TO PLACEMENT, STORE CABLE IN A HEATED BUILDING IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS FOR AT A PERIOD OF AT LEAST 24 HRS. PLACE CABLE DURING THE SAME DAY IT IS REMOVED FROM HEATED STORAGE.
2. CABLE PULLING TENSION SHALL NOT EXCEED MAXIMUM TENSION RECOMMENDED BY CABLE MANUFACTURER. PULLING MECHANISMS OF BOTH MANUAL AND POWER TYPES SHALL HAVE RATED CAPACITY IN TONS CLEARLY MARKED ON MECHANISM. IF ANY EXCESSIVE STRAIN DEVELOPS, PULLING OPERATION SHALL BE STOPPED AT ONCE AND DIFFICULTY DETERMINED AND CORRECTED. DO NOT PULL CABLE USING TRUCKS, FORKLIFTS, CRANES OR OTHER DEVICES WHERE TENSION OF CABLE PULL CANNOT BE EASILY CONTROLLED.
a. CABLE GRIPS: WHEN PULLING LOOPS ARE USED, ENTIRE LOOP SHALL BE CUT OFF, DISCARDED AND RECYCLED AFTER PULL IS COMPLETED.
b. INSPECTION: CAREFULLY INSPECT OUTSIDE OF EACH CABLE REEL AND REMOVE PROTRUDING NAILS, FASTENINGS OR OTHER OBJECTS WHICH MIGHT DAMAGE CABLE.
3. COMPLETE A THOROUGH VISUAL INSPECTION FOR FLAWS, BREAKS OR ABRASIONS IN CABLE SHEATH AS CABLE LEAVES THE REEL. USE PULLING SPEED SLOW ENOUGH TO PERMIT THIS INSPECTION.
4. REPLACE CABLE DAMAGED IN ANY WAY DURING INSTALLATION. DAMAGE TO THE SHEATH OR FINISH OF THE CABLE SHALL BE SUFFICIENT CAUSE FOR REJECTING THE CABLE.
a. CABLE BENDS: TAPE SHIELDED, FLAT TAPE ARMORED AND WIRE ARMORED CABLE SHALL NOT BE BENT TO RADIUS OF LESS THAN 12X OVERALL CABLE DIAMETER. ALL OTHER CABLES SHALL NOT BE BENT TO A RADIUS OF LESS THAN 8X CABLE DIAMETER.
b. SPARE CONDUCTORS: LEAVE SPARE CONDUCTORS OF A MULTI-CONDUCTOR CABLE AT THEIR MAXIMUM LENGTHS FOR POSSIBLE REPLACEMENT OF ANY OTHER CONDUCTORS IN THE CABLE. EACH SPARE CONDUCTOR SHALL BE NEATLY DRESSED FOR FUTURE USE AND MARKED AS "SPARE <<NUMBER>>".
c. LACING: USE UV RATED TIES TO NEATLY LACE TOGETHER CONDUCTORS ENTERING SWITCHBOARDS AND SIMILAR LOCATIONS AFTER CONDUCTORS HAVE EMERGED FROM THEIR SUPPORTING RACEWAY AND BEFORE THEY ARE ATTACHED TO TERMINALS.
5. CABLE IDENTIFICATION
a. IDENTIFY BOTH ENDS OF ALL CIRCUITS.
b. WRITE CIRCUIT NUMBER AT EACH MARKER IN ACCORDANCE WITH THE DRAWINGS.
c. IDENTIFY EACH CIRCUIT AT TERMINATIONS.
d. INDIVIDUALLY IDENTIFY EACH PHASE OF MULTIPHASE POWER CIRCUITS.
e. ATTACH CIRCUIT TAG SO IT IS READILY VISIBLE FOR CIRCUIT IDENTIFICATION.
6. CONTAIN DC WIRING WITHIN MODULE FOOTPRINT WHENEVER POSSIBLE.
7. CONDUCTORS SHALL BE IN CONDUIT WHEN NOT UNDER SOLAR MODULES OR ALONG RACKING.
8. CABLING MAY BE ATTACHED ALONG RACKING USING UV RESISTANT CABLE TIES SUCH AS HEYCO "NITYE" OR EQUIVALENT.
9. CABLING WITHIN DUAL TILT RACKING SHALL BE SUPPORTED ALONG RACKING USING UNIRAC RM WIRE MANAGEMENT CLIP OR EQUIVALENT.

APPROVED FOR CONSTRUCTION

THE DISTRIBUTION AND USE OF THE NATIVE FORMAT CAD FILE OF THIS DRAWING IS UNCONTROLLED. THE USER SHALL VERIFY TRACEABILITY OF THIS DRAWING TO THE LATEST CONTROLLED VERSION.



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Table with 4 columns: NO, DATE, REVISIONS AND RECORD OF ISSUE, and columns for AWC, RDB, JJA, JJA, JJA, JJA, DRN, DES, CHK, PDE, APP.

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF OHIO.
SIGNED: JACOB J. AUGSBURGER
DATE: 13/AUG/20 REG NO. PE. 84901

Table with columns for DESIGNER (RDB), DRAWN (AWC), CHECKED (JJA), and DATE (13/AUG/20).

Table with columns for PROJECT (J.P. MORGAN CHASE TRANCHE 8 - OHIO), DRAWING NUMBER (OH-STNDRD-SG20), and REV (2).

Table with columns for CODE, AREA, and other project details.

5.3.2 CONNECTORS

- A. THIS SECTION DEFINES METHODS OF CONNECTING CABLE BETWEEN ELECTRICAL SYSTEMS AND EQUIPMENT. TERM "CONNECTOR" IS APPLIED TO DEVICES THAT JOIN TWO OR MORE CONDUCTORS OR ARE USED TO TERMINATE CONDUCTORS AT EQUIPMENT TERMINALS FOR PROVIDING A CONTINUOUS ELECTRICAL PATH.
- B. INSTALL CONNECTORS AS FOLLOWS:
  1. USE CONNECTOR MATERIAL THAT IS COMPATIBLE WITH THE CONDUCTOR MATERIAL TO AVOID OCCURRENCE OF ELECTROLYTIC ACTION BETWEEN METALS.
  2. CALIBRATE INSTALLATION TOOL AS APPROVED BY MANUFACTURER.
  3. LOW VOLTAGE TERMINATIONS SHALL BE PERMITTED TO BE SCREW DOWN LUGS WHERE ONLY SCREW DOWN LUGS ARE AVAILABLE, SUCH AS MOLDED CASE CIRCUIT BREAKERS AND CONTROL / INSTRUMENT TERMINAL BLOCKS.
  4. DO NOT SPLICE CABLES OR UTILIZE JOINTS AND CONNECTIONS IN CABLE, OTHER THAN CABLE TERMINATIONS AT EQUIPMENT.

C. STAUBLI (PV-KBT4/5...-UR, PV-KST4/5...-UR, PV-KBT4/8II-UR AND PV-KST4/8II-UR) BARREL CRIMP CONTACTS SHALL BE USED WITH THE MC4 CONNECTOR. STAUBLI (PV-CZM-23100) CRIMPING TOOL/DIE COMBINATION SHALL BE USED.

5.4 LOW VOLTAGE DRY-TYPE TRANSFORMER

- A. MOUNT APPROXIMATELY WHERE INDICATED ON DRAWINGS.
- B. LOAD ANY VIBRATION ISOLATORS EXTERNAL TO UNIT PROPERLY AND PROVIDE COMPLETE ISOLATION WITH NO DIRECT TRANSFORMER UNIT METAL IN CONTACT WITH MOUNTING SURFACE. (IF REQUIRED)
- C. CONNECT ELECTRICAL CIRCUITS TO TRANSFORMERS BY MEANS OF MOISTURE PROOF, FLEXIBLE METALLIC CONDUIT IN A MANNER THAT PREVENTS TRANSFORMER VIBRATIONS FROM BEING TRANSMITTED TO BUILDING OR OTHER EQUIPMENT.
- D. GROUND ENCLOSURES AND NEUTRALS (IF REQUIRED) OF ALL TRANSFORMERS AND ALL MOISTURE PROOF FLEXIBLE CONDUITS IN ACCORDANCE WITH APPLICABLE CODES AND STANDARDS.
- E. CONNECT VOLTAGE TAPS ON ALL TRANSFORMERS TO GIVE AS CLOSE AS POSSIBLE TO RATED OUTPUT VOLTAGE UNDER NORMAL SYSTEM LOAD CONDITIONS.
- F. TAMPER RESISTANT HARDWARE SHALL BE INSTALLED. WALL MOUNTED TRANSFORMERS SHALL BE INSTALLED WITH DRIP PLATES.

5.5 LOW VOLTAGE PANELBOARDS

- A. MOUNT SECURELY WHERE INDICATED, PLUMB, IN-LINE AND SQUARE WITH WALLS. ALSO MOUNT WITH TOP OF ITS CABINET APPROXIMATELY 6 FT ABOVE FINISHED FLOOR.
- B. PROVIDE A TYPEWRITTEN CIRCUIT DIRECTORY UNDER A METAL FRAMED TRANSPARENT PLASTIC COVER INSIDE EACH PANELBOARD.
- C. PROVIDE AN ENGRAVED, LAMINATED PLASTIC NAMEPLATE ON OUTSIDE OF PANELBOARD SHOWING PANELBOARD DESIGNATION, VOLTAGE AND PHASES.

5.6 INVERTERS

- A. INSTALL IN ACCORDANCE WITH SOLAREEDGE INSTALLATION INSTRUCTIONS.

5.7 METER SOCKET

- A. INSTALL IN ACCORDANCE WITH UTILITY.

5.8 DISCONNECT SWITCHES

- A. MOUNT SWITCHES FOR SWITCH OPERATION IN VERTICAL POSITION.
- B. MOUNT DEVICE SO THAT INDICATING PANEL IS IN UPRIGHT VERTICAL POSITION AND EASILY SEEN.
- C. WIRE SUCH THAT WHEN SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).
- D. INSTALL CURRENT TRANSFORMERS FOR REVENUE GRADE METER WITHIN DISCONNECT SWITCHES IN ACCORDANCE WITH CONTINENTAL CONTROL SYSTEMS INSTALLATION INSTRUCTIONS.
- E. EQUIPMENT LOCATION TOLERANCES
  - a. LOCATE CLOSE TO UTILITY METER AND ON THE SAME WALL, PER UTILITY REQUIREMENTS.
  - b. COORDINATE LOCATION OF DISCONNECT SWITCH WITH ALL OTHER EQUIPMENT OR MATERIALS TO BE INSTALLED.

5.9 EQUIPMENT LABELING

- A. ALL EQUIPMENT SHALL HAVE A PERMANENT IDENTIFICATION LABEL VISIBLE AND READABLE FROM DISTANCE OF 48 IN. THAT PROVIDES UNIQUE EQUIPMENT IDENTIFICATION NUMBER AS INDICATED ON ELECTRICAL DRAWINGS. ALL TEXT SHALL BE UPPERCASE. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
- B. LISTED TO UL 969
- C. THE LABEL SHALL BE BLACK TEXT ON WHITE BACKGROUND

5.10 ALIGNMENT

- A. RIGID COMPONENTS, SUCH AS ENCLOSURES, SHALL BE ALIGNED AND CONNECTED WITH SPECIAL CARE TO PREVENT EXCESSIVE STRESS IN JOINTS, SUPPORTS AND CONNECTIONS.

5.11 BOLTED ELECTRICAL CONNECTIONS

- A. TORQUE BOLTED ELECTRICAL CONNECTIONS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND THE NEC. COORDINATE BOLT TIGHTNESS CHECKS TO MINIMIZE INTERFERENCE WITH EQUIPMENT INSTALLATION SEQUENCE.
- B. TIGHTEN STRUCTURAL BOLTS AND ELECTRICAL DRY, UNPLATED, NONLUBRICATED BOLTS WITH MANUAL TORQUE WRENCHES AND MARKED TORQUED CONNECTIONS WITH SCRIBE LINES.
- C. RANDOMLY CHECK TIGHTENED BOLTS IN ELECTRICAL CONNECTIONS; 10% OF CONNECTIONS SHALL BE REVIEWED, DOCUMENTED AND MARKED WITH TORQUE SCRIBE LINES.
- D. VERIFY FACTORY BOLT TORQUES AS PART OF THE EQUIPMENT CHECKOUT AND TEST PROCEDURES.
- E. SETUP TORQUE WRENCHES SO THEY VISUALLY OR AUDIBLY INDICATE WHEN PROPER TORQUE IS REACHED.
- F. RE-TORQUE AND WITNESS ALL CONNECTIONS IF 1% OF THE 10% SAMPLINGS FAIL.
- G. THOROUGHLY CLEAN AND COAT METAL SURFACES WITH A SUITABLE ANTIOXIDIZING COMPOUND WHERE BOLTED CONNECTIONS ARE MADE BETWEEN COPPER OR BRASS SURFACES.

5.12 EQUIPMENT FINISHES

- A. SURFACES OF MOST ELECTRICAL EQUIPMENT, SUCH AS PANELS, SWITCHGEAR, TRANSFORMERS AND CIRCUIT BREAKERS, ARE FINISHED AT THE FACTORY. EXERCISE CARE TO PREVENT DAMAGE TO THIS ORIGINAL FINISH DURING EQUIPMENT INSTALLATION AND DURING CONSTRUCTION WORK.
- B. IF FACTORY FINISH IS DAMAGED DURING CONSTRUCTION, TOUCH-UP OR REFINISH THE DAMAGED COMPONENT TO THE SATISFACTION OF CONSTRUCTION MANAGER, AT CONTRACTOR'S EXPENSE.

- C. TOUCHUP PAINT, IF FURNISHED WITH THE EQUIPMENT, MAY BE USED; OTHERWISE OBTAIN PAINT FROM THE EQUIPMENT MANUFACTURE.
- D. USE PAINT APPLICATION PROCEDURE IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATION INCLUDING SURFACE PREPARATION AND APPLICATION OF A PRIMER COAT.

5.13 SUPPLY SIDE CONNECTIONS TO EXISTING PANELS WITH COMBINED UTILITY METERING EQUIPMENT

- A. INTERCONNECT TO EXISTING BUS BARS BETWEEN THE LINE SIDE OF MAIN BREAKER AND METERING SECTION INSIDE CUSTOMER CABINET.
- B. MODIFICATIONS TO EXISTING EQUIPMENT SHALL REQUIRE 3RD PARTY UL RECERTIFICATION UNLESS USING MANUFACTURER PROVIDED MODIFICATIONS WHERE THE UL LISTING IS MAINTAINED.

6.0 ELECTRICAL EQUIPMENT TESTING

6.1 ELECTRICAL TESTING

- A. PERFORM ELECTRICAL TESTING IN ACCORDANCE WITH NETA ACCEPTANCE TESTING SPECIFICATIONS (ATS) PROCEDURES AND TEST FORMS. TEST PERSONNEL SHALL HAVE A MINIMUM OF 5 YEARS EXPERIENCE PERFORMING THE REQUIRED TYPE OF ELECTRICAL TESTS.
- B. ELECTRICAL TESTING AND COMMISSIONING SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING EQUIPMENT:
  1. ALL ELECTRICAL CABLES, INCLUDING
    - a. DC POWER CABLES
    - b. LOW VOLTAGE AC POWER CABLES
    - c. CONTROL CABLES
    - d. ANALOG INSTRUMENTATION CABLES
  2. GROUNDING SYSTEMS
  3. DRY-TYPE TRANSFORMERS
  4. PANELBOARDS
  5. INVERTERS
  6. DC OPTIMIZER
  7. CELLULAR KITS

6.2 CABLE TESTING

- A. PROVIDE FIELD TESTING OF ALL WIRE, CABLE, ELECTRICAL DEVICES AND EQUIPMENT, AND ELECTRICAL SYSTEMS FURNISHED AND INSTALLED.
- B. FOLLOWING ITEMS SHALL BE PERFORMED AND PROCEDURES SHALL BE FOLLOWED:
  1. TEST PROTOCOL AND FORMS SHALL CONFORM TO NETA ACCEPTANCE TESTING SPECIFICATIONS.
  2. PREPARE AND SUBMIT ELECTRICAL TESTING PLAN TO ENGINEER FOR REVIEW AND APPROVAL.
  3. INFORM CONSTRUCTION MANAGER IN WRITING A MINIMUM OF 3 DAYS IN ADVANCE OF ALL SCHEDULED TESTING TO WITNESS ANY SUCH ELECTRICAL TESTING.
  4. CREATE AND MAINTAIN WRITTEN RECORDS AND SUBMIT FOR REVIEW BY CONSTRUCTION MANAGER ALL ELECTRICAL TESTS DESCRIBED IN SECTION 5.4 OF 2017 NETA-ATS INCLUDING DATE OF TEST, TEST EQUIPMENT USED, PERSONNEL MAKING TEST, EQUIPMENT OR MATERIAL TESTED, TESTS PERFORMED AND RESULTS, INCLUDING ANY DEFICIENCIES FOUND.
  5. INCLUDE NAMEPLATE DATA OF EQUIPMENT BEING TESTED IN ALL TEST REPORTS.
  6. PROVIDE NECESSARY TEST EQUIPMENT, LABOR, MATERIALS AND SUBCONTRACTED TESTING SERVICES.
  7. IF EQUIPMENT OR MATERIAL ARE DAMAGED DUE TO IMPROPER TEST PROCEDURES OR TEST APPARATUS HANDLING, REPLACE OR RESTORE THE DAMAGED COMPONENT TO ORIGINAL CONDITION AT CONSTRUCTION MANAGER'S DISCRETION, AT CONTRACTOR'S EXPENSE.
  8. PROVIDE AND UTILIZE SAFETY DEVICES INCLUDING RUBBER GLOVES, BLANKETS, PROTECTIVE SCREENS AND BARRIERS, BARRICADE TAPE, DANGER SIGNS, ETC. DURING ELECTRICAL TESTING TO ADEQUATELY PROTECT AND WARN PERSONNEL IN THE VICINITY OF TESTS BEING PERFORMED.

6.2.1 AFTER PLACEMENT

- A. FURNISH ALL EQUIPMENT AND LABOR REQUIRED FOR TESTING.
- B. PERFORM PREOPERATIONAL TESTS ON INSULATED CONDUCTORS AFTER INSTALLATION AS FOLLOWS:
  1. LOW VOLTAGE CABLES SHALL BE EITHER INSULATION RESISTANCE TESTED BEFORE CONNECTING TO EQUIPMENT OR FUNCTIONALLY TESTED (AT EQUIPMENT OPERATION VOLTAGE) AS PART OF EQUIPMENT AND/OR SYSTEM CHECKOUT.
  2. INSULATED CONDUCTORS SHALL BE CONTINUITY TESTED FOR CORRECT CONDUCTOR IDENTIFICATION.
- C. TEST CIRCUITS WITH CIRCUIT COMPLETE EXCEPT FOR CONNECTIONS TO EQUIPMENT.
- D. PERFORM CONTINUITY TESTS ON ALL SUPERVISORY AND COMMUNICATION CABLE BEFORE AND AFTER EACH SPLICE IS MADE IN ADDITION TO TESTS PERFORMED AFTER CABLE PLACEMENT IS COMPLETE.
- E. CIRCUITS FAILING TO TEST SATISFACTORILY SHALL BE REPLACED OR REPAIRED AND THEN RETESTED, AT CONTRACTOR'S EXPENSE.

6.2.2 IDENTIFICATION TESTING

- A. IDENTIFICATION TESTS SHALL INCLUDE ALL TESTS NECESSARY TO CONFIRM THAT CONDUCTOR BEING INVESTIGATED ORIGINATES AND TERMINATES AT LOCATIONS DESIGNATED IN CIRCUIT LIST OR INDICATED ON DRAWINGS.

6.2.3 INSULATION RESISTANCE TESTING

- A. ALL CABLES RATED LESS THAN 5,000 V SHALL BE INSULATION RESISTANCE TESTED, INCLUDING:
  1. LOW VOLTAGE AC POWER CABLES
  2. DRY-TYPE TRANSFORMERS
- B. PERFORM INSULATION RESISTANCE TESTING WITH A 1,000 V MEGGER OR AN EQUIVALENT TESTING DEVICE.
- C. COMPLETE INSULATION RESISTANCE MEASUREMENTS BETWEEN EACH CONDUCTOR AND GROUND AND BETWEEN EACH CONDUCTOR AND ALL OTHER CONDUCTORS OF THE SAME CIRCUIT.
- D. MINIMUM ACCEPTABLE RESISTANCE VALUE SHALL BE 500 MEGAOHMS

6.2.4 CONTINUITY TESTING

- A. CONTINUITY TESTS SHALL INCLUDE ALL TESTS NECESSARY TO CONFIRM THAT EACH CONDUCTOR IS CONTINUOUS THROUGHOUT ITS ENTIRE LENGTH.

6.2.5 RS-485 COMMUNICATION CABLE TESTING

- A. TEST FOR CONTINUITY ALL INSULATED CONDUCTORS OF COMMUNICATION CABLE.
- B. PERFORM HIGH PERFORMANCE CABLE CERTIFICATION FOR PERMANENT LINK CONFIGURATION AND DOCUMENTED FOR ALL RS-485 CABLES.
- C. TEST SPECIFICATIONS FOR ALL INSTALLED CABLES SHALL MEET OR EXCEED THE SPECIFICATIONS FOR COMMUNICATION CABLING, RESPECTIVELY, THAT ARE DOCUMENTED WITHIN TIA/EIA-485.
- D. CORRECT OR REPLACE AND RECERTIFY CABLES NOT ACHIEVING A PASS RATING.
- E. A RATING OF \*PASS (MARGINALLY PASS) OR \*FAIL (MARGINALLY FAIL) IS NOT ACCEPTABLE.

SYMBOL LEGEND

- ELECTRICAL SERVICE PANEL
- INVERTER FUSED DISCONNECT
- PHOTOVOLTAIC AC DISCONNECT SWITCH
- DC/AC INVERTER
- DEDICATED PV SYSTEM COMBINER PANEL
- METERING AND SURGE PROTECTION CABINET
- PHOTOVOLTAIC PRODUCTION METER
- TRANSFORMER
- ELECTRICAL SERVICE DISCONNECT
- PHOTOVOLTAIC SYSTEM UTILITY DISCONNECT
- EXISTING UTILITY METER
- MODULE STRINGING
- MODULE STRINGING
- MODULE STRINGING
- MODULE STRINGING

- PROPERTY LINE
- ROOF RAFTERS
- GROUND CONDUCTOR
- ////// PITCHED ROOF FIRE CLEARANCE AREA
- FLAT ROOF FIRE CLEARANCE AREA

NORTH INDICATOR



DISCLAIMER: PLEASE NOTE THAT THE SYMBOLS LISTED ARE INTENDED TO ILLUSTRATE THOSE THAT ARE COMMONLY USED; NOT ALL ARE NECESSARILY UTILIZED WITHIN THIS SET OF DRAWINGS.

ABBREVIATIONS

- AC ALTERNATING CURRENT
- AHJ AUTHORITY HAVING JURISDICTION
- AWG AMERICAN WIRE GAUGE
- DC DIRECT CURRENT
- DWG DRAWING
- EMT ELECTRIC METALLIC TUBE CONDUIT
- GND GROUND
- IEEE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
- INV INVERTER
- MAX MAXIMUM
- MIN MINIMUM
- NEC NATIONAL ELECTRIC CODE
- NESC NATIONAL ELECTRICAL SAFETY CODE
- OSHA OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
- PV PHOTOVOLTAIC
- SS STAINLESS STEEL
- TYP TYPICAL
- UL UNDERWRITERS LABORATORIES
- UNO UNLESS NOTED OTHERWISE
- UV ULTRAVIOLET
- DS DISCONNECT SWITCH
- POI POINT OF INTERCONNECTION
- (E) EXISTING

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NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
2	18/FEB/21	APPROVED FOR CONSTRUCTION	AWC	AWC	JJA	JJA	JJA
1	03/DEC/20	ISSUED FOR PERMITTING	AWC	RDB	JJA	JJA	JJA
0	13/AUG/20	ISSUED FOR PERMITTING	AWC	RDB	JJA	JJA	JJA

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF OHIO.

SIGNED: JACOB J. AUGSBURGER  
 DATE: 13/AUG/20 REG NO. PE. 84901

DESIGNER: RDB	DRAWN: AWC
CHECKED: JJA	DATE: 13/AUG/20

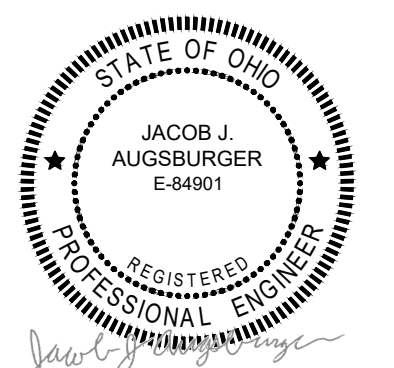
J.P. MORGAN CHASE  
 TRANCHE 8 - OHIO

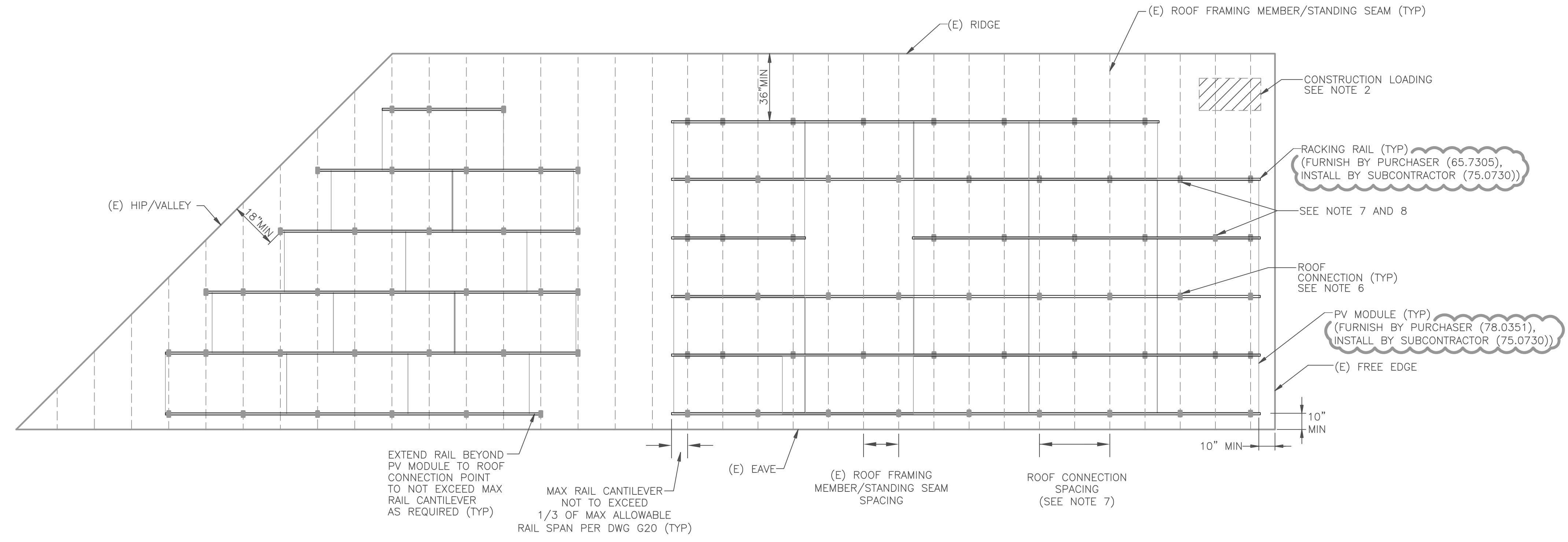
GENERAL NOTES

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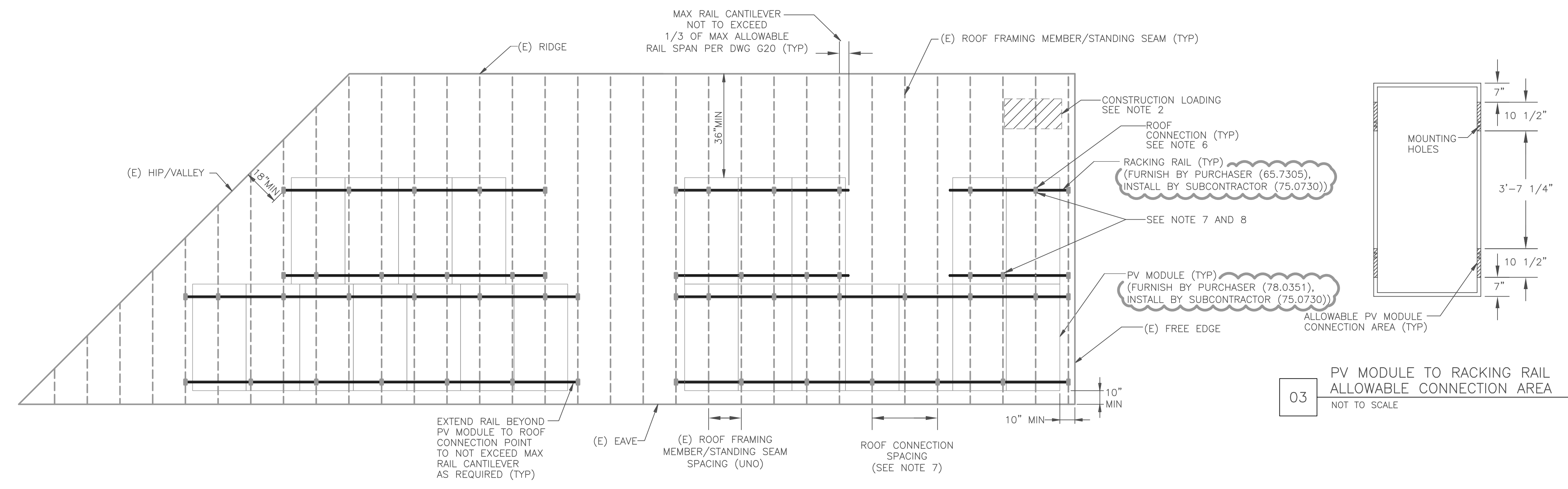
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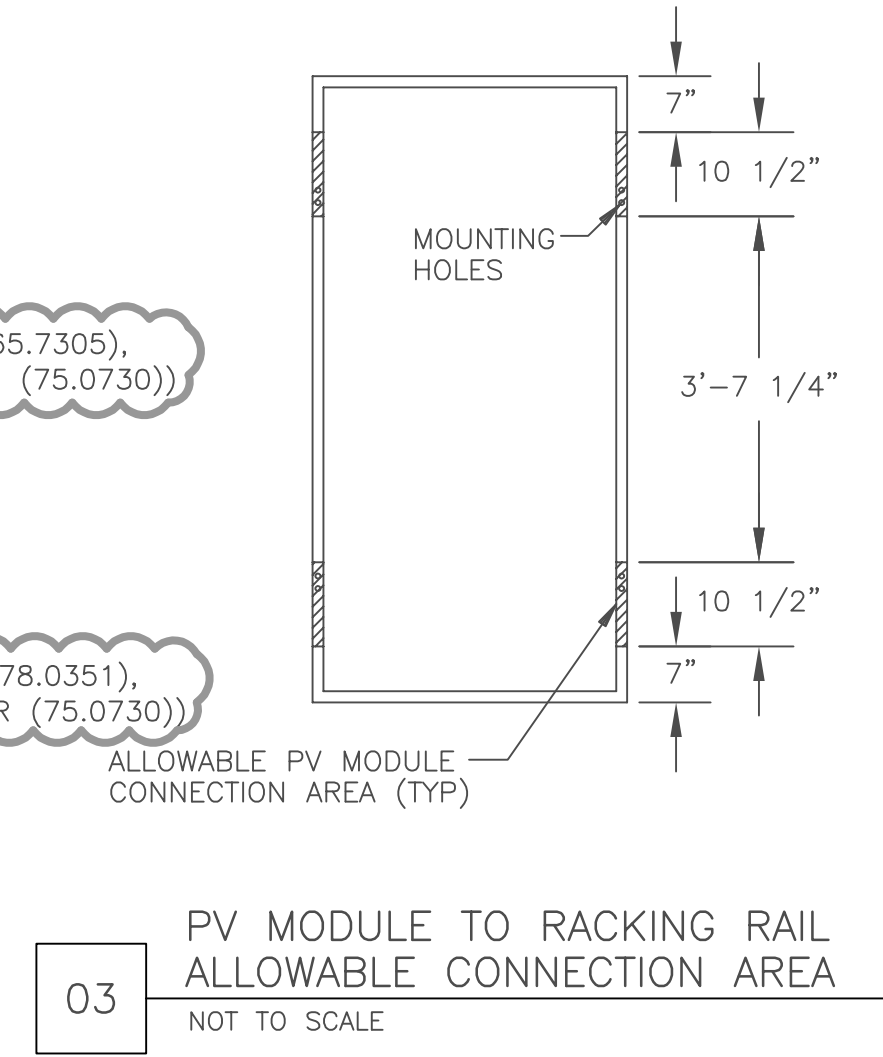




01 ROOF PLAN - SHARED RAIL SYSTEM TYPICAL ARRAY CONNECTION LAYOUT  
NOT TO SCALE



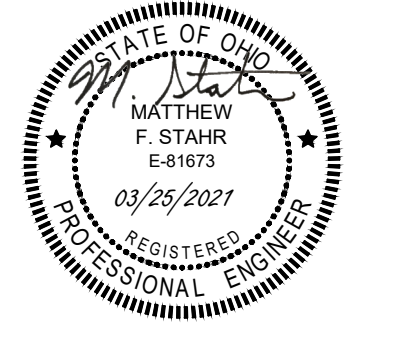
02 ROOF PLAN - DUAL RAIL SYSTEM TYPICAL ARRAY CONNECTION LAYOUT  
NOT TO SCALE



03 PV MODULE TO RACKING RAIL ALLOWABLE CONNECTION AREA  
NOT TO SCALE

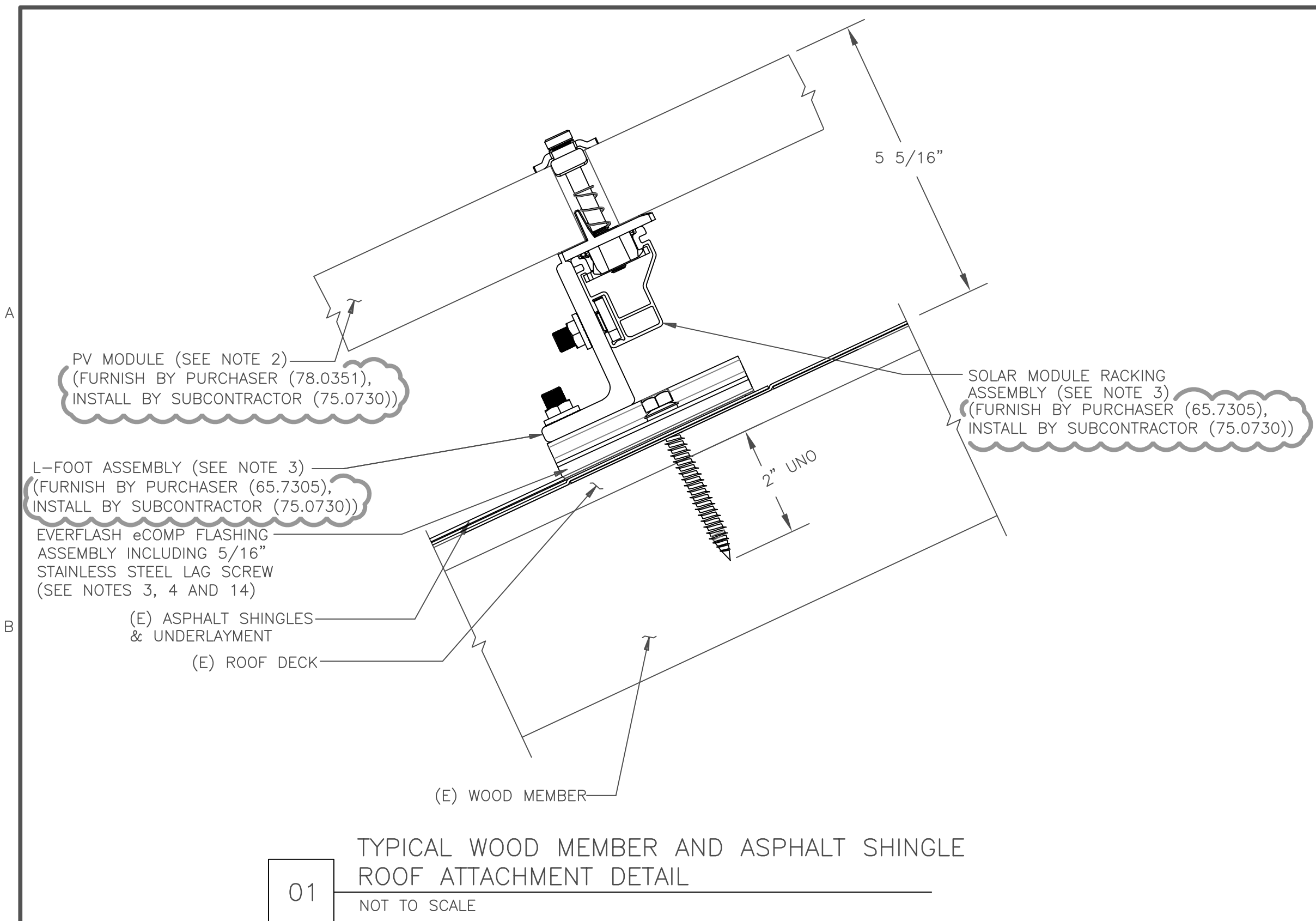
- NOTES:
- SEE DRAWING SG20 AND SG21 FOR GENERAL NOTES.
  - CONSTRUCTION LIVE LOADING ON THE ROOF, INCLUDING BUT NOT LIMITED TO MATERIAL STAGED ON THE ROOF, SHALL NOT EXCEED 20 psf. CONCENTRATED LOADING SHALL BE AVOIDED TO PREVENT LOCALIZED DAMAGES TO THE ROOF. FOR EXAMPLE A 26 SOLAR MODULE PALLET WEIGHING 1302 LBS MAY UTILIZE CRIBBING THAT DISTRIBUTES LOADING OVER AN 8'-3" X 8'-3" AREA TO MEET CONSTRUCTION LOAD REQUIREMENTS.
  - AS-BUILT LOCATION OF EXISTING RAFTER AND OTHER STRUCTURAL FRAMING MEMBERS AND ROOF TYPE MAY VARY FROM DIMENSIONS SHOWN ON THIS DRAWING. CONTRACTOR SHALL NOTIFY THE ENGINEER OF RECORD IN CASE OF A SIGNIFICANT DISCREPANCY BETWEEN DRAWING DIMENSIONS AND AS-BUILT DIMENSIONS BEFORE PROCEEDING WITH THE WORK.
  - INSTALL RACKING IN ACCORDANCE WITH EVEREST SOLAR SYSTEMS SPECIFICATIONS AND INSTALLATION MANUALS FOR THE APPLICABLE RAIL AND FLASHING SYSTEMS PROVIDED WITH THE SITE EQUIPMENT KIT.
  - THERMAL EXPANSION GAP (1.25" - 2") TO BE INCLUDED BETWEEN RAILS AT EVERY 65' OF RAIL LENGTH. SOLAR MODULES SHALL NOT BE INSTALLED ACROSS THIS GAP IN ACCORDANCE WITH EVEREST SOLAR SYSTEMS SPECIFICATIONS AND INSTALLATION MANUALS.
  - CONTRACTOR SHALL LOCATE EXISTING ROOF FRAMING MEMBERS AND CENTER ROOF CONNECTION FASTENERS ON ROOF FRAMING MEMBER UNLESS NOTED OTHERWISE.
  - ROOF CONNECTIONS TO ROOF FRAMING MEMBERS/STANDING SEAMS SHALL BE APPLIED AT EVERY OTHER ROOF FRAMING MEMBERS/STANDING SEAM NOT TO EXCEED 48" UNLESS NOTED OTHERWISE ON SITE SPECIFIC DESIGN DRAWING G20.
  - ROOF CONNECTIONS SHALL BE STAGGERED BETWEEN ADJACENT RAILS TO DISTRIBUTE LOAD BETWEEN EXISTING ROOF FRAMING MEMBERS/STANDING SEAMS UNLESS NOTED OTHERWISE ON SITE SPECIFIC DESIGN DRAWING G20.

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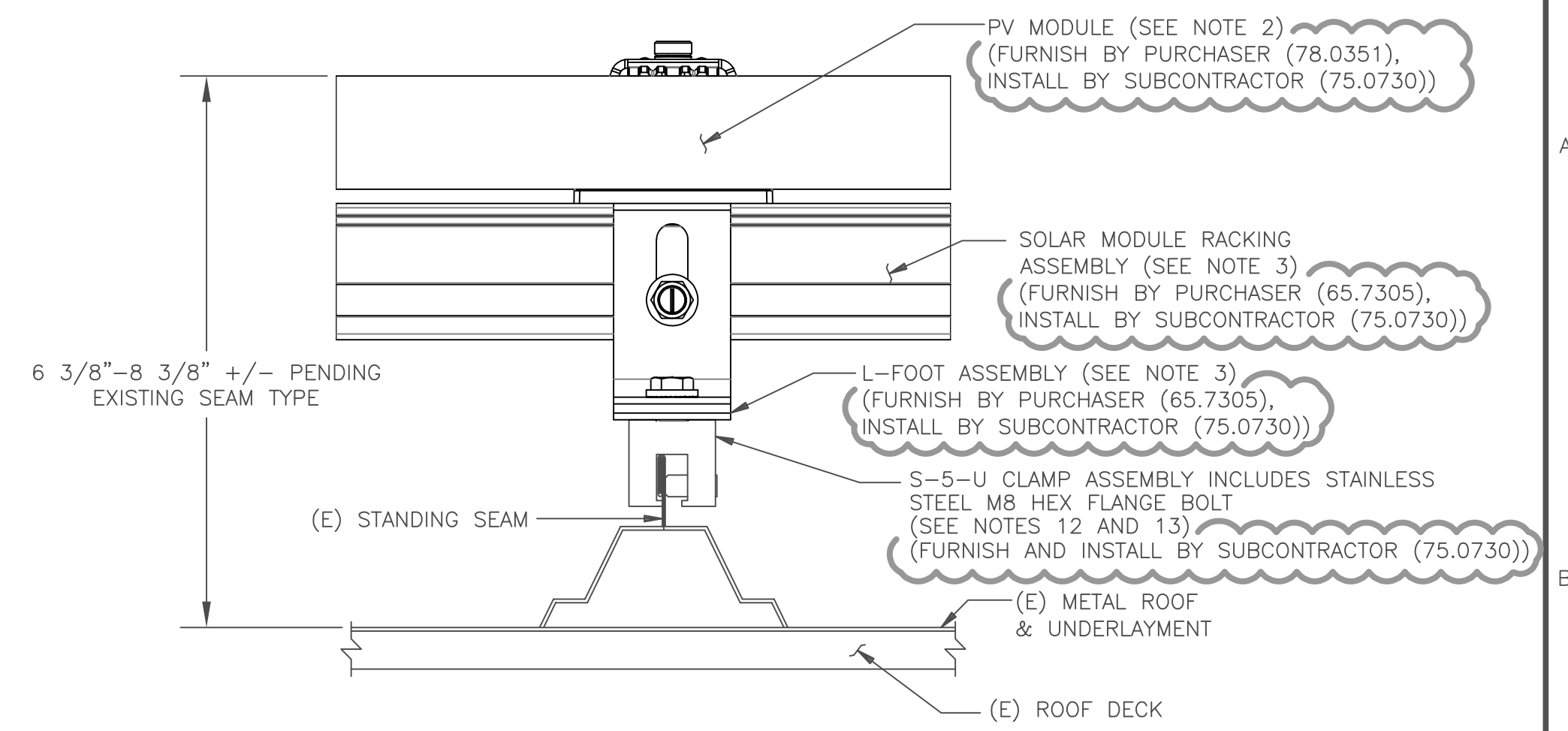
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		1	18/FEB/21	APPROVED FOR CONSTRUCTION	AWC	RDB	SAS	MFS	MFS			TRANCHÉ 8 - OHIO		OH-STNDRD-SS20		2
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		NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP			DATE	13/AUG/20	AREA		



**01** TYPICAL WOOD MEMBER AND ASPHALT SHINGLE ROOF ATTACHMENT DETAIL  
NOT TO SCALE

NOT USED

**02** TYPICAL ROOF MEMBRANE ATTACHMENT DETAIL  
NOT TO SCALE



**03** TYPICAL STANDING SEAM METAL ROOF ATTACHMENT DETAIL  
NOT TO SCALE  
(VIEW LOOKING UP THE SLOPE)

- NOTES:**
- SEE DRAWING SG20 AND SG21 FOR GENERAL NOTES.
  - DESIGN OF PV MODULE PER MISSION SOLAR SPECIFICATIONS NOTED ON DRAWINGS SR10 AND SR20.
  - DESIGN OF RACKING ASSEMBLY, RAIL SPAN, AND CONNECTION TO SOLAR MODULE PER EVEREST SOLAR SYSTEMS SPECIFICATIONS AND ENGINEERING LETTER FOR THE STATE.
  - APPLY SEALANT (FURNISH AND INSTALL BY SUBCONTRACTOR (75.0730)) TO PILOT HOLE AND FLASHING PER EVEREST SOLAR SYSTEMS EVERFLASH QUICK GUIDE.
  - FLAT WASHERS SHALL BE AISI 304 (18-8) STAINLESS STEEL AND CONFORM TO THE REQUIREMENTS OF ASTM A193 UNLESS NOTED OTHERWISE.
  - SPRING LOCK WASHERS SHALL BE AISI 304 (18-8) STAINLESS STEEL AND CONFORM TO THE REQUIREMENTS OF ASME B18.21.1 UNLESS NOTED OTHERWISE.
  - HEX NUTS SHALL BE AISI 304 (18-8) STAINLESS STEEL AND CONFORM TO THE REQUIREMENTS OF ASTM F594 UNLESS NOTED OTHERWISE.
  - BOLTS SHALL BE AISI 304 (18-8) STAINLESS STEEL AND CONFORM TO THE REQUIREMENTS OF ASTM F593 UNLESS NOTED OTHERWISE.
  - NOT USED
  - NOT USED
  - NOT USED
  - CONTRACTOR SHALL COMPLETE INSTALLATION IN ACCORDANCE WITH S-5I PRODUCT INSTALLATION REQUIREMENTS AND RECOMMENDATIONS.
  - S-5-U CLAMPS ARE RECOMMENDED FOR STANDING SEAM CONNECTION. FIELD VERIFY STANDING SEAM RIDGE PROFILE IS ACCEPTABLE WITH CLAMP AND NOTIFY ENGINEER OF RECORD FOR ANY VARIANCE FROM S-5-U CLAMPS PRIOR TO PROCUREMENT FOR REVIEW AND APPROVAL. S-5-U MINI CLAMPS ARE NOT ACCEPTABLE AND SHALL NOT BE USED.
  - FURNISH BY PURCHASER (65.7305) AND INSTALL BY SUBCONTRACTOR (75.0730) FOR EVERFLASH eCOMP FLASHING ASSEMBLY INCLUDING 5/16\"/>

NOT USED

**04** TYPICAL CORRUGATED METAL ROOF ATTACHMENT DETAIL  
NOT TO SCALE  
(VIEW LOOKING UP THE SLOPE)

NOT USED

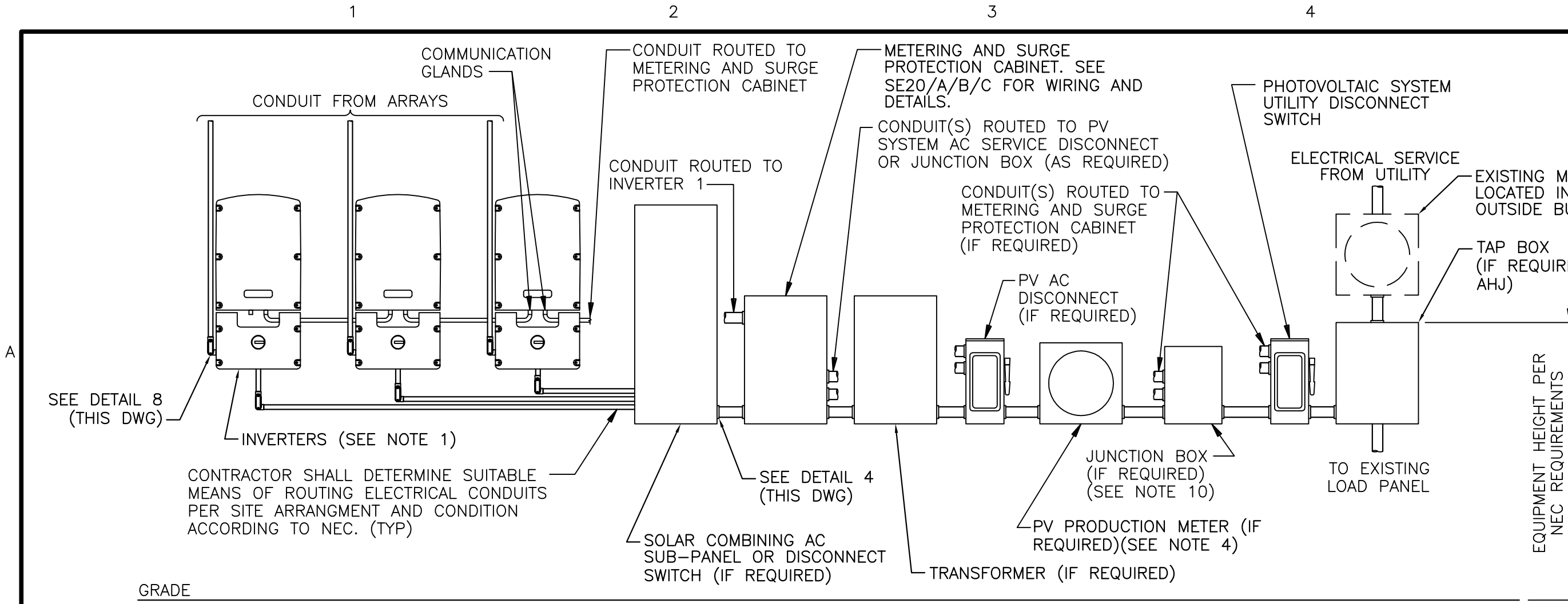
**05** TYPICAL STEEL MEMBER AND ASPHALT SHINGLE ROOF ATTACHMENT DETAIL  
NOT TO SCALE

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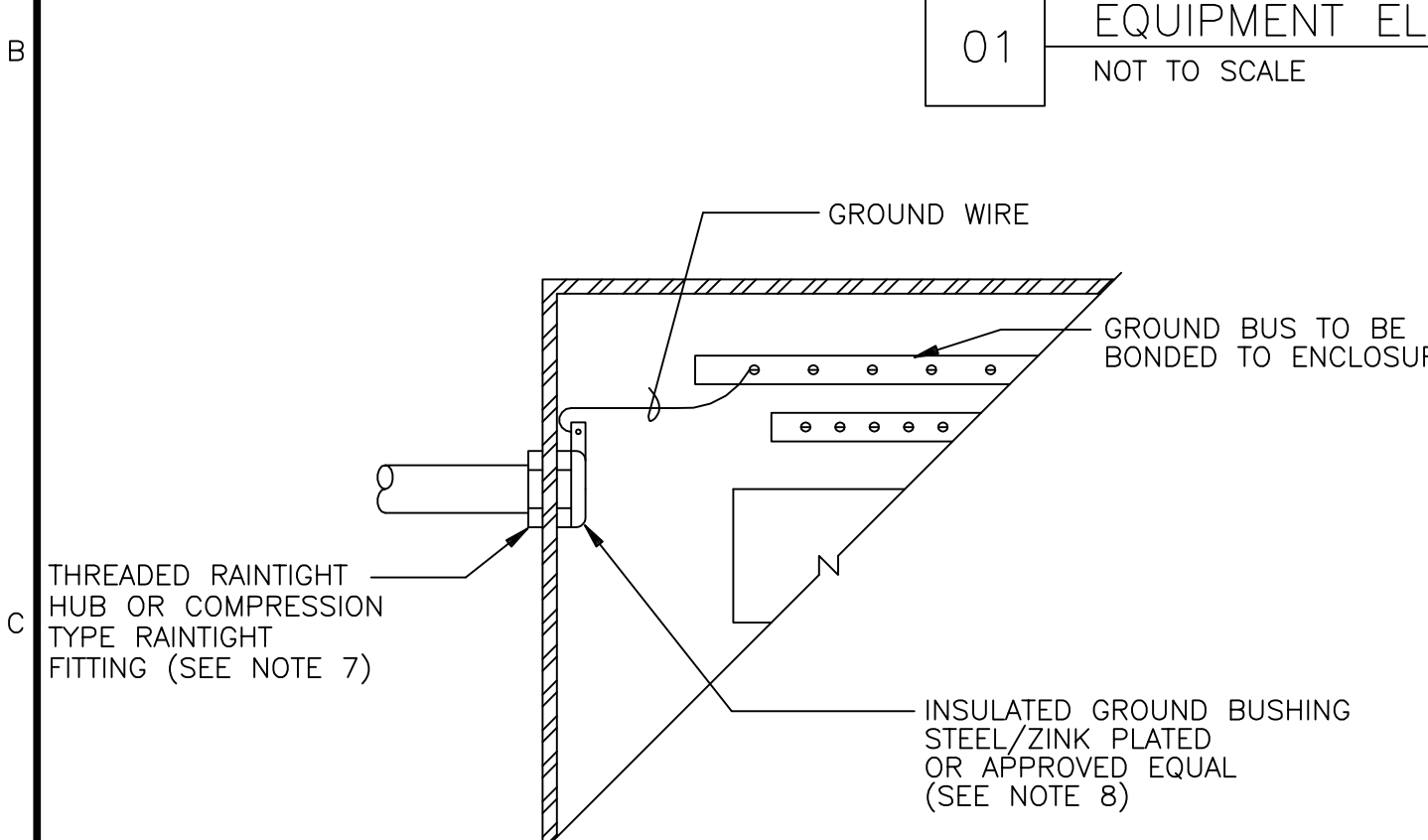


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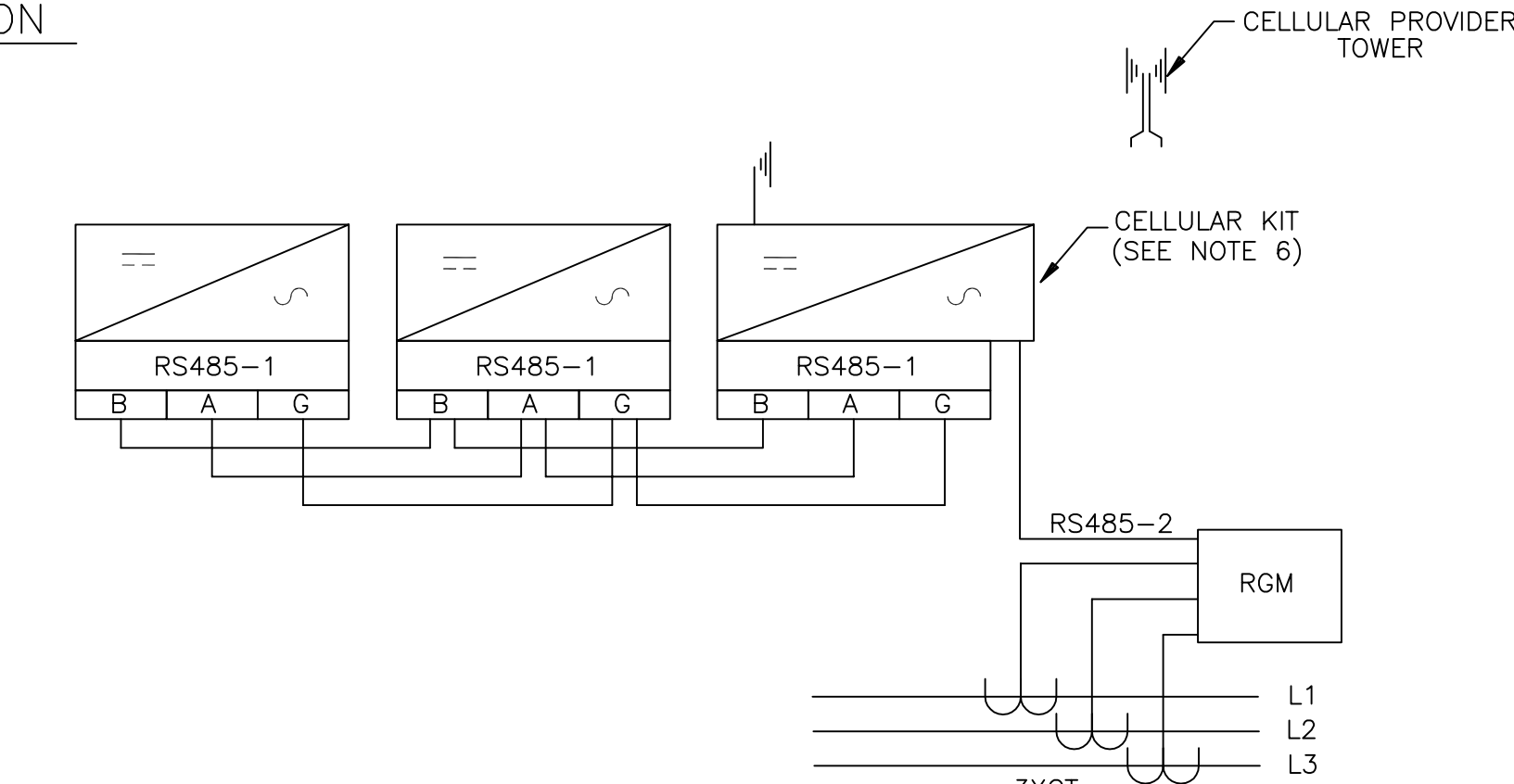
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		1	18/FEB/21	APPROVED FOR CONSTRUCTION	AWC	RDB	SAS	MFS	MFS			TRANCHE 8 - OHIO		OH-STNDRD-SS21		2
		0	13/AUG/20	ISSUED FOR PERMITTING	AWC	RDB	SAS	MFS	MFS			PITCHED ROOF CONNECTION DETAILS		CODE		
NO	DATE	REVISIONS AND RECORD OF ISSUE			DRN	DES	CHK	PDE	APP			CHECKED	DATE	AREA		



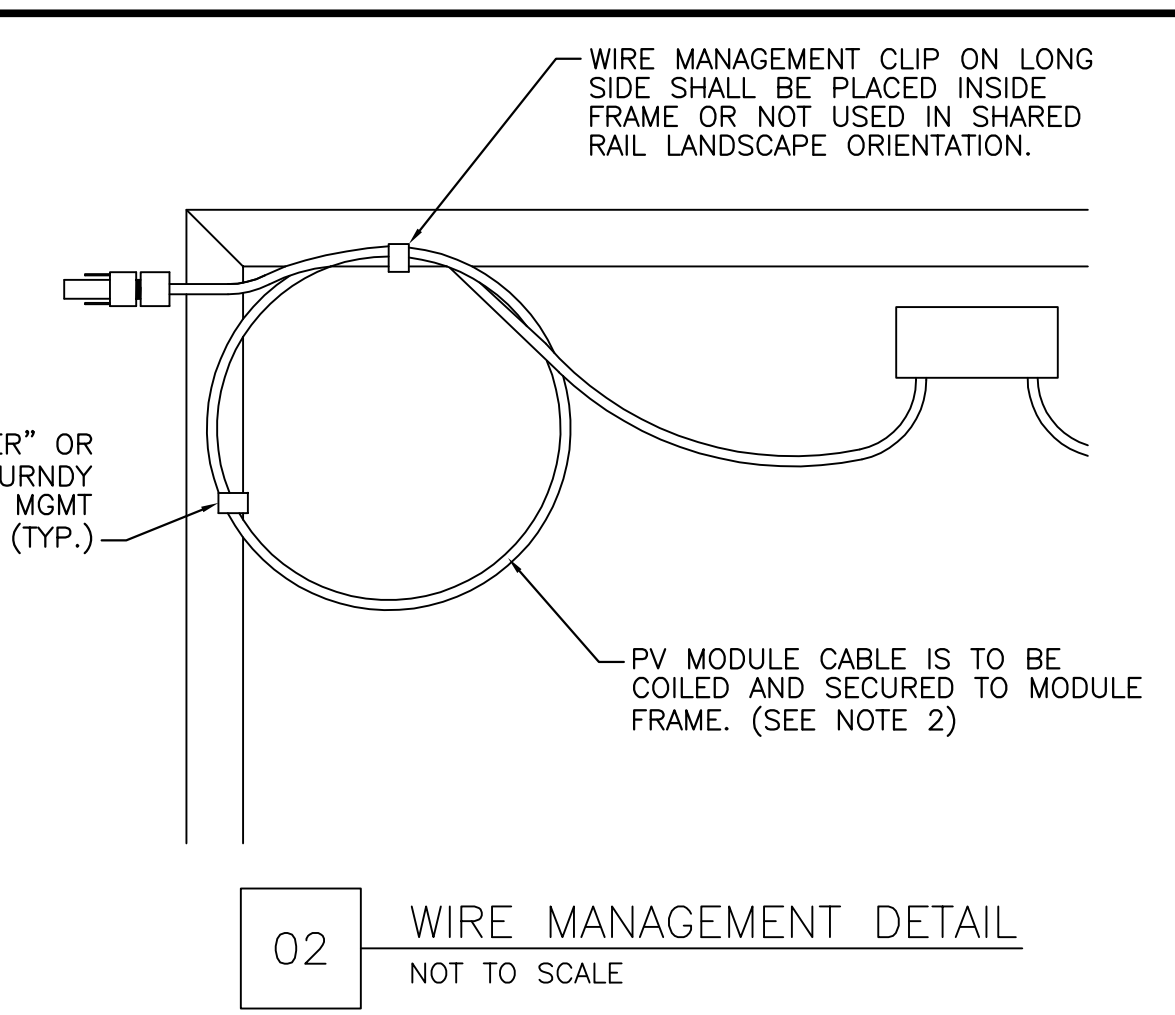
01 EQUIPMENT ELEVATION  
NOT TO SCALE



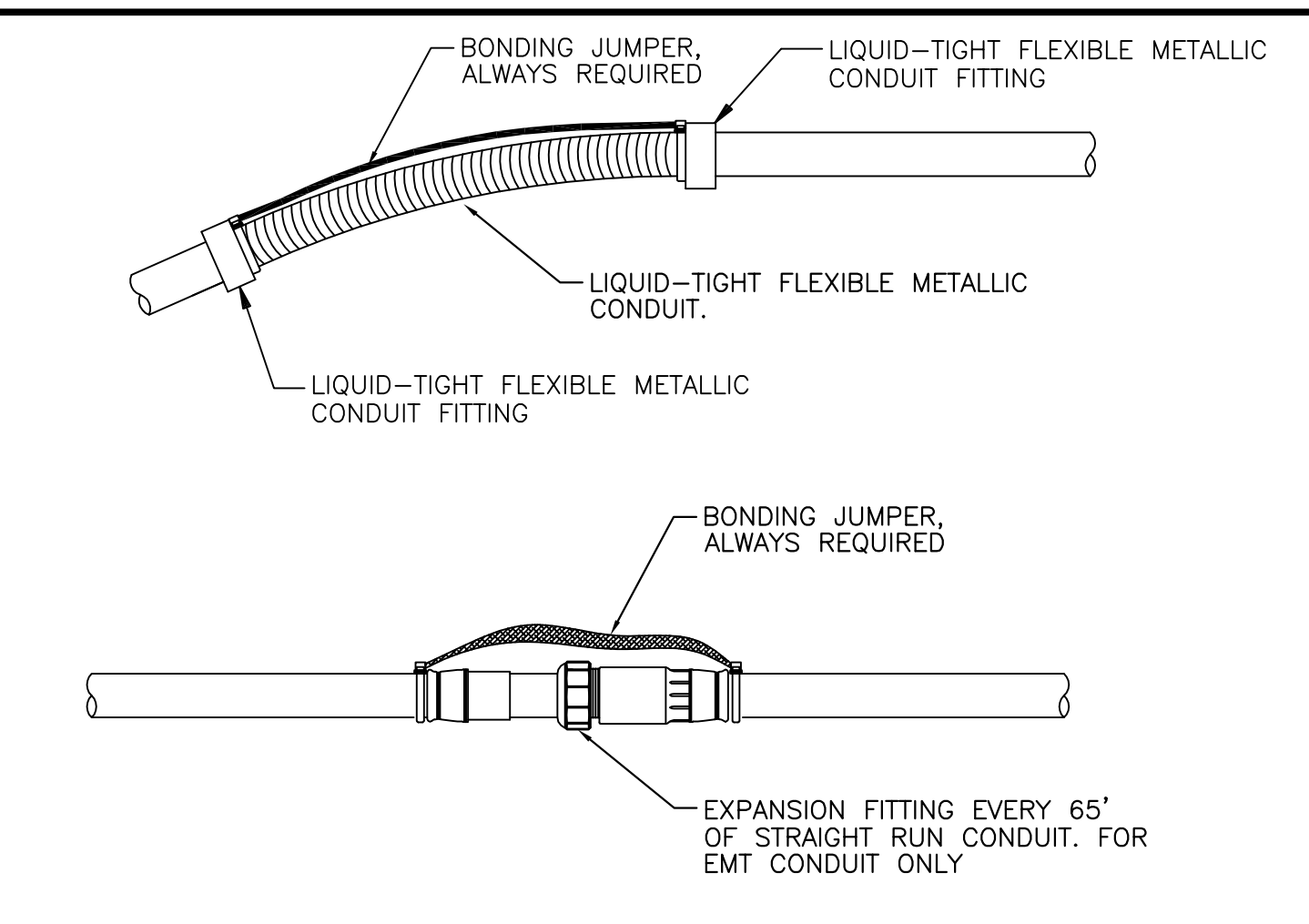
04 ENCLOSURE CONDUIT TERMINATION  
NOT TO SCALE



03 SINGLE OR MULTIPLE INVERTER DAS CONFIGURATION  
NOT TO SCALE

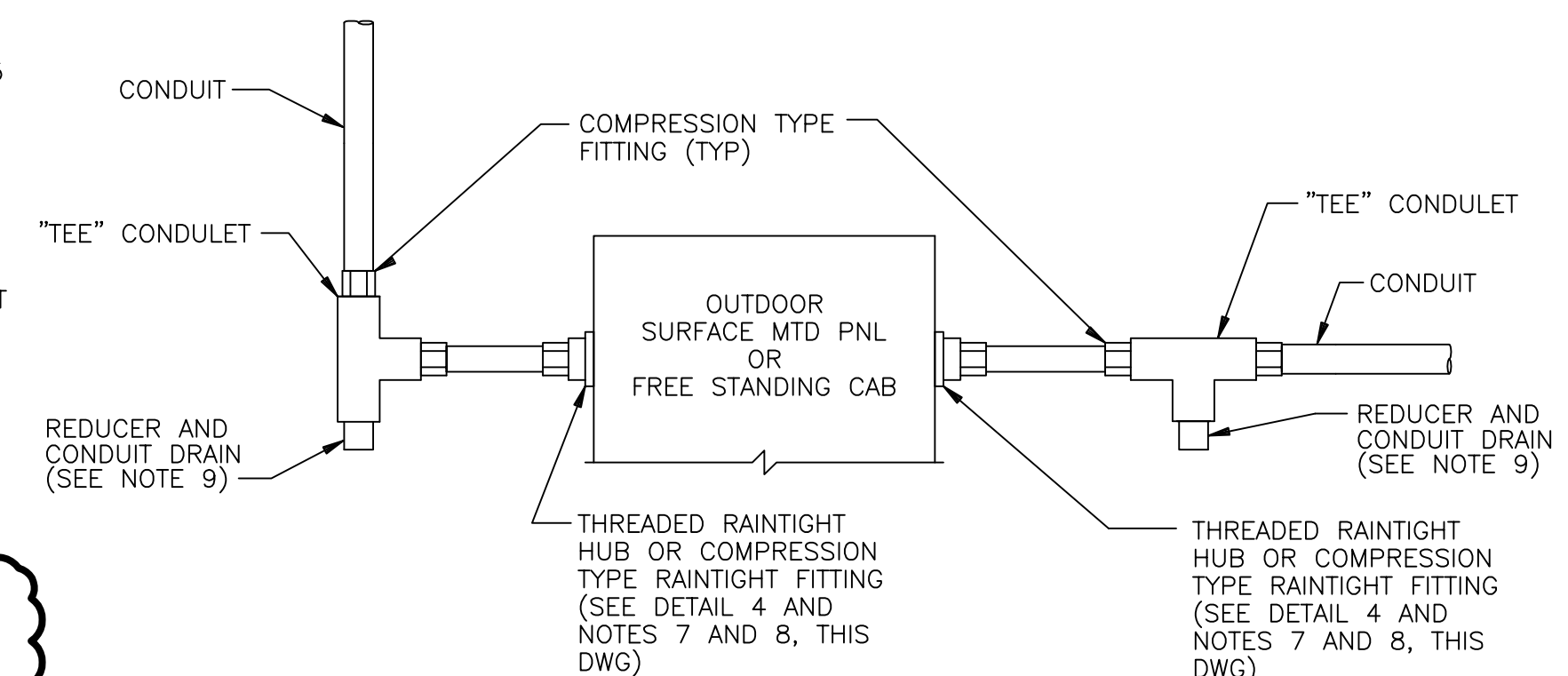


02 WIRE MANAGEMENT DETAIL  
NOT TO SCALE

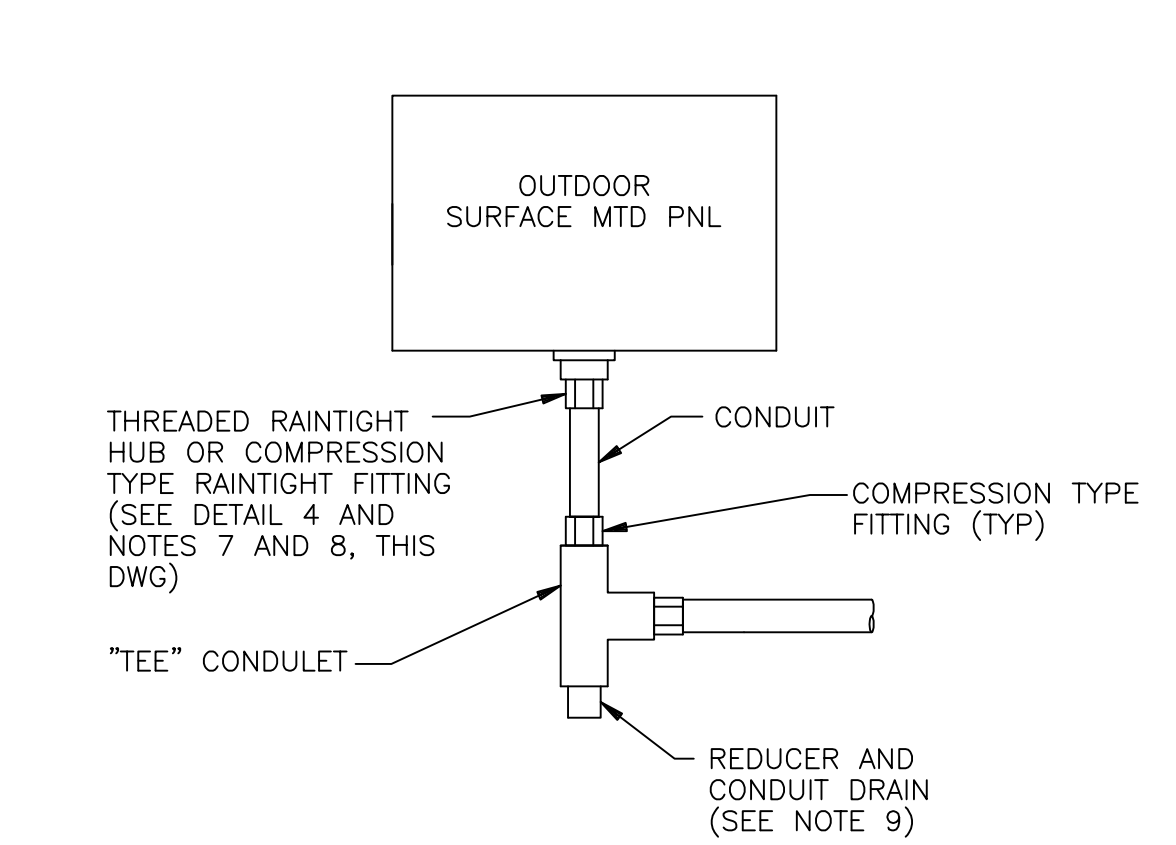


05 BONDING FOR CONDUIT CONNECTIONS  
NOT TO SCALE

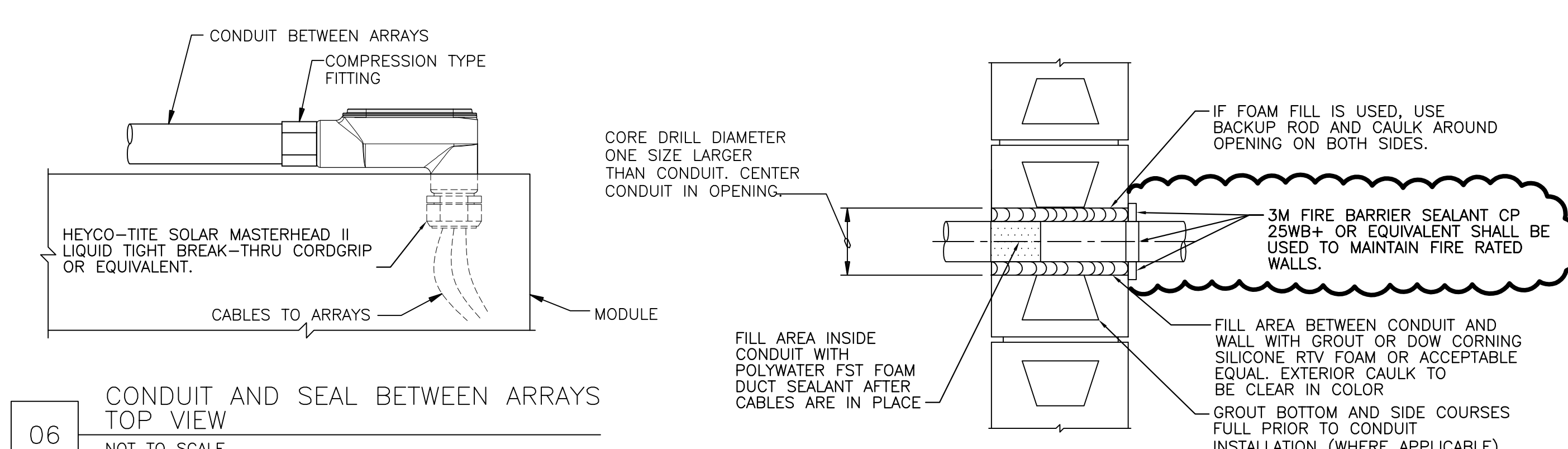
- NOTES:
1. THE NUMBER OF INVERTERS WILL VARY BY DESIGN. CLEARANCES AND SPACING FOR INVERTERS SHALL BE DETERMINED FROM SOLAREGE INSTALLATION MANUAL.
  2. CABLE MANAGEMENT SHALL BE INSTALLED TO SUPPORT AND MAINTAIN ADEQUATE STRAIN RELIEF IN A NEAT AND WORKMANLIKE MANNER FOR A 25 YEAR INSTALLATION. SPACING OF SUPPORTS SHALL BE ADEQUATE TO AVOID CONTACT WITH THE ROOF SURFACE AS REQUIRED.
  3. REFER TO RACKING VENDOR INSTALL MANUAL FOR RACK GROUNDING PROCEDURE.
  4. LINE UP ORDER SHOWN IS FOR UTILITY INTERCONNECTIONS THAT REQUIRE A UTILITY PV PRODUCTION METER. A UTILITY PV PRODUCTION METER IS NOT REQUIRED FOR SOME INTERCONNECTION UTILITIES.
  5. CONTRACTOR SHALL INSTALL DATA ACQUISITION SYSTEM (DAS) AS SHOWN ON DETAIL 3 AND ACCORDING TO INVERTER INSTALLATION MANUAL.
  6. ONE CELLULAR KIT IS REQUIRED PER SITE. THE CELLULAR KIT SHALL BE INSTALLED IN INVERTER 1 (INV1). ALL CABLES ARE TO BE ROUTED IN CONDUIT.
  7. ALL OUTDOOR CONDUITS TERMINATING AT ELECTRICAL EQUIPMENT SHALL TERMINATE AT EQUIPMENT WITH RAINIGHT HUBS OR COMPRESSION TYPE, RAINIGHT FITTINGS. WHERE CONDUIT KNOCKOUTS ARE NOT PROVIDED IN THE ELECTRICAL EQUIPMENT, CONTRACTOR SHALL LOCATE AND INSTALL CONDUIT TERMINATIONS AT LOCATIONS NOT TO NEGATIVELY IMPACT THE NEMA RATING OF THE EQUIPMENT ENCLOSURE. RAINIGHT THREADED HUBS SHALL BE CROUSE-HINDS TYPE "STG", OZ-GEDNEY TYPE "CH" OR ENGINEER ACCEPTABLE EQUAL. COMPRESSION TYPE FITTINGS SHALL BE EATON CONNECTOR, NON-INSULATED, RAINIGHT FITTINGS 65(X)RT SERIES OR ENGINEER ACCEPTABLE EQUAL.
  8. ALL CONDUITS TERMINATING AT ELECTRICAL EQUIPMENT SHALL BE INSTALLED WITH GROUNDING TYPE INSULATED BUSHINGS WITH INSULATING INSERTS AND BONDED TO THE EQUIPMENT GROUND WITH GREEN GROUND WIRE NOT LESS THAN 10AWG WIRE. HUBS OR FITTINGS THAT DO NOT HAVE AN INTEGRAL GROUNDING SCREW SHALL USE GROUNDING TYPE INSULATING BUSHINGS CROUSE-HINDS TYPE "GLL", OZ-GEDNEY TYPE IBC-L-BC OR ENGINEER ACCEPTABLE EQUAL.
  9. CONDUIT DRAINS SHALL BE INSTALLED AT ALL LOW POINTS OF CONDUIT RUNS.
  10. A JUNCTION BOX SHALL BE INSTALLED FOR THE REVENUE GRADE METER CONNECTIONS IF THE AC DISCONNECT HAS LIMITED SPACE TO INSTALL THE



08 TYPICAL CONDUIT FOR SIDE ENTRY INTO OUTDOOR SURFACE MOUNTED PANEL OR FREE STANDING CABINET  
NOT TO SCALE

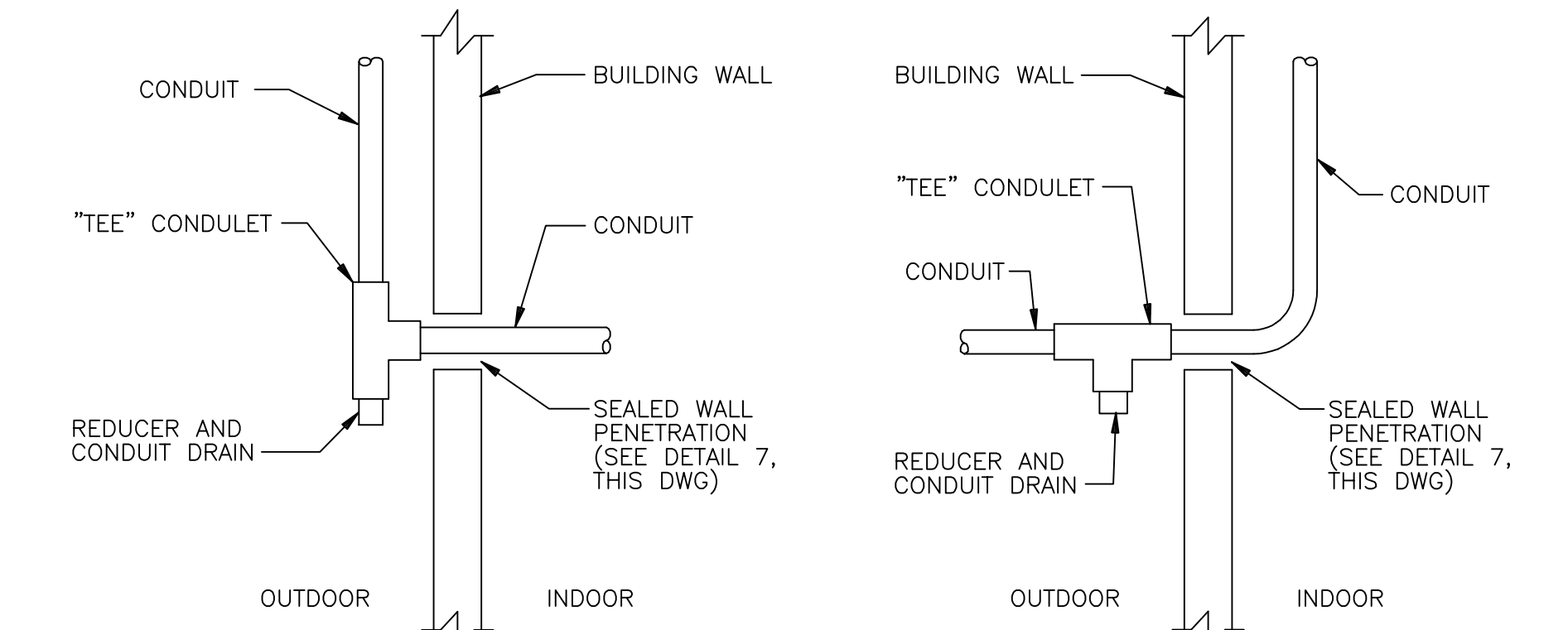


09 TYPICAL CONDUIT FOR BOTTOM ENTRY INTO OUTDOOR SURFACE MOUNTED PANEL  
NOT TO SCALE



06 CONDUIT AND SEAL BETWEEN ARRAYS  
TOP VIEW  
NOT TO SCALE

07 CONDUIT PENETRATION THROUGH WALL  
TYPICAL FOR ALL WALL TYPES



10 TYPICAL CONDUIT DRAIN AT EXTERIOR BUILDING WALL  
NOT TO SCALE

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1	18/FEB/21	APPROVED FOR CONSTRUCTION	AWC	AWC	JJA	JJA	JJA
0	13/AUG/20	ISSUED FOR PERMITTING	AWC	RDB	JJA	JJA	JJA

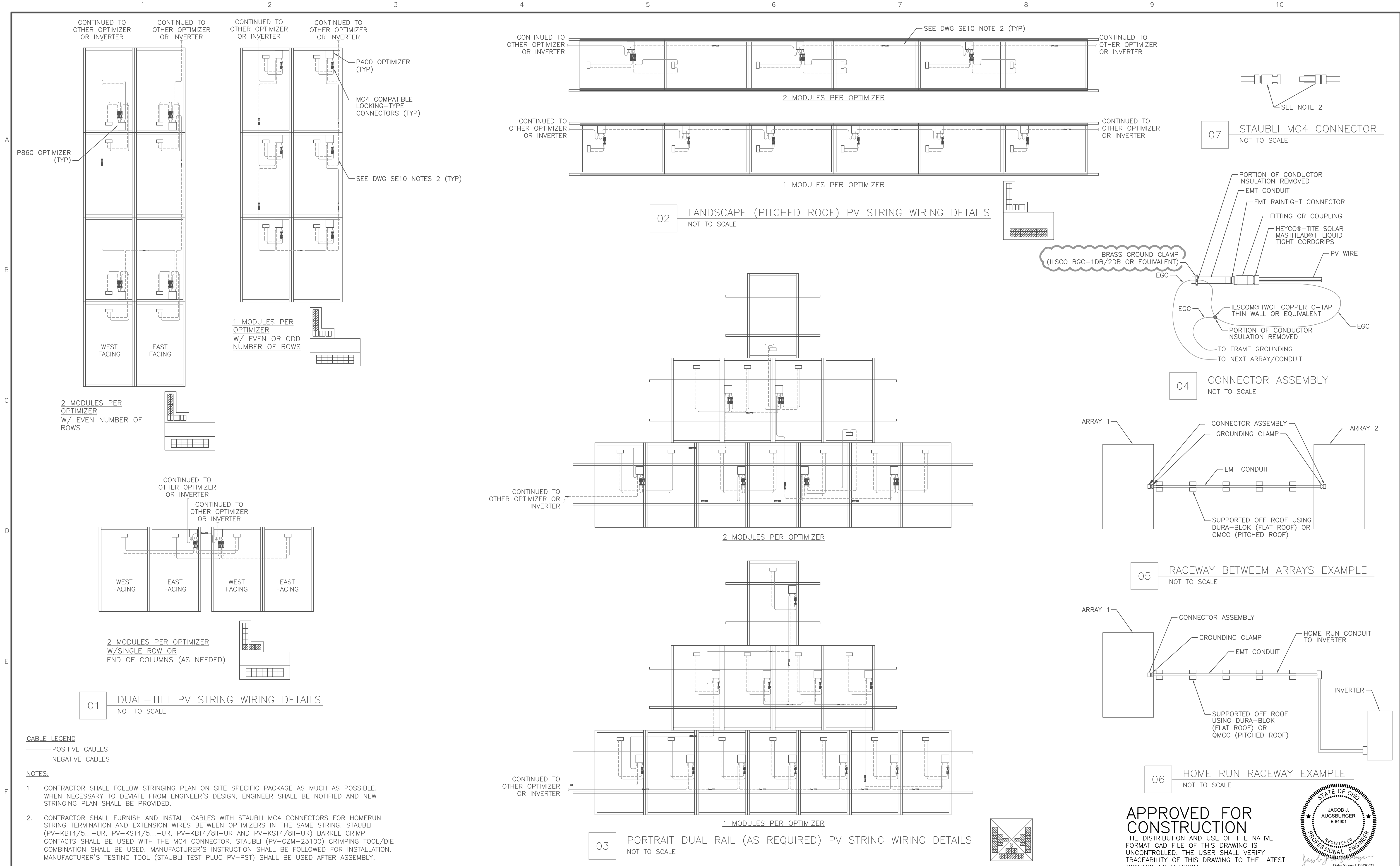
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SIGNED: JACOB J. AUGSBURGER  
DATE: 13/AUG/20 REG. NO. PE. 84901

**BLACK & VEATCH**  
DESIGNER: RDB  
DRAWN: AWC  
CHECKED: JJA  
DATE: 13/AUG/20

J.P. MORGAN CHASE  
TRANCHE 8 - OHIO  
ELECTRICAL DETAILS

PROJECT	DRAWING NUMBER	REV
OH-STNDRD-SE10	OH-STNDRD-SE10	1
CODE	AREA	

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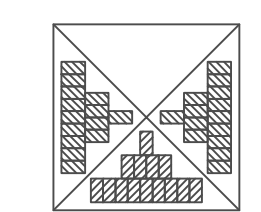


**CABLE LEGEND**  
 — POSITIVE CABLES  
 - - - - - NEGATIVE CABLES

- NOTES:**
- CONTRACTOR SHALL FOLLOW STRINGING PLAN ON SITE SPECIFIC PACKAGE AS MUCH AS POSSIBLE. WHEN NECESSARY TO DEVIATE FROM ENGINEER'S DESIGN, ENGINEER SHALL BE NOTIFIED AND NEW STRINGING PLAN SHALL BE PROVIDED.
  - CONTRACTOR SHALL FURNISH AND INSTALL CABLES WITH STAUBLI MC4 CONNECTORS FOR HOMERUN STRING TERMINATION AND EXTENSION WIRES BETWEEN OPTIMIZERS IN THE SAME STRING. STAUBLI (PV-KBT4/5...-UR, PV-KST4/5...-UR, PV-KBT4/8II-UR AND PV-KST4/8II-UR) BARREL CRIMP CONTACTS SHALL BE USED WITH THE MC4 CONNECTOR. STAUBLI (PV-CZM-23100) CRIMPING TOOL/DIE COMBINATION SHALL BE USED. MANUFACTURER'S INSTRUCTION SHALL BE FOLLOWED FOR INSTALLATION. MANUFACTURER'S TESTING TOOL (STAUBLI TEST PLUG PV-PST) SHALL BE USED AFTER ASSEMBLY.

ANSI D 3602 02/14/2017 04:16 PM

4	20/MAY/21	REVISED AS INDICATED	AWC	RDB	JJA	JJA	JJA	JJA	NO	3	18/FEB/21	APPROVED FOR CONSTRUCTION	AWC	AWC	JJA	JJA	JJA	I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF OHIO.	DESIGNER	RDB	DRAWN	AWC	J.P. MORGAN CHASE	PROJECT	TRANCHE 8 - OHIO	DRAWING NUMBER	REV	OH-STNDRD-SE12	4
												DATE		REVISIONS AND RECORD OF ISSUE		CHECKED		DATE		ELECTRICAL DETAILS NEC 2017		CODE		AREA					
												DATE		REVISIONS AND RECORD OF ISSUE		CHECKED		DATE											

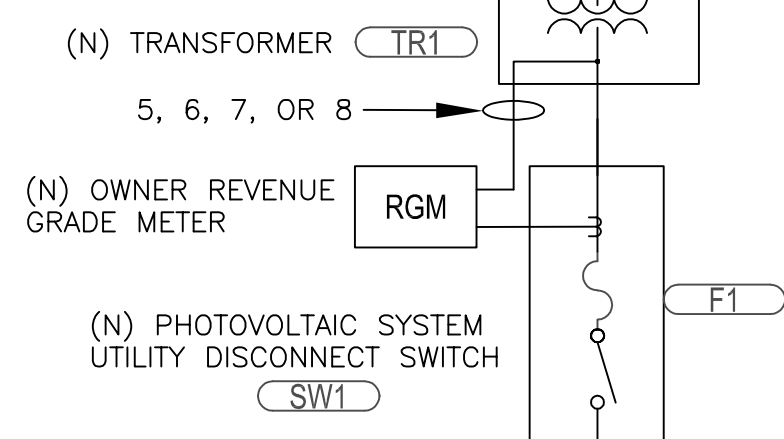
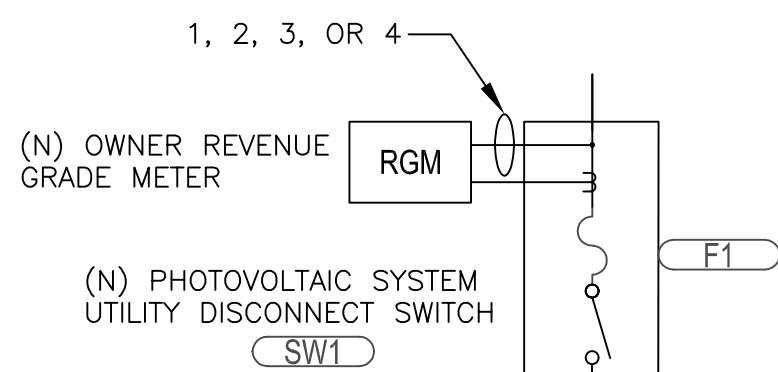


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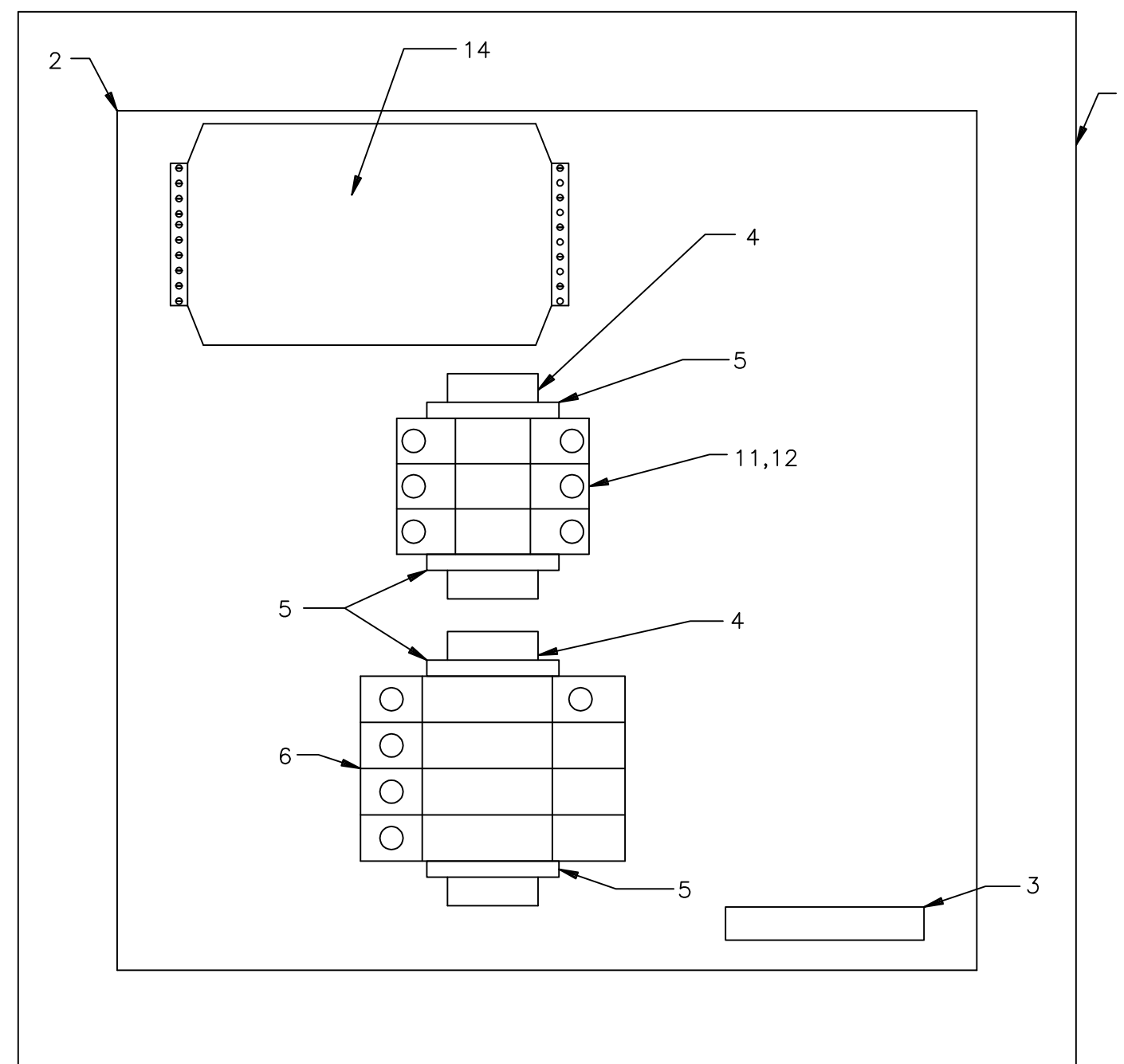
SUBCONTRACTOR SHALL FOLLOW ONE OF THESE OPTIONS BASED ON THE SITE SPECIFIC CONDITIONS FOR INSTALLING THE VOLTAGE REFERENCE CONDUCTORS (VRC) FOR THE OWNER'S REVENUE METER. ON ANY SITE SUBCONTRACTOR HAS THE OPTION OF SWAPPING OUT THE LV TRANSFORMER LUGS FOR A MULTIPLE HOLE LUG AND MAKE THE TAP CONNECTION FOR THE OWNER'S REVENUE METER VOLTAGE REFERENCE CONDUCTORS AT THE TRANSFORMER INSTEAD OF AT THE AC DISCONNECT. SUBCONTRACTOR SHALL CONFIRM CLEARANCES FOR THE SPECIFIC SITE VOLTAGE(S) ARE MAINTAINED BETWEEN PHASE CONDUCTORS AND FROM PHASE CONDUCTOR TO GROUND SURFACE WHEN SWAPPING OUT LUGS. SUBCONTRACTOR SHALL MARK ANY CHANGES ON RED-LINE AS-BUILT SET.

- VRC TO SW1 10' OR LESS FOLLOWING 240.21(B) (1)
- VRC TO SW1 25' OR LESS FOLLOWING 240.21(B) (2), USE VRC CONDUCTOR SIZE BASED ON FUSE IN SW1
- VRC TO SW1 UNLIMITED LENGTH, VRC CONDUCTOR AMPACITY EQUAL TO OR GREATER THAN SW1 FUSE (LIMITED UP TO #4 AWG)
- VRC TO SW1 UNLIMITED LENGTH, SUBCONTRACTOR SHALL PURCHASE AND INSTALL 30A FUSED DISCONNECT SWITCH ADJACENT TO SW1
- VRC TO TR1 10' OR LESS FOLLOWING 240.21(B) (1)
- VRC TO TR1 25' OR LESS FOLLOWING 240.21(B) (2), USE VRC CONDUCTOR SIZE BASED ON FUSE IN SW1
- VRC TO TR1 UNLIMITED LENGTH, VRC CONDUCTOR AMPACITY EQUAL TO OR GREATER THAN SW1 FUSE (LIMITED UP TO #4 AWG)
- VRC TO TR1 UNLIMITED LENGTH, SUBCONTRACTOR SHALL PURCHASE AND INSTALL 30A FUSED DISCONNECT SWITCH ADJACENT TO TR1



240.21(B)(2) 25' TAP RULE	
VRC CONDUCTOR SIZE	MAX SW1 FUSE SIZE (A)
10 AWG	105
8 AWG	150
6 AWG	195
4 AWG	255

**04** OWNERS REVENUE METER VOLTAGE REFERENCE CONDUCTORS (VRC)  
NOT TO SCALE



**01** TYPICAL PANEL LAYOUT  
NOT TO SCALE

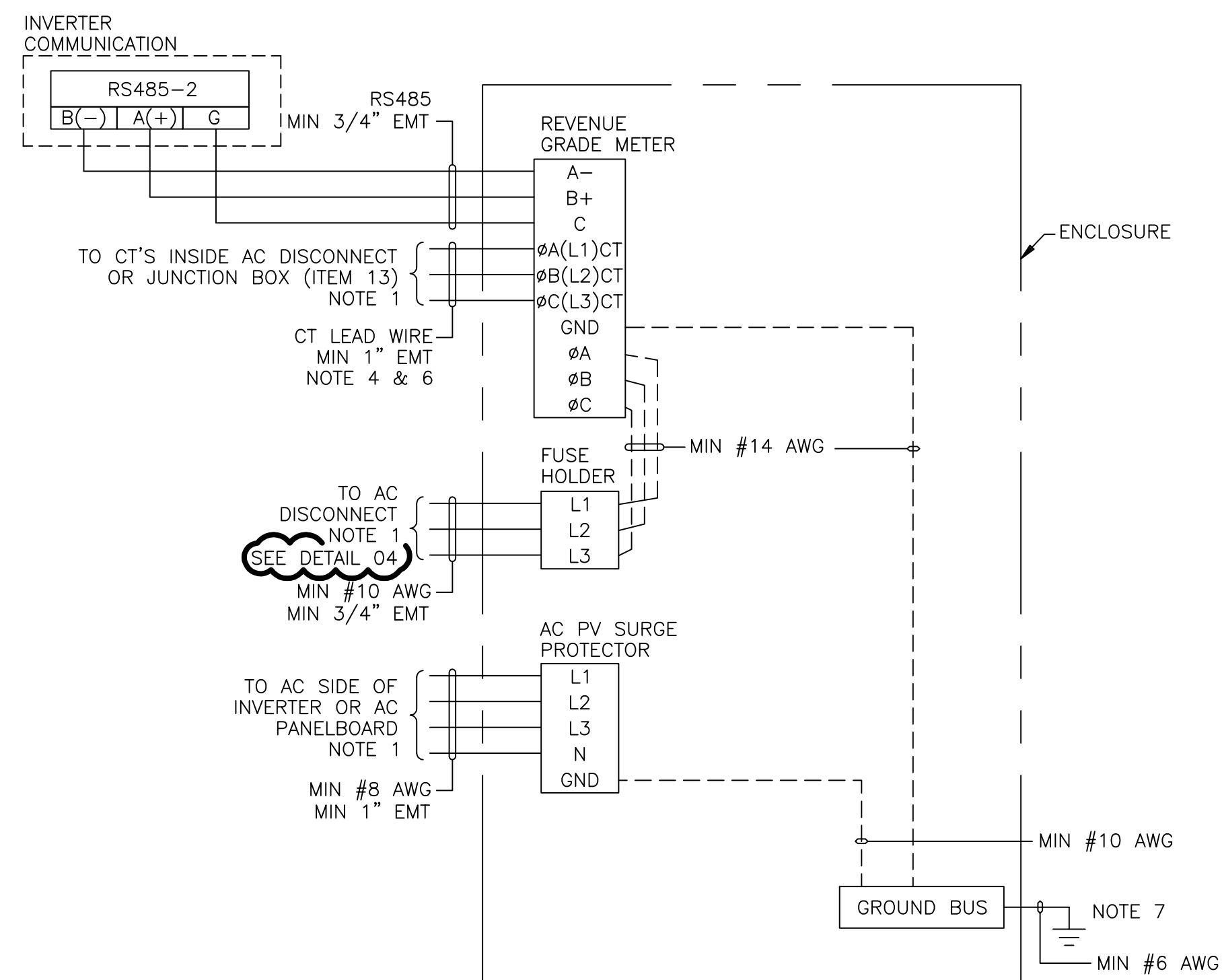
BILL OF MATERIAL					
ITEM	QTY	MANUFACTURER	MODEL	DESCRIPTION	
				DETAIL 01	(OR EQUIVALENT)
1	1	HOFFMAN	A16R166HCR (A16H1606SSLP 4X)	16"x16"x6" ENCLOSURE, NEMA 3R OR NEMA 4X	
2	1	HOFFMAN	A16P16G	13"x13" SUBPANEL	
3	1	EATON	GBK5	GROUND LUG KIT	
4	AS REQ'D	PHOENIX	0801733	35MM DIN RAIL CUT TO LENGTH	
5	4	PHOENIX	0800886	END CLAMP (E-NS-35-N)	
6	1	MERSEN	STP480YN07	480V AC PV SURGE PROTECTOR, 4P, DIN RAIL, TYPE 2, NOMINAL DISCHARGE CURRENT 20KA, MAX DISCHARGE CURRENT 75KA	
7	NOT USED				
8	NOT USED				
9	NOT USED				
10	NOT USED				
11	1	BUSSMANN	CHCC3DU	CH MODULAR, IP20 FINGER-SAFE, DIN RAIL HOLDER FOR CLASS CC FUSES	
12	3	BUSSMANN	KTK-R-1/2	LIMITRON KTK-R CLASS CC 600VAC 0.5A FAST-ACTING FUSES, SCCR 200KA	
13	3	CONTINENTAL CONTROL SYSTEMS	ACTL-1250-XXX OPT C0.3 (NOTE 3)	REVENUE GRADE, SPLIT-CORE CURRENT TRANSFORMERS, IEEE C57.13 CLASS 0.3	
14	1	CONTINENTAL CONTROL SYSTEMS	RWND-3D-240-MB	WATTNODE MODBUS REVENUE GRADE METER, 208-240 V SINGLE OR THREE PHASE SYSTEMS	
15	NOT USED				
16	1	ENCL. MFR STD	ENCL. MFR STD	MASTER KEYING LOCK	

**LEGEND**

- EXTERNAL WIRING
- FACTORY INTERNAL WIRING

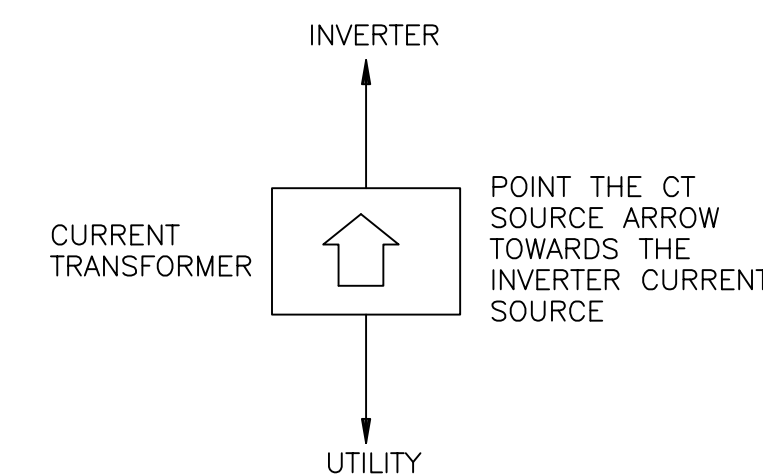
**NOTES:**

- USE DRAWING E20 OF THE SITE SPECIFIC DESIGN DRAWINGS FOR ACTUAL CONNECTION POINTS.
- SEE SE20A FOR SINGLE PHASE SYSTEMS AND SE20B FOR 480V SYSTEMS AND SE20C FOR 208V INVERTERS.
- USE TABLE 1 AND DRAWING E20 OF THE SITE SPECIFIC DESIGN DRAWINGS TO CHOOSE THE APPROPRIATE MODEL NUMBER BASED ON SYSTEM AC CAPACITY.
- THE CT LEADS SHALL BE EXTENDED WHERE THE STANDARD CT LEADS ARE NOT LONG ENOUGH. REFER TO CONTINENTAL CONTROL SYSTEMS LLC CT WIRE EXTENSION APPLICATION NOTE. THE EXTENSION WIRES SHALL MEET THE FOLLOWING REQUIREMENTS:
  - MINIMUM 18 AWG
  - TWISTED PAIR, 1 TWIST PER INCH
  - 600V RATED
  - LISTED TO UL 1015
- SITES WITHIN 2 MILES OF A BODY OF SALT WATER SHALL HAVE NEMA 4X RATED ENCLOSURES. NEMA 4X RATED ENCLOSURES ARE DENOTED BY AN "X" AFTER THE NUMBER IN THE DETAIL.
- FOR THE WATTNODE METER, ALIGN THE WHITE WIRE WITH THE WHITE DOT ON THE LABEL, AND THE BLACK WIRE WITH THE BLACK DOT.
- TERMINATE TO CLOSEST GROUNDING ELECTRODE. THE CONDUCTORS USED TO CONNECT THE SPD TO GROUND SHALL NOT BE ANY LONGER THAN NECESSARY AND SHALL AVOID UNNECESSARY BENDS.
- NOT USED
- NOT USED
- ALL CABLES SHALL HAVE A MINIMUM OF 600V INSULATION RATING.



**02** TYPICAL WIRING DIAGRAM  
NOT TO SCALE

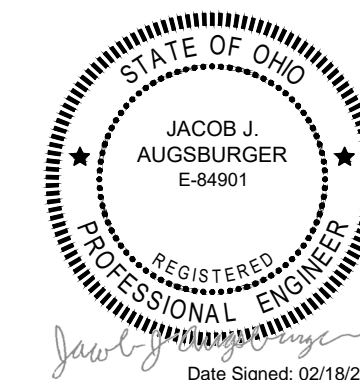
TABLE 1			
BOM REF	PHASE	AC CAPACITY (KW)	MODEL NUMBER
A	3	LESS THAN 80 KW	ACTL-1250-250 OPT C0.3
B	3	LESS THAN 142 KW AND GREATER THAN 80 KW	ACTL-1250-400 OPT C0.3
C	3	LESS THAN 210 KW AND GREATER THAN 142 KW	ACTL-1250-600 OPT C0.3



**03** CONNECTING THE CURRENT TRANSFORMER  
NOT TO SCALE

**APPROVED FOR CONSTRUCTION**

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I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF OHIO.

SIGNED: JACOB J. AUGSBURGER  
DATE: 13/AUG/20 REG NO. PE. 84901

**BLACK & VEATCH**  
DESIGNER: RDB DRAWN: AWC  
CHECKED: JJA DATE: 13/AUG/20

J.P. MORGAN CHASE  
TRANCHE 8 - OHIO

METERING AND SURGE PROTECTION DETAILS 3-PHASE

PROJECT: OH-STNDRD-SE20  
DRAWING NUMBER: 1

CODE: AREA:

REV: 1





**POLARIS™**  
Pre-Insulated Connectors  
Multi-Conductor Connector Either Side Wire Entry  
IPD Series



- SPECIFICATIONS**
- UL Listed 486A Wire Connector (Dry location).
  - Temperature Rating/Voltage: ALFCL.
  - Cold temperature rated to -45 °C, rated 600V, 90 °C.
  - Wire Type: Dual rated for use with copper only/ or aluminum cables. Not for fire-retarded, flexible wire.
  - Torque Chart 34.

- FEATURES**
- Wire entry ports on both sides of the connector allow for access from either side.
  - Eliminates the need for cover and taping.
  - Insulated with high-dielectric strength plastic.
  - Molded for precise fit and supplied with removable access plugs over the hex screws.
  - Supplied with removable plugs to close the entry port not being utilized.
  - Abrasion and chemical resistant.
  - UV resistant.
  - Will not support combustion.

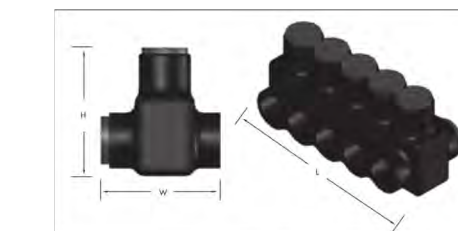


Figure varies by number of wire ports.

CAT. NO.	NO. OF PORTS	WIRE RANGE	COPPER CONDUCTOR MAX. AMPS	ALUMINUM CONDUCTOR MAX. AMPS	LENGTH (L) (IN.)	WIDTH (W) (IN.)	HEIGHT (H) (IN.)	MAX. TORQUE VALUE (IN./LBS.)	HEX/WRENCH SIZE (IN.)	STD. CTR. QTY.
IPD3/03	3	3/04 AWG	—	—	2.630	1.830	1.790	250	1/4	6
IPD3/04	4	3/04 AWG	—	—	3.410	1.830	1.790	250	1/4	6
IPD3/05	5	3/04 AWG	—	—	4.190	1.830	1.790	250	1/4	4
IPD3/06	6	3/04 AWG	—	—	4.970	1.830	1.790	250	1/4	4
IPD3/07	7	3/04 AWG	—	—	5.750	1.830	1.790	250	1/4	3
IPD3/08	8	3/04 AWG	—	—	6.530	1.830	1.790	250	1/4	3
IPD3/010	10	3/04 AWG	—	—	8.090	1.830	1.790	250	1/4	2
IPD3/012	12	3/04 AWG	—	—	9.70	1.830	1.790	250	1/4	2
IPD2503	3	250 MCM-6 AWG	—	—	2.930	2.280	2.180	360	5/16	6
IPD2504	4	250 MCM-6 AWG	527 A	410 A	3.800	2.280	2.180	360	5/16	6
IPD2505	5	250 MCM-6 AWG	—	—	4.660	2.280	2.180	360	5/16	4
IPD2506	6	250 MCM-6 AWG	790 A	615 A	5.520	2.280	2.180	360	5/16	4
IPD2507	7	250 MCM-6 AWG	—	—	6.380	2.280	2.180	360	5/16	3
IPD2508	8	250 MCM-6 AWG	1053 A	820 A	7.240	2.280	2.180	360	5/16	3
IPD25010	10	250 MCM-6 AWG	—	—	8.970	2.280	2.180	360	5/16	2
IPD25012	12	250 MCM-6 AWG	—	—	10.740	2.280	2.180	360	5/16	2
IPD3503	3	350 MCM-6 AWG	—	—	3.520	2.410	2.610	400	5/16	3
IPD3504	4	350 MCM-6 AWG	657 A	514 A	4.570	2.410	2.610	400	5/16	3
IPD3505	5	350 MCM-6 AWG	—	—	5.620	2.410	2.610	400	5/16	3
IPD3506	6	350 MCM-6 AWG	985 A	770 A	6.670	2.410	2.610	400	5/16	3
IPD3507	7	350 MCM-6 AWG	—	—	7.720	2.410	2.610	400	5/16	2
IPD3508	8	350 MCM-6 AWG	1314 A	1028 A	8.770	2.410	2.610	400	5/16	2
IPD3509	9	350 MCM-6 AWG	—	—	9.820	2.410	2.610	400	5/16	2
IPD35010	10	350 MCM-6 AWG	—	—	10.870	2.410	2.610	400	5/16	2
IPD35012	12	350 MCM-6 AWG	—	—	12.970	2.410	2.610	400	5/16	1

\*An "Industry First" by providing a UL Listed 486A/B connector with code compliant and UL Listed maximum ampacity for Copper and Aluminum parallel conductors.

TAP CUTSHEET (PG 1)

**POLARIS™**  
Pre-Insulated Connectors  
Multi-Cable Blocks Either Side Wire Entry  
IPD Series Cnt'd



- SPECIFICATIONS**
- UL Listed 486B Wire Connector (Dry location).
  - Temperature Rating/Voltage: ALFCL.
  - Cold temperature rated to -45 °C, rated 600V, 90 °C.
  - Wire Type: Dual rated for use with copper only/ or aluminum cables. Not for fire-retarded, flexible wire.
  - Torque Chart 34.

- FEATURES**
- Wire entry ports on both sides of the connector allow for access from either side.
  - Eliminates the need for cover and taping.
  - Insulated with high-dielectric strength plastic.
  - Molded for precise fit and supplied with removable access plugs over the hex screws.
  - Supplied with removable plugs to close the entry port not being utilized.
  - Abrasion, chemical and UV resistant.
  - Will not support combustion.

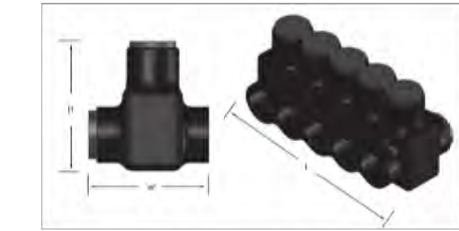


Figure varies by number of wire ports.

CAT. NO.	CERTIFICATION	NO. OF PORTS	WIRE RANGE	COPPER CONDUCTOR MAX. AMPS	ALUMINUM CONDUCTOR MAX. AMPS	LENGTH (L) (IN.)	WIDTH (W) (IN.)	HEIGHT (H) (IN.)	MAX. TORQUE VALUE (IN./LBS.)	HEX/WRENCH SIZE (IN.)	STD. CTR. QTY.
IPD5003	cULus	3	500 MCM-4 AWG	—	—	4.010	2.830	2.910	450	5/16	3
IPD5004*	cULus	4	500 MCM-4 AWG	806A	631 A	5.240	2.830	2.910	450	5/16	3
IPD5005	cULus	5	500 MCM-4 AWG	—	—	6.380	2.830	2.910	450	5/16	2
IPD5006*	cULus	6	500 MCM-4 AWG	1209 A	946 A	7.520	2.830	2.910	450	5/16	2
IPD5007	cULus	7	500 MCM-4 AWG	—	—	8.670	2.830	2.910	450	5/16	2
IPD5008*	cULus	8	500 MCM-4 AWG	1612 A	1262 A	9.820	2.830	2.910	450	5/16	2
IPD5009	cULus	9	500 MCM-4 AWG	—	—	10.980	2.830	2.910	450	5/16	2
IPD50010	cULus	10	500 MCM-4 AWG	—	—	12.110	2.830	2.910	450	5/16	1
IPD50012	cULus	12	500 MCM-4 AWG	—	—	14.400	2.830	2.910	450	5/16	1
IPD6003	cULus	3	600 MCM-6 AWG	—	—	4.550	2.960	3.030	550	5/16	3
IPD6004*	cULus	4	600 MCM-6 AWG	1035 A	810 A	5.850	2.960	3.030	550	5/16	3
IPD6005	cULus	5	600 MCM-6 AWG	—	—	7.150	2.960	3.030	550	5/16	2
IPD6006*	cULus	6	600 MCM-6 AWG	1554 A	1215 A	8.450	2.960	3.030	550	5/16	2
IPD6007	cULus	7	600 MCM-6 AWG	—	—	9.750	2.960	3.030	550	5/16	2
IPD6008*	cULus	8	600 MCM-6 AWG	2070 A	1620 A	11.050	2.960	3.030	550	5/16	2
IPD6009	cULus	9	600 MCM-6 AWG	—	—	12.390	2.960	3.030	550	5/16	1
IPD60010	cULus	10	600 MCM-6 AWG	—	—	13.650	2.960	3.030	550	5/16	1
IPD60012	cULus	12	600 MCM-6 AWG	—	—	16.250	2.960	3.030	550	5/16	1
IPD7503	—	3	750-250 MCM	—	—	4.950	3.410	3.420	550	3/8	3
IPD7504	—	4	750-250 MCM	—	—	6.380	3.410	3.420	550	3/8	2
IPD7505	—	5	750-250 MCM	—	—	7.800	3.410	3.420	550	3/8	1
IPD7506	—	6	750-250 MCM	—	—	9.230	3.410	3.420	550	3/8	1
IPD7507	—	7	750-250 MCM	—	—	10.650	3.410	3.420	550	3/8	1
IPD7508	—	8	750-250 MCM	—	—	12.080	3.410	3.420	550	3/8	1
IPD7509	—	9	750-250 MCM	—	—	13.490	3.410	3.420	550	3/8	1
IPD75010	—	10	750-250 MCM	—	—	14.930	3.410	3.420	550	3/8	1
IPD75012	—	12	750-250 MCM	—	—	17.780	3.410	3.420	550	3/8	1

\*An "Industry First" by providing a UL Listed 486A/B connector with code compliant and UL Listed maximum ampacity for Copper and Aluminum parallel conductors.

TAP CUTSHEET (PG 2)

ANSI D 34-22 02/14/2017 04:15 PM

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
1	18/FEB/21	APPROVED FOR CONSTRUCTION	AWC	RDB	JJA	JJA	JJA
0	13/AUG/20	ISSUED FOR PERMITTING	AWC	RDB	JJA	JJA	JJA

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF OHIO.

SIGNED: JACOB J. AUGSBURGER  
DATE: 13/AUG/20 REG. NO. PE. 84901

**BLACK & VEATCH**

DESIGNER: RDB DRAWN: AWC  
CHECKED: JJA DATE: 13/AUG/20

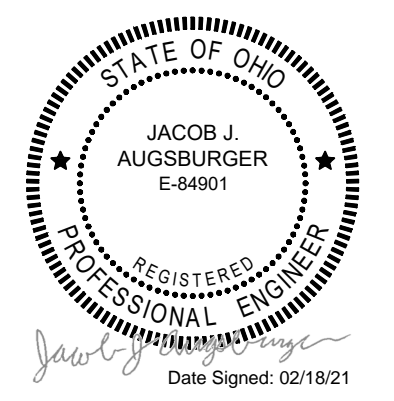
J.P. MORGAN CHASE  
TRANCHE 8 - OHIO

ELECTRICAL DATA CUTSHEETS

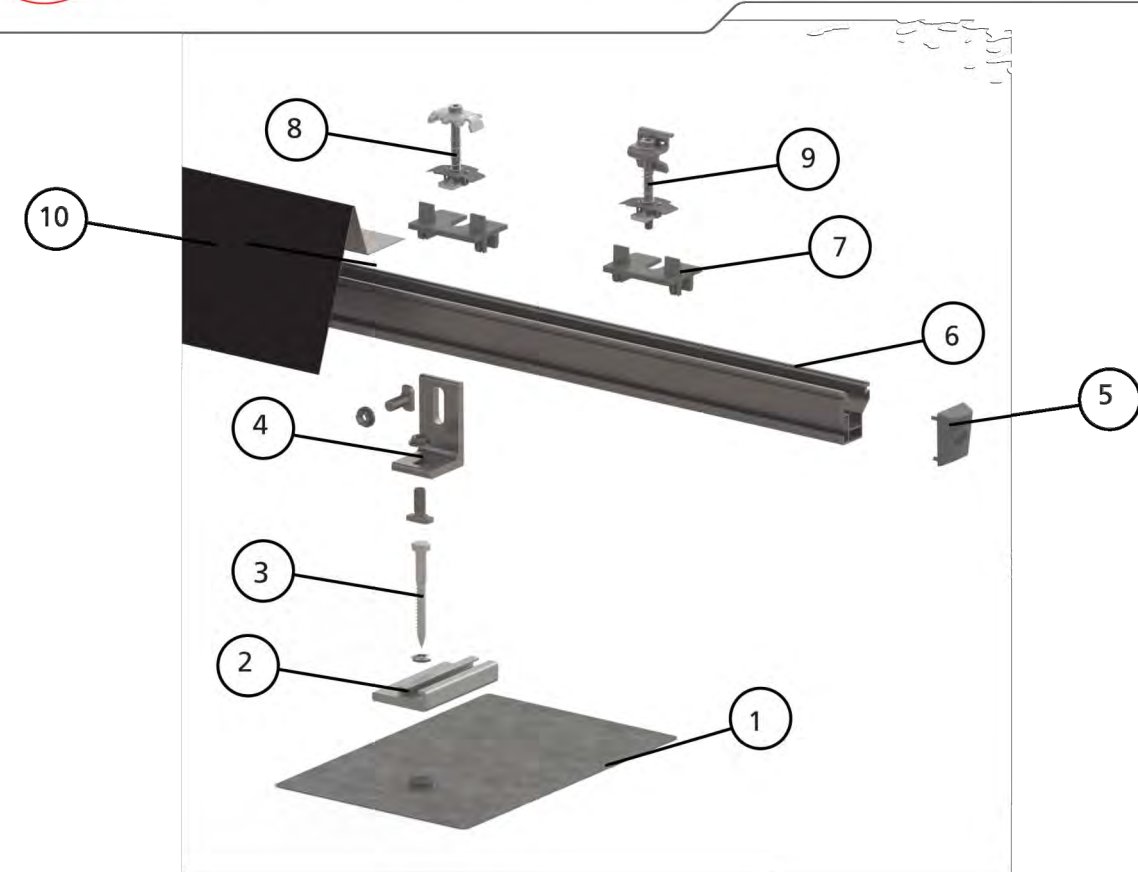
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OH-STNDRD-SR26		1

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**EVEREST** solar systems  
CrossRail and Shared Rail Systems



Item No.	Description	Product No.
1	EverFlash eComp Kit, 8x12"	4000366, 4000367
2	Slide Bracket (Shared Rail Only)	4000591
3	5/16 inch Lag Bolt and EPDM Washer	4000359
4	L-Foot with Hardware	4000630, 4000631
5	CrossRail End Cap (48-X, 48-XL shown), 80	4000433, 4001221
6	CrossRail (48-X shown), 48-XL, 80	multiple
7	AddOn, Slide In (Shared Rail Only)	4000632
8	CrossRail Mid Clamp Set	multiple
9	CrossRail End Clamp Set	4000429, 4000430
10	Array Skirt (Shared Rail Only)	4000493

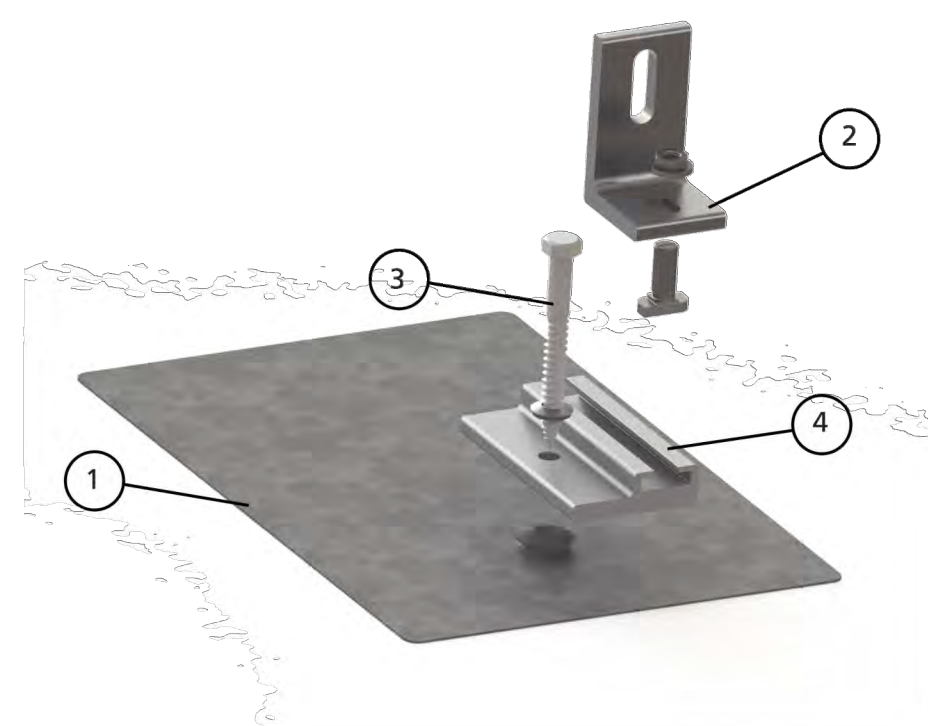
www.everest-solarsystems.com

EVEREST DATASHEET (PG 1)

NOT USED

VERSABRACKET DATASHEET

**EVEREST** solar systems  
EverFlash eComp + SR Slide Kit



Item No.	Description	Product No.
1	EverFlash eComp Kit	4000366, 4000367
2	L-Foot and Hardware	4000630, 4000631
3	5/16" Lag Bolt	4000359
4	Short Slider (EverFlash eComp + SR Slide Kit)	4000591

Technical data

EverFlash eComp + SR Slide Kit	
Roof Type	Composition Shingle
Material	Aluminum and stainless steel for high corrosion resistance
Finish	Mill
Roof Connection	5/16" lag bolt
Code Compliance	UL 2703
Compatibility	CrossRail 48-X, 48-XL, 80
Warranty	25 years



www.everest-solarsystems.com  
EverFlash eComp + SR Slide Kit Technical Sheet US01 | 0119 - Subject to change - Product illustrations are exemplary and may differ from the original.

EVEREST DATASHEET (PG 2)

**DURA-BLOK™ Rooftop Solutions Support**

DURA-BLOK™ Supports are made of 100% recycled rubber and are designed to provide an economical way to support pipes, HVAC systems, rooftop walkway systems, ducting, conduit, cable tray, and more.

Features & Benefits

- Made from 100% recycled rubber
- Qualifies for LEED credits
- Reflective strip on both sides allow for easy product visibility
- Channel is through bolted on all sizes for added strength
- 1" gap between blocks allows water to flow freely around longer assemblies
- No roof penetration required
- Product composition is not sharp or abrasive helping to extend the roof life
- Dampens vibration
- No need for supplemental rubber pad
- Will not float or blow away
- UV resistant
- Suitable for any type roofing material or other flat surface
- For sloped roofs see adjustable hinge fitting (B634) on page 11
- Open ends allows for easier adjustments to DBE, DBR, and DBM series
- Drainage channel through center of block

Base Only

DURA-BLOK channel support is designed as an economical support for piping systems, cable tray, HVAC equipment and many other applications.

**Specifications:**  
**Dimensions** - 4" (101mm) High x 6" (152mm) Wide x 9.6" (244mm) Long (base length)  
**Material** - 100% recycled rubber, UV resistant  
**Ultimate Load Capacity** - (uniform load) \*  
 DBP - 500 lbs. (2.22kN) DBM - 200 lbs. (0.89kN)

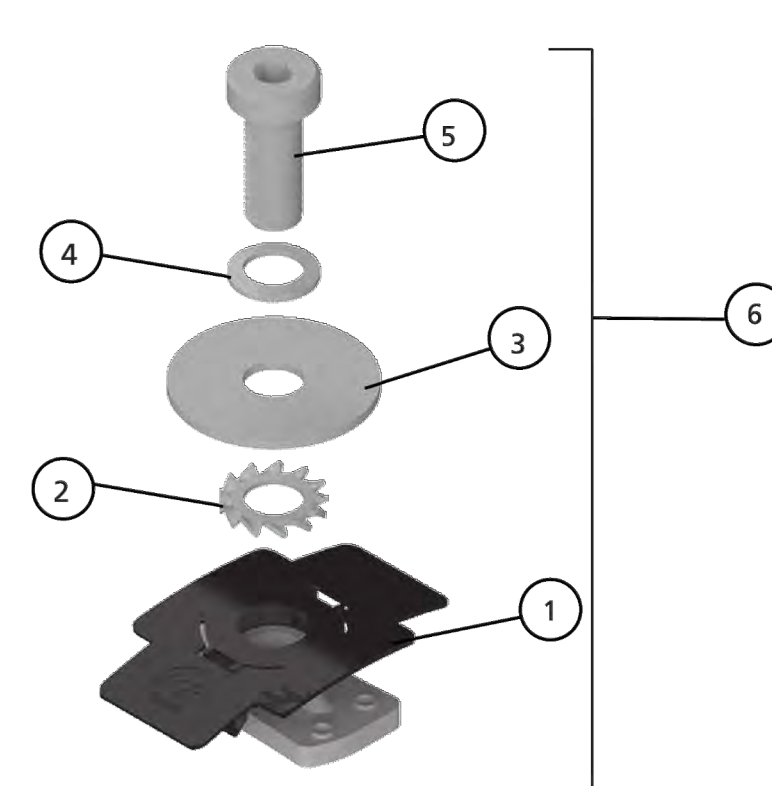


UPC/Part No.	B-Line Cat. No.	Height	Width	Length	Weight Each
782051 49691	DBP	4" (101mm)	6" (152mm)	9.6" (244mm)	4.48 (2.03kg)
782051 50005	DBM	4" (101mm)	6" (152mm)	4.8" (122mm)	2.35 (1.07kg)

\* For Roof Loading, Consult Roofing Manufacturer or Engineer. As with most commercial roofs, the weakest point may be the insulation board beneath the rubber membrane.

DURA-BLOK

**EVEREST** solar systems  
Micro-Inverter and Optimizer Mounting Kit



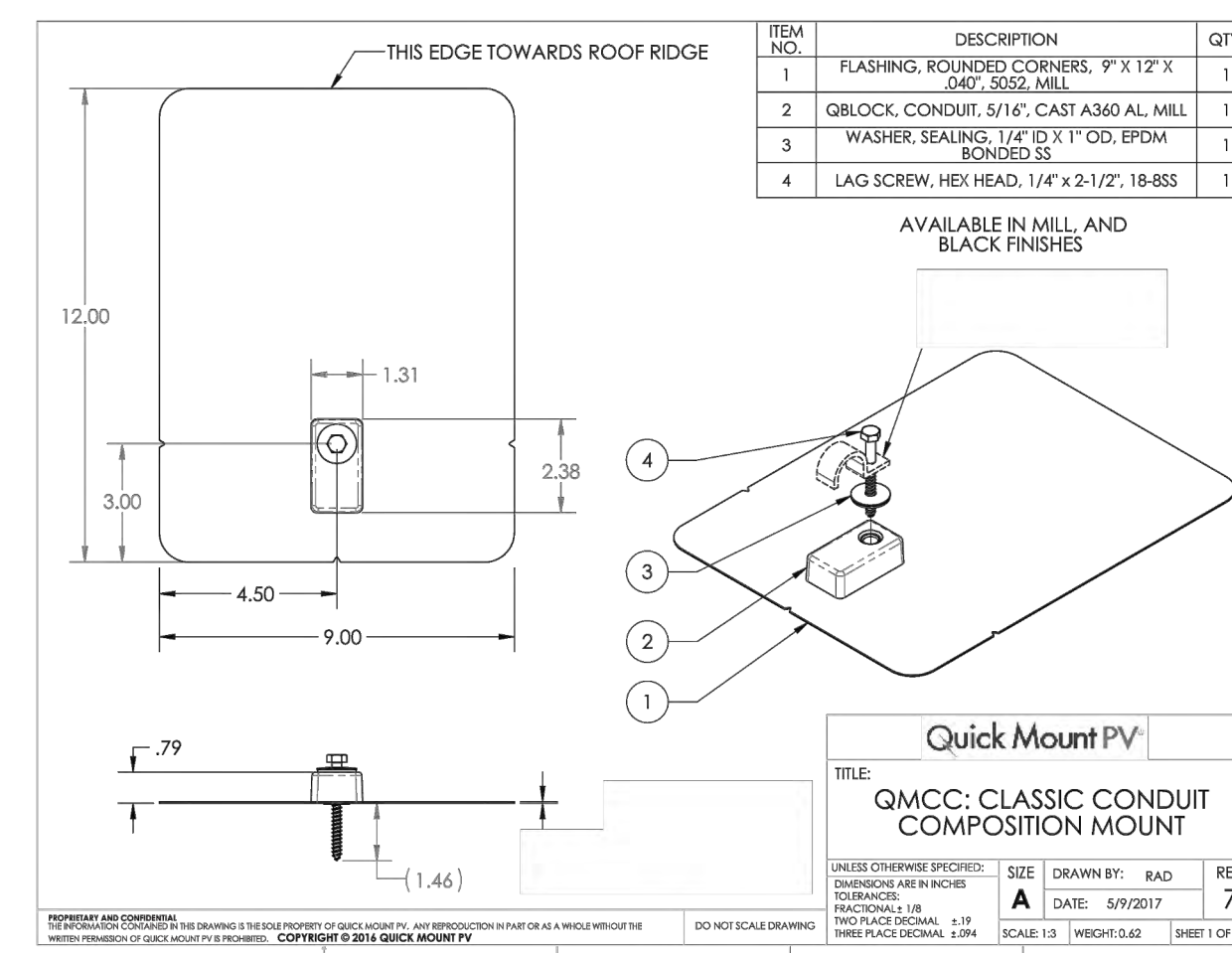
Item No.	Description	Product No.
1	MK3 Slot Nut,w/Clip, SS	4002042
2	Lock Washer, Serrated for SolarEdge Kit	4000626
3	Flat Washer 8, 4x30x1.5mm, SS	4000273
4	Lock Washer S8, 13x8.4x8mm, SS	4000120
5	Allen Bolt M8x20, SW6 Cap Head Screw	4000190
6	CR Micro, Optimizer & Accs. Mounting Kit	4000629

www.everest-solarsystems.com

EVEREST DATASHEET (PG 3)

**Classic Comp Conduit Mount | QMCC**

Elevated Water Seal Technology®



Lag pull-out (withdrawal) design values (lbs) in typical sheathing:			
	Lag Bolt Specifications	1 1/4" shaft per 1/2" thread depth	1 1/4" shaft per 1" thread depth
Plywood	Specific Gravity	.45	72
OSB		.45	72

Sources: APA - The Engineered Wood Association, TT-051C, 2011  
 Note: Lag pull-out (withdrawal) ultimate capacity = 350 lbs. in 1/2" plywood or 1/2" OSB.  
 IMPORTANT: To maintain waterproofing it is important that the aluminum flashing (Item 1) is properly placed under one full course above the mounting block with at least some of the flashing extending up under the course above that as well. See instructions on back.



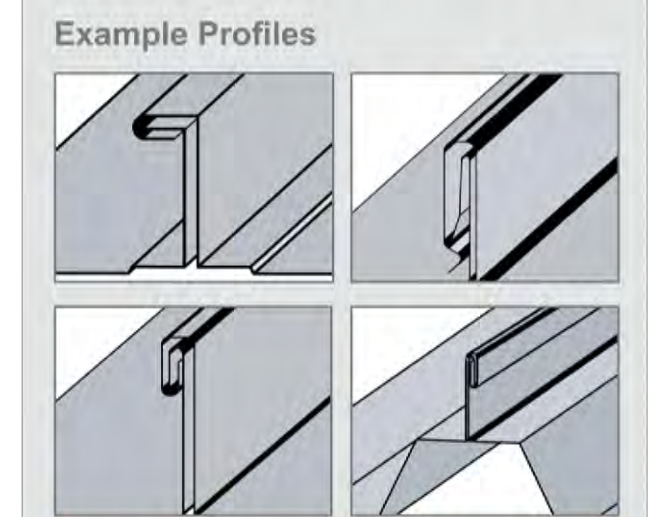
BI 7.2.3-8 May-2017, Rev 10

CONDUIT MOUNT

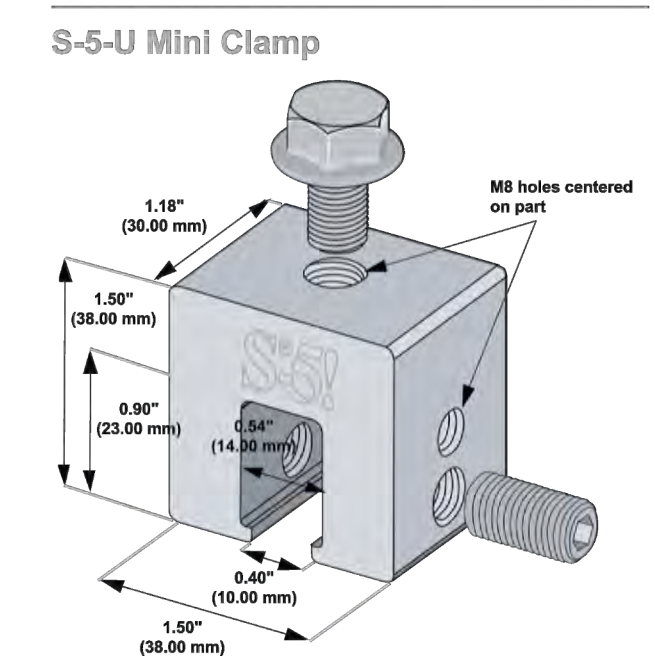
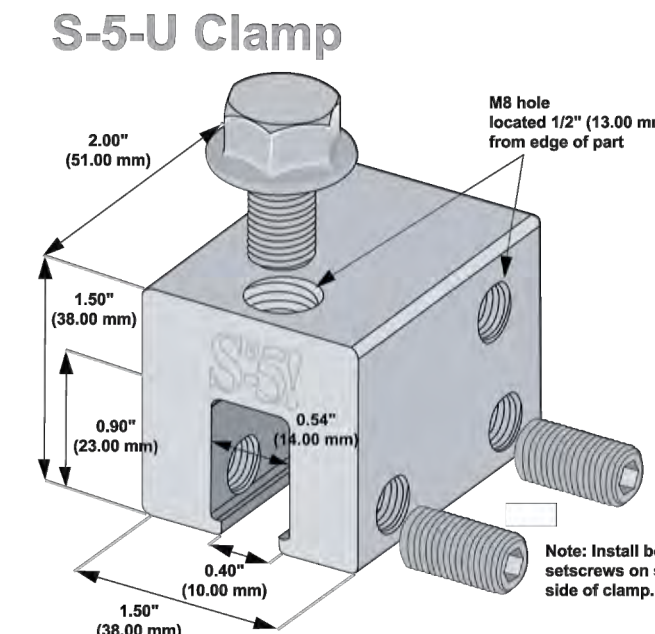
**S-5!**  
The Right Way!  
The strength of the S-5-U clamp is in its simple design. The patented setscrews will slightly dimple the metal seam material but not pierce it—leaving the roof manufacturer's warranty intact.

The S-5-U and S-5-U Mini clamps are each furnished with the hardware shown to the right. Each box also includes a bit tip for tightening setscrews using an electric screw gun. A structural aluminum attachment clamp, the S-5-U is compatible with most common metal roofing materials excluding copper. All included hardware is stainless steel. Please visit [www.S-5.com](http://www.S-5.com) for more information including CAD details, metallurgical compatibilities and specifications.

The S-5-U clamp has been tested for load-to-failure results on most major brands and profiles of standing seam roofing. The independent lab test data found at [www.S-5.com](http://www.S-5.com) can be used for load-critical designs and applications. S-5! holding strength is unmatched in the industry.



For horizontal seams under 0.65°, do not use this clamp. Visit [www.S-5.com](http://www.S-5.com) for more detailed information and proper clamp usage.



**S-5! Warning! Please use this product responsibly!**  
 Products are protected by multiple U.S. and foreign patents. Visit the website at [www.S-5.com](http://www.S-5.com) for complete information on patents and trademarks. For maximum holding strength, setscrews should be torqued and re-torqued as the same material compresses. Clamp ultimate tension should be verified using a calibrated torque wrench between 160 and 180 inch-pounds when used on 23ga steel, and between 130 and 150 inch-pounds for all other metals and thinner gauges of metal. Consult the S-5! website at [www.S-5.com](http://www.S-5.com) for published data regarding holding strength.

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 S-5! is a registered service to patents, trademarks, and copyrights. Version 02/15.

S-5-U DATASHEET

ANSI D 39-2017 02/14/2017 04:15 PM

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP	DESIGNER	DRAWN	CHECKED	DATE	PROJECT	DRAWING NUMBER	REV
1	18/FEB/21	APPROVED FOR CONSTRUCTION	AWC	RDB	SAS	MFS	MFS	J.P. MORGAN CHASE	TRANCHE 8 - OHIO	SAS	13/AUG/20	PROJECT	OH-STNDRD-SR30	1
0	13/AUG/20	ISSUED FOR PERMITTING	AWC	RDB	SAS	MFS	MFS	STRUCTURAL COMPONENT CUTSHEETS				CODE		
												AREA		



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