

# INSTALL SOLAR ARRAY

## ARMY AVIATION SUPPORT FACILITY

### FORT LEONARD WOOD, MO

#### INDEX OF DRAWINGS

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#### APPLICABLE CODES/DESIGN CONSIDERATIONS

- INTERNATIONAL BUILDING CODE (IBC) 2021
- THE AMERICAN WITH DISABILITIES ACT (ADAAG) 2010
- INTERNATIONAL MECHANICAL CODE (IMC) 2021
- INTERNATIONAL PLUMBING CODE (IPC) 2021
- ASHRAE 90.1 - 2016 ENERGY STANDARD FOR BUILDINGS
- NATIONAL ELECTRIC CODE (NEC) 2020

**OWNER:** STATE OF MISSOURI  
MICHAEL L. PARSON, GOVERNOR

MISSOURI NATIONAL GUARD  
OFFICE OF THE ADJUTANT GENERAL  
FACILITIES MANAGEMENT OFFICE

**DESIGNER:** CROSSED SWORDS ENGINEERING

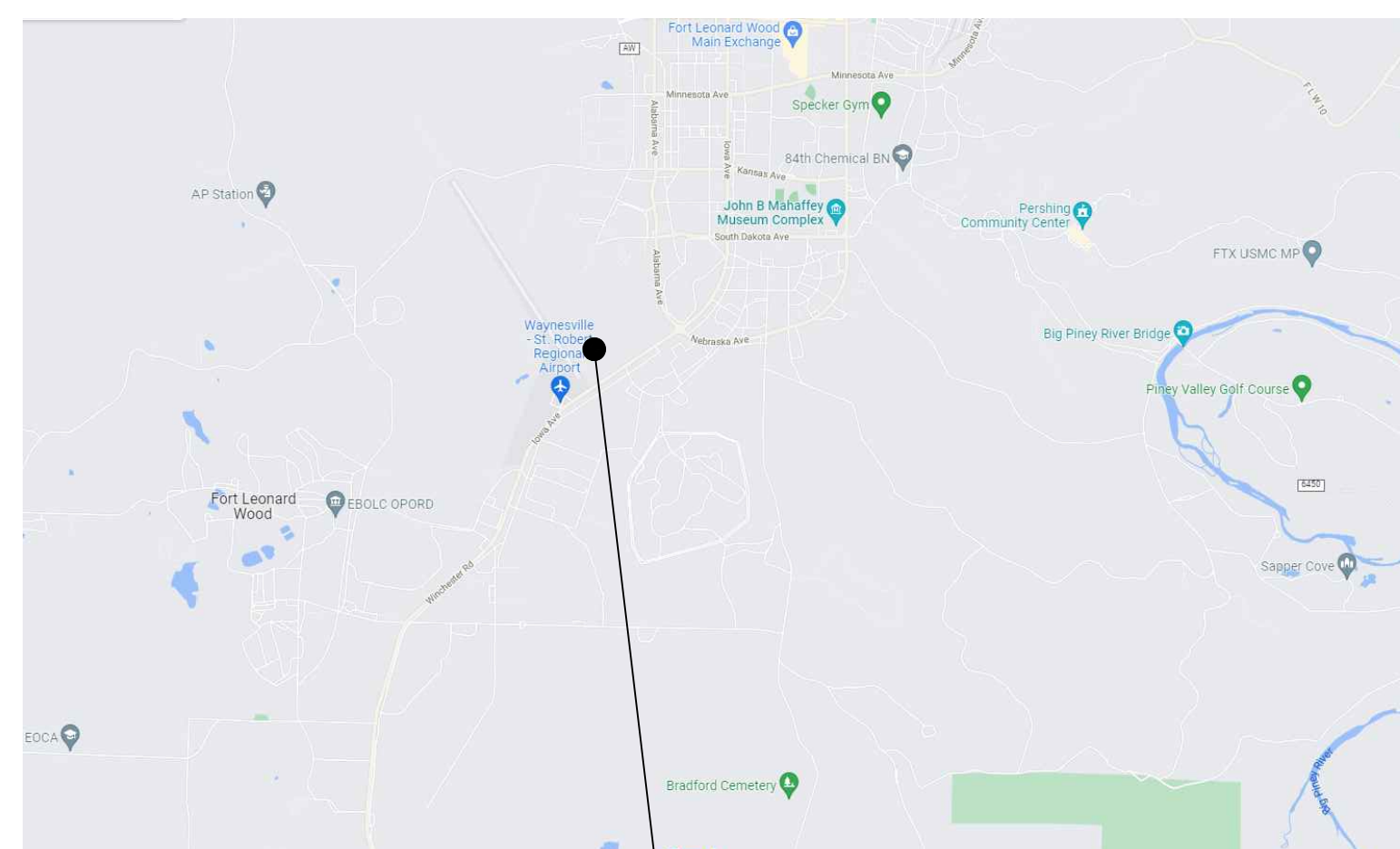
**PROJECT MANAGEMENT:** OFFICE OF ADMINISTRATION  
DIVISION OF FACILITIES MANAGEMENT  
DESIGN AND CONSTRUCTION

**PROJECT NUMBER:** T2228-01

**SITE NUMBER:** 6306

**ASSET NUMBER:** 8136306011

**SITE LOCATION MAP**

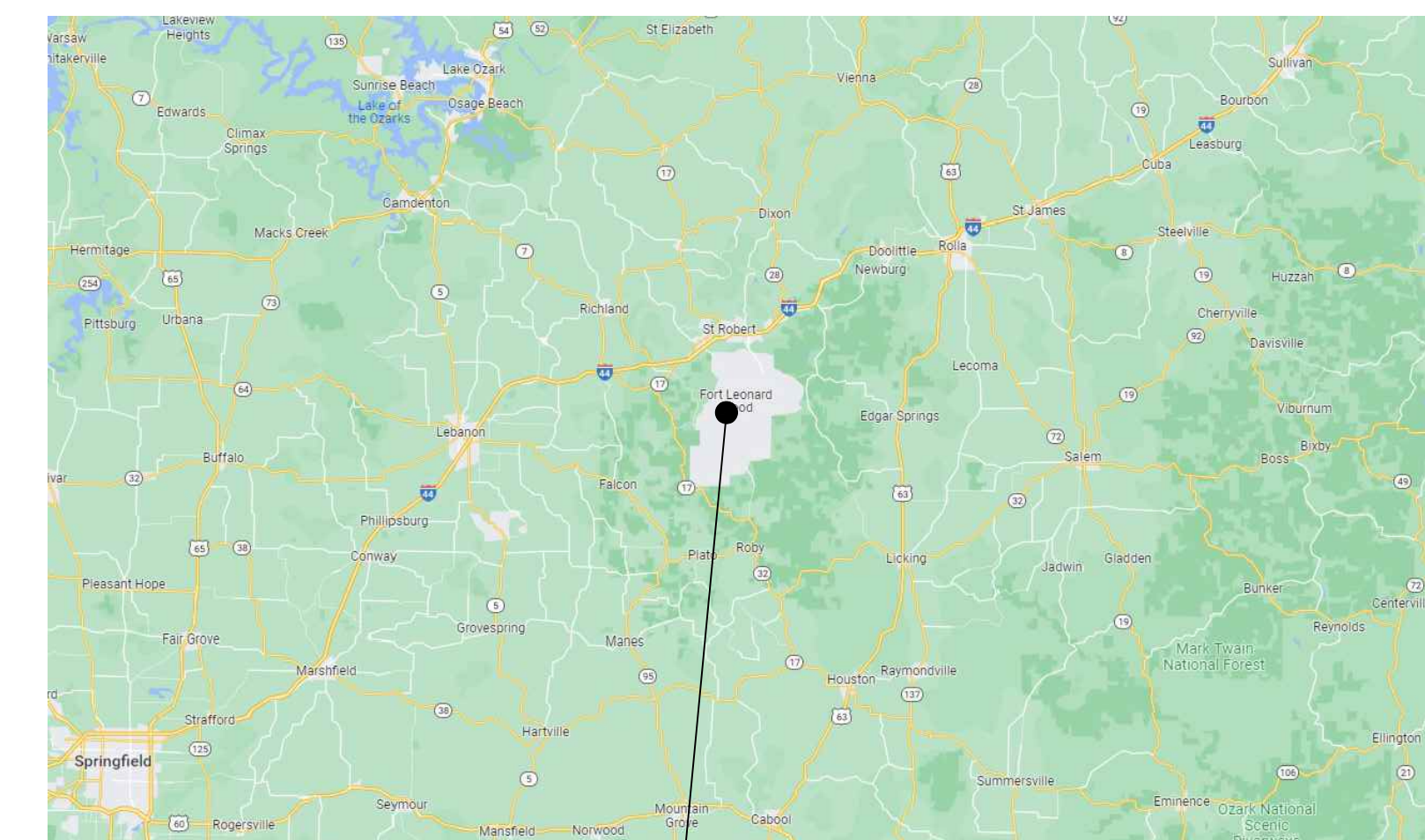


AVIATION SUPPORT FACILITY  
FT LEONARD WOOD, MO  
SITE: 5017

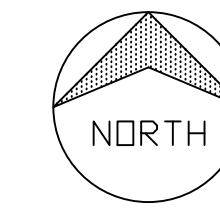


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1619 NE OAK TREE DRIVE  
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ROBERT7721@AOL.COM  
MO CERTIFICATE OF AUTHORITY  
#2016003099

**REGIONAL LOCATION MAP**



AVIATION SUPPORT FACILITY  
FT LEONARD WOOD, MO  
SITE: 5017



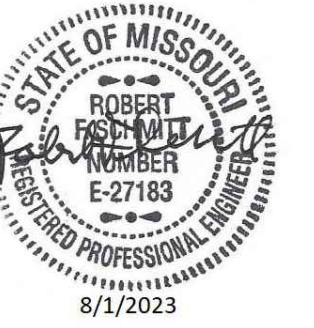
ISSUED FOR CONSTRUCTION  
8/1/2023

SHEET NUMBER:

**G-001**

1 OF 9 SHEETS  
AUGUST 1, 2023





CROSSED SWORDS ENGINEERING  
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MO STATE CERTIFICATE OF  
AUTHORITY#2016003099

OFFICE OF  
ADMINISTRATION  
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MANAGEMENT, DESIGN  
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FACILITIES MANAGEMENT OFFICE

INSTALL SOLAR ARRAY  
AVIATION SUPPORT FACILITY

AVIATION SUPPORT FACILITY  
12249 20TH ST. BLDG 5010  
FT. LEONARD WOOD, MO 65473

PROJECT # T2228-01  
SITE # 6306  
ASSET # 8136306011

REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
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REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
ISSUE DATE: 8/1/2023

CAD DWG FILE: C-101.DWG  
DRAWN BY: RFS  
CHECKED BY: RFS  
DESIGNED BY: RFS

SHEET TITLE:  
**SITE PLAN**

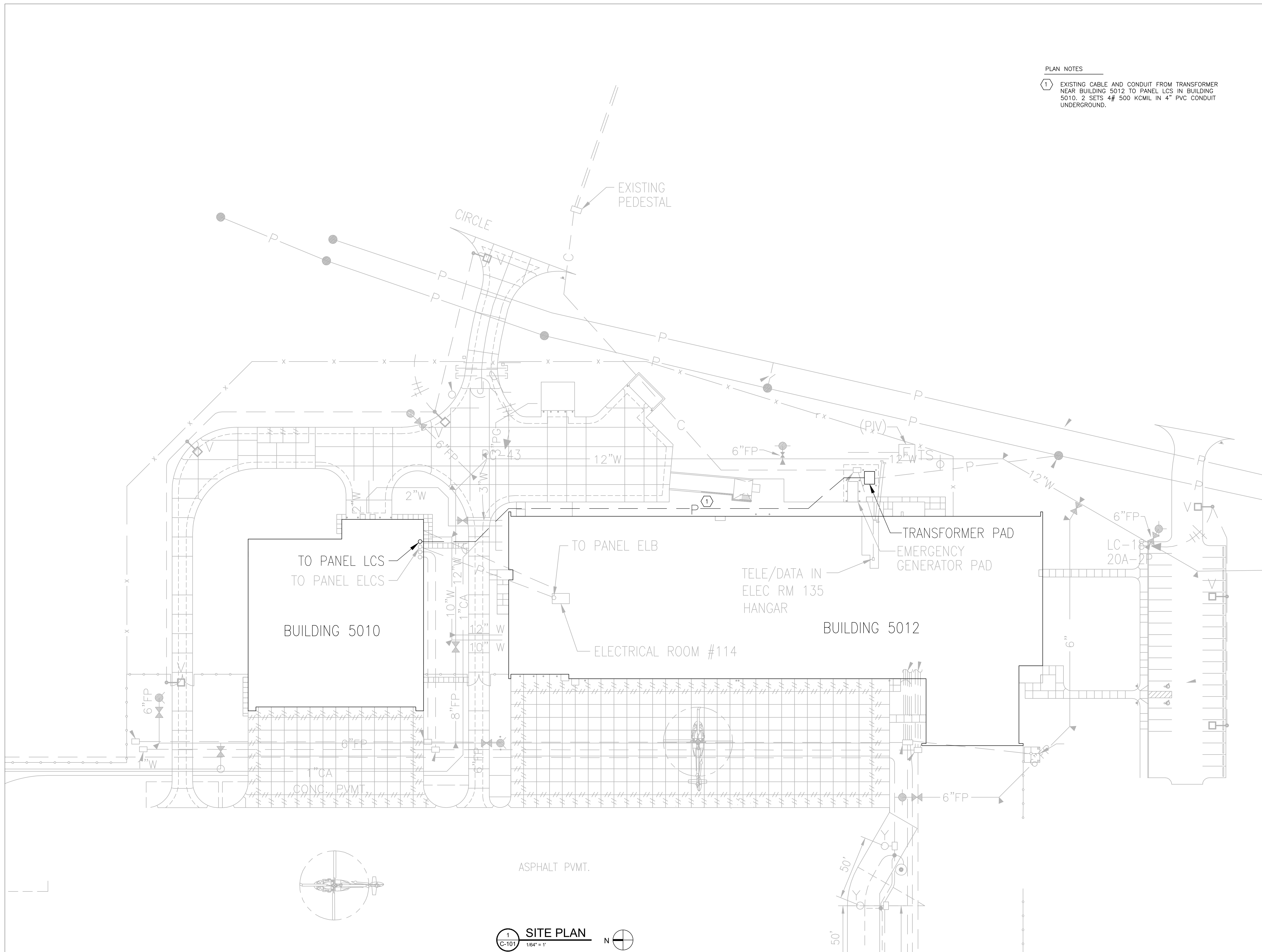
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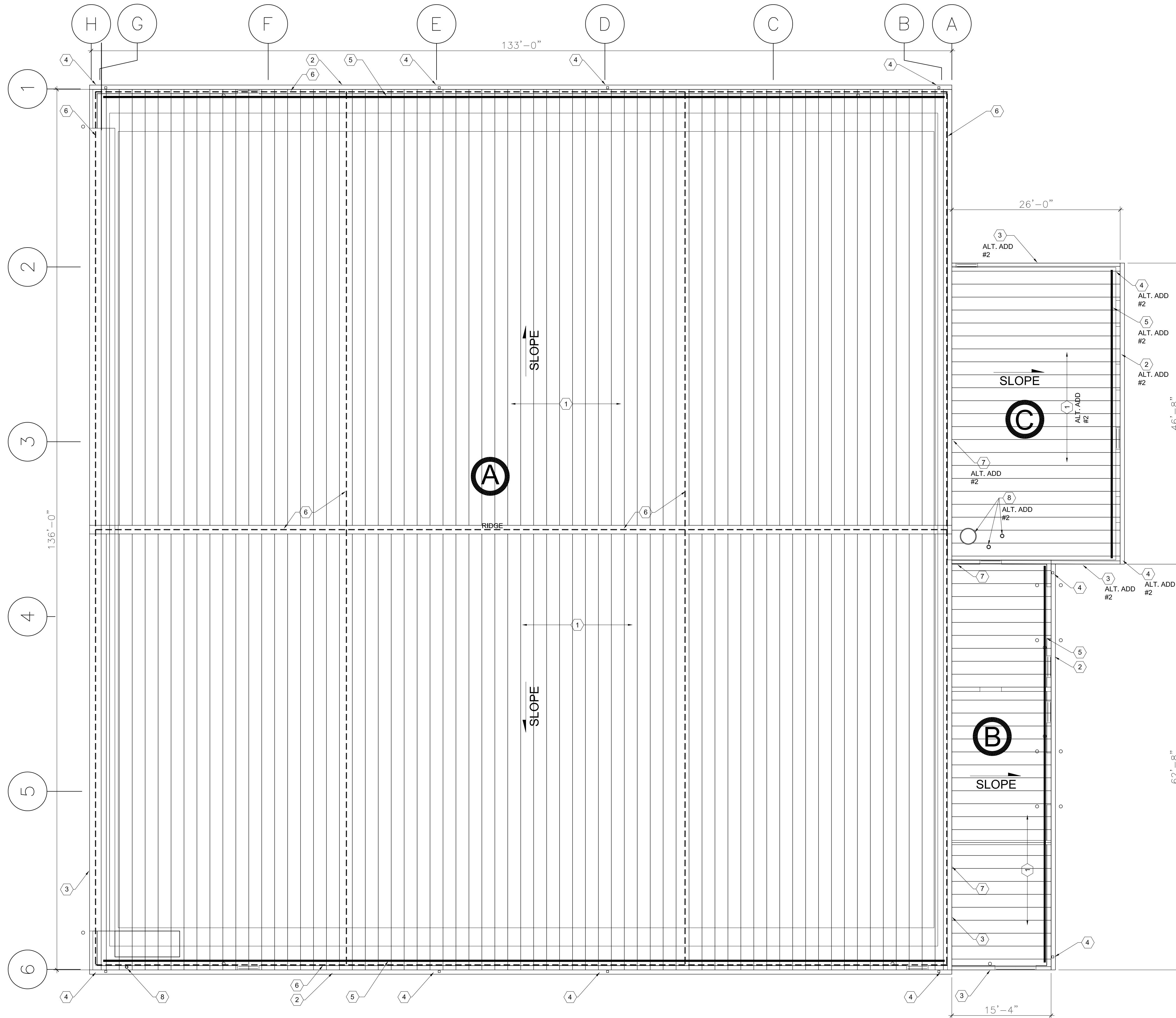
2 OF 9 SHEETS  
AUGUST 1, 2023

PLAN NOTES

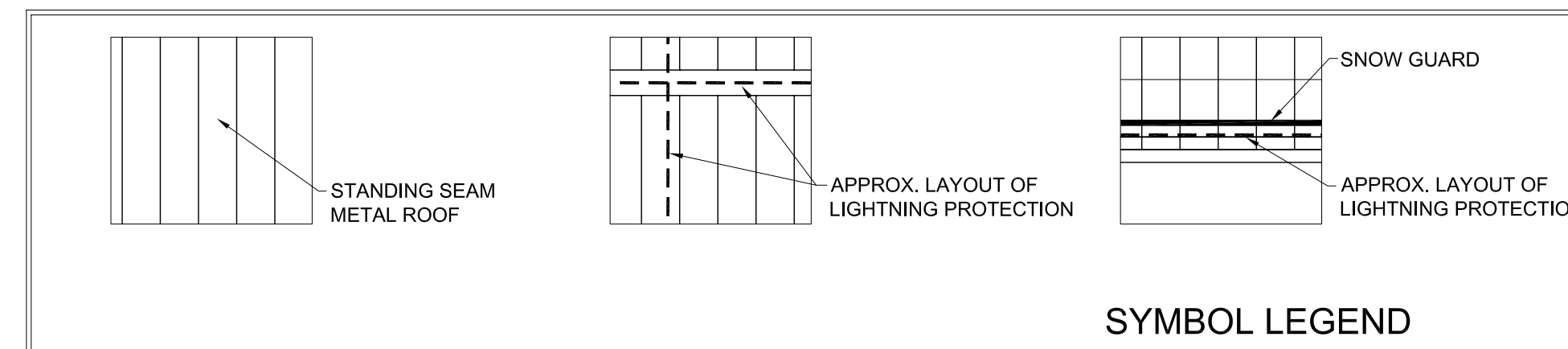
- ① EXISTING CABLE AND CONDUIT FROM TRANSFORMER NEAR BUILDING 5012 TO PANEL LCS IN BUILDING 5010. 2 SETS 4# 500 KCMIL IN 4" PVC CONDUIT UNDERGROUND.



1 SITE PLAN  
C-101 1/164" = 1' N



ROOF PLAN 1/A-101  
SCALE: 1/8" = 1' - 0"



**GENERAL NOTES**

REMOVE AND REPLACE ROOF AREAS AS NOTED ON PLAN. REMOVAL REPLACEMENT INCLUDES ALL INSULATION, TRIM, SNOW RAILS AND ACCESSORIES. SEQUENTIALLY REMOVE AND REPLACE ROOFING TO MAINTAIN WEATHER TIGHTNESS AND INTEGRITY. COORDINATE REMOVAL/REPLACEMENT SCHEDULE WITH OWNER ACTIVITIES AND OCCUPANCY.

REFER ELECTRICAL DRAWINGS FOR PLACEMENT AND LOCATION OF NEW SOLAR PANELS.

**ROOF AREAS DESCRIPTION**

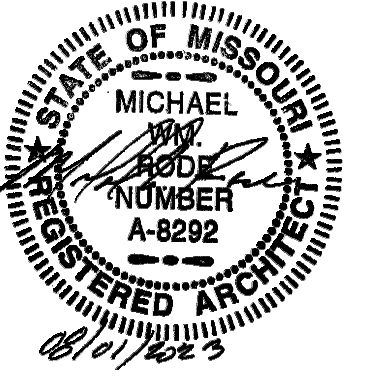
**(A)** ROOF AREA A - STORAGE HANGER - ORIGINAL CONSTRUCTION APPROX. 180'-0" X 133'-0" EXISTING EAVE HEIGHT APPROX. 24'-5" RIDGE HEIGHT APPROX. 35'-9" REMOVE EXISTING METAL ROOF AND CLIPS, SNOW RAILS, ROOF TRIM, GUTTERS AND DOWNSPOUTS - EXISTING ROOF IS NOT INSULATED. INSTALL NEW METAL ROOFING, TRIM, GUTTERS, DOWNSPOUTS AND INSULATION. WORK INCLUDES NEW SNOW RAILS AND REMOVAL AND REPLACEMENT OF ROOF LIGHTNING PROTECTION COMPONENTS. REFER SPECIFICATION SECTION 133419. (INSTALL THERMAL BLOCKS)

**(B)** ROOF AREA B - MECHANICAL SPACE - ORIGINAL CONSTRUCTION APPROX. 15'-4" X 62'-8" EXISTING EAVE HEIGHT APPROX. 14'-6" PEAK HEIGHT APPROX. 15'-0" REMOVE EXISTING METAL ROOF, INSULATION, AND CLIPS, SNOW RAILS, ROOF TRIM, GUTTERS AND DOWNSPOUS. INSTALL NEW METAL ROOFING, TRIM GUTTERS, DOWNSPOUTS AND INSULATION. AND NEW SNOW RAILS. REFER SPECIFICATION SECTION 133419 (DO NOT INSTALL THERMAL BLOCKS)

**(C)** ROOF AREA C - OFFICE SPACE - ADDITION CONSTRUCTED 2010 APPROX. 26'-0" X 46'-8" EXISTING EAVE HEIGHT APPROX. 15'-0" EXISTING ROOF AND ALL ROOF COMPONENTS TO REMAIN IN PLACE AS PART OF BASE BID PROPOSAL. AS AN ALTERNATE ADD #2 (ALT. ADD #2) PROPOSAL - REMOVE EXISTING METAL ROOF, INSULATION, AND CLIPS, SNOW RAILS, ROOF TRIM, GUTTERS AND DOWNSPOUS. INSTALL NEW METAL ROOFING, TRIM GUTTERS, DOWNSPOUTS AND INSULATION. AND NEW SNOW RAILS. REFER SPECIFICATION SECTION 133419 (DO NOT INSTALL THERMAL BLOCKS)

**PLAN NOTES**

- 1 NEW STANDING SEAM METAL ROOF PANELS, INSULATION - SEALANT AT ALL LAPS AND JOINTS. REFER METAL BUILDING SYSTEMS - ROOF REPLACEMENT SPECIFICATION SECTION 133419, AND JOINT SEALANTS - SPECIFICATION SECTION 079200.
- 2 NEW GUTTERS, EAVE TRIM, WALL CLOSURES AND ROOF PANEL CLOSURES - TAPE SEALANT AT ALL LAPS AND JOINTS. INSTALL NEW TRIM OF HEIGHT AND SUPPORTS TO ACCOMODATE NEW ROOF THICKNESS. REFER METAL BUILDING SYSTEMS - ROOF REPLACEMENT SPECIFICATION SECTION 133419, AND JOINT SEALANTS - SPECIFICATION SECTION 079200.
- 3 NEW RAKE/END TRIM AND WALL CLOSURES - SEALANT AT ALL LAPS AND JOINTS. NEW RAKE/END TRIM AND TRIM SUPPORT Zs. NEW RAKE HEIGHT TO PROVIDE SAME COVERAGE OF EXISTING WALL PANELS AND TO ACCOMODATE NEW ROOF THICKNESS. TAPE SEALANT AT ALL LAPS AND JOINTS. REFER METAL BUILDING SYSTEMS - ROOF REPLACEMENT SPECIFICATION SECTION 133419, AND JOINT SEALANTS - SPECIFICATION SECTION 079200.
- 4 NEW DOWNSPOUTS - CONNECT AT BASE TO EXISTING UNDERGROUND DRAINAGE SYSTEM. REFER METAL BUILDING SYSTEMS - ROOF REPLACEMENT SPECIFICATION SECTION 133419.
- 5 REMOVE EXISTING SNOW RAILS AND INSTALL NEW SNOW RAILS. REFER METAL BUILDING SYSTEMS - ROOF REPLACEMENT SPECIFICATION SECTION 133419.
- 6 LIGHTNING PROTECTION: APPROXIMATE LAYOUT OF EXISTING LIGHTNING PROTECTION. REMOVE ROOFING COMPONENTS, AIR TERMINALS, CONNECTIONS AND CONDUCTORS AS NEEDED FOR NEW ROOF INSTALLATION AN REPLACE WITH NEW COMPONENTS, INCLUDING THRU ROOF DOWN CONDUCTORS OF SUFFICIENT LENGTH THROUGH NEW ROOF, AND RECONNECT TO EXISTING GROUND WIRES AT EACH STRUCTURAL RIGID FRAME MEMBER. THROUGH ROOF PENETRATIONS TO BE FLASHED WITH BOOTS OR GROMETS MADE OF MATERIALS AND INSTALLED BY METHODS ACCEPTABLE TO NEW ROOF INSTALLER. ANY RE-USE OF EXISTING MATERIALS MUST FIRST BE APPROVED BY THE OWNER. REFER METAL BUILDING SYSTEMS - ROOF REPLACEMENT SPECIFICATION SECTION 133419. COORDINATE PLACEMENT WITH SNOW RAILS AND NEW SOLAR PANELS.
- 7 INSTALL NEW ROOF COUNTER FLASHING UNDER WALL PANELS. INSTALL NEW ROOFING WALL COUNTER FLASHING. REMOVE AND REINSTALL EXISTING BUILDING WALL PANELS AS NEEDED TO INSTALL NEW ROOF COUNTER FLASHING UNDER WALL PANELS. PROVIDE ZEE TRIM CLOSURE AND PLUG AT END OF ROOF PANEL. REFER DETAIL 3/A-103.
- 8 EXISTING PIPE/EQUIPMENT PENETRATIONS. INSTALL NEW FLASHING AND COUNTER FLASHING. SLEEVE EXISTING PIPE AS NEEDED TO EXTEND ABOVE NEW ROOF LEVEL.



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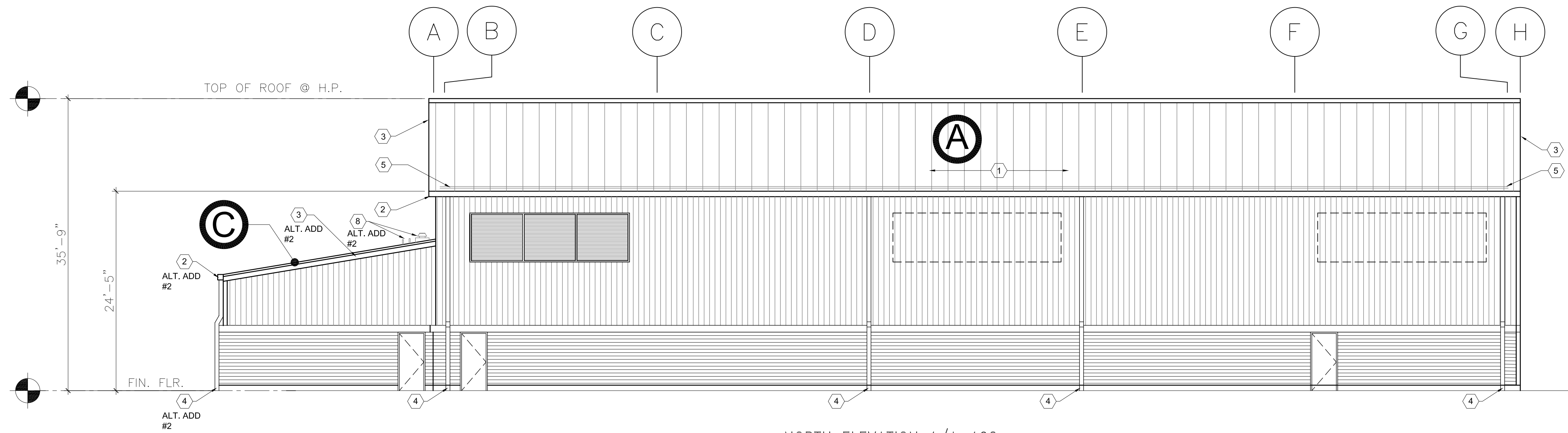
ISSUE DATE: 8/1/2023

CAD DWG FILE: A-101.DWG  
DRAWN BY: MWR  
CHECKED BY: RFS  
DESIGNED BY: MWR

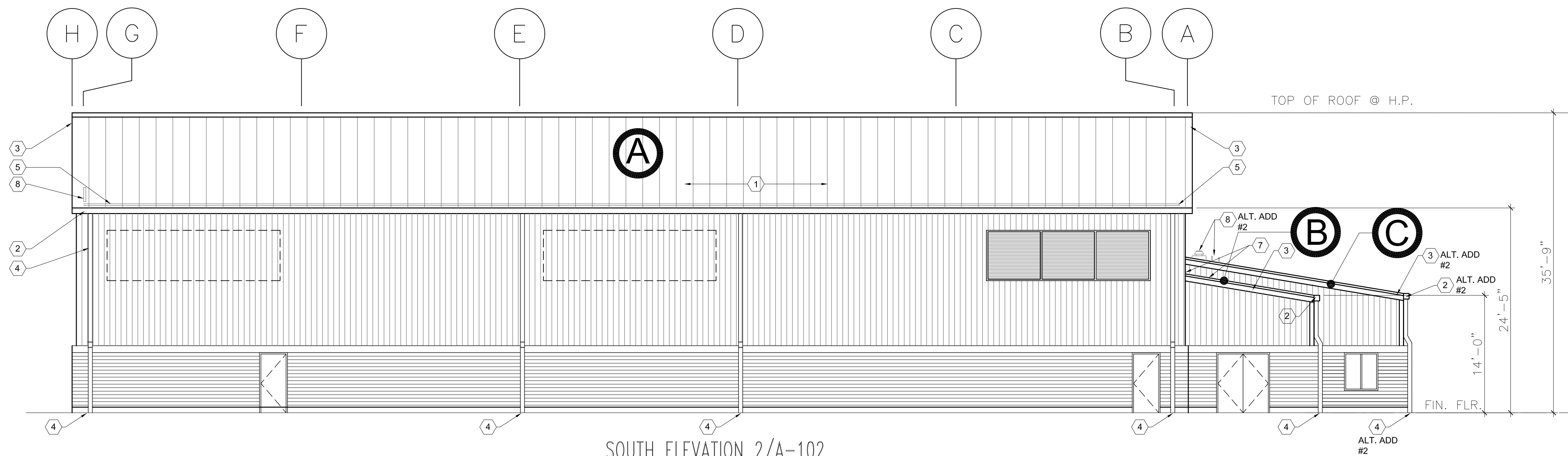
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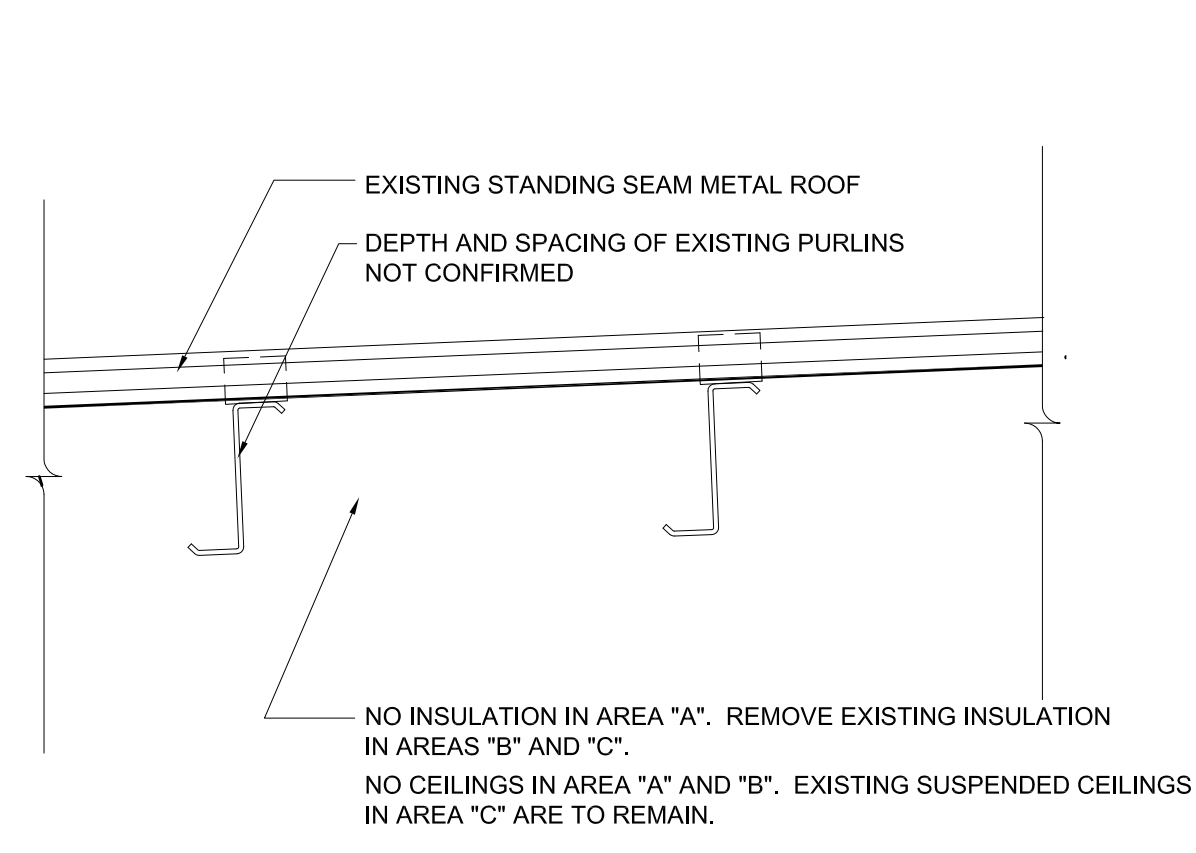
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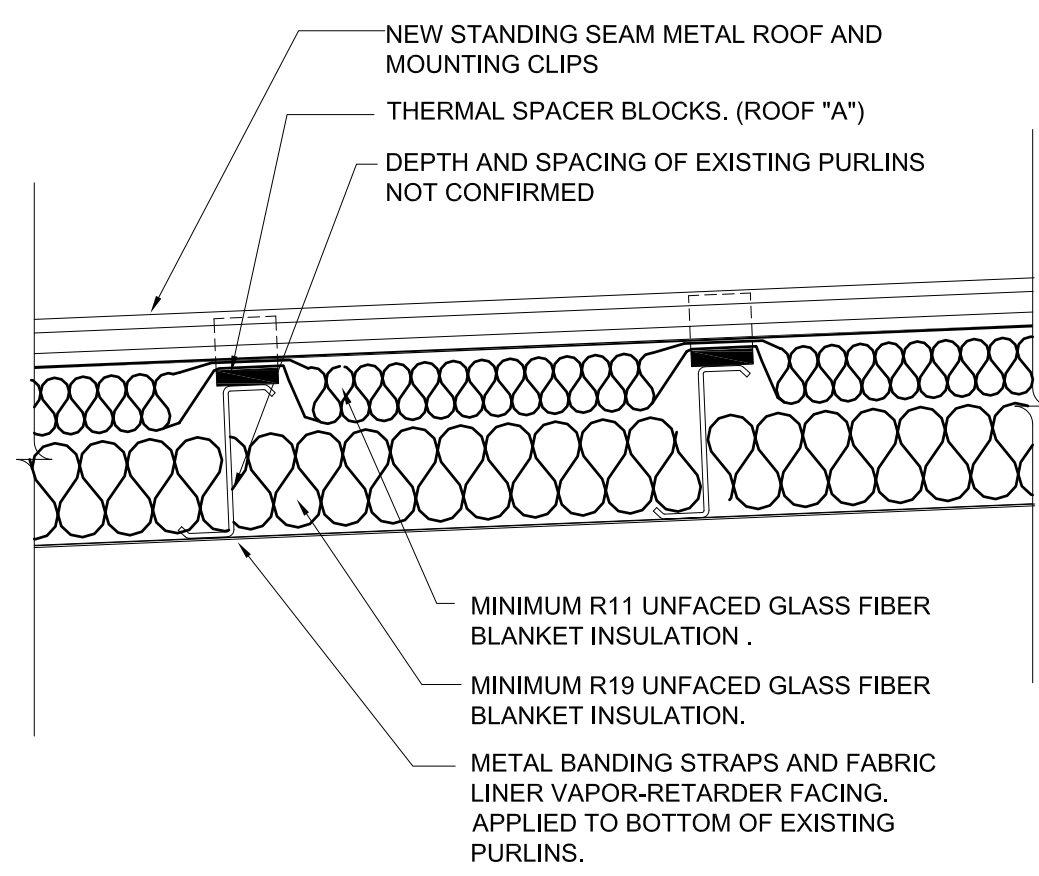
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SCALE: 1/8" = 1' - 0"



SOUTH ELEVATION 2/A-102  
SCALE: 1/8" = 1' - 0"



EXISTING ROOF SECTION 3/A-102  
SCALE: 1" = 1' - 0"



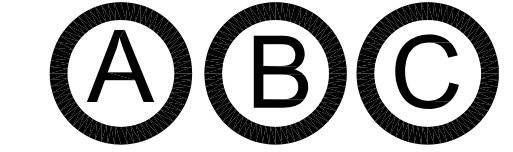
NEW ROOF SECTION 4/A-102  
SCALE: 1" = 1' - 0"

**GENERAL NOTES**

REMOVE AND REPLACE ROOF AREAS AS NOTED ON PLAN. REMOVAL REPLACEMENT INCLUDES ALL INSULATION, TRIM, SNOW RAILS AND ACCESSORIES. SEQUENTIALLY REMOVE AND REPLACE ROOFING TO MAINTAIN WEATHER TIGHTNESS AND INTEGRITY. COORDINATE REMOVAL/REPLACEMENT SCHEDULE WITH OWNER'S ACTIVITIES AND OCCUPANCY.

REFER ELECTRICAL DRAWINGS FOR PLACEMENT AND LOCATION OF NEW SOLAR PANELS.

**ROOF AREAS**

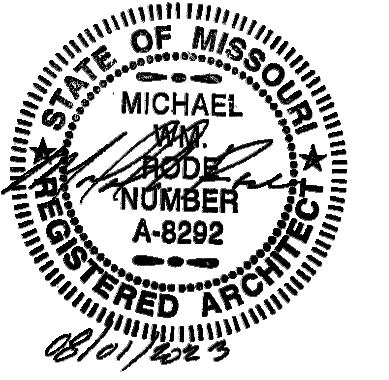


REFER SHEET A-101 FOR ROOF AREA DESCRIPTIONS

**PLAN NOTES**

- 1 NEW STANDING SEAM METAL ROOF PANELS, INSULATION - SEALANT AT ALL LAPS AND JOINTS. REFER METAL BUILDING SYSTEMS - ROOF REPLACEMENT SPECIFICATION SECTION 133419, AND JOINT SEALANTS - SPECIFICATION SECTION 079200.
- 2 NEW GUTTERS, EAVE TRIM, WALL CLOSURES AND ROOF PANEL CLOSURES - TAPE SEALANT AT ALL LAPS AND JOINTS. INSTALL NEW TRIM OF HEIGHT AND SUPPORTS TO ACCOMMODATE NEW ROOF THICKNESS. REFER METAL BUILDING SYSTEMS - ROOF REPLACEMENT SPECIFICATION SECTION 133419, AND JOINT SEALANTS - SPECIFICATION SECTION 079200.
- 3 NEW RAKE/END TRIM AND WALL CLOSURES - SEALANT AT ALL LAPS AND JOINTS. NEW RAKE/END TRIM AND TRIM SUPPORT Zs. NEW RAKE HEIGHT TO PROVIDE SAME COVERAGE OF EXISTING WALL PANELS AND TO ACCOMMODATE NEW ROOF THICKNESS. TAPE SEALANT AT ALL LAPS AND JOINTS. REFER METAL BUILDING SYSTEMS - ROOF REPLACEMENT SPECIFICATION SECTION 133419, AND JOINT SEALANTS - SPECIFICATION SECTION 079200.
- 4 NEW DOWNSPOUTS - CONNECT AT BASE TO EXISTING UNDERGROUND DRAINAGE SYSTEM. REFER METAL BUILDING SYSTEMS - ROOF REPLACEMENT SPECIFICATION SECTION 133419.
- 5 REMOVE EXISTING EXISTING SNOW RAILS AND INSTALL NEW SNOW RAILS. REFER METAL BUILDING SYSTEMS - ROOF REPLACEMENT SPECIFICATION SECTION 133419.
- 6 LIGHTNING PROTECTION: NOT SHOWN ON THIS SHEET, REFER TO SHEET A-101 FOR PLAN LAYOUT.
- 7 INSTALL NEW ROOF COUNTER FLASHING UNDER WALL PANELS. INSTALL NEW ROOFING WALL COUNTER FLASHING. REMOVE AND REINSTALL EXISTING BUILDING WALL PANELS AS NEEDED TO INSTALL NEW ROOF COUNTER FLASHING UNDER WALL PANELS. PROVIDE ZEE TRIM CLOSURE AND PLUG AT END OF ROOF PANEL. REFER DETAIL 3/A-103.
- 8 EXISTING PIPE/EQUIPMENT PENETRATIONS. INSTALL NEW FLASHING AND COUNTER FLASHING. SLEEVE EXISTING PIPE AS NEEDED TO EXTEND ABOVE NEW ROOF LEVEL.

STATE OF MISSOURI  
MICHAEL L. PARSON,  
GOVERNOR



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MO STATE CERTIFICATE OF AUTHORITY #2016005104



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AVIATION SUPPORT FACILITY  
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FT. LEONARD WOOD, MO 65473

PROJECT # T2228-01  
SITE # 6306  
ASSET # 8136306011

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DATE: \_\_\_\_\_

ISSUE DATE: 8/1/2023

CAD DWG FILE: A-102.DWG  
DRAWN BY: MWR  
CHECKED BY: RFS  
DESIGNED BY: MWR

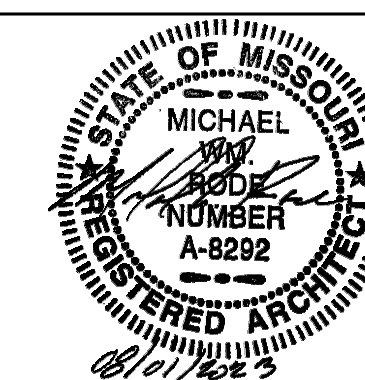
SHEET TITLE:  
ELEVATIONS AND SECTIONS

SHEET NUMBER:

**A-102**

4 OF 9 SHEETS  
AUGUST 1, 2023





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MO STATE CERTIFICATE OF AUTHORITY #2016005104



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PROJECT # T2228-01  
SITE # 6306  
ASSET # 8136306011

REVISION: \_\_\_\_\_  
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DATE: \_\_\_\_\_  
ISSUE DATE: 8/1/2023

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CHECKED BY: RFS  
DESIGNED BY: MWR

SHEET TITLE:  
ELEVATIONS AND  
SECTIONS

SHEET NUMBER:

**A-103**

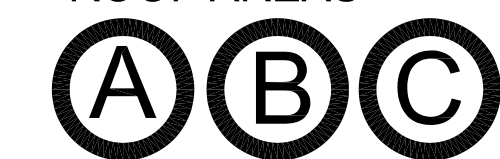
5 OF 9 SHEETS  
AUGUST 1, 2023

GENERAL NOTES

REMOVE AND REPLACE ROOF AREAS AS NOTED ON PLAN.  
REMOVAL REPLACEMENT INCLUDES ALL INSULATION, TRIM, SNOW  
RAILS AND ACCESSORIES. SEQUENTIALLY REMOVE AND REPLACE  
ROOFING TO MAINTAIN WEATHER TIGHTNESS AND INTEGRITY.  
COORDINATE REMOVAL/REPLACEMENT SCHEDULE WITH OWNER  
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REFER ELECTRICAL DRAWINGS FOR PLACEMENT AND LOCATION  
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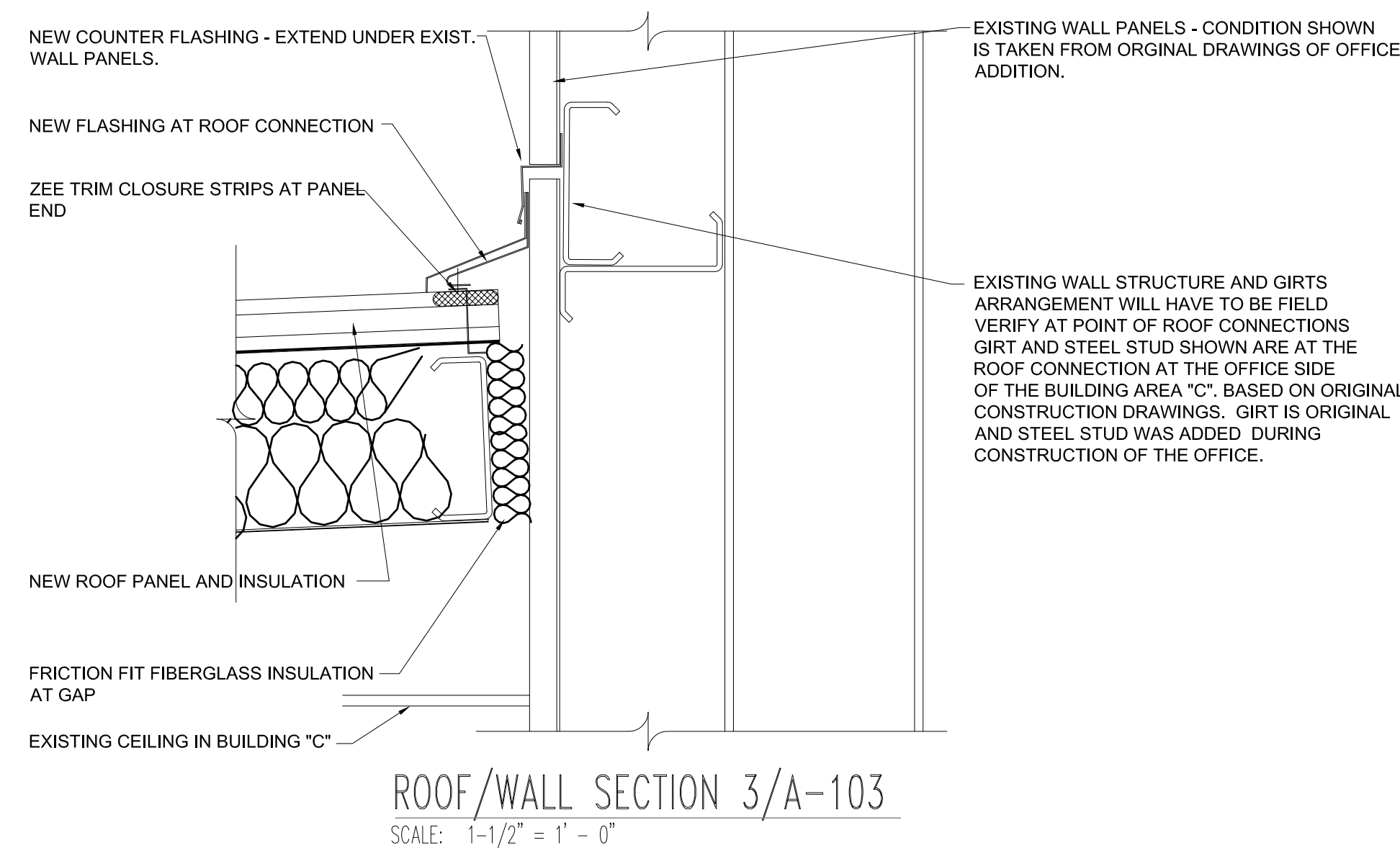
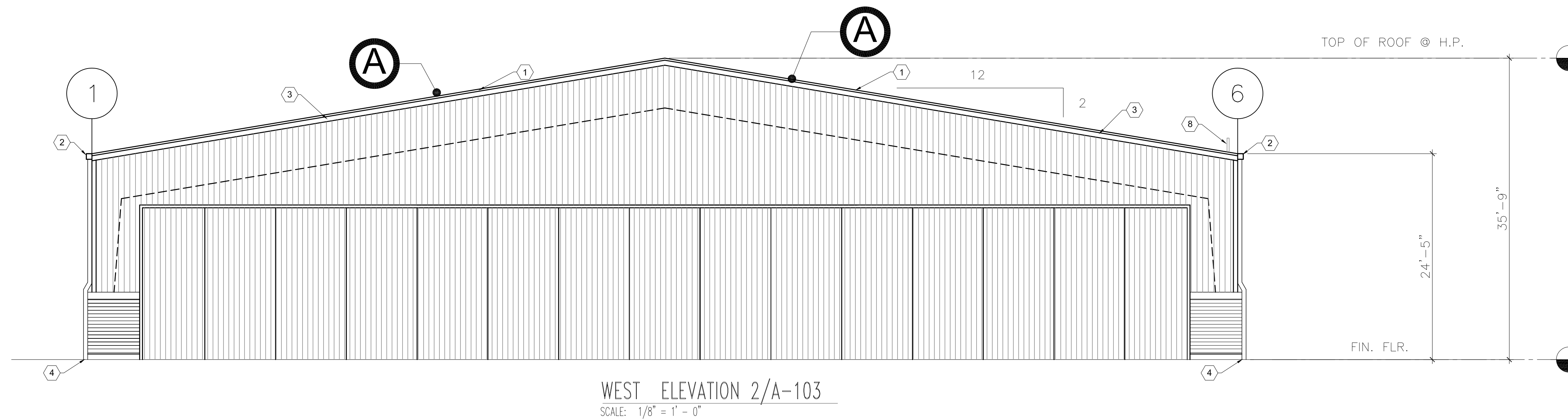
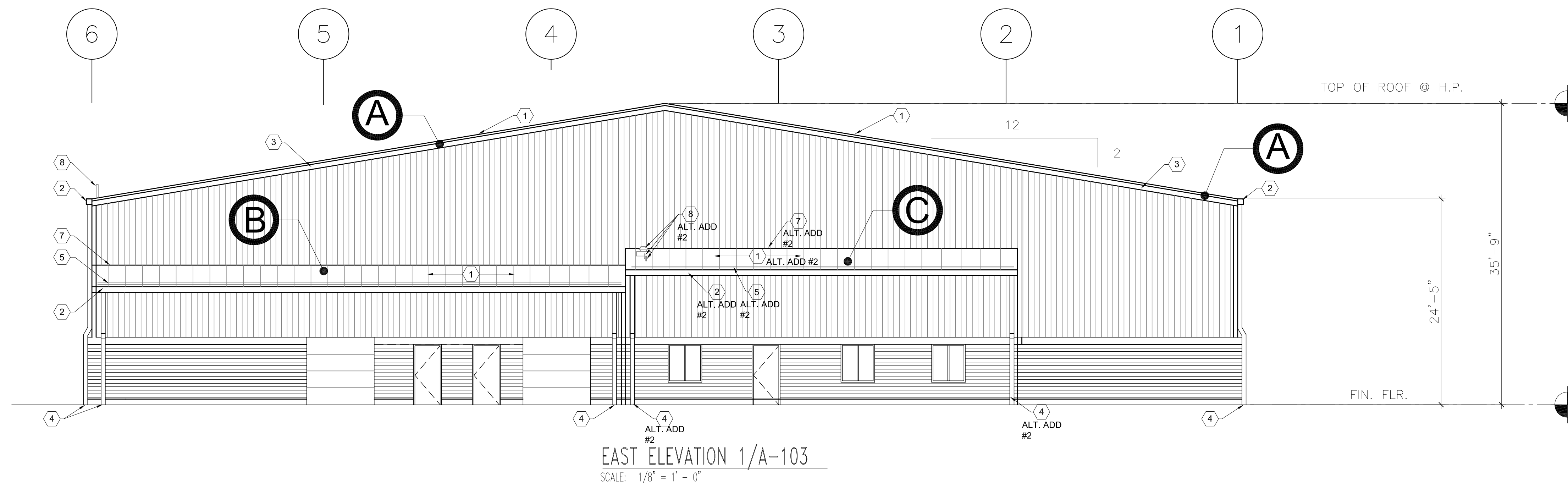
ROOF AREAS



REFER SHEET A-101 FOR ROOF AREA  
DESCRIPTIONS

PLAN NOTES

- 1 NEW STANDING SEAM METAL ROOF PANELS, INSULATION -  
SEALANT AT ALL LAPS AND JOINTS. REFER METAL BUILDING  
SYSTEMS - ROOF REPLACEMENT SPECIFICATION SECTION 133419,  
AND JOINT SEALANTS - SPECIFICATION SECTION 079200.
- 2 NEW GUTTERS, EAVE TRIM, WALL CLOSURES AND ROOF PANEL  
CLOSURES - TAPE SEALANT AT ALL LAPS AND JOINTS. INSTALL  
NEW TRIM OF HEIGHT AND SUPPORTS TO ACCOMMODATE NEW ROOF  
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- 6 LIGHTNING PROTECTION: NOT SHOWN ON THIS SHEET, REFER TO  
SHEET A-101 FOR PLAN LAYOUT.
- 7 INSTALL NEW ROOF COUNTER FLASHING UNDER WALL PANELS.  
INSTALL NEW ROOFING WALL COUNTER FLASHING. REMOVE AND  
REINSTALL EXISTING BUILDING WALL PANELS AS NEEDED TO  
INSTALL NEW ROOF COUNTER FLASHING UNDER WALL PANELS.  
PROVIDE ZEE TRIM CLOSURE AND PLUG AT END OF ROOF PANEL.  
REFER DETAIL 3/A-103.
- 8 EXISTING PIPE/EQUIPMENT PENETRATIONS. INSTALL NEW  
FLASHING AND COUNTER FLASHING. SLEEVE EXISTING PIPE AS  
NEEDED TO EXTEND ABOVE NEW ROOF LEVEL.



## GENERAL ELECTRICAL NOTES

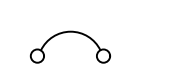
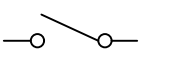
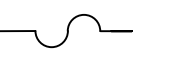
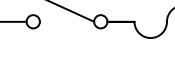

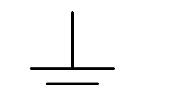
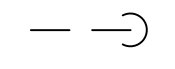

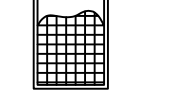


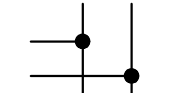
- PHOTOVOLTAIC (PV) SYSTEMS SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690.
- ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH MANUFACTURERS'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES.
- THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION
- LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 690.64 (B)]
- ALL PV SYSTEM COMPONENTS; MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINER BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY [NEC 690.4] & [NEC 690.60]
- PV MODULES:UL 1703 CERTIFIED, NFPA 70 CLASS C FIRE INVERTER(S):UL 1741 CERTIFIED, IEEE 1547, 929, 519 COMBINER BOX(S):UL 1703 OR UL 1741 ACCESSORY
- PV STRING HOME RUNS MUST BE LABELED AT ALL TERMINATIONS. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, ACCESSORIES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATION AS INDICATED ON THE DRAWINGS
- SUPPORT CONDUCTORS IN VERTICAL CONDUIT IN ACCORDANCE WITH THE REQUIREMENTS OF NEC 300.19.

## GROUNDING NOTES

- ONLY ONE CONNECTION TO AC CIRCUITS WILL BE USED FOR SYSTEM GROUNDING (NEC 690.42).
- RACKING AND STRUCTURAL COMPONENTS MUST BE ELECTRICALLY BONDED TOGETHER BY AN ACCEPTABLE MEANS. RACKING SYSTEM SHALL BE LISTED UL2703.
- MODULES SHALL BE GROUNDED WITH EQUIPMENT GROUNDING CONDUCTORS BONDED TO A LOCATION MEETING MANUFACTURER REQUIREMENTS WITH A MEANS OF BONDING LISTED FOR THIS PURPOSE.
- A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH NEC 690.47 AND NEC 250.50 THROUGH NEC 250.166 SHALL BE PROVIDED.
- PV SYSTEM SHALL BE GROUNDED IN ACCORDANCE WITH NEC 250.21 AND ALL METAL PARTS OR MODULE FRAMES ACCORDING TO NEC 690.43.
- ALL CONDUIT BETWEEN THE UTILITY AC DISCONNECT AND THE POINT OF CONNECTION IN THE MDP SHALL HAVE GROUNDED BUSHINGS AT BOTH ENDS.

## SCHEDULE OF ALTERNATES

- BASE BID, PROVIDE AND INSTALL 60 KW OF THE 120 KW SOLAR ARRAY SYSTEM ON THE SOUTH ROOF AREA OF BUILDING 5010. PROVIDE ONLY THE STRUCTURAL FRAMING AND INVERTERS FOR THE 60 KW SYSTEM. THE COMBINER PANEL, CONDUIT, WIRING, AND SYSTEM DISCONNECT SHALL STILL BE SIZED FOR THE FULL 120 KW SYSTEM.
- ALTERNATE NO. 1: PROVIDE AND INSTALL THE ADDITIONAL 60 KW OF SOLAR ARRAYS TO THE ROOF FOR A FULL 120 KW OF SOLAR POWER.

ABBREVIATIONS	SYMBOLS LEGEND	SYSTEM NOTES	CONSTRUCTION GENERAL NOTES
<p>A AMPERE AC ALTERNATING CURRENT AFCI ARC-FAULT CIRCUIT INTERRUPTER AHJ AUTHORITY HAVING JURISDICTION AIC AMERAGE INTERRUPTION CAPACITY ATS AUTOMATIC TRANSFER SWITCH AWG AMERICAN WIRE GAUGE CB-# CIRCUIT BREAKER BLDG BUILDING DC DIRECT CURRENT DWG DRAWING EMT ELECTRICAL METALLIC TUBE GFCI GROUND FAULT CIRCUIT INTERRUPTER GFP GROUND FAULT PROTECTION GND GROUND GEC GROUNDING ELECTRODE CONDUCTOR IBC INTERNATIONAL BUILDING CODE IFC INTERNATIONAL FIRE CODE KW KILOWATT MCB MAIN CIRCUIT BREAKER MDP MAIN DISTRIBUTION PANEL MLO MAIN LUG ONLY MTS MANUAL TRANSFER SWITCH N NEUTRAL NEC NATIONAL ELECTRICAL CODE NTS NOT TO SCALE OC ON CENTER OCPD OVERCURRENT PROTECTION DEVICE P POLE PH PHASE POC POINT OF CONNECTION PV PHOTOVOLTAIC RMC RIGID METALLIC CONDUIT SC SOURCE CIRCUIT TYP TYPICAL UL UNDERWRITERS LABORATORY V VOLT OR VOLTAGE W WATT XFMR TRANSFORMER</p>	<p>  ELECTRICAL BREAKER   ELECTRICAL DISCONNECT SWITCH   ELECTRICAL FUSE   ELECTRICAL FUSED DISCONNECT SWITCH   METER   SYSTEM OR EQUIPMENT GROUND   CONDUIT DOWN   CONTINUATION OF CONDUIT   PHOTOVOLTAIC (PV) MODULE   DC/AC INVERTER   POWER TRANSFORMER   CONNECTED CONDUCTOR                 </p> <p><b>APPLICABLE CODES</b></p> <p>NATIONAL ELECTRIC CODE (NEC), 2020 INTERNATIONAL BUILDING CODE (IBC), 2021 INTERNATIONAL FIRE CODE (IFC), 2021 LACLEDE ELECTRIC COOP UTILITY REQUIREMENTS</p>	<p>1. SOLAR ARRAY CONSISTS OF PV MODULES, CONNECTED IN SERIES.</p> <p>2. ARRAYS HAVE BEEN PLACED TO MINIMIZE OR ELIMINATE SHADING IMPACT FROM ADJACENT STRUCTURES AND/OR OBSTRUCTIONS.</p> <p>3. INVERTERS SHALL BE TRANSFORMERLESS STRING INVERTERS, LOCATED PER PLAN.</p> <p><b>SITE INFORMATION</b></p> <p>UTILITY COMPANY: LACLEDE ELECTRIC COOP</p> <p>POINT OF CONTACT: TERRY ROSENTHAL LACLEDE ELECTRIC COOP TROSENTHAL@LACLEDEELECTIC.COM O: 417-532-3164</p>	<p>1. ALL ELECTRICAL WORK SHALL BE PERFORMED BY A QUALIFIED LICENSED ELECTRICIAN AND/OR APPRENTICES WORKING UNDER THE DIRECT SUPERVISION OF THE LICENSED CONTRACTOR.</p> <p>2. ALL WORK CARRIED OUT SHALL COMPLY WITH THE SPECIFICATIONS, APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES, AND APPLICABLE REGULATIONS.</p> <p>3. PRIOR TO COMMENCEMENT OF ANY WORK, THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES NOTED AMONG SITE CONDITIONS, MANUFACTURER RECOMMENDATIONS, OR AUTHORITY HAVING JURISDICTION. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER OF RECORD A WRITTEN "RFI"(REQUEST FOR INFORMATION) PROPOSING AN ALTERNATIVE OR SEEKING CLARIFICATION.</p> <p>4. THE CONTRACTOR SHALL MAINTAIN IN GOOD CONDITION ONE COMPLETE SET OF PLANS WITH ALL REVISIONS, ADDENDA, AND CHANGE ORDERS ON THE PREMISES AT ALL TIMES.</p> <p>5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, ACCESSORIES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.</p> <p>6. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF WORK.</p> <p>7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.</p> <p>8. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF WORK AREA, ADJACENT AREAS AND BUILDING OCCUPANTS THAT ARE LIKELY TO BE AFFECTED BY THE WORK UNDER THIS CONTRACT. WORK SHALL CONFORM TO ALL OSHA REQUIREMENTS AND THE LOCAL JURISDICTION.</p> <p>9. CONTRACTOR SHALL LEAVE PREMISES IN A CLEAN CONDITION. ALL DEBRIS AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF IN A LAWFUL MANNER PER SPECIFICATIONS.</p> <p>10. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES NOT PART OF THE SCOPE OF WORK AS IDENTIFIED IN THESE PLANS.</p> <p>11. DUE TO THE FACT THAT PV MODULES ARE ENERGIZED WHENEVER THEY ARE EXPOSED TO LIGHT, CONTRACTOR SHALL DISABLE THE ARRAY DURING INSTALLATION AND SERVICE BY SHORT CIRCUITING, OPEN CIRCUITING, OR COVERING ARRAY WITH AN OPAQUE COVER ACCORDING TO MANUFACTURER'S INSTRUCTION.</p> <p><b>MONITORING AND CONTROLS</b></p> <p>CONTRACTOR SHALL PROVIDE A WIRELESS MONITORING AND CONTROLS NETWORK. THE SOLAR INVERTERS SHALL BE PROVIDED WITH MANUFACTURER STANDARD WIRELESS ACCESS CAPABILITY. CONTRACTOR SHALL PROVIDE CELLULAR HOTSPOT THAT WILL UPLOAD AND ALLOW CONTROL FROM A PASSWORD PROTECTED WEB ACCESS SYSTEM. THE CONTRACTOR SHALL INSTALL THE WEB MONITORING SOFTWARE ON AN EXISTING COMPUTER AS DESIGNATED BY THE STATE PROJECT MANAGER. SEE SPECIFICATION 263100 FOR ADDITIONAL INFORMATION.</p>



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**MISSOURI NATIONAL GUARD  
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FACILITIES MANAGEMENT OFFICE**

INSTALL SOLAR ARRAY  
AVIATION SUPPORT FACILITY

AVIATION SUPPORT FACILITY  
12249 20TH ST. BLDG 5010  
FT. LEONARD WOOD, MO 65473

PROJECT # T2228-01  
SITE # 6306  
ASSET # 8136306011

REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
ISSUE DATE: 8/1/2023

CAD DWG FILE: E-001.DWG  
DRAWN BY: RFS  
CHECKED BY: JC  
DESIGNED BY: RFS

SHEET TITLE:  
**ELECTRICAL  
LEGEND AND NOTES**

SHEET NUMBER:

**E-001**



**GENERAL NOTES**

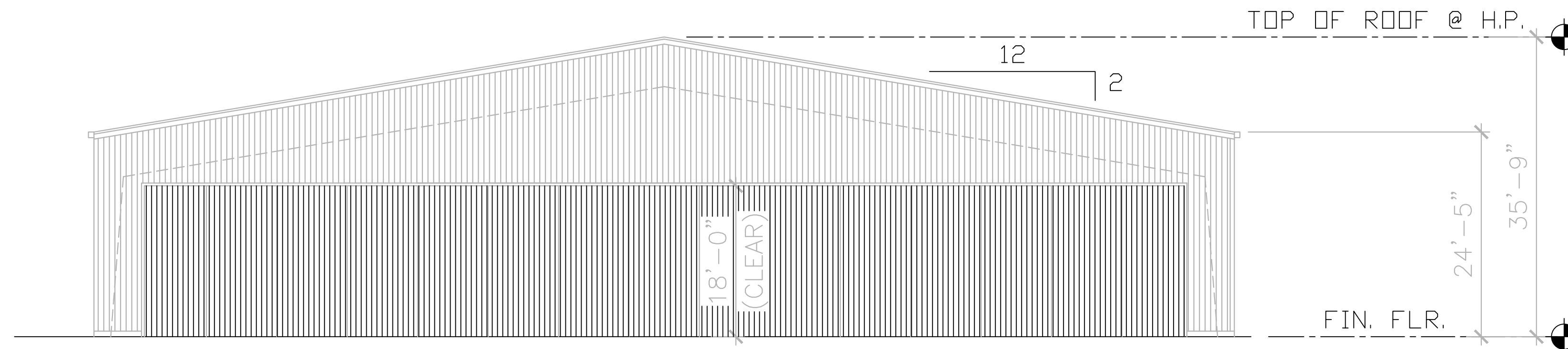
- SEE GENERAL NOTES SHEET E-001 FOR ADDITIONAL INFORMATION
- ALL CONDUIT RUNS ABOVE GRADE.
- SYSTEM INFORMATION. (FOR REFERENCE ONLY)  
SOLAR MODULE WEIGHT: 49.6 LBS.  
SOLAR MODULE DIMENSIONS: 79.06"x39.45"x1.57"
- ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC) 2020 AND UTILITY STANDARDS.

**PLAN NOTES**

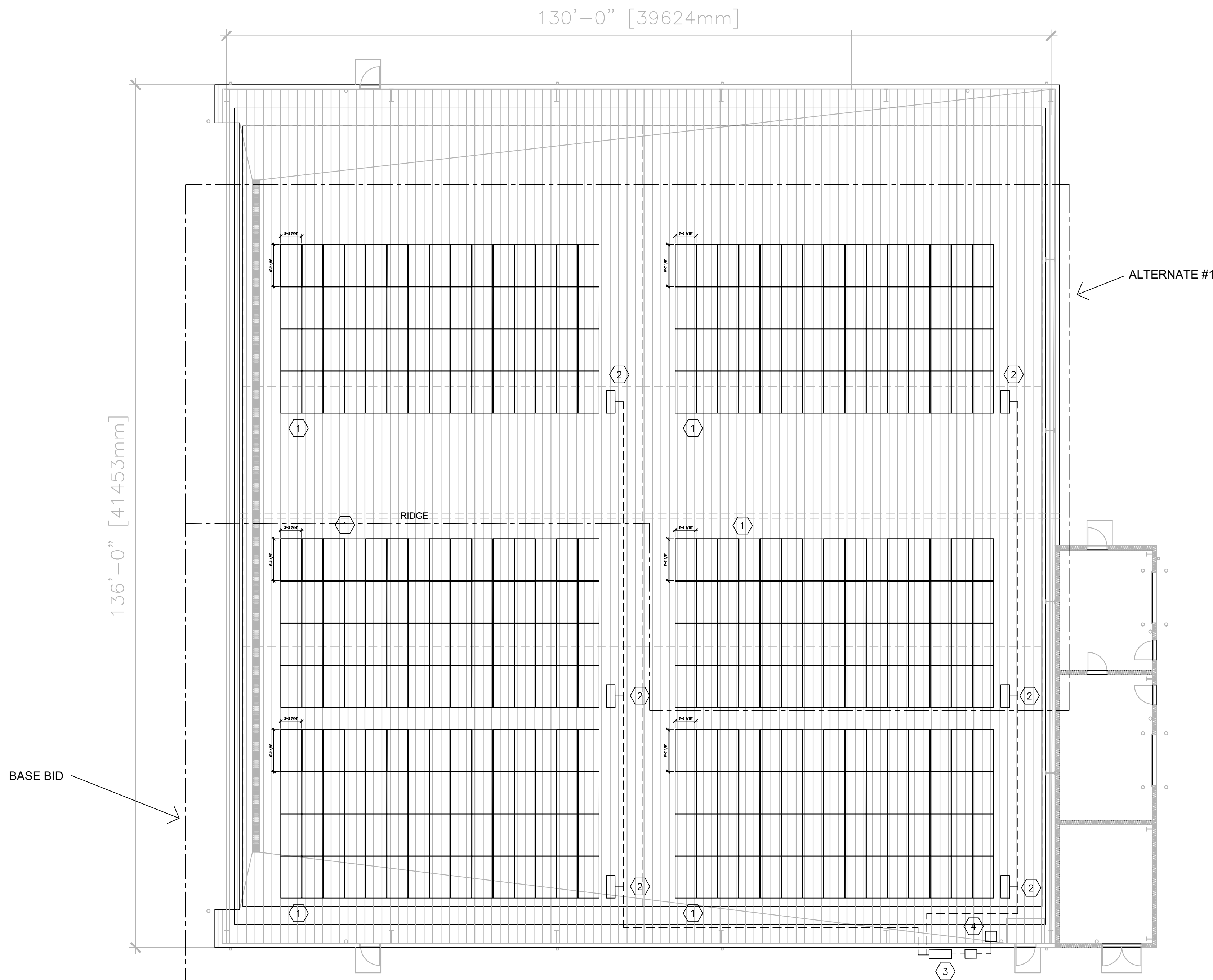
- INSTALL ROOF MOUNTED SOLAR ARRAY. SEE SHEET E-601 FOR DETAILED SOLAR MODULE AND EQUIPMENT INFORMATION. ROOF MOUNTS SHALL BE PER DETAILS ON SHEET E-501.
- INSTALL NEW DC TO AC SOLAR INVERTER.
- INSTALL NEW COMBINER BOX.
- CONNECT SOLAR ARRAY AC VIA ROOF MOUNTED WIRE AND CONDUIT TO EXISTING ELECTRICAL PANEL LCS INSIDE BUILDING. INSTALL NEW AC DISCONNECT PER UTILITY COMPANY REQUIREMENTS.

**SCHEDULE OF ALTERNATES**

- BASE BID. PROVIDE AND INSTALL 60 KW OF THE 120 KW SOLAR ARRAY SYSTEM ON THE SOUTH ROOF AREA OF THE BUILDING 5010. PROVIDE ONLY THE STRUCTURAL AND INVERTERS FOR THE 60 KW SYSTEM. THE COMBINER PANEL, CONDUIT, WIRING AND SYSTEM DISCONNECT SHALL BE SIZED FOR THE FULL 120 KW SYSTEM.
- ALTERNATE NO. 1: PROVIDE AND INSTALL THE ADDITIONAL 60 KW OF SOLAR ARRAYS TO THE ROOF FOR A FULL 120 KW OF SOLAR POWER.



2	BUILDING SECTION DIAGRAM
3/32"=1'-0"	-



1	ROOF PLAN
3/32"=1'-0"	-



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PROJECT # T2228-01  
SITE # 6306  
ASSET # 8136306011

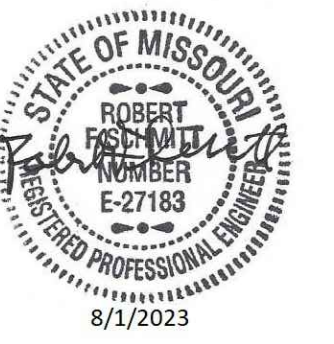
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DATE: \_\_\_\_\_  
REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
ISSUE DATE: 8/1/2023

CAD DWG FILE: E-101.DWG  
DRAWN BY: RFS  
CHECKED BY: JC  
DESIGNED BY: RFS

SHEET TITLE:  
**ELECTRICAL PLAN  
SOLAR ARRAY**

SHEET NUMBER:

**E-101**



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SITE # 6306  
ASSET # 8136306011

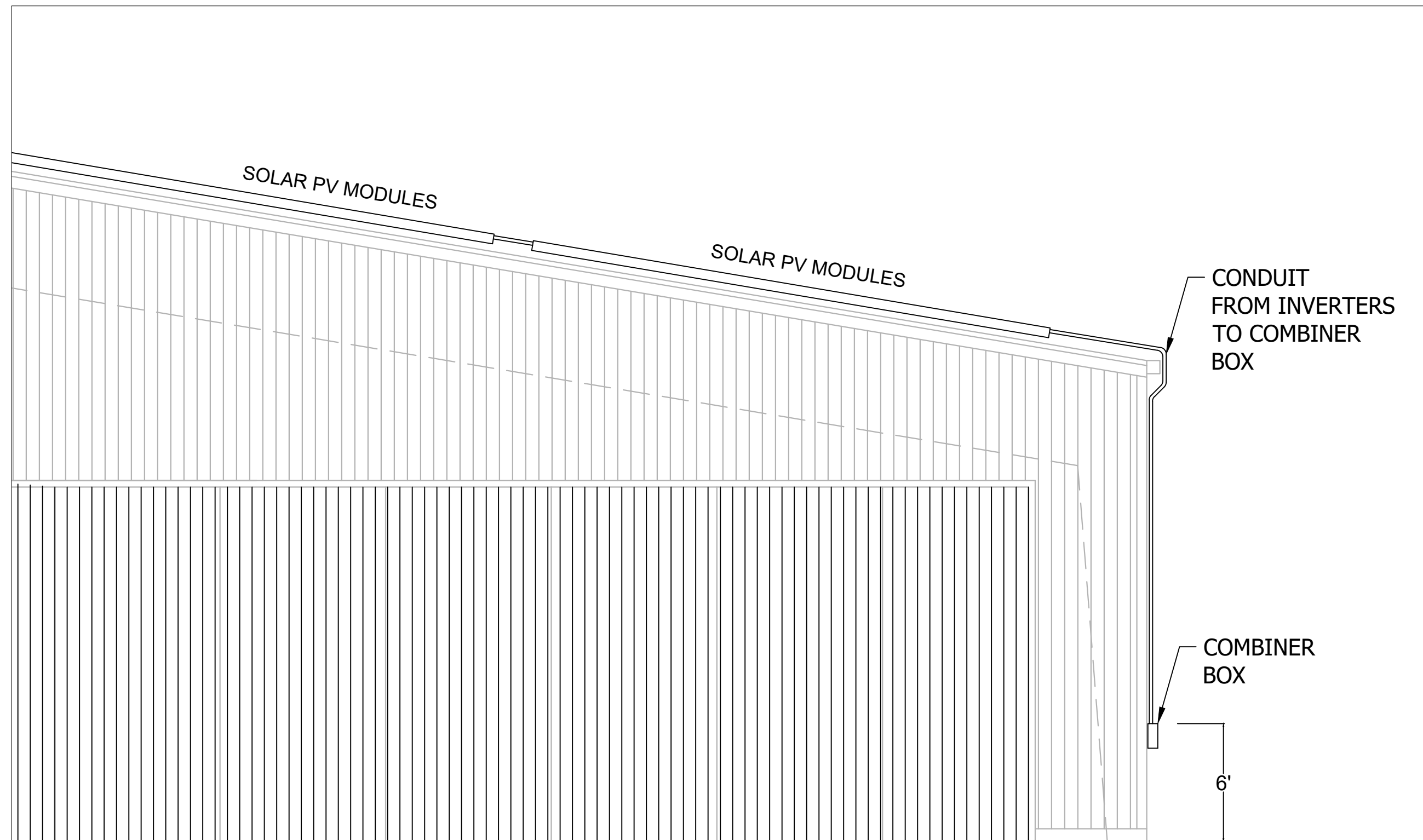
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REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
ISSUE DATE: 8/1/2023

CAD DWG FILE: E-501.DWG  
DRAWN BY: RFS  
CHECKED BY: RFS  
DESIGNED BY: RFS

SHEET TITLE:  
**ELECTRICAL  
DETAILS**

SHEET NUMBER:

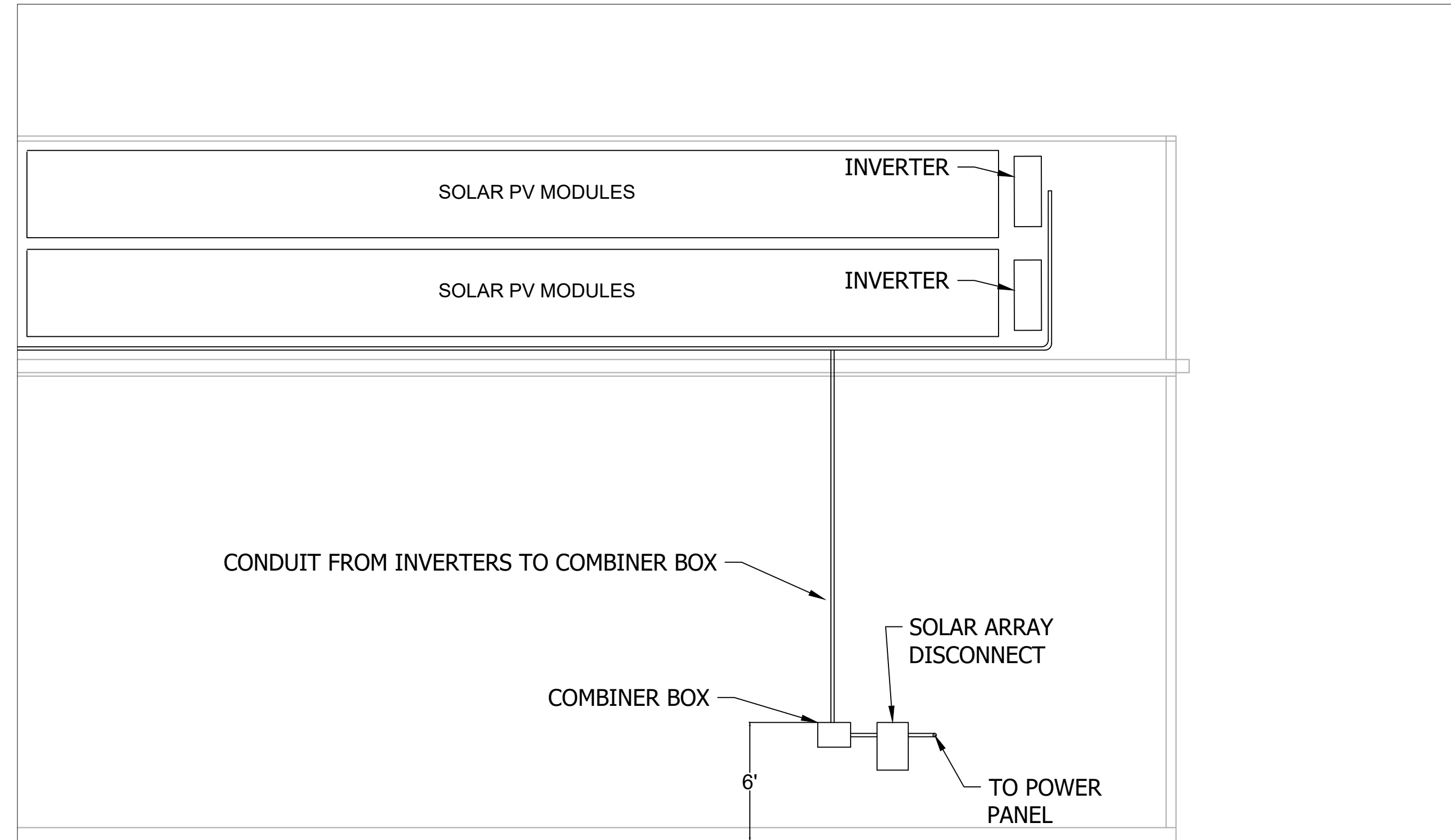
**E-501**



**NOTES**

1. CONDUIT TO BE SECURED TO ROOF/WALL STRUCTURE WITH CONDUIT STRAPS.
2. SEE ONE LINE DIAGRAM E-601 FOR EQUIPMENT REQUIREMENTS. ALL CONDUIT, CONDUCTORS AND EQUIPMENT SHALL BE PER DIVISION 26 SPECIFICATIONS.

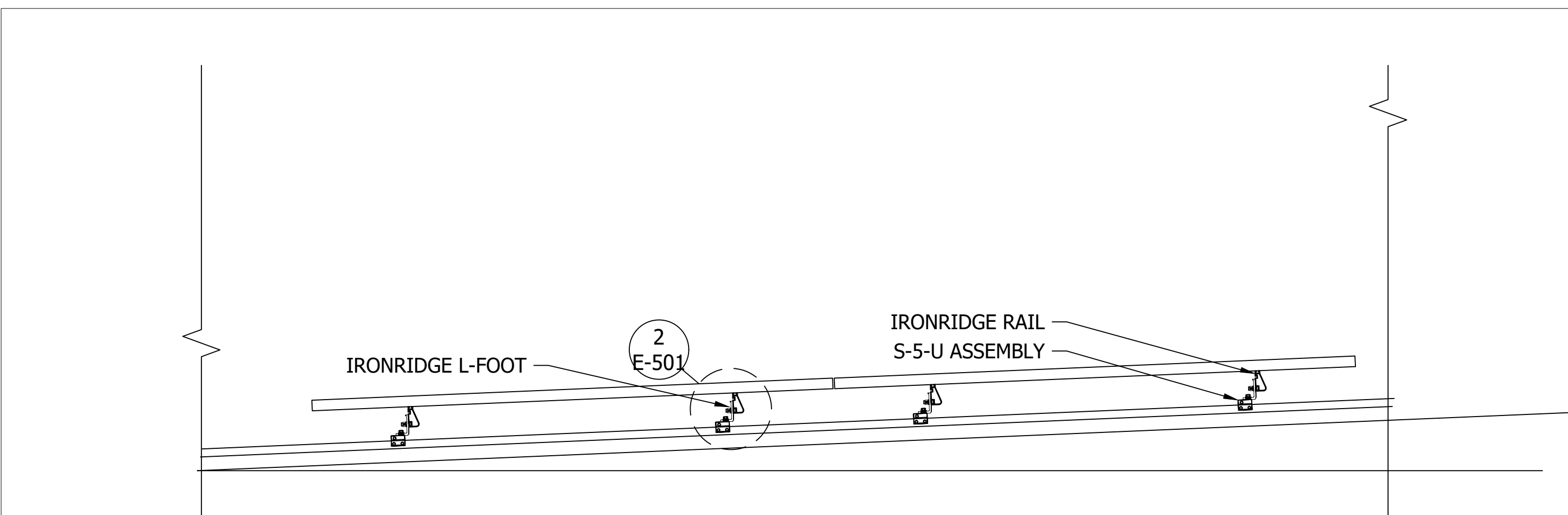
**3 BUILDING WEST VIEW LAYOUT DETAIL**  
E-501 NOT TO SCALE



**NOTES**

1. CONDUIT TO BE SECURED TO ROOF/WALL STRUCTURE WITH CONDUIT STRAPS.
2. SEE ONE LINE DIAGRAM E-601 FOR EQUIPMENT REQUIREMENTS. ALL CONDUIT, CONDUCTORS AND EQUIPMENT SHALL BE PER DIVISION 26 SPECIFICATIONS.

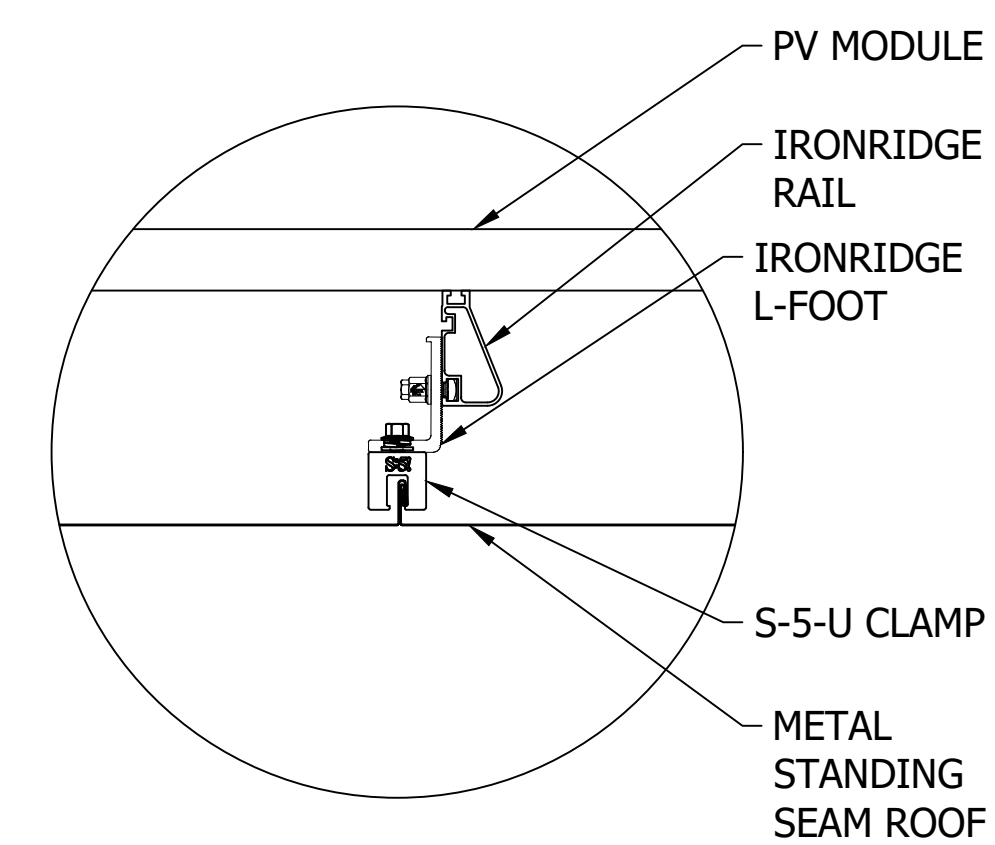
**4 BUILDING SOUTH VIEW LAYOUT DETAIL**  
E-501 NOT TO SCALE



**NOTES**

1. SOLAR MODULES SUPPORTS SHALL BE IRONRIDGE RAIL SERIES ROOF MOUNTS OR APPROVED EQUAL BY PROSOLAR, SNAPRACK OR UNIRAC, WITH S5 METAL SEAM ROOF CLIPS.

**1 SOLAR PANEL ROOF SUPPORT DETAIL**  
E-501 NOT TO SCALE



**NOTES**

1. CONTRACTOR SHALL COORDINATE WITH SOLAR MODULE PROVIDER, RAIL SYSTEM PROVIDER, AND ROOF INSTALLER.

**2 ROOF MOUNTING DETAILS**  
E-501 NOT TO SCALE





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SITE # 6306  
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DATE: \_\_\_\_\_  
ISSUE DATE: 8/1/2023

CAD DWG FILE: E-601.DWG  
DRAWN BY: RFS  
CHECKED BY: JC  
DESIGNED BY: RFS

SHEET TITLE:  
**ELECTRICAL  
ONE LINE DIAGRAM**

SHEET NUMBER:

**E-601**

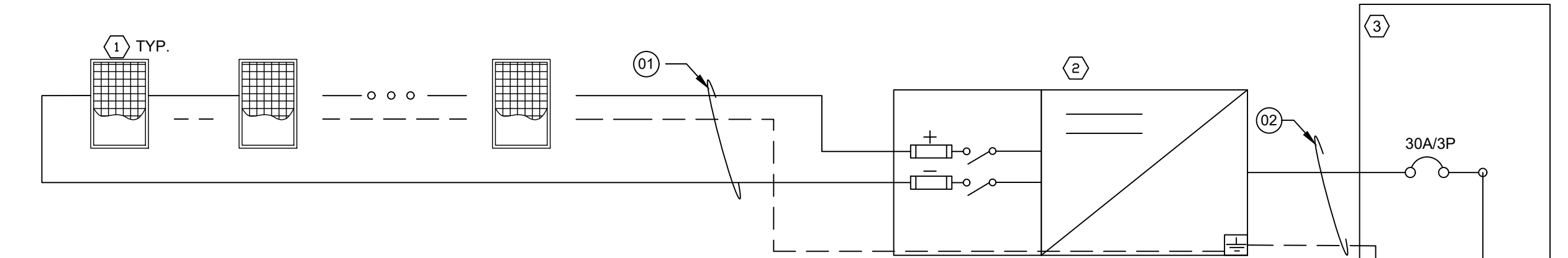
9 OF 9 SHEETS  
AUGUST 1, 2023

**BUILDING 5010 - 120 KW AC OUTPUT SOLAR ARRAY  
DC TO AC RATIO 1.2**

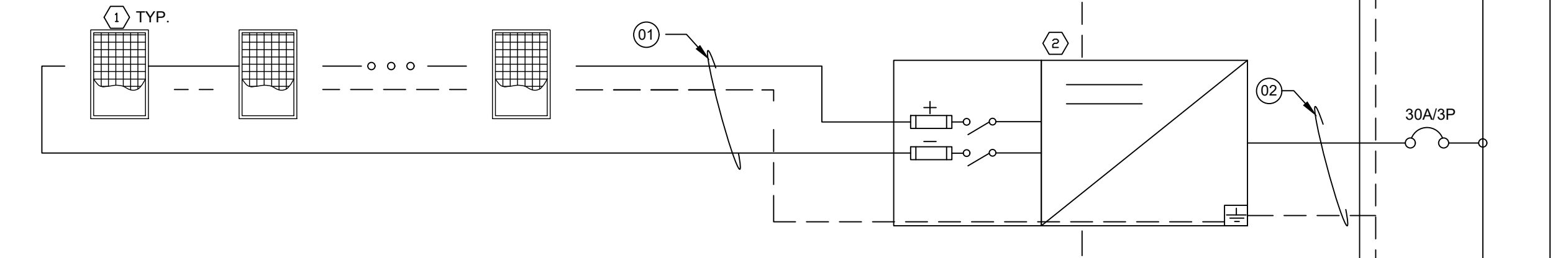
**SHEET NOTES**

- SOLAR MODULES INCLUDE OUTDOOR RATED QUICK CONNECTS WITH MULTI CONTACT CONNECTORS FOR MODULE INTERCONNECTION. DO NOT REMOVE THE QUICK CONNECTS, OTHERWISE THE MODULE WARRANTY AND THE UL LISTING MAY BE INVALIDATED.
- PV MODULES STRUNG IN SERIES. MODULE AND RACKING GROUNDING ACCOMPLISHED VIA CONTINUOUS CU CONDUCTOR.
- MODIFY EXISTING ELECTRICAL PANEL AS REQUIRED FOR THE CONNECTION OF INVERTER OUTPUT POWER TO THE PANEL.

INVERTER #1 (BASE BID)  
MPPT1: 2 STRINGS OF 15 MODULES IN SERIES  
MPPT2: 2 STRINGS OF 15 MODULES IN SERIES

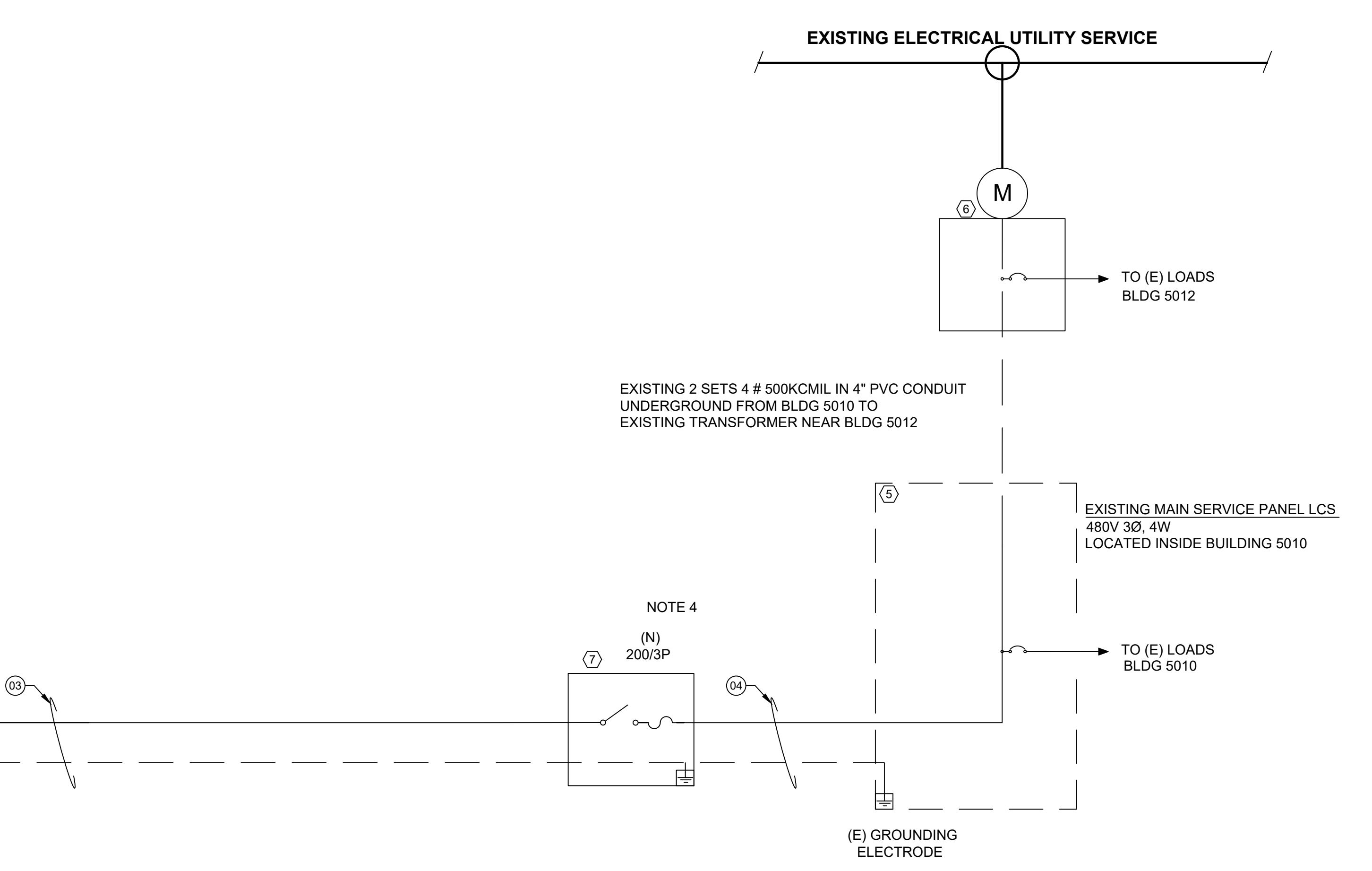


INVERTERS #2,3 (BASE BID) 4- 6 (ALTERNATE #1)  
MPPT1: 2 STRINGS OF 15 MODULES IN SERIES  
MPPT2: 2 STRINGS OF 15 MODULES IN SERIES



**SCHEDULE OF ALTERNATES**

- BASE BID. PROVIDE AND INSTALL 60 KW OF THE 120 KW SOLAR ARRAY SYSTEM ON THE SOUTH ROOF AREA OF BUILDING 5010. PROVIDE ONLY THE STRUCTURAL FRAMING AND INVERTERS FOR THE 60 KW SYSTEM. THE COMBINER PANEL, CONDUIT, WIRING, AND SYSTEM DISCONNECT SHALL STILL BE SIZED FOR THE FULL 120 KW SYSTEM.
- ALTERNATE NO. 1: PROVIDE AND INSTALL THE ADDITIONAL 60 KW OF SOLAR ARRAYS TO THE ROOF FOR A FULL 120 KW OF SOLAR POWER.



ID	QTY	DESCRIPTION
1	360	JINKO JMK400M-72HL-V, SOLAR MODULE . QTY 180 BASE BID, QTY 180 ALT #1.
2	6	20.0 kW STRING INVERTER: 2 MPPT WITH 6 INPUT PAIRS PER MPPT. 480V, 3 PHASE OUTPUT, 60 HZ. FRONIUS SYMO MODEL 20.0-3 480. QTY 3 BASE BID, QTY 3 ALTERNATE #1.
3	1	AC COMBINING PANEL, 250A, 3P, 4 W, WITH (6) 30 A CIRCUIT BREAKERS, NEMA 3R
4	1	SOLAR SYSTEM AC DISCONNECT, 200A, 3 PHASE, NEMA 3R
5	1	EXISTING MAIN PANEL LCS. 480V, 3PH, WYE.
6	1	EXISTING METER LOCATED AT BUILDING 5012 TRANSFORMER
7	1	PV AC DISCONNECT, FUSED 200A, 3 PHASE, NEMA 3R. SQUARE D OR APPROVED EQUAL

ID	CONDUCTOR	EGC	CONDUIT	CONDUCTORS IN CONDUIT	TEMPERATURE RATING
01	10 AWG PV WIRE	10 AWG	--	--	75C
02	8 AWG THWN-2	10 AWG	1"	4	75C
03	1/0 AWG	6 AWG	1-1/2"	4	75C
04	1/0 AWG	6 AWG	1-1/2"	4	75C

- ALL EXPOSED SOURCE CIRCUIT CONDUCTORS SHALL BE 600V RATED PV-WIRE SUITABLE FOR USE WITH TRANSFORMERLESS INVERTERS.
- ALL CONDUIT TO BE PER SPECIFICATIONS UNLESS OTHERWISE REQUIRED BY LOCAL A.H.
- ALL CONDUIT SIZES ARE BASED ON MINIMUM PER NEC CODE REQUIREMENTS.
- WIRE AMPACITY IS BASED ON NUMBER OF WIRES PER CONDUIT. IF CONDUITS ARE INSTALLED DIFFERENTLY THAN SHOWN, WIRE SIZES MAY BE AFFECTED.

SITE CONDITIONS:	
ASHRAE MAX AVG. TEMP:	98.3°F
ASHRAE EXTREME MIN TEMP:	-0.4°F
PV MODULE OUTPUT	
VOC:	49.1 Vdc
TEMP. COEFFICIENT OF Voc:	-0.29 %/°C
ISC:	10.61 Adc
VMP:	40.16 Vdc
IMP:	9.96 Adc
INVERTER DETAILS	
RATED POWER OUTPUT (kW)	20.0
OUTPUT VOLTAGE (V)	480
OUTPUT CURRENT (A)	24
SOURCE CIRCUIT DETAILS	
MODULES PER STRING	15
TEMPERATURE ADJUSTED VOC	824.9
SHORT CIRCUIT CURRENT	49.1