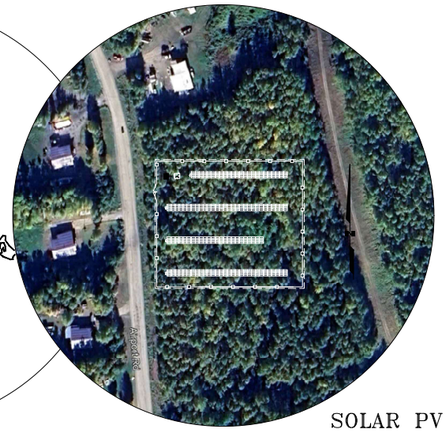
TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY DESIGN
ISSUED FOR PV CONSTRUCTION BID

ALASKA



SOLAR PV SITE

Electric Power Systems Inc.
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DRAWING INDEX				SCOPE OF WORK
TITLE	DRAWING NUMBER	SHEET	REVISION	
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	RYRE-EL-0000	1	B	THE PROJECT SCOPE IS TO INSTALL A GRID-TIED SOLAR PHOTOVOLTAIC ~~AND BATTERY ENERGY STORAGE SYSTEM~~ IN RUBY, AK.
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	RYRE-EL-0000	2	B	THE SYSTEM CONSISTS OF GROUND MOUNTED SOLAR ARRAYS AND 2 STRING INVERTERS MOUNTED INSIDE A CONTAINER. ~~THE BATTERY MODULES AND INVERTER WILL BE HOUSED INSIDE A CONTAINER AND HAVE SELF-SERVING AUXILIARY LOADS.~~ BOTH SYSTEMS WILL OPERATE IN PARALLEL WITH THE LOCAL UTILITY AND HAVE RELATED ELECTRICAL SAFETY AND METERING SYSTEMS.
SITE LAYOUT DIAGRAM	RYRE-EL-2500	1	B	
SITE LAYOUT - PV ARRAY	RYRE-EL-2500	2	B	
~~SITE LAYOUT - BESS~~	~~RYRE-EL-2500~~	~~3~~	~~A~~	
~~SITE LAYOUT - INTERCONNECTION~~	~~RYRE-EL-2500~~	~~4~~	~~A~~	**SYSTEM SUMMARY**
SITE LAYOUT - POWER CONVERSION HUT LAYOUT	RYRE-EL-2500	5	B	PV SYSTEM SIZE: 257.046kWDC/250KWAC
SITE LAYOUT - COMMUNICATIONS PANEL DETAILS	RYRE-EL-2500	6	A	~~BESS SYSTEM SIZE: 450KW~~
				INTERCONNECTION VOLTAGE: 12.47kV, 3 PHASE, 4 WIRE
ONE LINE DIAGRAM	RYRE-EL-0010	1	B	
				GENERAL NOTES
THREE LINE DIAGRAM	RYRE-EL-0100	1	A	
				ALL ELECTRICAL WORK TO BE INSTALLED BY A QUALIFIED AND LICENSED ELECTRICAL CONTRACTOR.
PV ARRAY DC WIRING DIAGRAM	RYRE-EL-0011	1	A	
PV ELECTRICAL SITE PLAN	RYRE-EL-0020	1	A	CONTRACTOR WILL FOLLOW IBC 2021 AND NFPA 70 NEC 2023 AS WELL AS ALL APPLICABLE LOCAL, STATE, MUNICIPAL AND CITY CODES, ORDINANCES AND REGULATIONS.
GROUNDING PLAN	RYRE-SS-2000	1	A	ALL MODULES AND INVERTERS SHALL BE UL LISTED 1703 & CEC APPROVED. ALL ELECTRICAL COMPONENTS AND MATERIALS SHALL BE LISTED FOR ITS PURPOSE AND INSTALLED IN A WORKMAN LIKE MANNER.
WIREWAY DETAILS	RYRE-SS-2000	1	A	
GROUNDING AND WIREWAY DETAILS	RYRE-SS-2000	1	A	PRIOR TO INSTALLATION, THE CONTRACTOR SHALL UNDERSTAND ALL DRAWINGS AND PRODUCT MANUALS.
SITE FENCING DETAILS	RYRE-SS-2000	1	A	
EQUIPMENT SAFETY LABEL SCHEUDLE	RYRE-SS-2000	1	A	ALL DESIGN AND SPECIFICATIONS OF STRUCTURAL COMPONENTS ARE OUTSIDE THE SCOPE OF THESE PLANS.
TRANSFORMER DETAILS	RYRE-SS-2000	1	A	
EQUIPMENT NAMEPLATE DETAILS	RYRE-SS-2000	1	A	**PROJECT ENTITIES**
PV STRING CALCULATIONS	RYRE-EL-0700	1	A	OWNER: TANANA CHIEFS CONFERENCE
				ENGINEER OF RECORD: ELECTRIC POWER SYSTEMS, INC.
				ELECTRIC SERVICE PROVIDER: CITY OF RUBY ELECTRIC UTILITY

BESS DRAWINGS NOT INCLUDED IN THIS DRAWING SET

NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	TJT/05-05-2025	JRV/05-05-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE RUBY RENEWABLE ENERGY COVER SHEET AND INDEX

ryre-pr-0001_1.dwg

REF DWG(S):

DRAWING NO.: RYRE-PR-0001

SHEET 1 OF 1

ELECTRICAL SPECIFICATIONS

GENERAL

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL A COMPLETE, TESTED, COMMISSIONED, AND SATISFACTORY ELECTRIC INSTALLATION IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS. THE INTENT OF THE DRAWINGS IS NOT TO SHOW OR LIST EVERY ITEM TO BE PROVIDED BY THE CONTRACTOR. IF AN ITEM IS NOT SHOWN OR LISTED THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE MISSING ITEMS TO ALLOW THE SYSTEM TO FUNCTION PROPERLY.

2. ALL DIMENSIONS AND LOCATIONS OF EXISTING CONDITIONS MUST BE VERIFIED PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES NOTED

3. ALL CONTRACTOR INITIATED CHANGES SHALL BE SUBMITTED IN WRITING TO THE ENGINEER OF RECORD FOR APPROVAL PRIOR TO ANY CHANGES IN THE FIELD.

4. EXACT LOCATION AND MOUNTING OF ALL EQUIPMENT SHALL BE VERIFIED IN THE FIELD.

5. THE CONTRACTOR SHALL READ AND UNDERSTAND ALL DRAWINGS AND EQUIPMENT MANUALS PRIOR TO INSTALLATION OR OPERATION OF EQUIPMENT. CONTRACTOR IS TO PROVIDE SKILLED LABOR FOR EACH TRADE WHOSE WORK RELATES TO THE DRAWINGS AND SPECIFICATIONS.

6. ALL OUTDOOR EQUIPMENT ENCLOSURES SHALL BE RATED NEMA 3R MINIMUM.

7. ALL THE EQUIPMENT SHOULD BE FREE FROM ANY DEBRIS, DAMAGED COMPONENTS AND ANY CONNECTION ISSUES.

8. THE CONTRACTOR SHALL KEEP ACCURATE RECORDS OF ALL DEVIATIONS IN WORK AS INSTALLED FROM WORK SPECIFIED ON THE DRAWINGS, OR IN THE SPECIFICATIONS, NOTING THE ORIGIN OF THE CHANGE.

9. SUFFICIENT ACCESS AND WORKING SPACE SHALL BE PROVIDED NEAR ELECTRICAL EQUIPMENT PER NEC ARTICLE 110.

10. CONTRACTOR SHALL PREPARE AN OPERATION AND MAINTENANCE MANUAL FOR ALL EQUIPMENT AND SYSTEMS INSTALLED.

11. CONDUIT JOINTS SHALL BE CUT SQUARE AND DE-BURRED UNTIL SMOOTH. BENDS SHALL BE MADE SO THAT THE CONDUIT IS NOT DAMAGED. THERE SHOULD NOT BE MORE THAN THE EQUIVALENT OF FOUR QUARTER-BENDS (360 DEGREES) BETWEEN PULL POINTS.

12. METALIC CONDUIT GROUNDS SHALL BE INSULATED AND SOLIDLY GROUNDED TO THE EGC SYSTEM. GROUNDS SHALL BE SIZED ACCORDING TO THE NEC.

13. CONDUCTORS SHALL BE COLOR-CODED, FACTORY OR FIELD APPLIED, WITH AN INDUSTRY STANDARD COLOR FOR EACH PHASE AND THE NEUTRAL.

RECORD DOCUMENTS

14. ON COMPLETION OF THE PROJECT, A COMPLETE SET OF MARKED-UP PRINTS SHOWING ANY DEVIATIONS SHALL BE DELIVERED TO THE ENGINEER OF RECORD. UNTIL THESE DRAWINGS ARE REVIEWED BY THE ENGINEER, THE CONTRACT SHALL REMAIN INCOMPLETE.

WIRING METHODS

15. EXPOSED PV WIRING SHALL BE PV WIRE TYPE, 90 DEGREE C, WET RATED AND UV RESISTANT.

16. PV SOURCE AND OUTPUT CIRCUIT CONDUCTORS SHALL BE RED FOR POSITIVE, BLACK FOR NEGATIVE, AND GREEN FOR GROUND. FIELD WIRING THAT IS NOT COLOR CODED SHALL BE MARKED AT BOTH ENDS SHOWING CIRCUIT POLARITY.

17. DC EQUIPMENT SHALL BE LISTED WITH A DC VOLTAGE GREATER THAN OR EQUAL TO THE MAXIMUM DC SYSTEM VOLTAGE.

18. INTERCONNECT WIRING AND POWER CONDUCTORS MUST BE IN ACCORDANCE WITH NEC NFPA 70. CONDUCTORS MUST CONFORM TO THE MINIMUM BEND RADIUS SPECIFIED IN THE SPECIFIC NEC ARTICLE. WIRE BUNDLES SHALL BE KEPT AWAY FROM SHARP EDGES TO AVOID DAMAGE TO WIRE INSULATION. CONDUCTORS SHALL BE COPPER RATED AT 90 DEGREES C UNLESS OTHERWISE NOTED IN THE DRAWINGS. FOR OUTDOOR INSTALLATIONS, CONDUITS AND FITTINGS SHALL BE PROPERLY NEMA RATED AS REQUIRED BY THE NEC.

19. CONNECTORS SHALL BE TORQUED PER DEVICE LISTING OR MANUFACTURER'S RECOMMENDATION.

20. AC WIRING SHALL BE COPPER RATED AT 90 DEGREES C, RATED 600VAC UNLESS OTHERWISE NOTED IN THE DRAWINGS.

21. PV SOURCE CIRCUITS IN FREE AIR SHALL BE PROPERLY SUPPORTED AND SEPARATED TO MAINTAIN AMPACITY RATINGS AND INSULATION INTEGRITY.

25. FIELD MADE CONNECTORS FOR PV QUICK CONNECTS SHALL BE THE SAME TYPE AND MANUFACTURER AS THE PV MODULES AND USE THE MANUFACTURER SPECIFIED CRIMPING TOOL.

GROUNDING

26. ONLY ONE CONNECTION TO DC CIRCUITS AND ONE CONNECTION TO AC CIRCUITS SHALL BE MADE FOR SYSTEM GROUNDING.

27. NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER EQUIPMENT GROUNDING TO ENSURE THE TERMINAL LUG IS PROPERTY BOLTED AND METAL-METAL CONTACT IS MADE. PAINT AND/OR FINISH AT THE POINT OF CONTACT IS TO BE REMOVED.

28. MODULES SHALL BE BONDED WITH EQUIPMENT GROUNDING CONDUCTORS BONDED TO A LOCATION APPROVED BY THE MANUFACTURER WITH A MEANS OF BONDING LISTED FOR THIS PURPOSE.

29. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, INCLUDING BUT NOT LIMITED TO GROUND RODS, GROUNDING LUGS, GROUNDING CLAMPS, ETC.

30. GROUNDING CONDUCTORS SHALL MEET THE FOLLOW SPECIFICATIONS:
- 30.1. SOLID CONDUCTORS: ASTM B 3.
- 30.2. STRANDED CONDUCTORS: ASTM B 8.
- 30.3. TINNED CONDUCTORS: ASTM B 33.

31. GROUNDING BUS WHERE SPECIFIED SHALL BE RECTANGULAR BARS OF ANNEALED COPPER, CROSS SECTION SIZED FOR APPLICATION PER NEC, UNLESS OTHERWISE INDICATED; WITH INSULATORS.

32. GROUNDING CONDUCTORS SHALL BE ROUTED ALONG THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE. AVOID OBSTRUCTING ACCESS OR PLACING CONDUCTORS WHERE THEY MAY BE SUBJECTED TO STRAIN, IMPACT, OR DAMAGE.

33. INSTALL A GROUND CONDUCTOR LOOP AND GROUND RODS, ELECTRICALLY CONNECTED TO BUILDING STRUCTURE, GROUND RODS, AND EXTERIOR EQUIPMENT AS SHOWN ON DRAWINGS.

RACEWAYS

34. METAL CONDUIT AND TUBING SHALL MEET THE FOLLOWING STANDARDS:
- 34.1. RIGID STEEL CONDUIT: ANSI C80.1.
- 34.2. EMT: ANSI C80.3. (FOR INDOOR USE ONLY).
- 34.3. LFMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.

35. FITTINGS FOR CONDUIT SHALL BE LISTED FOR TYPE AND SIZE RACEWAY WITH WHICH USED, AND FOR APPLICATION AND ENVIRONMENT IN WHICH INSTALLED.

36. COATED FITTINGS FOR PVC-COATED CONDUIT SHALL HAVE MINIMUM THICKNESS OF 0.040 INCHES WITH OVERLAPPING SLEEVES PROTECTING THREADED JOINTS.

37. NONMETALIC WIREWAY SHALL BE PROVIDED AS FIBERGLASS POLYESTER, EXTRUDED AND FABRICATED TO SIZE AND SHAPE INDICATED, WITH NO HOLES OR KNOCKOUTS. COVER IS GASKETED WITH OIL-RESISTANT GASKET MATERIAL AND FASTENED WITH CAPTIVE SCREWS TREATED FOR CORROSION RESISTANCE. CONNECTIONS ARE FLANGED, WITH STAINLESS-STEEL SCREWS AND OIL-RESISTANT GASKETS.

38. RACEWAYS FOR OPTICAL FIBER AND COMMUNICATIONS CIRCUITS SHALL BE INSTALLED AS FOLLOWS:
- 38.1. 3/4-INCH TRADE SIZE AND SMALLER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 50 FEET.
- 38.2. 1-INCH TRADE SIZE AND LARGER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 75 FEET.
- 38.3. INSTALL WITH A MAXIMUM OF TWO 90-DEGREE BENDS OR EQUIVALENT FOR EACH LENGTH OF RACEWAY UNLESS DRAWINGS SHOW STRICTER REQUIREMENTS. SEPARATE LENGTHS WITH PULL OR JUNCTION BOXES OR TERMINATIONS AT DISTRIBUTION FRAMES OR CABINETS WHERE NECESSARY TO COMPLY WITH THESE REQUIREMENTS.

DISCONNECTING MEANS

39. MEANS SHALL BE PROVIDED TO DISCONNECT THE PV SYSTEM FROM WIRING SYSTEMS INCLUDING POWER SYSTEMS AND ENERGY STORAGE SYSTEMS.

40. PV DISCONNECTS SHALL NOT BE REQUIRED TO BE SUITABLE AS SERVICE EQUIPMENT AND SHALL BE RATED IN ACCORDANCE WITH ARTICLE 690 PART III: DISCONNECTING MEANS.

PANELBOARDS

41. CONTRACTOR SHALL PROVIDE THE FOLLOWING SUBMITTALS:

- 41.1. EACH TYPE OF PANELBOARD, OVERCURRENT PROTECTIVE DEVICE, TRANSIENT VOLTAGE SUPPRESSION DEVICE, ACCESSORY, AND COMPONENT INDICATED. INCLUDE DIMENSIONS AND MANUFACTURERS' TECHNICAL DATA ON FEATURES, PERFORMANCE, ELECTRICAL CHARACTERISTICS, RATINGS, AND FINISHES.
- 41.2. MANUFACTURER SEISMIC QUALIFICATION CERTIFICATION: SUBMIT CERTIFICATION THAT PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, ACCESSORIES, AND COMPONENTS WILL WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS" INCLUDE THE FOLLOWING:
  - 41.2.1. BASIS OF CERTIFICATION: INDICATE WHETHER WITHSTAND CERTIFICATION IS BASED ON ACTUAL TEST OF ASSEMBLED COMPONENTS OR ON CALCULATION.
  - 41.2.2. DIMENSIONED OUTLINE DRAWINGS OF EQUIPMENT UNIT: IDENTIFY CENTER OF GRAVITY AND LOCATE AND DESCRIBE MOUNTING AND ANCHORAGE PROVISIONS.
  - 41.2.3. DETAILED DESCRIPTION OF EQUIPMENT ANCHORAGE DEVICES ON WHICH THE CERTIFICATION IS BASED AND THEIR INSTALLATION REQUIREMENTS.
- 41.3. FIELD QUALITY-CONTROL TEST REPORTS INCLUDING THE FOLLOWING:
  - 41.3.1. TEST PROCEDURES USED.
  - 41.3.2. TEST RESULTS THAT COMPLY WITH REQUIREMENTS.
  - 41.3.3. RESULTS OF FAILED TESTS AND CORRECTIVE ACTION TAKEN TO ACHIEVE TEST RESULTS THAT COMPLY WITH REQUIREMENTS.
- 41.4. PANELBOARD SCHEDULES: FOR INSTALLATION IN PANELBOARDS. SUBMIT FINAL VERSIONS AFTER LOAD BALANCING.
- 41.5. OPERATION AND MAINTENANCE DATA: FOR PANELBOARDS AND COMPONENTS TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS. IN ADDITION TO ITEMS SPECIFIED IN DIVISION 01 SECTION "OPERATION AND MAINTENANCE DATA," INCLUDE THE FOLLOWING:
  - 41.5.1. MANUFACTURER'S WRITTEN INSTRUCTIONS FOR TESTING AND ADJUSTING OVERCURRENT PROTECTIVE DEVICES.
  - 41.5.2. TIME-CURRENT CURVES, INCLUDING SELECTABLE RANGES FOR EACH TYPE OF OVERCURRENT PROTECTIVE DEVICE

42. CONTRACTOR SHALL MEET THE FOLLOWING QUALITY ASSURANCE STANDARDS:

- 42.1. SOURCE LIMITATIONS: OBTAIN PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, COMPONENTS, AND ACCESSORIES THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER.
- 42.2. PRODUCT OPTIONS: DRAWINGS INDICATE SIZE, PROFILES, AND DIMENSIONAL REQUIREMENTS OF PANELBOARDS AND ARE BASED ON THE SPECIFIC SYSTEM INDICATED. REFER TO DIVISION 01 SECTION "PRODUCT REQUIREMENTS."
- 42.3. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
- 42.4. COMPLY WITH NEMA PB 1.
- 42.5. COMPLY WITH NFPA 70.

43. CONTRACTOR SHALL COORDINATE LAYOUT AND INSTALLATION OF PANELBOARDS AND COMPONENTS WITH OTHER CONSTRUCTION THAT PENETRATES WALLS OR IS SUPPORTED BY THEM, INCLUDING ELECTRICAL AND OTHER TYPES OF EQUIPMENT, RACEWAYS, PIPING, AND ENCUMBRANCES TO WORKSPACE CLEARANCE REQUIREMENTS.

44. CONTRACTOR SHALL PROVIDE PANELBOARD PRODUCTS THAT MEET THE FOLLOWING CRITERIA
- 44.1. MANUFACTURER SHALL BE AS SHOWN ON DRAWINGS OR EQUAL.
- 44.2. FABRICATE AND TEST PANELBOARDS ACCORDING TO IEEE 344 TO WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS."
- 44.3. ENCLOSURES: SURFACE MOUNTED CABINETS. NEMA PB 1, TYPE 1.
  - 44.3.1. RATED FOR ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.
  - 44.3.2. OUTDOOR LOCATIONS: NEMA 250, TYPE 4X STAINLESS.
  - 44.3.3. OTHER WET OR DAMP INDOOR LOCATIONS: NEMA 250, TYPE 4X.
  - 44.3.4. FRONT: SECURED TO BOX WITH CONCEALED TRIM CLAMPS. FOR SURFACE-MOUNTED FRONTS, MATCH BOX DIMENSIONS; FOR FLUSH-MOUNTED FRONTS, OVERLAP BOX.
  - 44.3.5. FINISH: MANUFACTURER'S STANDARD ENAMEL FINISH OVER CORROSION-RESISTANT TREATMENT OR PRIMER COAT.
  - 44.3.6. DIRECTORY CARD: WITH TRANSPARENT PROTECTIVE COVER, MOUNTED IN METAL FRAME, INSIDE PANELBOARD DOOR
- 44.4. PHASE AND GROUND BUSES:
  - 44.4.1. MATERIAL: HARD-DRAWN COPPER, 98 PERCENT CONDUCTIVITY.
  - 44.4.2. EQUIPMENT GROUND BUS: ADEQUATE FOR FEEDER AND BRANCH-CIRCUIT EQUIPMENT GROUND CONDUCTORS; BONDED TO BOX.
- 44.5. CONDUCTOR CONNECTORS: SUITABLE FOR USE WITH CONDUCTOR MATERIAL.
  - 44.5.1. LUGS: MECHANICAL TYPE.
- 44.6. SERVICE EQUIPMENT LABEL: UL LABELED FOR USE AS SERVICE EQUIPMENT FOR PANELBOARDS WITH MAIN SERVICE DISCONNECT SWITCHES.
- 44.7. UL LABEL INDICATING SERIES-CONNECTED RATING WITH INTEGRAL OR REMOTE UPSTREAM OVERCURRENT PROTECTIVE DEVICES. INCLUDE SIZE AND TYPE OF UPSTREAM DEVICE ALLOWABLE, BRANCH DEVICES ALLOWABLE, AND UL SERIES-CONNECTED SHORT-CIRCUIT RATING.

45. CONTRACTOR SHALL PROVIDE OVERCURRENT PROTECTIVE DEVICES THAT MEET THE FOLLOWING CRITERIA:

- 45.1. MOLDED-CASE CIRCUIT BREAKER: PROVIDE BREAKERS FROM PANELBOARD MANUFACTURER. UL 489, WITH SERIES-CONNECTED RATING TO MEET AVAILABLE FAULT CURRENTS
- 45.2. THERMAL-MAGNETIC CIRCUIT BREAKERS: INVERSE TIME-CURRENT ELEMENT FOR LOW-LEVEL OVERLOADS, AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS. ADJUSTABLE MAGNETIC TRIP SETTING FOR CIRCUIT-BREAKER FRAME SIZES 250 A AND LARGER
- 45.3. ADJUSTABLE INSTANTANEOUS-TRIP CIRCUIT BREAKERS: MAGNETIC TRIP ELEMENT WITH FRONT-MOUNTED, FIELD-ADJUSTABLE TRIP SETTING.
- 45.4. ELECTRONIC TRIP-UNIT CIRCUIT BREAKERS SHALL HAVE RMS SENSING; FIELD-REPLACEABLE RATING PLUG; AND WITH THE FOLLOWING FIELD-ADJUSTABLE SETTINGS:
  - 45.4.1. INSTANTANEOUS TRIP.
  - 45.4.2. LONG- AND SHORT-TIME PICKUP LEVELS.
  - 45.4.3. LONG- AND SHORT-TIME TIME ADJUSTMENTS.
  - 45.4.4. GROUND-FAULT PICKUP LEVEL, TIME DELAY, AND I2/T RESPONSE.
- 45.5. GFCI CIRCUIT BREAKERS: SINGLE- AND TWO-POLE CONFIGURATIONS WITH 5-MA WHERE INSTALLED PROTECTION OF GENERAL USE RECEPTACLES. WHERE REQUIRED, 30-MA TRIP SENSITIVITY FOR CIRCUITS INSTALLED TO SUPPLY SPECIFIC EQUIPMENT.

REQUIRED SAFETY SIGNS AND LABELS

1. THE MARKING SHALL ADEQUATELY WARN OF THE HAZARD USING EFFECTIVE WORDS AND/OR COLORS AND/OR SYMBOLS PER NEC 110.21.

2. THE LABEL SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN PER NEC 110.21.

3. THE LABEL SHALL BE OF SUFFICIENT DURABILITY ABLE TO WITHSTAND THE ENVIRONMENT INSTALLED IN PER NEC 110.21.

4. LABELS AND MARKINGS SHALL BE APPLIED TO THE APPROPRIATE COMPONENTS IN ACCORDANCE WITH THE NEC.

5. PV MODULES AND INVERTERS ARE TO BE SUPPLIED FROM THE MANUFACTURER WITH PRE-APPLIED MARKINGS TO MEET THE REQUIREMENTS OF NEC 690.51 & 690.41(B)(1).

6. UNLESS OTHERWISE SPECIFIED ON THE LABELING SHEET, OSHA 1910.145 AND ANSI Z535 RECOMMENDED SPECIFICATIONS ARE AS FOLLOWS:
- 6.1. ROUNDED OR BLUNT CORNERS FREE OF SHARP EDGES.
- 6.2. VISIBLE AT A MINIMUM DISTANCE OF 5FT. OR GREATER.
- 6.3. "DANGER" HEADER; RED BACKGROUND WITH WHITE LETTERING.
- 6.4. "WARNING" HEADER; ORANGE BACKGROUND WITH BLACK LETTERING.
- 6.5. "CAUTION" HEADER; YELLOW BACKGROUND WITH BLACK LETTERING.
- 6.6. "NOTICE" LABEL HEADER TO BE IN BLUE WITH WHITE LETTERING.
- 6.7. OTHER TEXT TO BE BLACK ON A WHITE BACKGROUND.

7. ALL RELEVANT COMPONENTS OF THE PHOTOVOLTAIC SYSTEM SHALL BE CLEARLY MARKED AND LABELED IN ACCORDANCE WITH NEC ARTICLE 690.

NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN

DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

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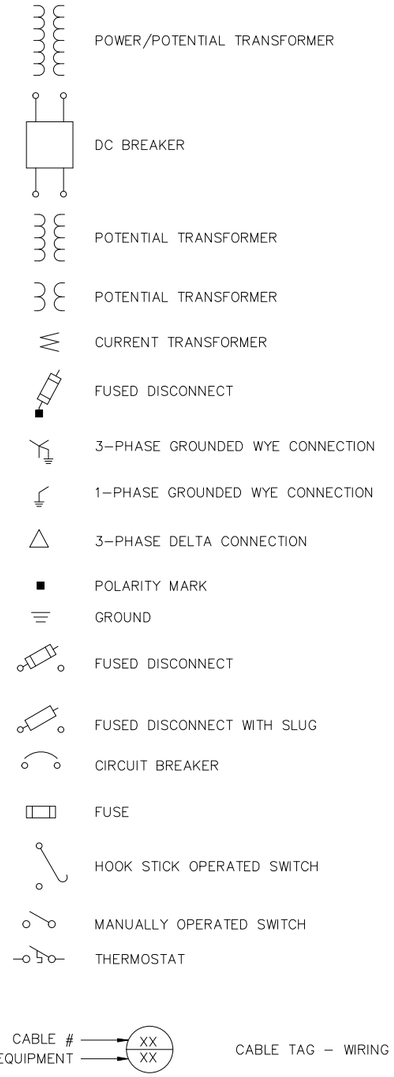
STANDARD BLOCKS – ELECTRICAL



STANDARD ABBREVIATIONS – ELECTRICAL

A	AMPERE
ACB	AIR CIRCUIT BREAKER
AB	AIR BREAK
ABV	ABOVE
AC	ALTERNATING CURRENT
ADJ	ADJUSTABLE
ADJT	ADJACENT
ALT	ALTERNATE
AL	ALUMINUM
APPRX	APPROXIMATE
B	BUS
BF	BREAKER FAIL
BFI	BREAKER FAIL INITIATE
BKR	BREAKER
BLDG	BUILDING
BLK	BLOCK
BOT	BOTTOM
BTU	BRITISH THERMAL UNIT
BTWN	BETWEEN
BU	BACKUP
C	COLOUMB
CAP	CAPACITOR OR CAPACITANCE
CAP	CORRUGATED ALUMINUM PIPE
CB	CENTER BREAK
CBL	CABLE
CEM	CEMENT
CF	CUBIC FOOT
CHK	CHECK
CI	CAST IRON
CIP	CAST IRON PIPE
CIPC	CAST–IN–PLACE CONCRETE
CIR	CIRCLE
CKT	CIRCUIT
CLK	CLOCK
CLS	CLOSE
CMIL	CIRCULAR MIL
CMP	CORRUGATED METAL PIPE
COS	COSINE
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CS	
CSP	CORRUGATED STEEL PIPE
CT	CURRENT TRANSFORMER
CTRL	CONTROLSWITCHER OR CONTROL SWITCH
CTS	CLEAR TO SEND
CU	COPPER
DC	DIRECT CURRENT
DCD	DATA CARRIER DETECT
DCE	DATA COMMUNICATIONS EQUIPMENT
DDE	DOUBLE DEAD END
DE	DEAD END
DEM	DEMOLISH, DEMOLITION
DEMOB	DEMOBILIZE
DET	DETAIL
DFR	DISTURBANCE FAULT RECORDER
DI	DIGITAL INPUT
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIST	DISTRIBUTION
DNP	DISTRIBUTED NETWORK PROTOCOL
DO	DIGITAL OUTPUT
DSSS	D STREET SUBSTATION
DTE	DATA TERMINAL EQUIPMENT
DWG	DRAWING
EA	EACH
EIA	ELECTRONICS INDUSTRY ASSOCIATION
EJ	EXPANSION JOINT
EL	ELECTRICAL
ELEV	ELEVATION
ENCL	ENCLOSURE
EQ	EQUAL
EQUIP	EQUIPMENT
EST	ESTIMATE
EXIST	EXISTING
F	FARAD
F	FUSE
FREQ	FREQUENCY
FT	FEET
FT	FEED THROUGH
FUT	FUTURE
G	CONDUCTANCE OR GROUND
GA	GAUGE
GALV	GALVANIZED
GB	GROUND BUS
GCB	GAS CIRCUIT BREAKER
GEN	GENERATOR
GI	GALVANIZED IRON
GND	GROUND
GOAB	GANG OPERATED AIR–BREAK SWITCH
GRC	GALVANIZED RIGID CONDUIT
GRD	GRADE, GRADING
GRSC	GALVANIZED RIGID STEEL CONDUIT
H	HENERY
HDPE	HIGH–DENSITY POLYETHYLENE
HLO	HOT LINE ORDER
HORIZ	HORIZONTAL
HP	HORSEPOWER
HZ	HERTZ
IA	PHASE A CURRENT
IB	PHASE B CURRENT
IC	PHASE C CURRENT
ID	INSIDE DIAMETER
IN	INPUT
IN	INCH
IN	NEUTRAL CURRENT
INCL	INCLUDE(D), INCLUDING
IND	INDUSTRY
INT	INTERSECTION
INV	INVERT
IP	POLARIZING CURRENT
j	COMPLEX NUMBER
J	JOULE
JB	JUNCTION BOX
KA	KILOAMPRERE
KV	KILOVOLT
KW	KILOWATT
L	INDUCTANCE
L	LINE
L	LOAD
LB	LOAD BREAK
LGPP	LANDFILL GAS POWER PLANT
LT	LIGHT
M	METER(S)
MAT	MATERIAL
MAX	MAXIMUM
MFG	MANUFACTURER
MI	MILE
MIN	MINIMUM
MISC	MISCELLANEOUS
MM	MILLIMETER(S)
MO	MOTOR OPERATED (OR)
MOB	MOBILIZE
MTR	METER
MW	MEGAWATT
N	NEUTRAL
N	NEWTON
N	NORTH
NC	NORMALLY CLOSED
NCC	NORMALLY CLOSED CONTACT
N/C	NO CONNECTION
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOC	NORMALLY OPEN CONTACT
NS	SYNCHRONIZING NEUTRAL
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
OUT	OUTPUT
P	REAL POWER OR PRIMARY
PB	PUSH BUTTON
PF	POWER FACTOR
PLC	PROGRAMMABLE LOGIC CONTROLLER
PM	PAD–MOUNT TRANSFORMER
PSSS	PROVIDER SWITCHYARD
PT	POINT
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER
Q	REACTIVE POWER
R	RESISTANCE OR RESISTOR
RCLS	RECLOSE
RAD	RADIUS
RAD	RADIAN
RD	ROAD
RE	REMOTE END
REF	REFERENCE
REQD	REQUIRED
RET	REMOTE END TRIP
RET	RETURN
REV	REVISION
RLY	RELAY
RR	RAILROAD
ROW	RIGHT OF WAY
RTS	READY TO SEND
RTU	REMOTE TERMINAL UNIT
RX	RECEIVE
S	APPARENT POWER
S	SOUTH
S	SOURCE
S–L	SOURCE–LOAD
SA	SURGE ARRESTOR
SC	SWITCH CABINET
SEC	SECTION
SEC	SECONDARY
SVC	SERVICE
SVC	STATIC VAR COMPENSATOR
SHT	SHEET
SIM	SIMILAR
SIN	SINE
SPEC	SPECIFICATION
SPECS	SPECIFICATIONS
SPSS	SPARTAN SUBSTATION
SS	SYNCHRONIZING SWITCH
STA	STATION
STD	STANDARD
SW	SWITCH
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
SYNCH	SYNCHRONIZE
T	TIME OR TRANSFORMER
TAN	TANGENT
TCM	TRIP COIL MONITOR
TEL	TELEPHONE
TERM	TERMINAL
TEMP	TEMPORARY
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
TRP	TRIP
TURB	TURBINE
TX	TRANSMIT
TYP	TYPICAL
UG	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
V	VOLT
VA	VOLTAMPERE
VA	PHASE A VOLTAGE
VAR	REACTIVE POWER
VB	PHASE B VOLTAGE
VAC	ALTERNATING CURRENT VOLTAGE
VC	PHASE C VOLTAGE
VCB	VACUUM CIRCUIT BREAKER
VDC	DIRECT CURRENT VOLTAGE
VERT	VERTICAL
VIF	VERIFY IN FIELD
VN	NEUTRAL VOLTAGE
VR	VOLTAGE REGULATOR
VREG	VOLTAGE REGULATOR
VS	SYNCHRONIZING VOLTAGE
VT	VOLTAGE TRANSFORMER
W	WEST
W	WATT
W/	WITH
W/O	WITHOUT
X	REACTANCE
XFMR	TRANSFORMER
XMSSN	TRANSMISSION
Y	ADMITTANCE
YL	YELLOW
Z	IMPEDANCE
2	TIME–DELAY
21	DISTANCE
25	SYNCHRONISM CHECK
27	UNDERVOLTAGE
30	ANNUNCIATOR
32	DIRECTIONAL POWER
37	UNDERCURRENT OR UNDERPOWER
38	BEARING
40	FIELD
43	MANUAL TRANSFER OR SELECTOR DEVICE
46	REVERSE–PHASE
47	PHASE–SEQUENCE VOLTAGE
49	MACHINE OR TRANSFORMER THERMAL RELAY
50	INSTANTANEOUS OVERCURRENT
51	AC TIME OVERCURRENT
52	AC CIRCUIT BREAKER
52a	NORMALLY OPEN BREAKER CONTACT
52b	NORMALLY CLOSED BREAKER CONTACT
59	OVERVOLTAGE
60	VOLTAGE BALANCE
63	PRESSURE SWITCH
64	APPARATUS GROUND
67	AC DIRECTIONAL OVERCURRENT
68	BLOCKING
69	PERMISSIVE
71	LEVEL SWITCH
74	ALARM
76	DC OVERCURRENT
78	OUT–OF–STEP
79	RECLOSING RELAY
81	FREQUENCY
85	CARRIER OR PILOT WIRE
86	LOCK OUT
87	DIFFERENTIAL
94	TRIPPING

NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	TJT/05-05-2025	JRV/05-05-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

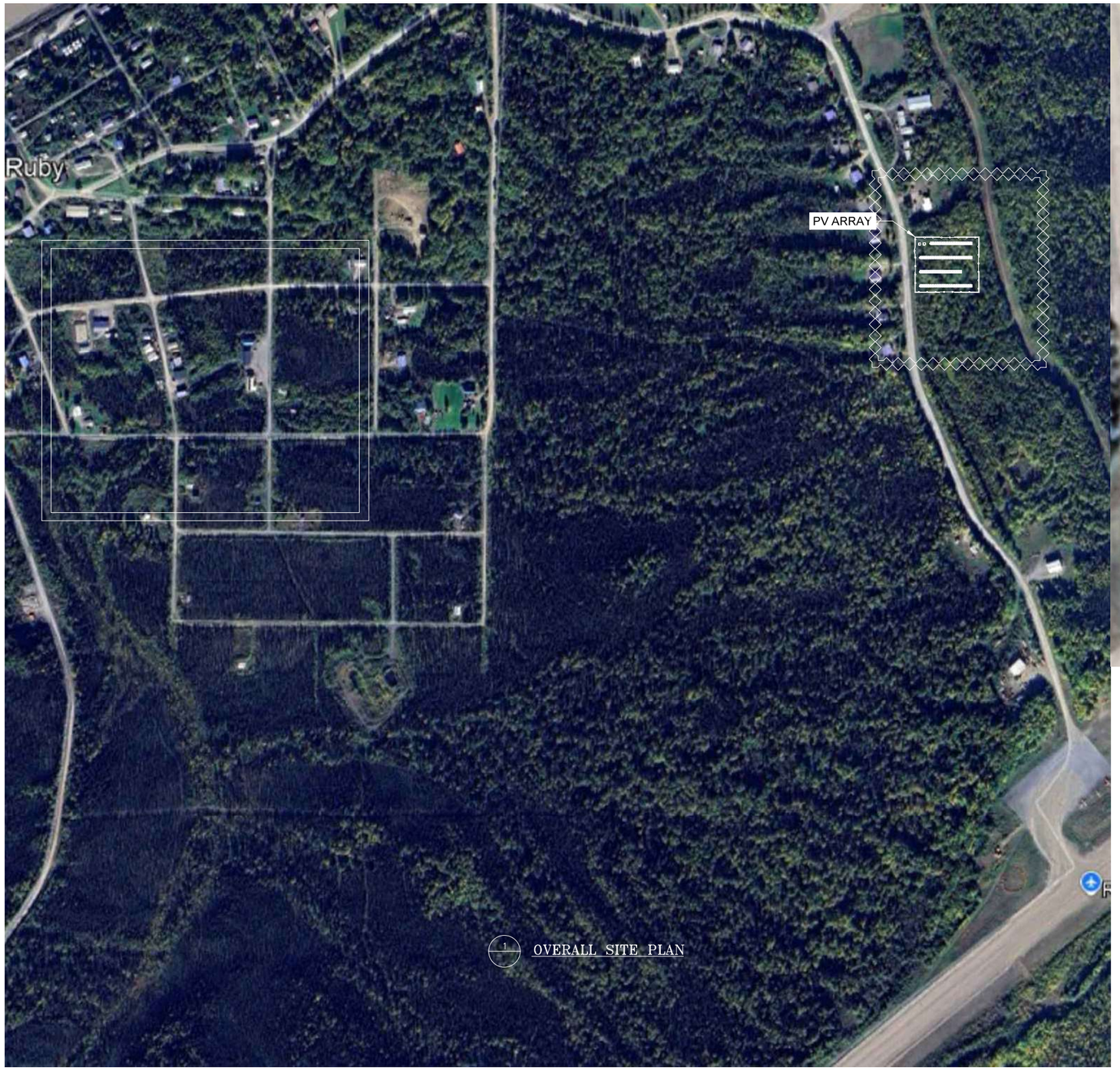
DRAWING NAME:
TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
GENERAL INFORMATION AND SPECIFICATIONS

ryre-el-0000_2.dwg

REF DWG(S):

DRAWING NO.: RYRE-EL-0000

SHEET 2 OF 2



1 OVERALL SITE PLAN

2 PV LAYOUT SITE PLAN

NOT FOR CONSTRUCTION

SEE REFERENCE 1 FOR FURTHER DETAILS

SEE REFERENCE 2 FOR FURTHER DETAILS

~~SEE REFERENCE 3 FOR FURTHER DETAILS~~

SHEET NOTES

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE LOCATIONS OF EXISTING PROPERTY LINES AND CORNERS PRIOR TO CONSTRUCTION.
2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE ALL UNDERGROUND UTILITIES MARKED PRIOR TO CONSTRUCTION.
3. ALL DIMENSIONS ARE FOR REFERENCE ONLY. PLEASE REFER TO MANUFACTURERS DRAWINGS TO CONFIRM ALL DIMENSIONS.

BESS DRAWINGS NOT INLCUDED IN THIS DRAWING SET

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	RYRE-EL-2500/2	PV ARRAY LAYOUT DIAGRAM
2	RYRE-SS-2000/2	WIREWAY DETAILS
~~3~~	~~RYRE-EL-2500/3~~	~~BESS LAYOUT~~

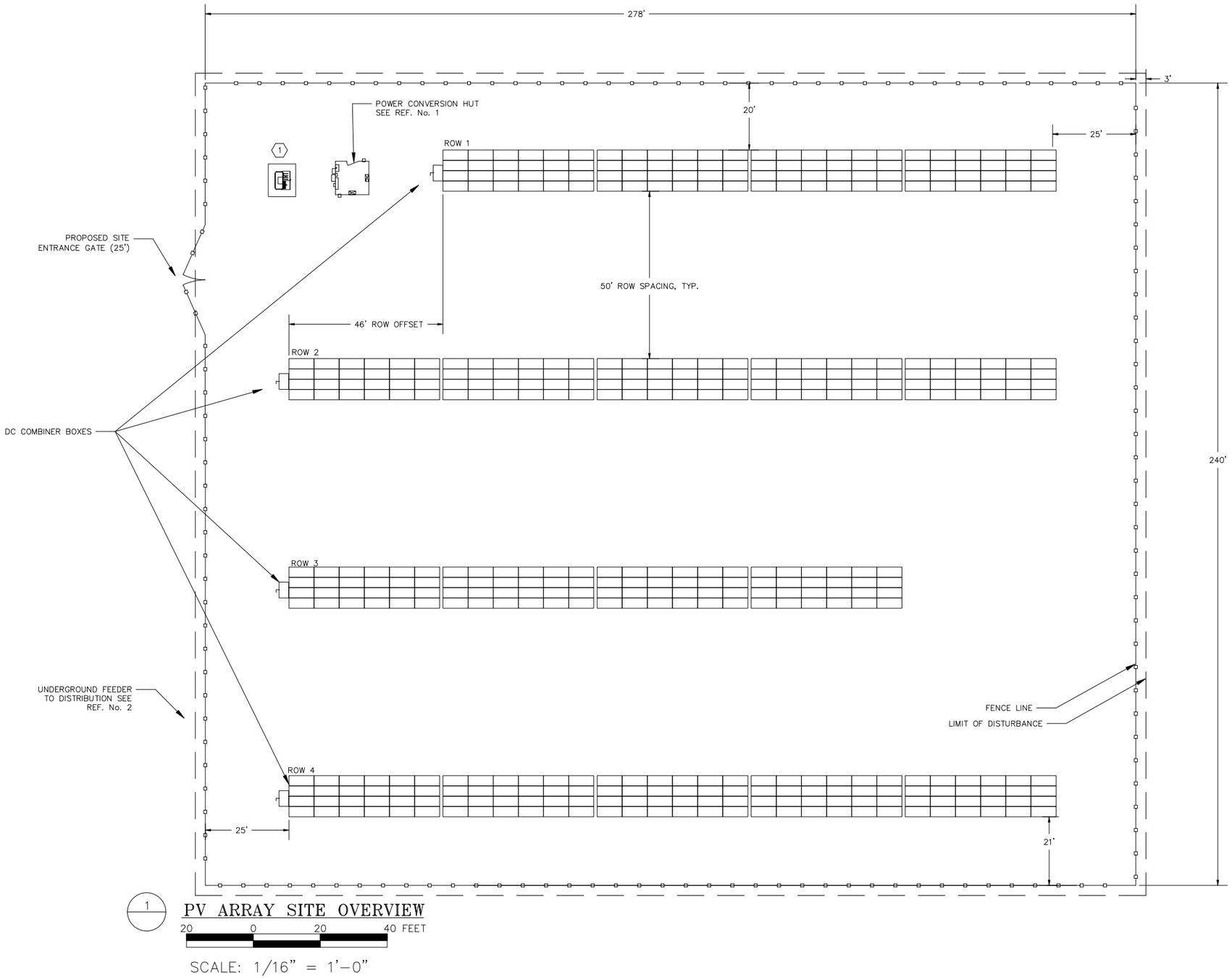
DRAWING NAME:
TANANA CHIEFS CONFERENCE RUBY RENEWABLE ENERGY SITE LAYOUT DIAGRAM

ryre-el-2500_1.dwg

REF DWG(S):

DRAWING NO.: RYRE-EL-2500

SHEET 1 OF 6



1 PV ARRAY SITE OVERVIEW

20 0 20 40 FEET

SCALE: 1/16" = 1'-0"

System Summary

Physical Arrangement	
Methodology	Fixed Tilt, Ground Mount
Tilt	35°
Azimuth	180°
Racking System / Model	Nuance Osprey PowerRACK LTE 4x6x4
Electrical Arrangement	
Watts per Module	595W
24 Module Strings (#)	18
Quantity of Modules	432
Total DC System Size	257,040W
Inverter Arrangement	
Manufacturer	SMA
Model	Sunny Highpower PEAK3 125-US
Inverter Size	125kW
Quantity of Inverters	2
Strings per Inverter	9
PV Modules	
Manufacturer	SEG Solar
Model	SEG-595-BTA-BG
Peak Power	595W
Quantity of Modules	432

LEGEND	
	DC COMBINER BOXES (4)
- - - - - - - - -	LIMIT OF DISTURBANCE (LOD)
	FENCE LINE
	PV ARRAY

NOT FOR CONSTRUCTION

NOTES:

1. INSTALL PV STEP-UP TRANSFORMER AT LEAST 10' FROM FENCELINE, AS MEASURED BY THE FURTHEST EXTENT OF THE CONCRETE PAD.

PROJECT: RUBY RENEWABLE ENERGY DESIGN

DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	RYRE-EL-2500/5	POWER CONVERSION HUT LAYOUT DIAGRAM
2	RYRE-EL-2000/2	WIREWAY DETAILS

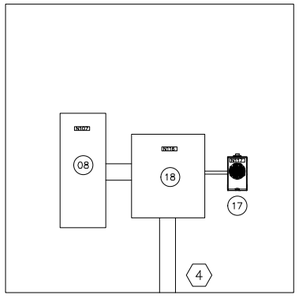
DRAWING NAME: TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
PV ARRAY LAYOUT DIAGRAM

ryre-el-2500_2.dwg

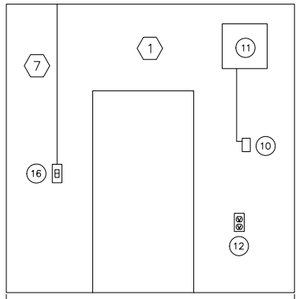
REF DWG(S):

DRAWING NO.: RYRE-EL-2500

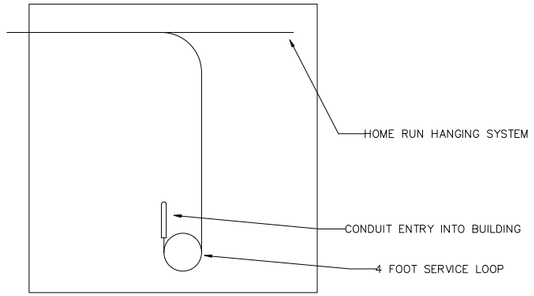
SHEET 2 OF 6



PCH (WEST OUTSIDE)



PCH (NORTH INSIDE)



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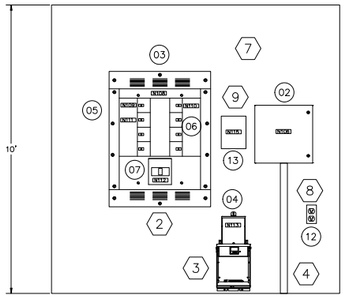
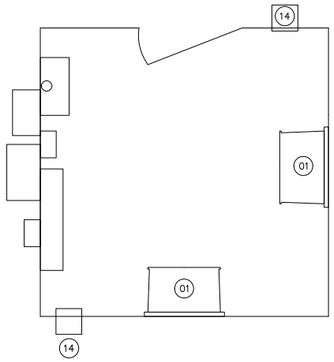
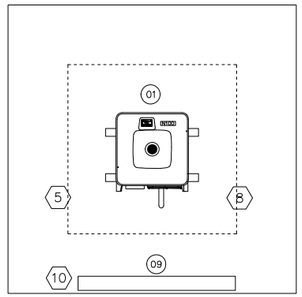
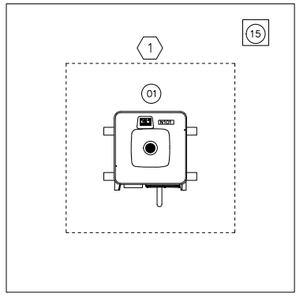


PCH (WEST INSIDE)

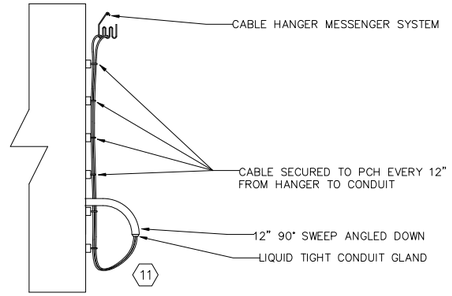




PCH (EAST INSIDE)



PCH (SOUTH INSIDE)



HOME-RUN ENTRY

BUILDING MANUFACTURER TO PROVIDE PRE-FABRICATED METAL BUILDING PER FOLLOWING SPECIFICATIONS:

STRUCTURAL:
- -ROOF PITCH: 3:12
- -ROOF DEAD LOAD 30PSF MINIMUM
- -MAX WALL LOAD: 220LBS (INVERTER)
- -MAX FLOOR LOAD: 210LBS (STATION SERVICE SUBSTATION)

INSULATION:
- -WALL INSULATION: R22 MINIMUM
- -CEILING INSULATION: R30 MINIMUM

ALL INTERIOR CONDUITS SHALL BE GALVANIZED RIGID CONDUIT (GRC) OR ELECTRICAL METALLIC TUBING (EMT). EXTERIOR CONDUIT SHALL BE RIGID GALVANIZED CONDUIT ONLY. EMT TYPE COUPLERS AND FITTINGS SHALL BE RAIN-TIGHT COMPRESSION TYPE. GROUNDING BUSHINGS SHALL BE INSTALLED AT THE SOURCE END OF THE EMT CONDUIT RUNS FROM THE AC PANEL.

NOT FOR CONSTRUCTION

BILL OF MATERIAL (6)

REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	EA	2	SUNNY HIGHPOWER PEAK3-125KW	SMA/SHP 125-US-21
02	EA	1	COMMUNICATION PANEL	SEE REF. 1
03	EA	1	POWER DISTRIBUTION PANELBOARD	SQUARED/HCJ23734M
04	EA	1	STATION SERVICE SUBSTATION, 10kVA	HAMMOND/M1PC010LESF
05	EA	2	200A CIRCUIT BREAKER	
06	EA	1	30A/2P CIRCUIT BREAKER	
07	EA	1	400A MAIN CIRCUIT BREAKER	
08	EA	1	400A LOAD BREAK DISCONNECT W/PROVISIONS FOR PADLOCK	
09	EA	1	ELECTRIC BASEBOARD HEATER, 1000W, 120VAC W/ BUILD-IN THERMOSTAT	
10	EA	1	ADJUSTABLE THERMOSTAT	
11	EA	1	WALL MOUNT SHUTTER FAN, >2500CFM, 120VAC W/ DAMPER MOTOR CONTROLLED BY THERMOSTAT	
12	EA	2	GFCI RECEPTACLE	
13	EA	1	SHARK 250 SELF-ENCLOSED METER ASSEMBLY	ELECTRO INDUSTRIES /ENCSHK250-277-60-10-V3-D2-INP100S-X
14	EA	2	90° VENTILATION HOOD WITH INSECT SCREEN	
15	EA	1	10" MOTORIZED INTAKE DAMPER	
16	EA	1	LIGHT SWTICH	
17	EA	1	600V 20A METER SOCKET W/SELF -SHUNTING BYPASS	MILBANK/UC7237-XL
18	EA	1	400A CT ENCLOSURE	

NOTES:

1. MOUNT SMA SHP-125-US INVERTERS SUCH THAT THEY ARE 4" AWAY FROM THE WALL, AND 20" ON ALL OTHER SIDES FROM WALLS, FLOORS, CEILINGS, AND OTHER DEVICES. MAINTAIN 4' WORKING CLEARANCE ZONE IN FRONT OF INVERTERS, PER NEC. PROVIDE A 4" X 4" WIREWAY (MINIMUM) BETWEEN INVERTERS AND PANELBOARD
2. MOUNT POWER DISTRIBUTION PANELBOARD SUCH THAT MANUFACTURER RECOMMENDED CLEARANCE DISTANCES BETWEEN THE PANELBOARD AND WALLS, FLOORS, CEILINGS, AND OTHER DEVICES IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE IN FRONT OF THE PANELBOARD, PER NEC
3. MOUNT STATION SERVICE SUBSTATION SUCH THAT ALL MANUFACTURER RECOMMENDED CLEARANCE ZONES AWAY FROM EQUIPMENT IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE ZONE IN FRONT OF THE DEVICE, PER NEC
4. ROUTE CONDUITS SUCH THAT THE STUB-UP AREA IS DIRECTLY UNDER ALL DESTINATION DEVICES IN THE POWER CONVERSION HUT
5. PROVIDE CEILING MOUNTED LIGHTING SUCH THAT 30 FOOTCANDLES IS MAINTAINED. MOUNT LIGHT SWITCH NEXT TO DOOR AT LEAST 40" FROM FLOOR.
6. ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN CAN BE CONTRACTOR DETERMINED, PROVIDED THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.
7. VENTILATION FOR THE ENCLOSURE SHALL BE PROVIDED BY A WEATHERPROOF 120VAC EXHAUST FAN WITH A MINIMUM FLOW RATE OF 2500CRFM, CONTROLLED BY AN ADJUSTABLE THERMOSTAT FOR FAN OPERATION OF INTERIOR AIR TEMPERATURES OF 35°C AND ABOVE, AND BY A 10" MOTORIZED INTAKE DAMPER. EXHAUST SHALL BE PROVIDED WITH A 90° EXTERIOR HOOD WITH A 900° EXTERIOR HOOD WITH INSECT SCREENS TO PREVENT INTRUSIONS OF WIND DRIVEN RAIN/SNOW.
8. MOUNT RECEPTACLES ON INSIDE WALLS OF PCH AT LEAST 18" FROM FLOOR. MOUNT ONE RECEPTACLE ON SOUTH SIDE OF DOOR (EAST WALL), AND ONE RECEPTACLE NEXT TO POWER DISTRIBUTION PANELBOARD (WEST WALL).
9. CONNECT SHARK 250 CURRENT TRANSFORMERS AND POTENTIAL TRANSFORMERS TO THE 400A OUTPUT BREAKER AT POWER DISTRIBUTION PANELBOARD THROUGH A 1" CONDUIT.
10. HEATING TO BE PROVIDED BY ELECTRIC BASEBOARD HEATER WITH BUILT-IN THERMOSTAT. HEATER TO TURN ON BELOW 10°F.
11. HOME-RUN CABLES TO ENTER INTO PCH VIA CONDUIT SWEEP ANGLED DOWN. MIN CONDUIT RADIUS TO BE 8 X THE DIAMETER OF THE LARGEST CABLE. SUPPORT CABLES EVERY 12"AS MEASURED BY THE CABLES PATH FROM HANGER, TO CONDUIT WITH UV RESISTANT, OUTDOOR RATED CABLE TIES. ADD IN A 4FT SERVICE LOOP BEFORE ENTERING INTO THE CONDUIT. EXACT HEIGHT AND PLACEMENT OF CONDUIT TO BE DETERMINED BY CONTRACTOR ON-SITE.

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

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ENG. STAMP

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Consulting Engineers
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WEB: WWW.EPSINC.COM

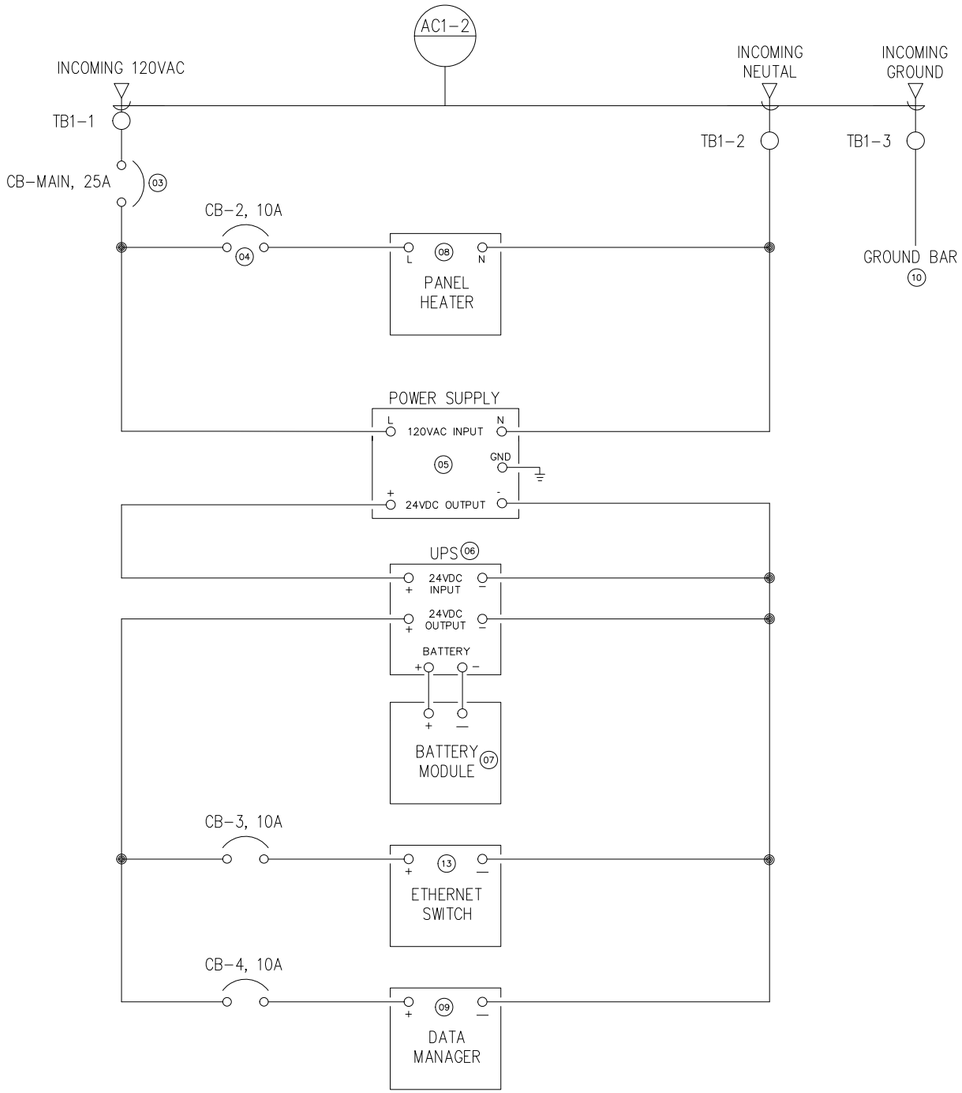
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	RYRE-EL-2500/6	COMMUNICATIONS PANEL DETAILS
2	RYRE-SS-2000/7	EQUIPMENT NAMEPLATE SCHEDULE

DRAWING NAME:
TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
POWER CONVERSION HUT LAYOUT

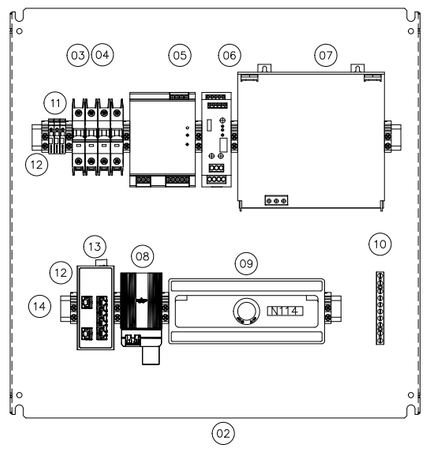
ryre-el-2500_5.dwg

REF DWG(S):

DRAWING NO.: RYRE-EL-2500



1 ONE-LINE DIAGRAM



2 PANEL ELEVATION – INSIDE

1:4 – 1" = 4"

1

BILL OF MATERIAL

REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	EA	2	24" X 24" X 10" NEMA 1 MILD STEEL WALL MOUNTED ENCLOSURE	
02	EA	1	INNER PANEL FOR 24X24X10 ENCLOSURE	
2 03	EA	1	25A, 600V UL489 1-POLE BREAKER	
04	EA	3	10A, 600V UL489 1-POLE BREAKER	
05	EA	1	PHOENIX CONTACT 120VAC/24VDC PS, 20 AMP	PHOENIX CONTACT/ 2866776
06	EA	1	PHOENIX CONTACT 20 AMP UPS	PHOENIX CONTACT/ 2320238
07	EA	1	PHOENIX CONTACT 12 Ah BATTERY	PHOENIX CONTACT/ 1274119
08	EA	1	150W PANEL HEATER W/BUILT IN REGULATION ON: 41°F – OFF: 59	STEGO/06021.0-00
09	EA	1	DATA MANAGER	SMA/EDMM-20
10	EA	1	UL467 GROUND BAR, 6 POLE MINIMUM	
11	EA	3	6MM DINRAIL MOUNTED TERMINAL BLOCK	
12	EA	10	6MM DINRAIL MOUNTED TERMINAL BLOCK END STOP	
13	EA	1	UNMANAGED ETHERNET SWITCH, 2 FIBER PORTS	MOXA/EDS-G308-2SPF
14	EA	1	35MM DIN MOUNTING RAIL	

NOTES:

1 ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN CAN BE CONTRACTOR DETERMINED, PROVIDED THAT THE CONTRACTOR DETERMINED PRODUCT MATCHES THE PRODUCT DESCRIPTION IN THE CENTER COLUMN, AND THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.

2 PROVIDE 1 SPARE CIRCUIT BREAKER FOR EACH SIZE (REF. NO. 3, AND RE. NO. 4) AND STORE IN BOTTOM OF ENCLOSURE

3 PANEL BOM

NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	RYRE-SS-2000/7	EQUIPMENT NAMEPLATE SCHEDULE

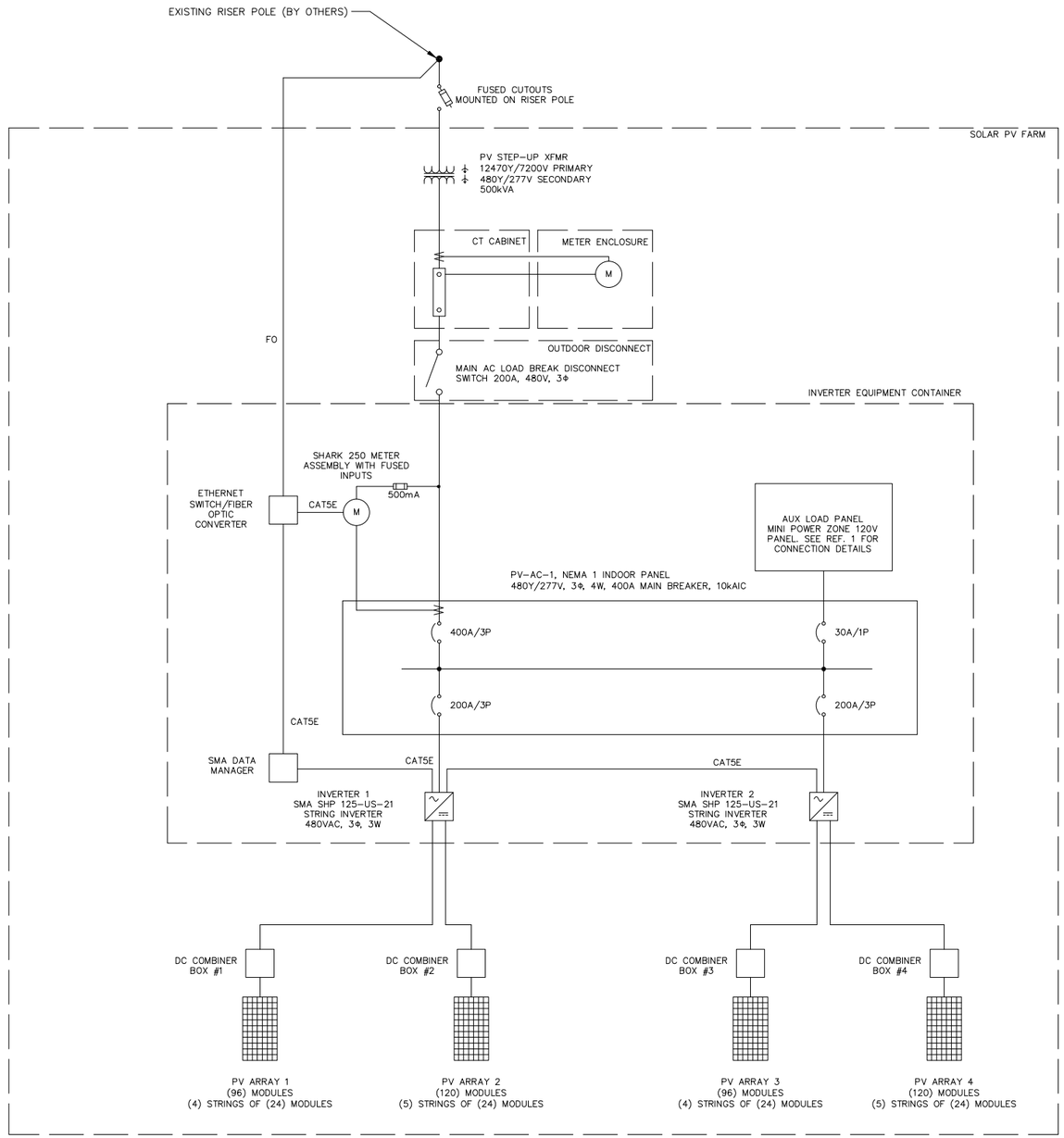
DRAWING NAME: TANANA CHIEFS CONFERENCE RUBY RENEWABLE ENERGY COMMUNICATIONS PANEL DETAILS

ryre-el-2500_6.dwg

REF DWG(S):

DRAWING NO.: RYRE-EL-2500

SHEET 6 OF 6



NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

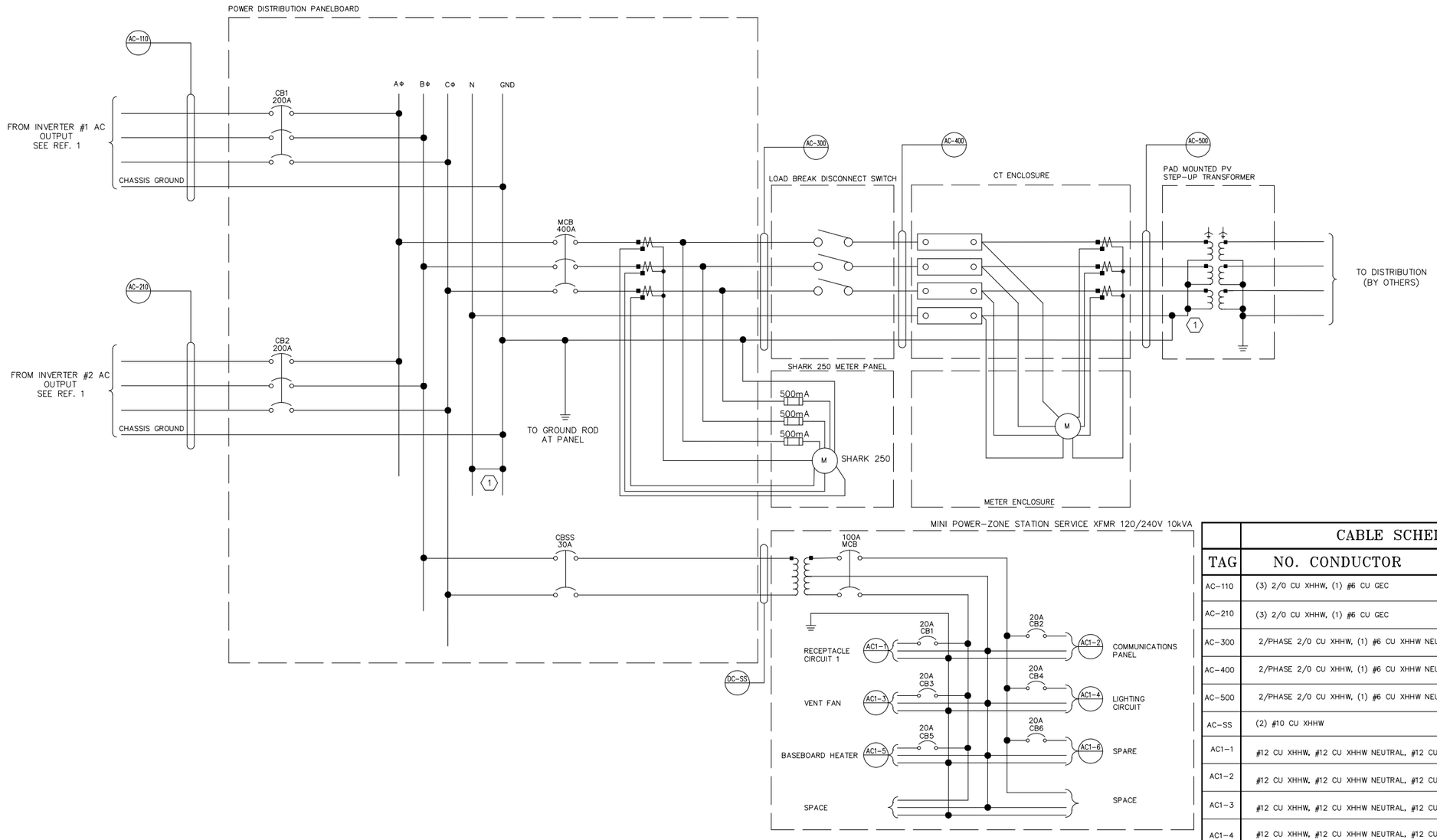
DRAWING NAME:
TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
SITE ONELINE DIAGRAM

ryre-el-0010_1.dwg

REF DWG(S):

DRAWING NO.: RYRE-EL-0010

SHEET 1 OF 1



	CABLE SCHEDULE	
TAG	NO. CONDUCTOR	RACEWAY
AC-110	(3) 2/0 CU XHHW, (1) #6 CU GEC	C-0111
AC-210	(3) 2/0 CU XHHW, (1) #6 CU GEC	C-0112
AC-300	2/PHASE 2/0 CU XHHW, (1) #6 CU XHHW NEUTRAL, (1) #6 CU GEC	C-11 C-12 C-13
AC-400	2/PHASE 2/0 CU XHHW, (1) #6 CU XHHW NEUTRAL, (1) #6 CU GEC	C-21 C-22 C-23
AC-500	2/PHASE 2/0 CU XHHW, (1) #6 CU XHHW NEUTRAL, (1) #6 CU GEC	C-31 C-32 C-33
AC-SS	(2) #10 CU XHHW	1/2" EMT
AC1-1	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-2	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-3	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-4	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-5	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT

NOTE:
- LOW VOLTAGE AC CONDUCTOR SIZING BASED ON A TEMPERATURE RATING OF 75°C.
- MEDIUM VOLTAGE AC CABLES BASED ON A TEMPERATURE RATING OF 105°C.
- USE OF CABLE LARGER THAN SPECIFIED IN THE CABLE SCHEDULE IS ALLOWED, PROVIDED THAT THE TEMPERATURE RATING OF THE CONDUCTOR IS MAINTAINED.
- IF LARGER-THAN-SPECIFIED CABLE IS USED, CONFIRM THAT THE CONDUIT SIZE IN THE ASSOCIATED RACEWAY MAINTAINS A MAXIMUM 40% FILL RATIO
- SEE REF. 2 FOR CONDUIT SCHEDULE

NOTES:

(1) LIFT XO BUSHING BOND JUMPER AND ISOLATE ALL XO CONNECTIONS FROM ANY GROUNDING AT THE UTILITY SERVICE POLE. INSTALL N-G BOND JUMPER ONLY IN THE POWER DISTRIBUTION PANELBOARD TO GROUND SECONDARY OF TRANSFORMER AT PCH.

NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	RYRE-EL-0011/1	PV ARAY DC WRING DIAGRAM
2	RYRE-SS-2000/2	WIREWAY DETAILS

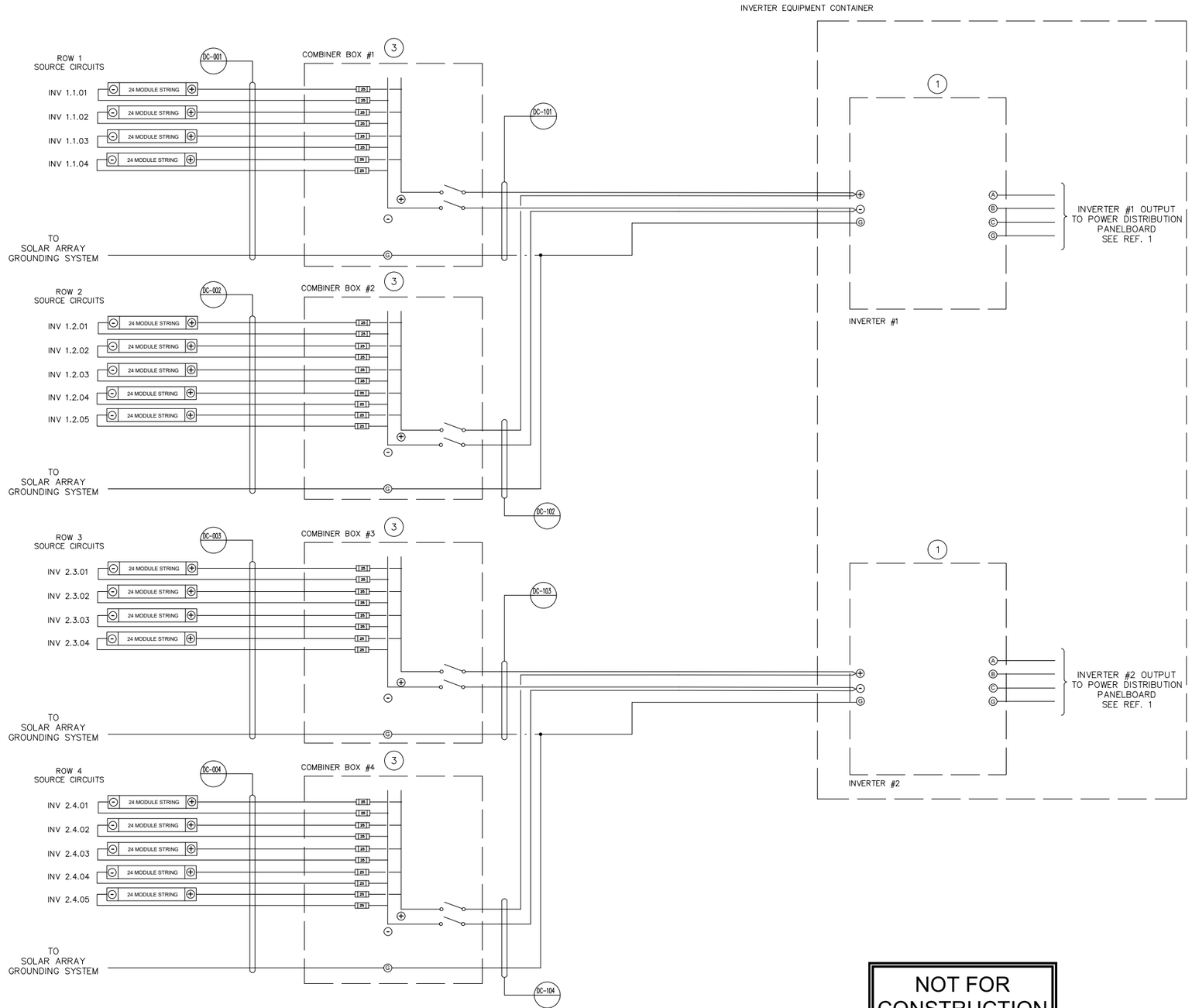
DRAWING NAME:
TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
SITE THREELINE DIAGRAM

ryre-el-0100_1.dwg

REF DWG(S):

DRAWING NO.: RYRE-EL-0100

SHEET 1 OF 1



LEGEND

INV X.X.XX

DESTINATION INVERTER NO.
DESTINATION COMBINER NO.
SOURCE CIRCUIT NUMBER

EQUIPMENT SCHEDULE		
TAG	QUANTITY	DESCRIPTION
1	2	PV INVERTER; SMA SUNNY HIGHPOWER PEAK3 125-US
2	4	10 INPUT DC COMBINER; TERRASMART FSFT275-10-N4-CD OR EQUIVALENT

CABLE SCHEDULE		
TAG	NO. CONDUCTOR	RACEWAY
DC-001	(8) #10 CU PV WIRE, (1) #6 CU EGC	FREE AIR
DC-002	(10) #10 CU PV WIRE, (1) #6 CU EGC	FREE AIR
DC-003	(8) #10 CU PV WIRE, (1) #6 CU EGC	FREE AIR
DC-004	(10) #10 CU PV WIRE, (1) #6 CU EGC	FREE AIR
DC-101	(2) #4 AL PV WIRE, (1) #6 CU EGC	FREE AIR
DC-102	(2) #2 AL PV WIRE, (1) #6 CU EGC	FREE AIR
DC-103	(2) #4 AL PV WIRE, (1) #6 CU EGC	FREE AIR
DC-104	(2) #2 AL PV WIRE, (1) #6 CU EGC	FREE AIR

NOTE: 1) DC STRING CONDUCTOR SIZING BASED ON COPPER UL 4703 PV WIRE WITH A TEMPERATURE RATING OF 90°C.
2) DC CABLE SIZING FOR HOME-RUNS BASED ON AL 2KV PV WIRE AMPACITY WITH A TEMPERATURE RATING OF 75°C IN FREE AIR (TABLE 310.15(B)(17)) AND A VOLTAGE DROP OF LESS THAN 2%. USE OF CABLE LARGER THAN SPECIFIED IN THE CABLE SCHEDULE IS ALLOWED, PROVIDED THAT THE CONDUCTOR DESCRIPTION IS MAINTAINED.
3) USE OF CABLE LARGER THAN SPECIFIED IN THE CABLE SCHEDULE IS ALLOWED, PROVIDED THAT THE TEMPERATURE RATING OF THE CONDUCTOR IS MAINTAINED.

NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	RYRE-EL-0100/1	THREE-LINE DIAGRAM

DRAWING NAME:
TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
PV ARRAY DC WIRING DIAGRAM

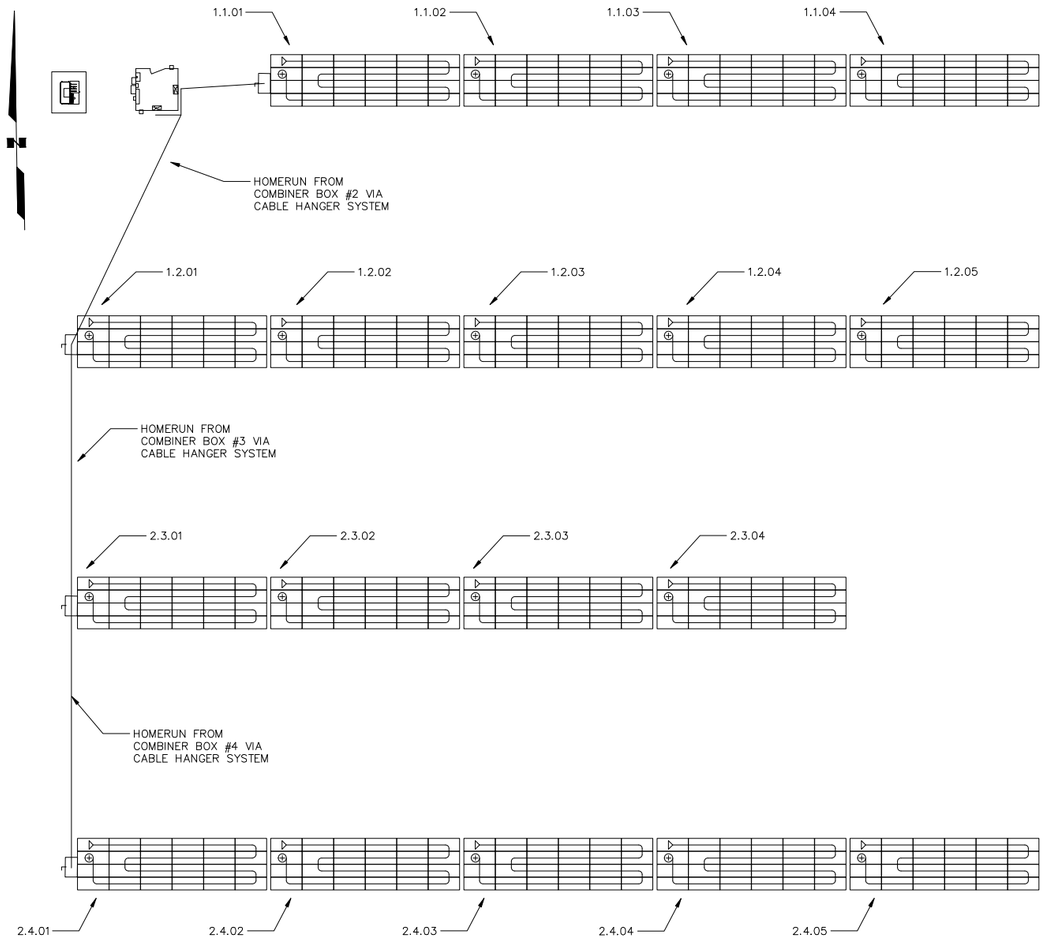
ryre-el-0011_1.dwg

REF DWG(S):

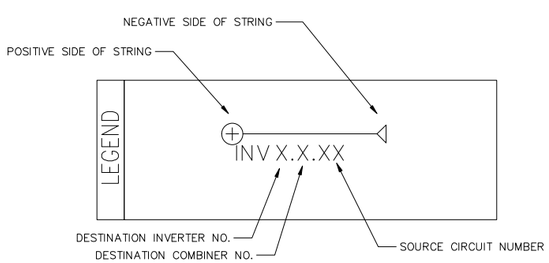
DRAWING NO.: RYRE-EL-0011

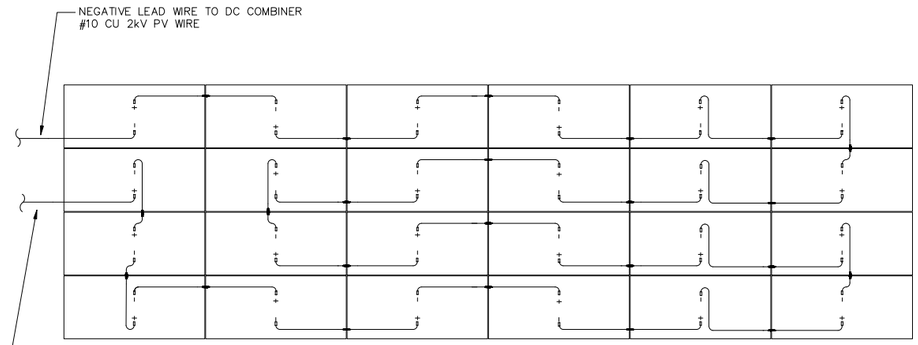
SHEET 1 OF 1

NOT FOR CONSTRUCTION

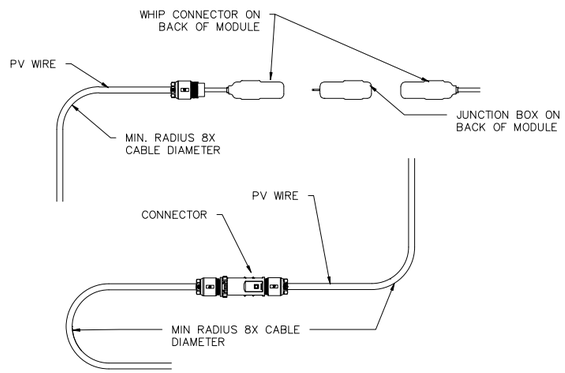


1 PV ELECTRICAL SITE PLAN
NTS



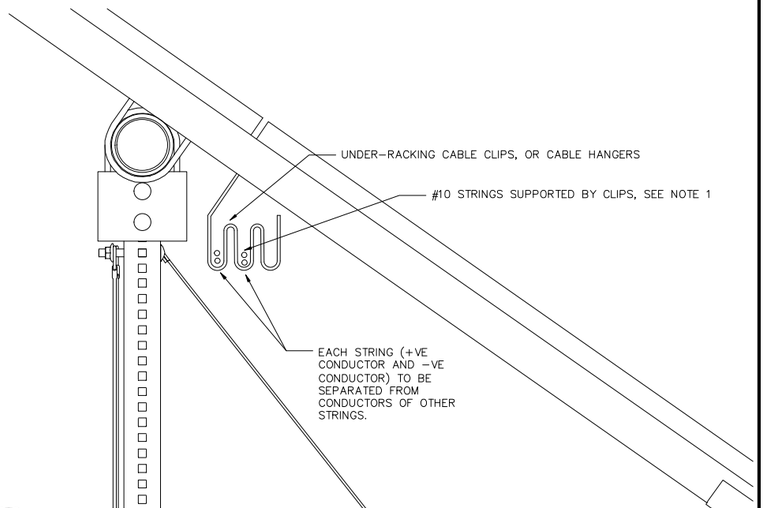


2 TYPICAL 24 MODULE SERIES WIRING
NTS



PV WIRE BENDING REQUIREMENTS NOTES:
1. OBSERVE MIN. BENDING RADIUS REQUIREMENTS WHEN BUILDING AND SECURING SOURCE CIRCUIT CONDUCTORS TO MODULES AND RACKING.
2. SEE MODULE SPEC SHEET OR CABLE SPECS FOR CABLE DIAMETER.

3 PV WIRE BENDING REQUIREMENTS
NTS



3 TYPICAL STRING SUPPORT CLIP DETAIL

TYPICAL 24 MODULE SERIES WIRING NOTES:
1. SUPPORT #10 STRINGS WITH CABLE CLIPS, OR OTHER TCC APPROVED UNDER-RACKING CABLE MANAGEMENT SYSTEM AT MOST EVERY 4' (48"). INSTALL PER MANUFACTURERS RECOMMENDATIONS. EXACT PLACEMENT AND CONNECTION METHOD TO BE DETERMINED BY CONTRACTOR ON-SITE

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

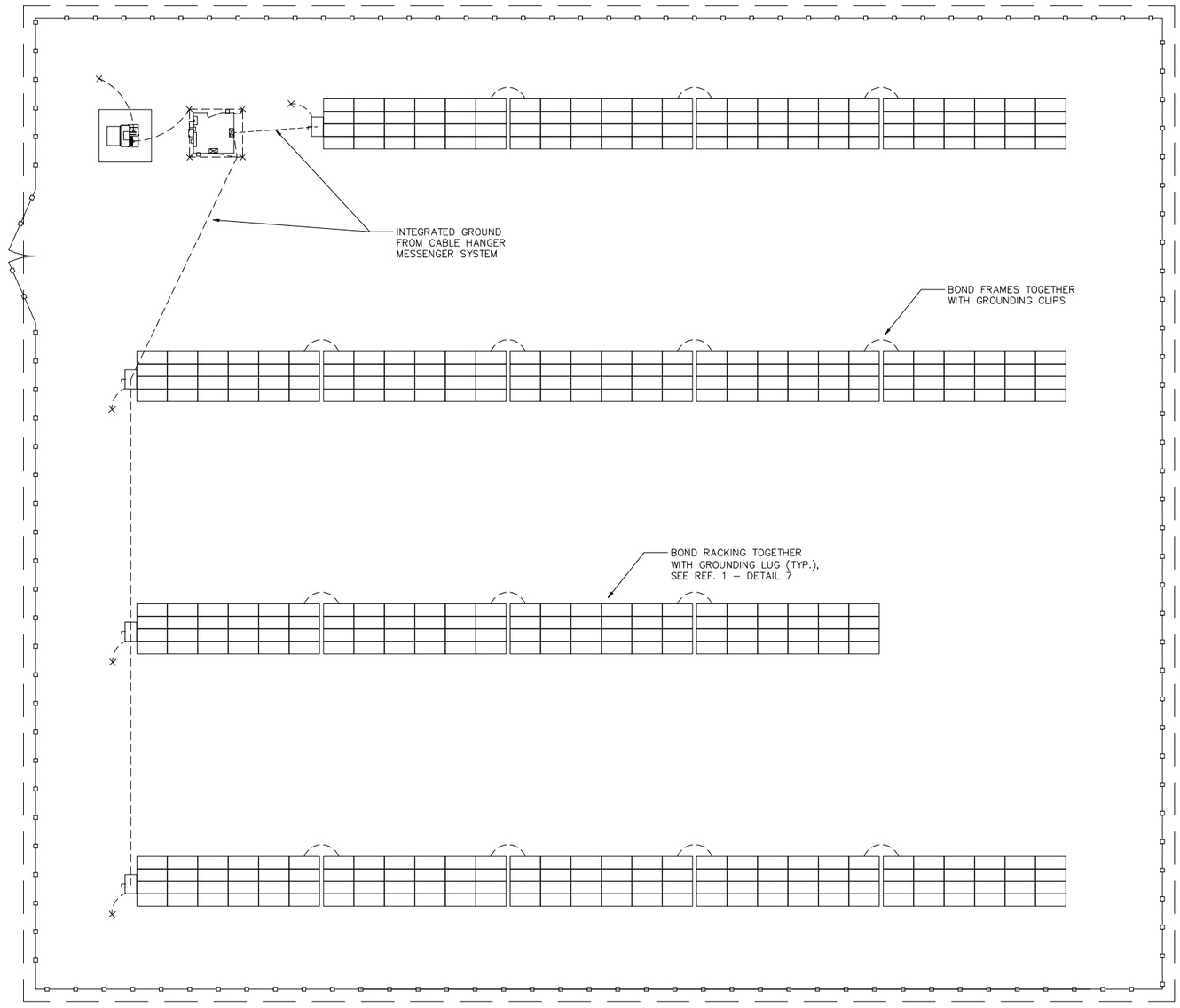
DRAWING NAME:
TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
PV ARRAY DC WIRING DIAGRAM

ryre-el-0011_1.dwg

REF DWG(S):

DRAWING NO.: RYRE-EL-0011

SHEET 1 OF 1



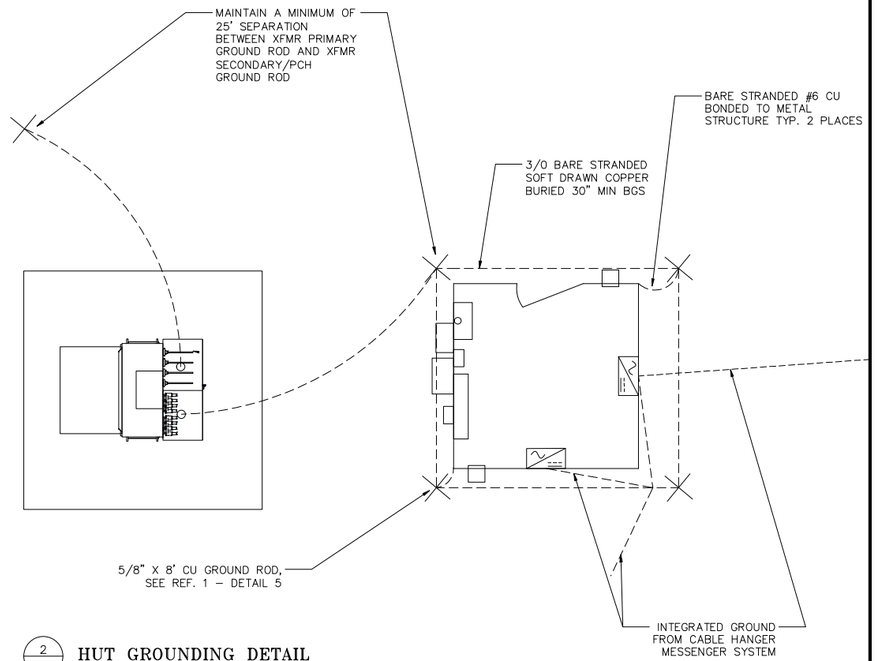
LEGEND	
×	GROUNDING RODS (5/8" x 8')
– – –	GROUNDING GRID

1 SITE GROUNDING PLAN

10 0 10 20 FEET

GROUNDING PLAN NOTES:

1. CONTRACTOR TO TEST EACH GROUNDING ELECTRODE USING THE FALL OF POTENTIAL TEST. GROUND RODS SPACED 6' MIN APART SHALL BE ADDED AS NECESSARY UNTIL A RESISTANCE TO GROUND VALUE OF 25 OHMS OR LESS IS ACHIEVED.
2. MIN. BARE COPPER GROUND WIRE SIZE SHALL BE #6



2 HUT GROUNDING DETAIL

4 0 4 8 FEET

NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	RYRE-SS-2000/3	GROUNDING AND WIREWAY DETAILS

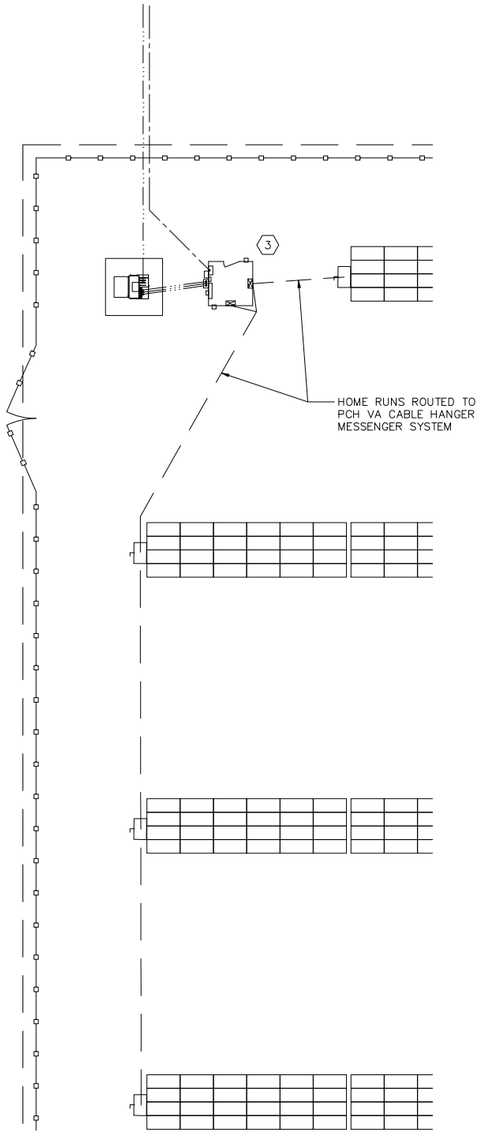
DRAWING NAME:
TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
PV ARRAY GROUNDING PLAN

ryre-ss-2000_1.dwg

REF DWG(S):

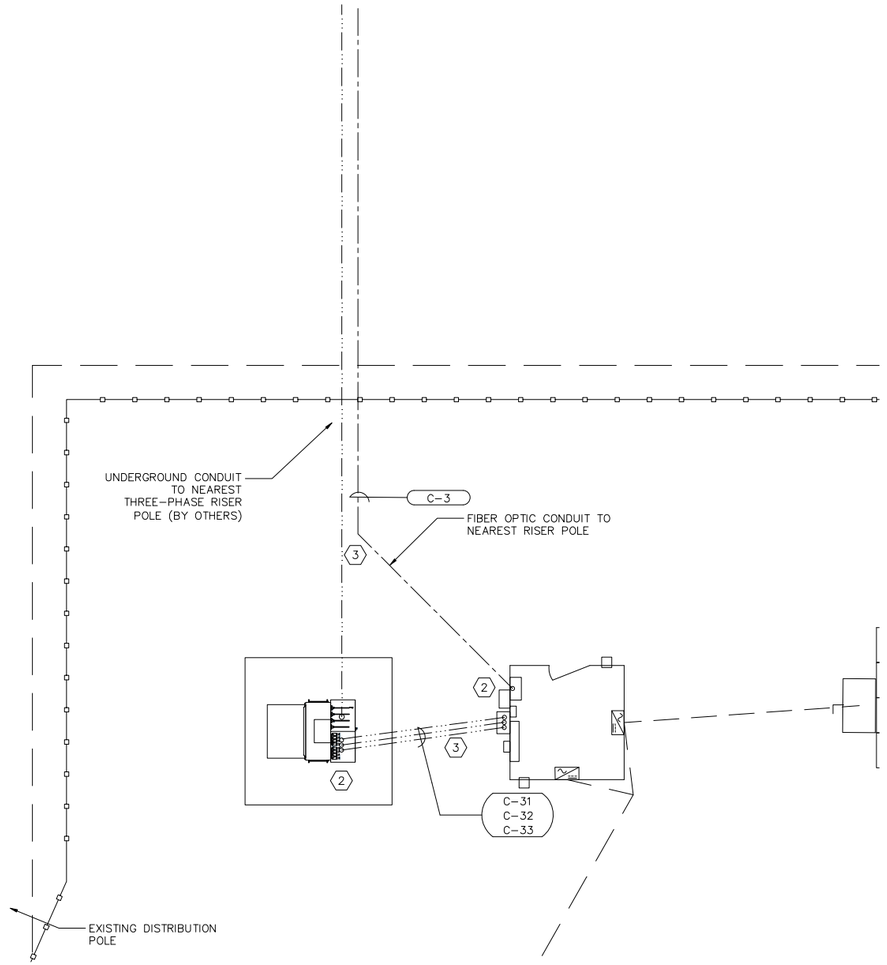
DRAWING NO.: RYRE-SS-2000

SHEET 1 OF 7



1 SITE WIREWAY PLAN

10 0 10 20 FEET



2 SITE CONDUIT PLAN

5 0 5 10 FEET

LEGEND	
	DC COMBINER BOXES (4)
	CABLE HANGER MESSENGER
	UG POWER CABLE
	UG COMM CABLE
	CONDUIT STUB-UP AREA
	PV ARRAY

CONDUIT SCHEDULE (1)			
TAG	FUNCTION	CONDUIT TYPE	TRADE SIZE
C-0110	INV1 TO CB1	EMT	2"
C-0210	INV2 TO CB2	EMT	2"
C-11 – C13	MCB1 TO AC D.S.	PVC	3 X 3"
C-21 – C23	AC D.S. TO CT CAB.	PVC	3 X 3"
C-31 – C33	CT CAB. TO XFMR	PVC	3 X 3"
C-3	COMM PANEL TO POLE	HDPE	1"

NOTES:

(1) TRADE SIZE OF CONDUITS SHOWN IN CONDUIT SCHEDULE ARE MINIMUM SIZES BASED ON NFPA 70 NEC2023 CONDUIT FILL % (CHAPTER 9 TABLE 1). USE OF CONDUIT THAT IS LARGER IN TRADE SIZE THAN SPECIFIED IN CONDUIT SCHEDULE IS PERMITTED.

(2) IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM PRODUCT DIMENSIONS, AND ROUTE CONDUITS TO APPROPRIATE STUB-UP AREAS.

(3) CONDUIT AND WIREWAY ROUTING SHOWN ON DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. EXACT WIREWAY ROUTING TO BE DETERMINED BY CONTRACTOR ON-SITE.

NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
WIREWAY DETAILS

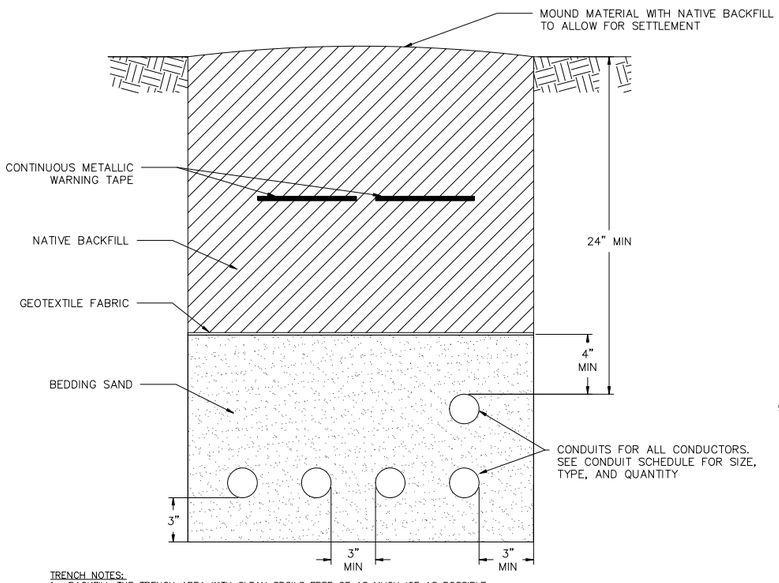
ryre-ss-2000_2.dwg

REF DWG(S):

DRAWING NO.: RYRE-SS-2000

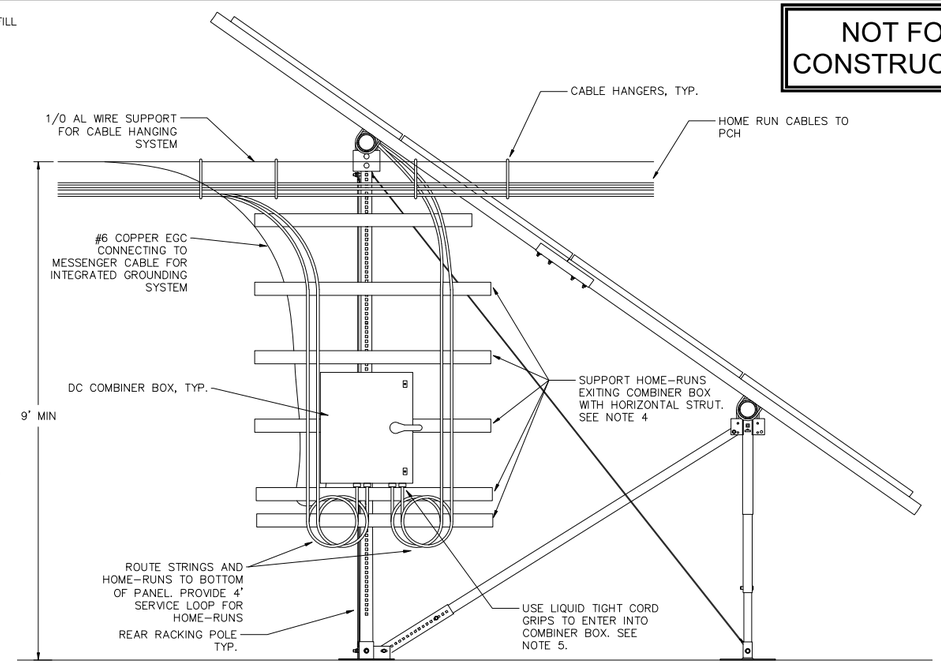
SHEET 2 OF 7

NOT FOR CONSTRUCTION



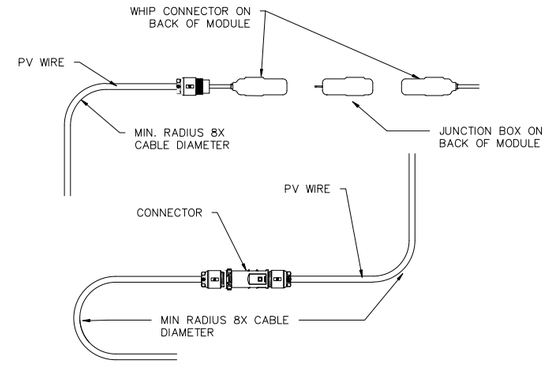
TRENCH NOTES:
1. BACKFILL THE TRENCH AREA WITH CLEAN SPOILS FREE OF AS MUCH ICE AS POSSIBLE.
2. CONSOLIDATION OF BACK FILL MATERIALS SHALL BE COMPLETED IN 12 INCH LIFTS MAXIMUM. INTENT OF THE CONSOLIDATION IS TO ENSURE ELIMINATION OF VOIDS.
3. FOR TRENCH IN GRAVEL, THE TRENCH CAP SHALL NOT EXCEED 4 INCHES. FOR TRENCH IN TUNDRA, THE TRENCH CAP SHOULD BE 35% – 40% OF THE TRENCH DEPTH (1.75' TO 2' FOR A 5' DEEP TRENCH), TO ALLOW FOR SETTLING AND ICE THAW. CONTRACTOR SHALL DISPOSE OF EXCESS EXCAVATED MATERIALS. FINAL CONTOURING OF THE TRENCH CAP IN TUNDRA SHOULD BE CONDUCTED BY HAND (MATCHING SURROUNDING DRAINAGE PATTERNS), TO ENSURE NO DIVERSION OF WATER OCCURS, RESULTING IN EROSION.
4. TRENCHES 1' WIDE SHOULD NOT NEED ANY SEEDING. FINAL REHABILITATION DETERMINATION TO BE MADE BY AGENCY REPRESENTATIVES.
5. COMPANY REPRESENTATIVE SHALL BE NOTIFIED AND PRESENT FOR ACCEPTANCE OF TRENCH PRIOR TO PLACEMENT OF CABLE AND BACKFILLING OF TRENCH (24–HOUR NOTICE REQUIRED). AGENCY REPRESENTATIVE SHALL ALSO PROVIDE ACCEPTANCE OF CABLE PRIOR TO BACKFILLING.
6. BEDDING SHALL BE 3/8" MINUS MATERIAL, NO CRUSHED OR SHARP ROCK. BEDDING MATERIAL SHALL NOT BE MACHINE COMPACTED WITHIN 6" OF CABLES. SLURRY OF A COMPOSITION THAT WILL NOT DAMAGE THE CABLE IS AN ACCEPTABLE BEDDING MATERIAL.
7. MAINTAIN 1' MIN. SEPARATION BETWEEN POWER CONDUCTORS AND COMMUNICATION CABLES

1 TYPICAL TRENCH
NTS



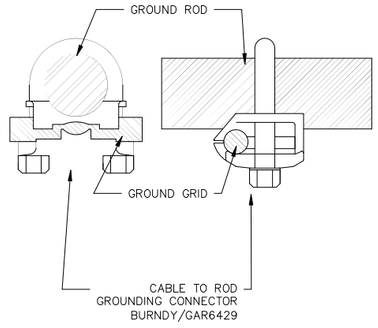
2 TYPICAL HOME RUN CABLE RUNWAY DETAIL
NTS

TYPICAL COMBINER BOX DETAIL NOTES:
1. ENSURE THAT CABLES ROUTED FROM HANGING SYSTEM TO COMBINER BOXES DO NOT EXCEED CONDUCTOR BENDING RADIUS
2. INSTALL CABLE HANGING SYSTEM ACCORDING TO MANUFACTURERS INSTALLATION INSTRUCTIONS
3. CONTRACTOR TO DETERMINE MOST SUITABLE MOUNTING SOLUTION FOR OVERHEAD CABLE MANAGEMENT SYSTEM
4. SUPPORT DC CABLES EXITING THE DC COMBINER BOX WITH A UV RESISTANT, OUTDOOR RATED CABLE TIE CONNECTED TO A HORIZONTAL STRUT. INSTALL CLOSEST CABLE SUPPORT A DISTANCE OF NO MORE THAN 12" AWAY FROM THE COMBINER BOX, AS MEASURED BY THE CABLE PATH. SUPPORT HOME–RUNS EVERY 12" UNTIL SUPPORTED BY CABLE HANGER MESSENGER SYSTEM. SUPPORT STRINGS EVERY 12" UNTIL SUPPORTED BY UNDER–RACKING CABLE MANAGEMENT SYSTEM.
5. USE A LIQUID TIGHT CORD GRIP OR CABLE GLAND FOR HOME–RUNS AND STRINGS WHEN ENTERING COMBINER BOX.

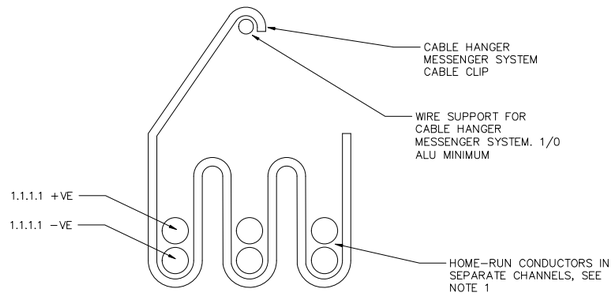


PV WIRE BENDING REQUIREMENTS NOTES:
1. OBSERVE MIN. BENDING RADIUS REQUIREMENTS WHEN BUILDING AND SECURING SOURCE CIRCUIT CONDUCTORS TO MODULES AND RACKING.
2. SEE MODULE SPEC SHEET OR CABLE SPECS FOR CABLE DIAMETER.

3 PV WIRE BENDING REQUIREMENTS
NTS

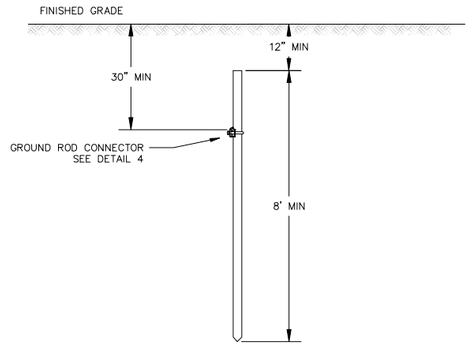


4 GROUND ROD CONNECTION
NTS



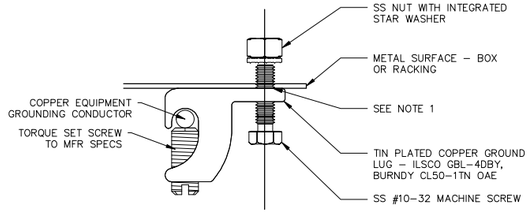
5 TYPICAL HOME–RUN CABLE HANGER DETAIL
NTS

TYPICAL HOME–RUN CABLE HANGER DETAIL NOTES:
1. HOME–RUN CONDUCTORS OF DIFFERENT CIRCUITS TO BE ROUTED IN SEPARATE CHANNELS IN CABLE HANGER MESSENGER SYSTEM. THE +VE AND –VE CONDUCTORS OF A SINGLE HOME–RUN CIRCUIT MAY BE ROUTED IN THE SAME CHANNEL.
2. INSTALL CABLE HANGERS IN REGULAR INTERVALS AS DIRECTED BY MANUFACTURERS INSTALLATION INSTRUCTIONS, OR, A DISTANCE OF NO MORE THAN 5' APART FROM EACH OTHER.
3. IF HOME–RUNS AND STRINGS ARE ROUTED IN THE SAME CABLE HANGER MESSENGER SYSTEM, SEPARATE HOME–RUNS AND STRINGS IN SEPARATE CHANNELS.



TYPICAL GROUND ROD NOTES:
1. CONTRACTOR TO PERFORM SOIL RESISTIVITY TESTING TO DETERMINE AMOUNT OF GROUND RODS NEEDED TO KEEP RESISTANCE BELOW 5 OHMS

6 TYPICAL GROUND ROD
NTS



TYPICAL METAL RACKING GROUNDING NOTES:
1. PRIOR TO MOUNTING LUGS ON ANODIZED ALUMINUM OR PAINTED METAL SURFACES, THE SURFACE MUST BE STRIPPED AND THEN COVERED WITH BURDNY PENETROX A–13 ANTI–OXIDANT COMPOUND BELOW THE LUG TO ENSURE CONDUCTIVITY
2. ON ANODIZED AL SURFACES, THE ANODIZATION SHALL BE GROUND OFF.
3. ON PAINTED SURFACES, THE PAINT LAYER SHALL BE GROUND OR SCRATCHED OFF.

7 TYPICAL METAL RACKING BONDING
NTS

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

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FAX: (907) 522–1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

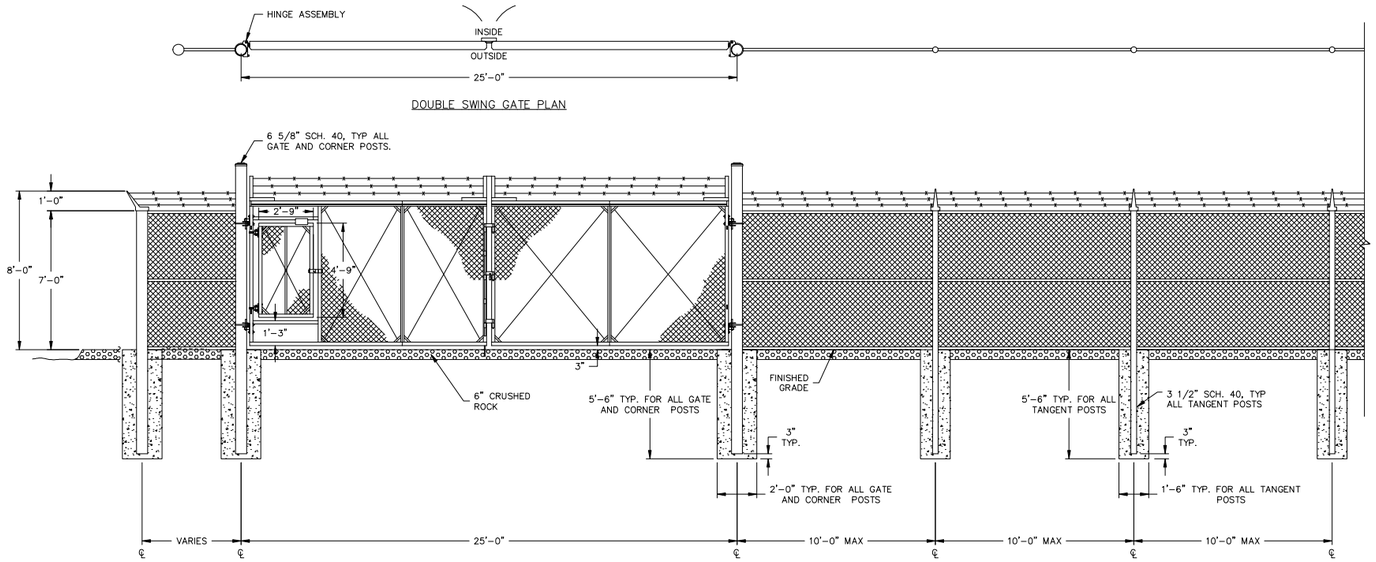
DRAWING NAME:
TANANA CHIEFS CONFERENCE RUBY RENEWABLE ENERGY GROUNDING AND WIREWAY DETAILS

ryre–ss–2000_3.dwg

REF DWG(S):

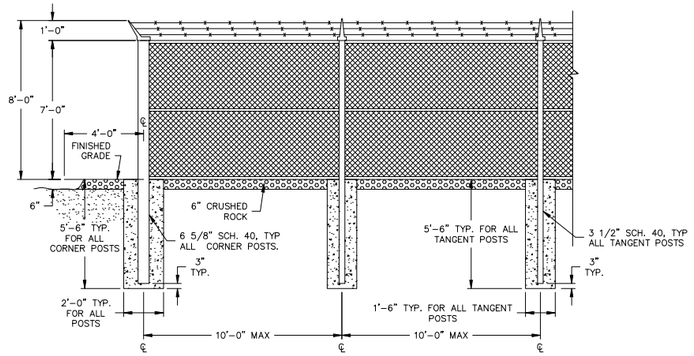
DRAWING NO.: RYRE–SS–2000

SHEET 3 OF 7

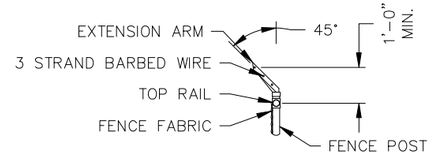


DOUBLE SWING GATE PLAN

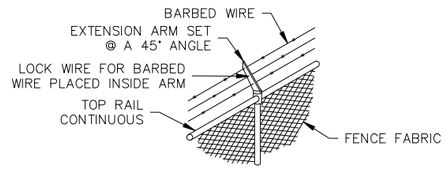
1 FENCE/GATE ELEVATION



2 CORNER/TERMINAL FENCE POST ELEVATION



3 "V" TYPE EXTENSION ARM
N.T.S.



4 POST EXTENSION WITH BARBED WIRE
N.T.S.

NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
FENCE DETAILS
ryre-ss-2000_4.dwg

REF DWG(S):

DRAWING NO.: RYRE-SS-2000

4.5"

MANUAL DISCONNECT FOR PARALLEL GENERATION

3/8 MIN. TEXT

3" (RED BACKGROUND)

LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECT. LABEL TO BE ENGRAVED PLASTIC.
(1) TOTAL

NOTICE

PHOTOVOLTAIC SYSTEM GENERATION METER

LABEL TO BE LOCATED ON THE PV SYSTEM GENERATION METER.
(1) TOTAL

NEC 2023 690.13(B), 690.54

NOTICE

PHOTOVOLTAIC SYSTEM AC DISCONNECT AND POWER SOURCE

RATED OUTPUT CURRENT: 351A

NOMINAL OPERATING VOLTAGE: 480VAC

LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECT. (1) TOTAL

NEC 2023 705.12(B)(3)(3)

⚠ *WARNING*

THIS EQUIPMENT FED BY MULTIPLE SOURCES

TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR.

PERMANENT WARNING LABEL SHALL BE APPLIED TO DISTRIBUTION EQUIPMENT WHERE THE PV SYSTEM INTERCONNECTS. (1) TOTAL

NEC 2023 690.7(D)

MAXIMUM DC VOLTAGE OF PV SYSTEM

MAXIMUM VOLTAGE: 1069VDC

LABEL TO BE LOCATED ON COVER OF DC DISCONNECTING MEANS. (4) TOTAL

NEC 2023 690.31(D)(2)

WARNING: PHOTOVOLTAIC POWER SOURCE

3/8 MIN.

RED BACKGROUND

LABEL SHALL BE LOCATED ON ALL EXPOSED RACEWAYS, CABLE TRAYS, OTHER WIRING METHODS, COVERS OR ENCLOSURES OF PULL BOXES AND JUNCTION BOXES AND ON CONDUIT BODIES IN WHICH ANY OF THE AVAILABLE CONDUIT OPENINGS ARE UNUSED. LABEL SHALL BE REFLECTIVE, AND ALL LETTERS CAPITALIZED AND SHALL BE MINIMUM HEIGHT OF 3/8" IN WHITE ON A RED BACKGROUND. SPACING BETWEEN LABELS OR MARKINGS, OR BETWEEN A LABEL AND MARKING, SHALL NOT BE MORE THAN 10FT.

NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

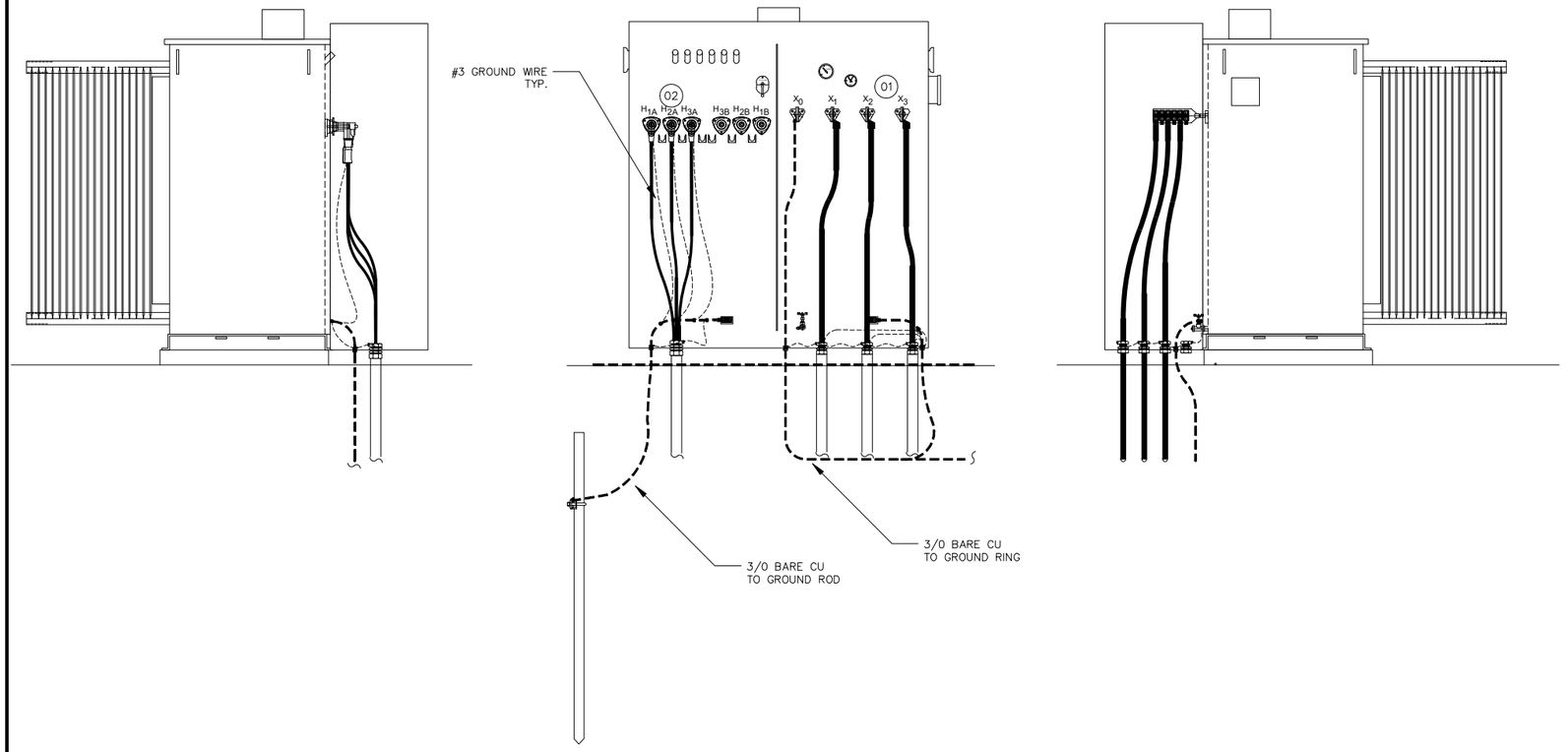
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
EQUIPMENT SAFETY LABEL SCHEDULE

ryre-ss-2000_5.dwg

REF DWG(S):

DRAWING NO.: RYRE-SS-2000



BILL OF MATERIAL

REF. NO.	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	–	CABLE LUG, NEMA 2–HOLE, 4/0 AWG CU	BURNDY/YA282N
02	–	CONNECTOR, COMPRESSION, 4/0 CU TO #6–#2 CU	BURNDY/YGHC29C26
03			
04			
05			
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NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
TRANSFORMER DETAILS

ryre-ss-2000_6.dwg

REF DWG(S):

DRAWING NO.: RYRE-SS-2000

NAMEPLATE NUMBER	QTY	LINE 1 TEXT	LINE 2 TEXT	LINE 3 TEXT	NAMEPLATE SIZE HEIGHT x WIDTH (IN)	TEXT HEIGHT (IN)
N100	1	INVERTER 1			2 x 4	3/8
N101	1	INVERTER 2			2 x 4	3/8
N102	1	DC COMBINER	BOX 1		2 x 4	3/8
N103	1	DC COMBINER	BOX 2		2 x 4	3/8
N104	1	DC COMBINER	BOX 3		2 x 4	3/8
N105	1	DC COMBINER	BOX 4		2 x 4	3/8
N106	1	COMMUNICATIONS	PANEL		2 x 4	3/8
N107	1	400A	MAIN AC PANEL		2 x 4	3/8
N108	1	POWER DISTRIBUTION	PANELBOARD		2 x 4	3/8
N109	1	CB 1			1 x 3	1/8
N1010	1	CB 2			1 x 3	1/8
N111	1	CB SS			1 x 3	1/8
N112	1	MCB			2 x 4	3/8
N113	1	120V STATION SERVICE PANEL			2 x 4	3/8
N114		DATA MANAGER			1 x 3	1/8
N115		METER PANEL			2 x 4	3/8
N116		CT ENCLOSURE			2 x 4	3/8
N117		METER ENCLOSURE			2 x 4	3/8

NOTES:

1) ALL NAMEPLATES SHALL BE 1/16" THICK MINIMUM PLASTIC.
2) ALL NAMEPLATES SHALL HAVE EXTERIOR RATED HIGH-TACK ADHESIVE.
3) ALL NAMEPLATES SHALL BE BLACK SURFACE WTH WHITE TEXT.
4) ALL TEXT SHALL BE "ARIAL BOLD" FONT.
5) EACH LINE OF TEXT SHALL BE CENTERED ON THE NAMEPLATE.
6) ALL TEXT SHALL BE UPPER CASE.
7) ALL DIMENSIONS SHOWN IN INCHES.

NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
EQUIPMENT NAMEPLATE SCHEDULE

ryre-ss-2000_7.dwg

REF DWG(S):

DRAWING NO.: RYRE-SS-2000

SHEET 7 OF 7

Circuit Information			Electrical calculations													System Information				
Destination Inverter No.	Destination Combiner No.	Source Circuit No.	Modules (#)	Open Circuit Voltage (VOC)	Maximum Power Voltage (Vmp)	Short Circuit Current (Isc)	Continuous Current (1.25*Isc)	Irradiance Current (1.25*CC)	Mininum Fuse Size (A)	Selected Fuse Size (A)	Minimum Wire Ampacity (A)	Selected String Wire Size (CU 2KV PV Wire, 90°C, <2% Voltage Drop) (AWG)	Maximum Wire Distance (FT)	Voltage Drop (V)	Voltage Drop (%)	Circuit Information from	to	Continuous Current (A)	Minimum Wire Ampacity From Selected Device (A)	Selected Wire Size (AL 2KV PV Wire, 75°C, <2% Voltage Drop)(AWG)
1	1	1	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	25	1.41	0.13	DS1	INV1	87.44	88	4
1	1	2	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	75	4.23	0.40	DS2	INV1	109.30	110	2
1	1	3	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	120	6.77	0.63	DS3	INV2	87.44	88	4
1	1	4	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	165	9.31	0.87	DS4	INV2	109.30	110	2
1	1	1	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	25	1.41	0.13					
1	2	2	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	75	4.23	0.40					
1	2	3	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	120	6.77	0.63					
1	2	4	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	165	9.31	0.87			PANEL CHARACTERISTICS		
1	2	5	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	210	11.84	1.11			Voc (V)	52.58	
2	3	1	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	25	1.41	0.13			Voc Coef. (%/°C)	−0.25	
2	3	2	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	75	4.23	0.40			Vmp (V)	44.64	
2	3	3	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	120	6.77	0.63			Pmax Coef. (%/°C)	−0.3	
2	3	4	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	165	9.31	0.87					
2	4	1	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	25	1.41	0.13			SITE CHARACTERISTICS		
2	4	2	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	75	4.23	0.40			T_Amb Min (°C)	−45	
2	4	3	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	120	6.77	0.63			T_Amb Max (°C)	26	
2	4	4	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	165	9.31	0.87					
2	4	5	24	1483	1068.1	13.99	17.49	21.86	21.86	25	25	10	210	11.84	1.11					

NOTES:

1) TEMPERATURE CORRECTED OPEN CIRCUIT VOLTAGE CALCULATIONS ARE AS FOLLOWS: VOC = ((Voc * # MODULES) * (1 + ((T_AMB MIN − T_AMB MAX) * (VOC COEF.))

NOT FOR CONSTRUCTION

PROJECT: RUBY RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0227

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
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FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE
RUBY RENEWABLE ENERGY
PV STRING CALCULATIONS

ryre-el-0700_1.dwg

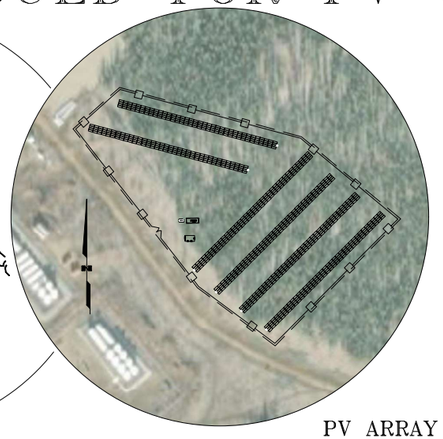
REF DWG(S):

DRAWING NO.: RYRE-EL-0700

SHEET 1 OF 1

TANANA CHIEFS CONFERENCE
HUSLIA PV/BESS DESIGN
EPS JOB NO. 25-0360 - ISSUED FOR PV CONSTRUCTION BID

ALASKA


PV ARRAY

Electric Power Systems Inc.
Consulting Engineers
TEL:(907) 522-1953
FAX:(907) 522-1182

DRAWING INDEX

TITLE	DRAWING NUMBER	SHEET	REVISION
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	HPVD-EL-0001	1	B
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	HPVD-EL-0001	2	B
~~SITE LAYOUT DIAGRAM~~	~~HPVD-EL-2500~~	~~1~~	~~D~~
SITE LAYOUT - PV	HPVD-EL-2500	2	B
SITE LAYOUT - INTERCONNECTION	HPVD-EL-2500	3	B
SITE LAYOUT - POWER CONVERSION HUT	HPVD-EL-2500	4	A
SITE LAYOUT - COMMUNICATIONS PANEL	HPVD-EL-2500	5	A
ONE LINE DIAGRAM	HPVD-EL-0010	1	B
THREE LINE DIAGRAM	HPVD-EL-0100	1	A
PV ARRAY DC WIRING DIAGRAM	HPVD-EL-0011	1	A
PV ELECTRICAL SITE PLAN	HPVD-EL-0020	1	A
GROUNDING PLAN	HPVD-SS-2000	1	A
WIREWAY DETAILS	HPVD-SS-2000	2	A
EQUIPMENT SAFETY LABEL SCHEDULE	HPVD-SS-2000	3	A
SITE FENCING DETAILS	HPVD-SS-2000	4	A
EQUIPMENT NAMEPLATE SCHEDULE	HPVD-SS-2000	5	A
PV STRING CALCULATIONS	HPVD-EL-0700	1	A

BESS DRAWINGS NOT INCLUDED IN THIS DRAWING SET

SCOPE OF WORK

THE PROJECT SCOPE IS TO INSTALL A GRID-TIED SOLAR PHOTOVOLTAIC SYSTEM ~~AND A BESS SYSTEM~~ IN HUSLIA, AK

THE PV SYSTEM CONSISTS OF GROUND MOUNTED SOLAR ARRAYS AND 3 STRING INVERTERS. ~~THE BESS SYSTEM CONSISTS OF A BATTERY CONTAINER NEAR THE SOLAR ARRAY.~~ THE PV SYSTEM WILL OPERATE IN PARALLEL WITH THE LOCAL UTILITY, WHILE THE ~~BESS WILL HAVE GRID FORMING CAPABILITIES.~~ EACH SYSTEM WILL HAVE RELATED ELECTRICAL SAFETY AND METERING SYSTEMS.

SYSTEM SUMMARY

PV SYSTEM SIZE: 518kWdc / 375kWac
~~BESS SYSTEM SIZE: 500kVA / 750kWh~~
INTERCONNECTION VOLTAGE: 480V, 3 PHASE, 4 WIRE

GENERAL NOTES

ALL ELECTRICAL WORK TO BE INSTALLED BY A QUALIFIED AND LICENSED ELECTRICAL CONTRACTOR.

CONTRACTOR WILL FOLLOW IBC 2021, NFPA 70, AND NEC 2023 AS WELL AS ALL APPLICABLE LOCAL, STATE, MUNICIPAL AND CITY CODES, ORDINANCES AND REGULATIONS.

ALL MODULES AND INVERTERS SHALL BE UL LISTED 1703 & CEC APPROVED. ALL ELECTRICAL COMPONENTS AND MATERIALS SHALL BE LISTED FOR ITS PURPOSE AND INSTALLED IN A WORKMAN LIKE MANNER.

PRIOR TO INSTALLATION, THE CONTRACTOR SHALL UNDERSTAND ALL DRAWINGS AND PRODUCT MANUALS.

PROJECT ENTITIES

PROJECT DEVELOPER: TANANA CHIEFS CONFERENCE

ELECTRICAL ENGINEER OF RECORD: ELECTRIC POWER SYSTEMS, INC.

ELECTRIC SERVICE PROVIDER: AVEC

NOT FOR CONSTRUCTION

PROJECT: HUSLIA PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0360

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	GGL/08-22-2025	MED/08-22-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE HUSLIA PV/BESS DESIGN COVER SHEET/INDEX

hpvd-pr-0000_1.dwg

REF DWG(S):

DRAWING NO.: HPVD-PR-0000

SHEET 1 OF 1

ELECTRICAL SPECIFICATIONS

GENERAL

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL A COMPLETE, TESTED, COMMISSIONED, AND SATISFACTORY ELECTRIC INSTALLATION IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS. THE INTENT OF THE DRAWINGS IS NOT TO SHOW OR LIST EVERY ITEM TO BE PROVIDED BY THE CONTRACTOR. IF AN ITEM IS NOT SHOWN OR LISTED THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE MISSING ITEMS TO ALLOW THE SYSTEM TO FUNCTION PROPERLY.

2. ALL DIMENSIONS AND LOCATIONS OF EXISTING CONDITIONS MUST BE VERIFIED PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES NOTED

3. ALL CONTRACTOR INITIATED CHANGES SHALL BE SUBMITTED IN WRITING TO THE ENGINEER OF RECORD FOR APPROVAL PRIOR TO ANY CHANGES IN THE FIELD.

4. EXACT LOCATION AND MOUNTING OF ALL EQUIPMENT SHALL BE VERIFIED IN THE FIELD.

5. THE CONTRACTOR SHALL READ AND UNDERSTAND ALL DRAWINGS AND EQUIPMENT MANUALS PRIOR TO INSTALLATION OR OPERATION OF EQUIPMENT. CONTRACTOR IS TO PROVIDE SKILLED LABOR FOR EACH TRADE WHOSE WORK RELATES TO THE DRAWINGS AND SPECIFICATIONS.

6. ALL OUTDOOR EQUIPMENT ENCLOSURES SHALL BE RATED NEMA 3R MINIMUM.

7. ALL THE EQUIPMENT SHOULD BE FREE FROM ANY DEBRIS, DAMAGED COMPONENTS AND ANY CONNECTION ISSUES.

8. THE CONTRACTOR SHALL KEEP ACCURATE RECORDS OF ALL DEVIATIONS IN WORK AS INSTALLED FROM WORK SPECIFIED ON THE DRAWINGS, OR IN THE SPECIFICATIONS, NOTING THE ORIGIN OF THE CHANGE.

9. SUFFICIENT ACCESS AND WORKING SPACE SHALL BE PROVIDED NEAR ELECTRICAL EQUIPMENT PER NEC ARTICLE 110.

10. CONTRACTOR SHALL PREPARE AN OPERATION AND MAINTENANCE MANUAL FOR ALL EQUIPMENT AND SYSTEMS INSTALLED.

11. CONDUIT JOINTS SHALL BE CUT SQUARE AND DE-BURRED UNTIL SMOOTH. BENDS SHALL BE MADE SO THAT THE CONDUIT IS NOT DAMAGED. THERE SHOULD NOT BE MORE THAN THE EQUIVALENT OF FOUR QUARTER-BENDS (360 DEGREES) BETWEEN PULL POINTS.

12. METALIC CONDUIT GROUNDS SHALL BE INSULATED AND SOLIDLY GROUNDED TO THE EGC SYSTEM. GROUNDS SHALL BE SIZED ACCORDING TO THE NEC.

13. CONDUCTORS SHALL BE COLOR-CODED, FACTORY OR FIELD APPLIED, WITH AN INDUSTRY STANDARD COLOR FOR EACH PHASE AND THE NEUTRAL.

RECORD DOCUMENTS

14. ON COMPLETION OF THE PROJECT, A COMPLETE SET OF MARKED-UP PRINTS SHOWING ANY DEVIATIONS SHALL BE DELIVERED TO THE ENGINEER OF RECORD. UNTIL THESE DRAWINGS ARE REVIEWED BY THE ENGINEER, THE CONTRACT SHALL REMAIN INCOMPLETE.

WIRING METHODS

15. EXPOSED PV WIRING SHALL BE PV WIRE TYPE, 90 DEGREE C, WET RATED AND UV RESISTANT.

16. PV SOURCE AND OUTPUT CIRCUIT CONDUCTORS SHALL BE RED FOR POSITIVE, BLACK FOR NEGATIVE, AND GREEN FOR GROUND. FIELD WIRING THAT IS NOT COLOR CODED SHALL BE MARKED AT BOTH ENDS SHOWING CIRCUIT POLARITY.

17. DC EQUIPMENT SHALL BE LISTED WITH A DC VOLTAGE GREATER THAN OR EQUAL TO THE MAXIMUM DC SYSTEM VOLTAGE.

18. INTERCONNECT WIRING AND POWER CONDUCTORS MUST BE IN ACCORDANCE WITH NEC NFPA 70. CONDUCTORS MUST CONFORM TO THE MINIMUM BEND RADIUS SPECIFIED IN THE SPECIFIC NEC ARTICLE. WIRE BUNDLES SHALL BE KEPT AWAY FROM SHARP EDGES TO AVOID DAMAGE TO WIRE INSULATION. CONDUCTORS SHALL BE COPPER RATED AT 90 DEGREES C UNLESS OTHERWISE NOTED IN THE DRAWINGS. FOR OUTDOOR INSTALLATIONS, CONDUITS AND FITTINGS SHALL BE PROPERLY NEMA RATED AS REQUIRED BY THE NEC.

19. CONNECTORS SHALL BE TORQUED PER DEVICE LISTING OR MANUFACTURER'S RECOMMENDATION.

20. AC WIRING SHALL BE COPPER RATED AT 90 DEGREES C, RATED 600VAC UNLESS OTHERWISE NOTED IN THE DRAWINGS.

21. PV SOURCE CIRCUITS IN FREE AIR SHALL BE PROPERLY SUPPORTED AND SEPARATED TO MAINTAIN AMPACITY RATINGS AND INSULATION INTEGRITY.

25. FIELD MADE CONNECTORS FOR PV QUICK CONNECTS SHALL BE THE SAME TYPE AND MANUFACTURER AS THE PV MODULES AND USE THE MANUFACTURER SPECIFIED CRIMPING TOOL.

GROUNDING

26. ONLY ONE CONNECTION TO DC CIRCUITS AND ONE CONNECTION TO AC CIRCUITS SHALL BE MADE FOR SYSTEM GROUNDING.

27. NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER EQUIPMENT GROUNDING TO ENSURE THE TERMINAL LUG IS PROPERTY BOLTED AND METAL-METAL CONTACT IS MADE. PAINT AND/OR FINISH AT THE POINT OF CONTACT IS TO BE REMOVED.

28. MODULES SHALL BE BONDED WITH EQUIPMENT GROUNDING CONDUCTORS BONDED TO A LOCATION APPROVED BY THE MANUFACTURER WITH A MEANS OF BONDING LISTED FOR THIS PURPOSE.

29. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, INCLUDING BUT NOT LIMITED TO GROUND RODS, GROUNDING LUGS, GROUNDING CLAMPS, ETC.

30. GROUNDING CONDUCTORS SHALL MEET THE FOLLOW SPECIFICATIONS:
 30.1. SOLID CONDUCTORS: ASTM B 3.
 30.2. STRANDED CONDUCTORS: ASTM B 8.
 30.3. TINNED CONDUCTORS: ASTM B 33.

31. GROUNDING BUS WHERE SPECIFIED SHALL BE RECTANGULAR BARS OF ANNEALED COPPER, CROSS SECTION SIZED FOR APPLICATION PER NEC, UNLESS OTHERWISE INDICATED; WITH INSULATORS.

32. GROUNDING CONDUCTORS SHALL BE ROUTED ALONG THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE. AVOID OBSTRUCTING ACCESS OR PLACING CONDUCTORS WHERE THEY MAY BE SUBJECTED TO STRAIN, IMPACT, OR DAMAGE.

33. INSTALL A GROUND CONDUCTOR LOOP AND GROUND RODS, ELECTRICALLY CONNECTED TO BUILDING STRUCTURE, GROUND RODS, AND EXTERIOR EQUIPMENT AS SHOWN ON DRAWINGS.

RACEWAYS

34. METAL CONDUIT AND TUBING SHALL MEET THE FOLLOWING STANDARDS:
 34.1. RIGID STEEL CONDUIT: ANSI C80.1.
 34.2. EMT: ANSI C80.3.
 34.3. LFMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.

35. FITTINGS FOR CONDUIT SHALL BE LISTED FOR TYPE AND SIZE RACEWAY WITH WHICH USED, AND FOR APPLICATION AND ENVIRONMENT IN WHICH INSTALLED.

36. COATED FITTINGS FOR PVC-COATED CONDUIT SHALL HAVE MINIMUM THICKNESS OF 0.040 INCHES WITH OVERLAPPING SLEEVES PROTECTING THREADED JOINTS.

37. NONMETALIC WIREWAY SHALL BE PROVIDED AS FIBERGLASS POLYESTER, EXTRUDED AND FABRICATED TO SIZE AND SHAPE INDICATED, WITH NO HOLES OR KNOCKOUTS. COVER IS GASKETED WITH OIL-RESISTANT GASKET MATERIAL AND FASTENED WITH CAPTIVE SCREWS TREATED FOR CORROSION RESISTANCE. CONNECTIONS ARE FLANGED, WITH STAINLESS-STEEL SCREWS AND OIL-RESISTANT GASKETS.

38. RACEWAYS FOR OPTICAL FIBER AND COMMUNICATIONS CIRCUITS SHALL BE INSTALLED AS FOLLOWS:
 38.1. 3/4-INCH TRADE SIZE AND SMALLER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 50 FEET.
 38.2. 1-INCH TRADE SIZE AND LARGER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 75 FEET.
 38.3. INSTALL WITH A MAXIMUM OF TWO 90-DEGREE BENDS OR EQUIVALENT FOR EACH LENGTH OF RACEWAY UNLESS DRAWINGS SHOW STRICTER REQUIREMENTS. SEPARATE LENGTHS WITH PULL OR JUNCTION BOXES OR TERMINATIONS AT DISTRIBUTION FRAMES OR CABINETS WHERE NECESSARY TO COMPLY WITH THESE REQUIREMENTS.

DISCONNECTING MEANS

39. MEANS SHALL BE PROVIDED TO DISCONNECT THE PV SYSTEM FROM WIRING SYSTEMS INCLUDING POWER SYSTEMS AND ENERGY STORAGE SYSTEMS.

40. PV DISCONNECTS SHALL NOT BE REQUIRED TO BE SUITABLE AS SERVICE EQUIPMENT AND SHALL BE RATED IN ACCORDANCE WITH ARTICLE 690 PART III: DISCONNECTING MEANS.

PANELBOARDS

41. CONTRACTOR SHALL PROVIDE THE FOLLOWING SUBMITTALS:

 41.1. EACH TYPE OF PANELBOARD, OVERCURRENT PROTECTIVE DEVICE, TRANSIENT VOLTAGE SUPPRESSION DEVICE, ACCESSORY, AND COMPONENT INDICATED. INCLUDE DIMENSIONS AND MANUFACTURERS' TECHNICAL DATA ON FEATURES, PERFORMANCE, ELECTRICAL CHARACTERISTICS, RATINGS, AND FINISHES.

 41.2. MANUFACTURER SEISMIC QUALIFICATION CERTIFICATION: SUBMIT CERTIFICATION THAT PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, ACCESSORIES, AND COMPONENTS WILL WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS" INCLUDE THE FOLLOWING:
  41.2.1. BASIS OF CERTIFICATION: INDICATE WHETHER WITHSTAND CERTIFICATION IS BASED ON ACTUAL TEST OF ASSEMBLED COMPONENTS OR ON CALCULATION.
  41.2.2. DIMENSIONED OUTLINE DRAWINGS OF EQUIPMENT UNIT: IDENTIFY CENTER OF GRAVITY AND LOCATE AND DESCRIBE MOUNTING AND ANCHORAGE PROVISIONS.
  41.2.3. DETAILED DESCRIPTION OF EQUIPMENT ANCHORAGE DEVICES ON WHICH THE CERTIFICATION IS BASED AND THEIR INSTALLATION REQUIREMENTS.

 41.3. FIELD QUALITY-CONTROL TEST REPORTS INCLUDING THE FOLLOWING:
  41.3.1. TEST PROCEDURES USED.
  41.3.2. TEST RESULTS THAT COMPLY WITH REQUIREMENTS.
  41.3.3. RESULTS OF FAILED TESTS AND CORRECTIVE ACTION TAKEN TO ACHIEVE TEST RESULTS THAT COMPLY WITH REQUIREMENTS.

 41.4. PANELBOARD SCHEDULES: FOR INSTALLATION IN PANELBOARDS. SUBMIT FINAL VERSIONS AFTER LOAD BALANCING.

 41.5. OPERATION AND MAINTENANCE DATA: FOR PANELBOARDS AND COMPONENTS TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS. IN ADDITION TO ITEMS SPECIFIED IN DIVISION 01 SECTION "OPERATION AND MAINTENANCE DATA," INCLUDE THE FOLLOWING:
  41.5.1. MANUFACTURER'S WRITTEN INSTRUCTIONS FOR TESTING AND ADJUSTING OVERCURRENT PROTECTIVE DEVICES.
  41.5.2. TIME-CURRENT CURVES, INCLUDING SELECTABLE RANGES FOR EACH TYPE OF OVERCURRENT PROTECTIVE DEVICE

42. CONTRACTOR SHALL MEET THE FOLLOWING QUALITY ASSURANCE STANDARDS:

 42.1. SOURCE LIMITATIONS: OBTAIN PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, COMPONENTS, AND ACCESSORIES THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER.
 42.2. PRODUCT OPTIONS: DRAWINGS INDICATE SIZE, PROFILES, AND DIMENSIONAL REQUIREMENTS OF PANELBOARDS AND ARE BASED ON THE SPECIFIC SYSTEM INDICATED. REFER TO DIVISION 01 SECTION "PRODUCT REQUIREMENTS."
 42.3. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
 42.4. COMPLY WITH NEMA PB 1.
 42.5. COMPLY WITH NFPA 70.

43. CONTRACTOR SHALL COORDINATE LAYOUT AND INSTALLATION OF PANELBOARDS AND COMPONENTS WITH OTHER CONSTRUCTION THAT PENETRATES WALLS OR IS SUPPORTED BY THEM, INCLUDING ELECTRICAL AND OTHER TYPES OF EQUIPMENT, RACEWAYS, PIPING, AND ENCUMBRANCES TO WORKSPACE CLEARANCE REQUIREMENTS.

44. CONTRACTOR SHALL PROVIDE PANELBOARD PRODUCTS THAT MEET THE FOLLOWING CRITERIA
 44.1. MANUFACTURER SHALL BE AS SHOWN ON DRAWINGS OR EQUAL.
 44.2. FABRICATE AND TEST PANELBOARDS ACCORDING TO IEEE 344 TO WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS."
 44.3. ENCLOSURES: SURFACE MOUNTED CABINETS. NEMA PB 1, TYPE 1.
  44.3.1. RATED FOR ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.
  44.3.2. OUTDOOR LOCATIONS: NEMA 250, TYPE 4X STAINLESS.
  44.3.3. OTHER WET OR DAMP INDOOR LOCATIONS: NEMA 250, TYPE 4X.
  44.3.4. FRONT: SECURED TO BOX WITH CONCEALED TRIM CLAMPS. FOR SURFACE-MOUNTED FRONTS, MATCH BOX DIMENSIONS; FOR FLUSH-MOUNTED FRONTS, OVERLAP BOX.
  44.3.5. FINISH: MANUFACTURER'S STANDARD ENAMEL FINISH OVER CORROSION-RESISTANT TREATMENT OR PRIMER COAT.
  44.3.6. DIRECTORY CARD: WITH TRANSPARENT PROTECTIVE COVER, MOUNTED IN METAL FRAME, INSIDE PANELBOARD DOOR

 44.4. PHASE AND GROUND BUSES:
  44.4.1. MATERIAL: HARD-DRAWN COPPER, 98 PERCENT CONDUCTIVITY.
  44.4.2. EQUIPMENT GROUND BUS: ADEQUATE FOR FEEDER AND BRANCH-CIRCUIT EQUIPMENT GROUND CONDUCTORS; BONDED TO BOX.

 44.5. CONDUCTOR CONNECTORS: SUITABLE FOR USE WITH CONDUCTOR MATERIAL.
  44.5.1. LUGS: MECHANICAL TYPE.

 44.6. SERVICE EQUIPMENT LABEL: UL LABELED FOR USE AS SERVICE EQUIPMENT FOR PANELBOARDS WITH MAIN SERVICE DISCONNECT SWITCHES.

 44.7. UL LABEL INDICATING SERIES-CONNECTED RATING WITH INTEGRAL OR REMOTE UPSTREAM OVERCURRENT PROTECTIVE DEVICES. INCLUDE SIZE AND TYPE OF UPSTREAM DEVICE ALLOWABLE, BRANCH DEVICES ALLOWABLE, AND UL SERIES-CONNECTED SHORT-CIRCUIT RATING.

45. CONTRACTOR SHALL PROVIDE OVERCURRENT PROTECTIVE DEVICES THAT MEET THE FOLLOWING CRITERIA:

 45.1. MOLDED-CASE CIRCUIT BREAKER: PROVIDE BREAKERS FROM PANELBOARD MANUFACTURER. UL 489, WITH SERIES-CONNECTED RATING TO MEET AVAILABLE FAULT CURRENTS

 45.2. THERMAL-MAGNETIC CIRCUIT BREAKERS: INVERSE TIME-CURRENT ELEMENT FOR LOW-LEVEL OVERLOADS, AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS. ADJUSTABLE MAGNETIC TRIP SETTING FOR CIRCUIT-BREAKER FRAME SIZES 250 A AND LARGER

 45.3. ADJUSTABLE INSTANTANEOUS-TRIP CIRCUIT BREAKERS: MAGNETIC TRIP ELEMENT WITH FRONT-MOUNTED, FIELD-ADJUSTABLE TRIP SETTING.

 45.4. ELECTRONIC TRIP-UNIT CIRCUIT BREAKERS SHALL HAVE RMS SENSING; FIELD-REPLACEABLE RATING PLUG; AND WITH THE FOLLOWING FIELD-ADJUSTABLE SETTINGS:
  45.4.1. INSTANTANEOUS TRIP.
  45.4.2. LONG- AND SHORT-TIME PICKUP LEVELS.
  45.4.3. LONG- AND SHORT-TIME TIME ADJUSTMENTS.
  45.4.4. GROUND-FAULT PICKUP LEVEL, TIME DELAY, AND I2/T RESPONSE.

 45.5. GFCI CIRCUIT BREAKERS: SINGLE- AND TWO-POLE CONFIGURATIONS WITH 5-MA WHERE INSTALLED PROTECTION OF GENERAL USE RECEPTACLES. WHERE REQUIRED, 30-MA TRIP SENSITIVITY FOR CIRCUITS INSTALLED TO SUPPLY SPECIFIC EQUIPMENT.

REQUIRED SAFETY SIGNS AND LABELS

1. THE MARKING SHALL ADEQUATELY WARN OF THE HAZARD USING EFFECTIVE WORDS AND/OR COLORS AND/OR SYMBOLS PER NEC 110.21.

2. THE LABEL SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN PER NEC 110.21.

3. THE LABEL SHALL BE OF SUFFICIENT DURABILITY ABLE TO WITHSTAND THE ENVIRONMENT INSTALLED IN PER NEC 110.21.

4. LABELS AND MARKINGS SHALL BE APPLIED TO THE APPROPRIATE COMPONENTS IN ACCORDANCE WITH THE NEC.

5. PV MODULES AND INVERTERS ARE TO BE SUPPLIED FROM THE MANUFACTURER WITH PRE-APPLIED MARKINGS TO MEET THE REQUIREMENTS OF NEC 690.51 & 690.41(B)(1).

6. UNLESS OTHERWISE SPECIFIED ON THE LABELING SHEET, OSHA 1910.145 AND ANSI Z535 RECOMMENDED SPECIFICATIONS ARE AS FOLLOWS:
 6.1. ROUNDED OR BLUNT CORNERS FREE OF SHARP EDGES.
 6.2. VISIBLE AT A MINIMUM DISTANCE OF 5FT. OR GREATER.
 6.3. "DANGER" HEADER; RED BACKGROUND WITH WHITE LETTERING.
 6.4. "WARNING" HEADER; ORANGE BACKGROUND WITH BLACK LETTERING.
 6.5. "CAUTION" HEADER; YELLOW BACKGROUND WITH BLACK LETTERING.
 6.6. "NOTICE" LABEL HEADER TO BE IN BLUE WITH WHITE LETTERING.
 6.7. OTHER TEXT TO BE BLACK ON A WHITE BACKGROUND.

7. ALL RELEVANT COMPONENTS OF THE PHOTOVOLTAIC SYSTEM SHALL BE CLEARLY MARKED AND LABELED IN ACCORDANCE WITH NEC ARTICLE 690.

NOT FOR CONSTRUCTION

PROJECT: HUSLIA PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0360

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	GGL/08-22-2025	MED/08-25-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
HUSLIA PV/BESS DESIGN
GENERAL INFORMATION AND SPECIFICATIONS
hpvd-el-0000_1.dwg

REF DWG(S):

DRAWING NO.: HPVD-EL-0000

STANDARD BLOCKS – ELECTRICAL

CABLE # → XX
EQUIPMENT → XX

CABLE TAG – WIRING DIAGRAMS & 3–LINES

STANDARD ABBREVIATIONS – ELECTRICAL

A	AMPERE
ACB	AIR CIRCUIT BREAKER
AB	AIR BREAK
ABV	ABOVE
AC	ALTERNATING CURRENT
ADJ	ADJUSTABLE
ADJT	ADJACENT
ALT	ALTERNATE
AL	ALUMINUM
APPRX	APPROXIMATE
B	BUS
BF	BREAKER FAIL
BFI	BREAKER FAIL INITIATE
BKR	BREAKER
BLDG	BUILDING
BLK	BLOCK
BOT	BOTTOM
BTU	BRITISH THERMAL UNIT
BTWN	BETWEEN
BU	BACKUP
C	COLOUMB
CAP	CAPACITOR OR CAPACITANCE
CAP	CORRUGATED ALUMINUM PIPE
CB	CENTER BREAK
CBL	CABLE
CEM	CEMENT
CF	CUBIC FOOT
CHK	CHECK
CI	CAST IRON
CIP	CAST IRON PIPE
CIPC	CAST–IN–PLACE CONCRETE
CIR	CIRCLE
CKT	CIRCUIT
CLK	CLOCK
CLS	CLOSE
CMIL	CIRCULAR MIL
CMP	CORRUGATED METAL PIPE
COS	COSINE
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CS	
CSP	CORRUGATED STEEL PIPE
CT	CURRENT TRANSFORMER
CTRL	CONTROLSWITCHER OR CONTROL SWITCH
CTS	CLEAR TO SEND
CU	COPPER
DC	DIRECT CURRENT
DCD	DATA CARRIER DETECT
DCE	DATA COMMUNICATIONS EQUIPMENT
DDE	DOUBLE DEAD END
DE	DEAD END
DEM	DEMOLISH, DEMOLITION
DEMOB	DEMOBILIZE
DET	DETAIL
DFR	DISTURBANCE FAULT RECORDER
DI	DIGITAL INPUT
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIST	DISTRIBUTION
DNP	DISTRIBUTED NETWORK PROTOCOL
DO	DIGITAL OUTPUT
DSSS	D STREET SUBSTATION
DTE	DATA TERMINAL EQUIPMENT
DWG	DRAWING
EA	EACH
EIA	ELECTRONICS INDUSTRY ASSOCIATION
EJ	EXPANSION JOINT
EL	ELECTRICAL
ELEV	ELEVATION
ENCL	ENCLOSURE
EQ	EQUAL
EQUIP	EQUIPMENT
EST	ESTIMATE
EXIST	EXISTING
F	FARAD
F	FUSE
FREQ	FREQUENCY
FT	FEET
FT	FEED THROUGH
FUT	FUTURE
G	CONDUCTANCE OR GROUND
GA	GAUGE
GALV	GALVANIZED
GB	GROUND BUS
GCB	GAS CIRCUIT BREAKER
GEN	GENERATOR
GI	GALVANIZED IRON
GND	GROUND
GOAB	GANG OPERATED AIR–BREAK SWITCH
GRC	GALVANIZED RIGID CONDUIT
GRD	GRADE, GRADING
GRSC	GALVANIZED RIGID STEEL CONDUIT
H	HENERY
HDPE	HIGH–DENSITY POLYETHYLENE
HLO	HOT LINE ORDER
HORIZ	HORIZONTAL
HP	HORSEPOWER
HZ	HERTZ
IA	PHASE A CURRENT
IB	PHASE B CURRENT
IC	PHASE C CURRENT
ID	INSIDE DIAMETER
IN	INPUT
IN	INCH
IN	NEUTRAL CURRENT
INCL	INCLUDE(D), INCLUDING
IND	INDUSTRY
INT	INTERSECTION
INV	INVERT
IP	POLARIZING CURRENT
j	COMPLEX NUMBER
J	JOULE
JB	JUNCTION BOX
KA	KILOAMPRERE
KV	KILOVOLT
KW	KILOWATT
L	INDUCTANCE
L	LINE
L	LOAD
LB	LOAD BREAK
LGPP	LANDFILL GAS POWER PLANT
LT	LIGHT
M	METER(S)
MAT	MATERIAL
MAX	MAXIMUM
MFG	MANUFACTURER
MI	MILE
MIN	MINIMUM
MISC	MISCELLANEOUS
MM	MILLIMETER(S)
MO	MOTOR OPERATED (OR)
MOB	MOBILIZE
MTR	METER
MW	MEGAWATT
N	NEUTRAL
N	NEWTON
N	NORTH
NC	NORMALLY CLOSED
NCC	NORMALLY CLOSED CONTACT
N/C	NO CONNECTION
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOC	NORMALLY OPEN CONTACT
NS	SYNCHRONIZING NEUTRAL
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
OUT	OUTPUT
P	REAL POWER OR PRIMARY
PB	PUSH BUTTON
PF	POWER FACTOR
PLC	PROGRAMMABLE LOGIC CONTROLLER
PM	PAD–MOUNT TRANSFORMER
PSSS	PROVIDER SWITCHYARD
PT	POINT
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER
Q	REACTIVE POWER
R	RESISTANCE OR RESISTOR
RCLS	RECLOSE
RAD	RADIUS
RAD	RADIAN
RD	ROAD
RE	REMOTE END
REF	REFERENCE
REQD	REQUIRED
RET	REMOTE END TRIP
RET	RETURN
REV	REVISION
RLY	RELAY
RR	RAILROAD
ROW	RIGHT OF WAY
RTS	READY TO SEND
RTU	REMOTE TERMINAL UNIT
RX	RECEIVE
S	APPARENT POWER
S	SOUTH
S	SOURCE
S–L	SOURCE–LOAD
SA	SURGE ARRESTOR
SC	SWITCH CABINET
SEC	SECTION
SEC	SECONDARY
SVC	SERVICE
SVC	STATIC VAR COMPENSATOR
SHT	SHEET
SIM	SIMILAR
SIN	SINE
SPEC	SPECIFICATION
SPECS	SPECIFICATIONS
SPSS	SPARTAN SUBSTATION
SS	SYNCHRONIZING SWITCH
STA	STATION
STD	STANDARD
SW	SWITCH
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
SYNCH	SYNCHRONIZE
T	TIME OR TRANSFORMER
TAN	TANGENT
TCM	TRIP COIL MONITOR
TEL	TELEPHONE
TERM	TERMINAL
TEMP	TEMPORARY
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
TRP	TRIP
TURB	TURBINE
TX	TRANSMIT
TYP	TYPICAL
UG	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
V	VOLT
VA	VOLTAMPERE
VA	PHASE A VOLTAGE
VAR	REACTIVE POWER
VB	PHASE B VOLTAGE
VAC	ALTERNATING CURRENT VOLTAGE
VC	PHASE C VOLTAGE
VCB	VACUUM CIRCUIT BREAKER
VDC	DIRECT CURRENT VOLTAGE
VERT	VERTICAL
VIF	VERIFY IN FIELD
VN	NEUTRAL VOLTAGE
VR	VOLTAGE REGULATOR
VREG	VOLTAGE REGULATOR
VS	SYNCHRONIZING VOLTAGE
VT	VOLTAGE TRANSFORMER
W	WEST
W	WATT
W/	WITH
W/O	WITHOUT
X	REACTANCE
XFMR	TRANSFORMER
XMSSN	TRANSMISSION
Y	ADMITTANCE
YL	YELLOW
Z	IMPEDANCE
2	TIME–DELAY
21	DISTANCE
25	SYNCHRONISM CHECK
27	UNDERVOLTAGE
30	ANNUNCIATOR
32	DIRECTIONAL POWER
37	UNDERCURRENT OR UNDERPOWER
38	BEARING
40	FIELD
43	MANUAL TRANSFER OR SELECTOR DEVICE
46	REVERSE–PHASE
47	PHASE–SEQUENCE VOLTAGE
49	MACHINE OR TRANSFORMER THERMAL RELAY
50	INSTANTANEOUS OVERCURRENT
51	AC TIME OVERCURRENT
52	AC CIRCUIT BREAKER
52a	NORMALLY OPEN BREAKER CONTACT
52b	NORMALLY CLOSED BREAKER CONTACT
59	OVERVOLTAGE
60	VOLTAGE BALANCE
63	PRESSURE SWITCH
64	APPARATUS GROUND
67	AC DIRECTIONAL OVERCURRENT
68	BLOCKING
69	PERMISSIVE
71	LEVEL SWITCH
74	ALARM
76	DC OVERCURRENT
78	OUT–OF–STEP
79	RECLOSING RELAY
81	FREQUENCY
85	CARRIER OR PILOT WIRE
86	LOCK OUT
87	DIFFERENTIAL
94	TRIPPING

NOT FOR CONSTRUCTION

PROJECT: HUSLIA PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25–0360

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	GGL/08–22–2025	MED/08–25–2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10–08–2025	MED/10–08–2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
HUSLIA PV/BESS DESIGN
GENERAL INFORMATION AND SPECIFICATIONS

hpvd–el–0000_1.dwg

REF DWG(S):

DRAWING NO.: HPVD–EL–0000

SHEET 2 OF 2

NOT FOR CONSTRUCTION

1 SITE LAYOUT
1/32" = 40'-0"

LEGEND	
	DC COMBINER BOX (6)
	LIMIT OF DISTURBANCE (LOD)
	FENCE LINE
	LEASE LOT
	PV ARRAY

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR CONFIRMING SOLAR ARRAY LEASE LOT PROPERTY LINES AND CORNERS PRIOR TO CONSTRUCTION

PROJECT: HUSLIA PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0360

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	GGL/ 08-22-2025	MED/ 08-22-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

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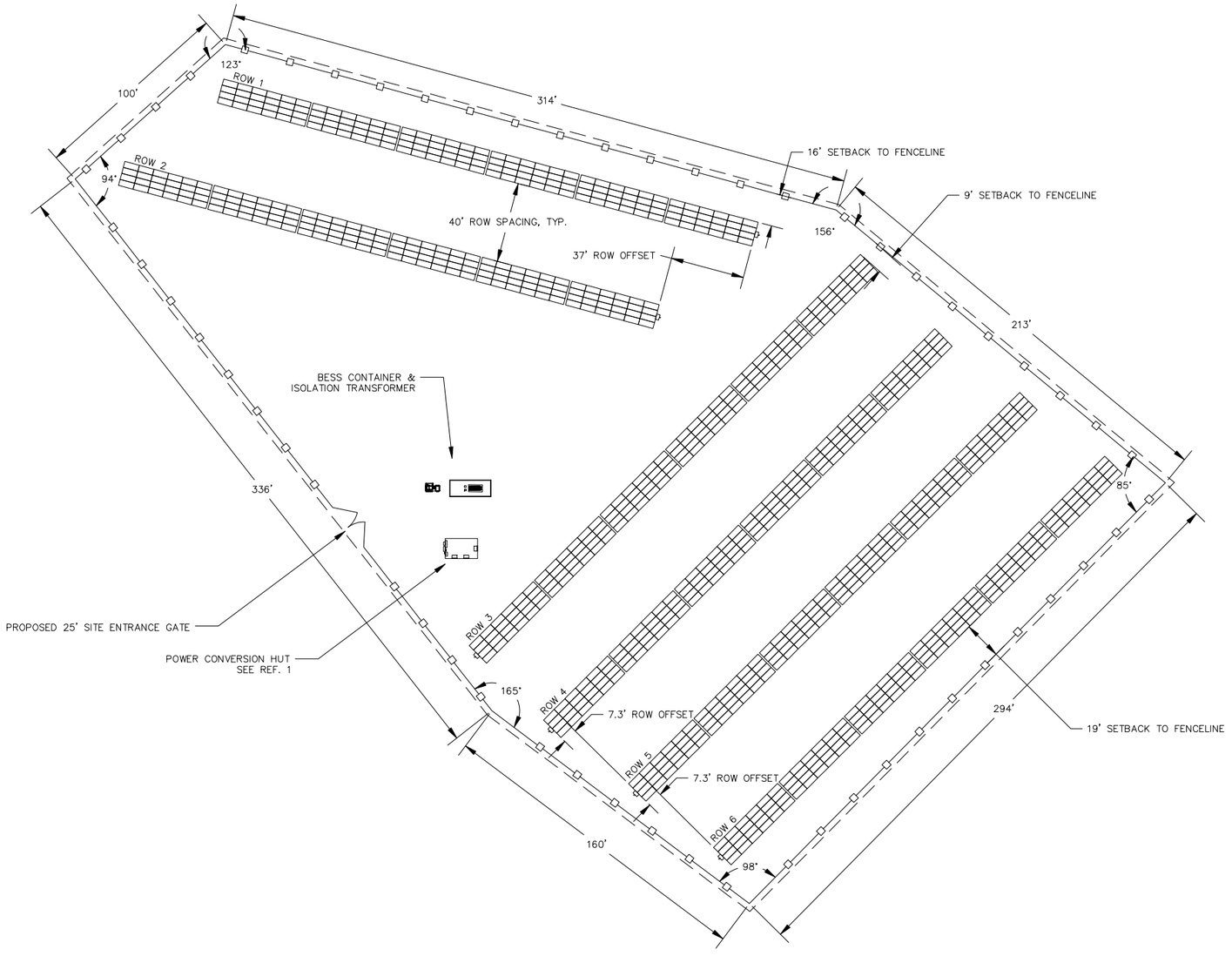
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
HUSLIA PV/BESS DESIGN
PV ARRAY LAYOUT DIAGRAM

hpvd-el-2500_2.dwg

REF DWG(S):

DRAWING NO.: HPVD-EL-2500



1 SITE LAYOUT

1/32" = 40'-0"

System Summary

Physical Arrangement	
Methodology	Fixed Tilt, Ground Mount
Tilt	35°
Racking System / Model	Nuance PowerRACK 4X6
Electrical Arrangement	
Watts per Module	595W
24 Module Strings (#)	36
Quantity of Modules	864
Total DC System Size	514,080W
DC/AC Ratio	1.37
Inverter Arrangement	
Manufacturer	SMA
Model	Sunny Highpower PEAK3 125-US
Inverter Size	125kW
Quantity of Inverters	3
Strings per Inverter	12
PV Modules	
Manufacturer	SEG SOLAR
Model	SEG-595-BTA-BG
Peak Power	595W
Quantity of Modules	864

LEGEND	
	DC COMBINER BOX (6)
	LIMIT OF DISTURBANCE (LOD)
	FENCE LINE
	PV ARRAY
	SOLAR INVERTER (3)

NOT FOR CONSTRUCTION

PROJECT: HUSLIA PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: MAX DONALDSON/JOHN VENABLES JOB #: 25-0360

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	MED/ 08-22-2025	JRV/ 08-22-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	JRV/10-08-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	HPVD-EL-2500/4	POWER CONVERSION HUT LAYOUT DIAGRAM

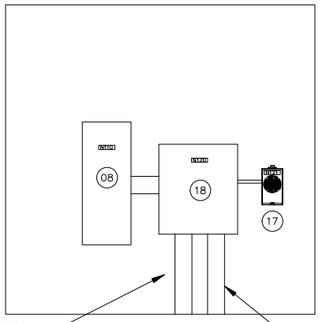
DRAWING NAME:
TANANA CHIEFS CONFERENCE
HUSLIA PV/BESS DESIGN
PV ARRAY LAYOUT DIAGRAM

hpvd-el-2500_3.dwg

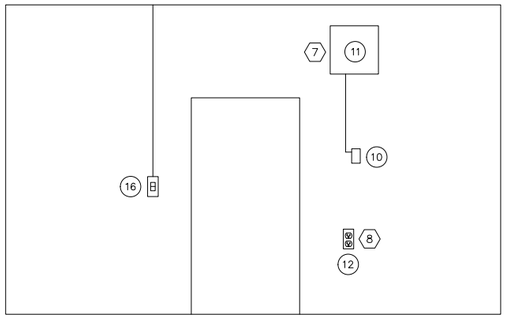
REF DWG(S):

DRAWING NO.: HPVD-EL-2500

SHEET 3 OF 5



PCH (WEST OUTSIDE)



PCH (NORTH INSIDE)

BUILDING MANUFACTURER TO PROVIDE PRE-FABRICATED METAL BUILDING PER FOLLOWING SPECIFICATIONS:

STRUCTURAL:
- -ROOF PITCH: 3:12
- -ROOF DEAD LOAD 30PSF MINIMUM
- -MAX WALL LOAD: 220LBS (INVERTER)
- -MAX FLOOR LOAD: 210LBS (STATION SERVICE SUBSTATION)

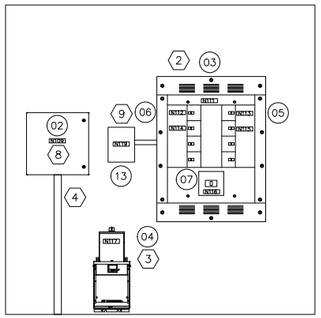
INSULATION:
- -WALL INSULATION: R22 MINIMUM
- -CEILING INSULATION: R30 MINIMUM

ALL INTERIOR CONDUITS SHALL BE GALVANIZED RIGID CONDUIT (GRC) OR ELECTRICAL METALLIC TUBING (EMT). EXTERIOR CONDUIT SHALL BE RIGID GALVANIZED CONDUIT ONLY. EMT TYPE COUPLERS AND FITTINGS SHALL BE RAIN-TIGHT COMPRESSION TYPE. GROUNDING BUSHINGS SHALL BE INSTALLED AT THE SOURCE END OF THE EMT CONDUIT RUNS FROM THE AC PANEL.

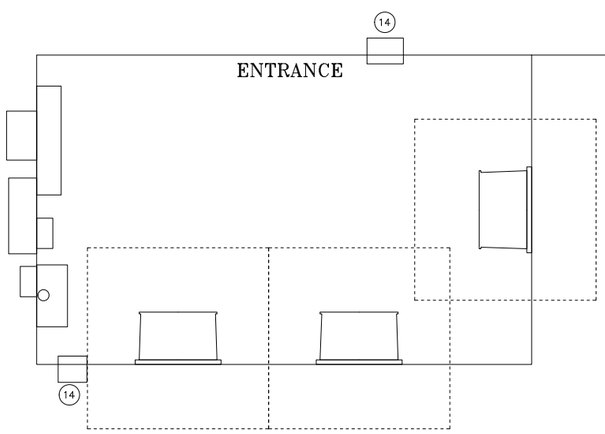
(6)

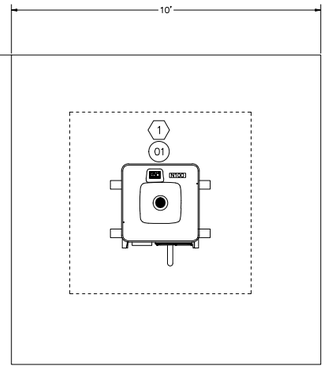
BILL OF MATERIAL

REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
(01)	EA	3	SUNNY HIGHPOWER PEAK3-125KW	SMA/SHP 125-US-21
(02)	EA	1	COMMUNICATION PANEL	SEE REF. 1
(03)	EA	1	POWER DISTRIBUTION PANELBOARD	SQUARED/HCP18686M
(04)	EA	1	STATION SERVICE SUBSTATION, 10kVA	HAMMOND/M1PC010LESF
(05)	EA	3	200A CIRCUIT BREAKER	
(06)	EA	1	30A/2P CIRCUIT BREAKER	
(07)	EA	1	600A MAIN CIRCUIT BREAKER	
(08)	EA	1	600A LOAD BREAK DISCONNECT W/PROVISIONS FOR PADLOCK	
(09)	EA	1	ELECTRIC BASEBOARD HEATER, 1000W, 120VAC W/ BUILD-IN THERMOSTAT	
(10)	EA	1	ADJUSTABLE THERMOSTAT	
(11)	EA	1	WALL MOUNT SHUTTER FAN, >2500CFM, 120VAC W/ DAMPER MOTOR CONTROLLED BY THERMOSTAT	
(12)	EA	2	GFCI RECEPTACLE	
(13)	EA	1	SHARK 250 SELF-ENCLOSED METER ASSEMBLY	ELECTRO INDUSTRIES /ENCSHK250-277-60-10-V3-D2-INP100S-X
(14)	EA	2	90° VENTILATION HOOD WITH INSECT SCREEN	
(15)	EA	1	10" MOTORIZED INTAKE DAMPER	
(16)	EA	1	LIGHT SWTICH	
(17)	EA	1	600V 20A METER SOCKET W/SELF-SHUNTING BYPASS	MILBANK/UC7237-XL
(18)	EA	1	800A CT ENCLOSURE	



PCH (WEST INSIDE)





PCH (EAST INSIDE)

NOTES:

(1) MOUNT SMA SHP-125-US INVERTERS SUCH THAT THEY ARE 4" AWAY FROM THE WALL, AND 20" ON ALL OTHER SIDES FROM WALLS, FLOORS, CEILINGS, AND OTHER DEVICES. MAINTAIN 4' WORKING CLEARANCE ZONE IN FRONT OF INVERTERS, PER NEC. PROVIDE A 4" X 4" WIREWAY (MINIMUM) BETWEEN INVERTERS AND PANELBOARD

(2) MOUNT POWER DISTRIBUTION PANELBOARD SUCH THAT MANUFACTURER RECOMMENDED CLEARANCE DISTANCES BETWEEN THE PANELBOARD AND WALLS, FLOORS, CEILINGS, AND OTHER DEVICES IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE IN FRONT OF THE PANELBOARD, PER NEC

(3) MOUNT STATION SERVICE SUBSTATION SUCH THAT ALL MANUFACTURER RECOMMENDED CLEARANCE ZONES AWAY FROM EQUIPMENT IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE ZONE IN FRONT OF THE DEVICE, PER NEC

(4) ROUTE CONDUITS SUCH THAT THE STUB-UP AREA IS DIRECTLY UNDER ALL DESTINATION DEVICES IN THE POWER CONVERSION HUT

(5) PROVIDE CEILING MOUNTED LIGHTING SUCH THAT 30 FOOTCANDLES IS MAINTAINED. MOUNT LIGHT SWITCH NEXT TO DOOR AT LEAST 40" FROM FLOOR.

(6) ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN CAN BE CONTRACTOR DETERMINED, PROVIDED THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.

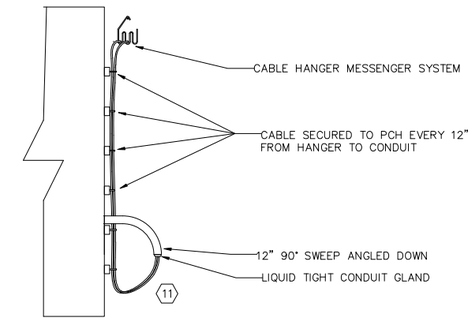
(7) VENTILATION FOR THE ENCLOSURE SHALL BE PROVIDED BY A WEATHERPROOF 120VAC EXHAUST FAN WITH A MINIMUM FLOW RATE OF 2500CRFM, CONTROLLED BY AN ADJUSTABLE THERMOSTAT FOR FAN OPERATION OF INTERIOR AIR TEMPERATURES OF 35°C AND ABOVE, AND BY A 10" MOTORIZED INTAKE DAMPER. EXHAUST SHALL BE PROVIDED WITH A 90° EXTERIOR HOOD WITH A 900° EXTERIOR HOOD WITH INSECT SCREENS TO PREVENT INTRUSIONS OF WIND DRIVEN RAIN/SNOW.

(8) MOUNT RECEPTACLES ON INSIDE WALLS OF PCH AT LEAST 18" FROM FLOOR. MOUNT ONE RECEPTACLE ON EAST SIDE OF DOOR (NORTH WALL), AND ONE RECEPTACLE NEXT TO INVERTER 2 (SOUTH WALL).

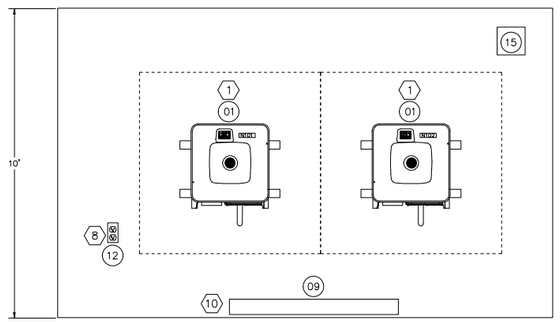
(9) CONNECT SHARK 250 CURRENT TRANSFORMERS AND POTENTIAL TRANSFORMERS TO THE 400A OUTPUT BREAKER AT POWER DISTRIBUTION PANELBOARD THROUGH A 1" CONDUIT.

(10) HEATING TO BE PROVIDED BY ELECTRIC BASEBOARD HEATER WITH BUILT-IN THERMOSTAT. HEATER OT TURN ON BELOW 10°F.

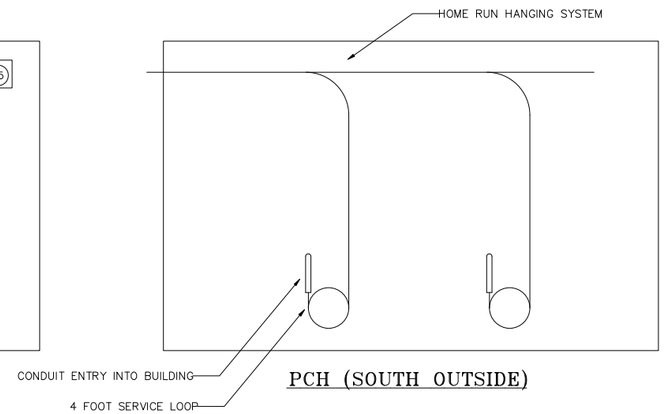
(11) HOME-RUN CABLES TO ENTER INTO PCH VIA CONDUIT SWEEP ANGLED DOWN. MIN CONDUIT RADIUS TO BE 8 X THE DIAMETER OF THE LARGEST CABLE. SUPPORT CABLES EVERY 12"AS MEASURED BY THE CABLES PATH FROM HANGER, TO CONDUIT WITH UV RESISTANT, OUTDOOR RATED CABLE TIES. ADD IN A 4FT SERVICE LOOP BEFORE ENTERING INTO THE CONDUIT. EXACT HEIGHT AND PLACEMENT OF CONDUIT TO BE DETERMINED BY CONTRACTOR ON-SITE.



HOME-RUN ENTRY



PCH (SOUTH INSIDE)



PCH (SOUTH OUTSIDE)

NOT FOR CONSTRUCTION

PROJECT: HUSLIA PV/BESS ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0360

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

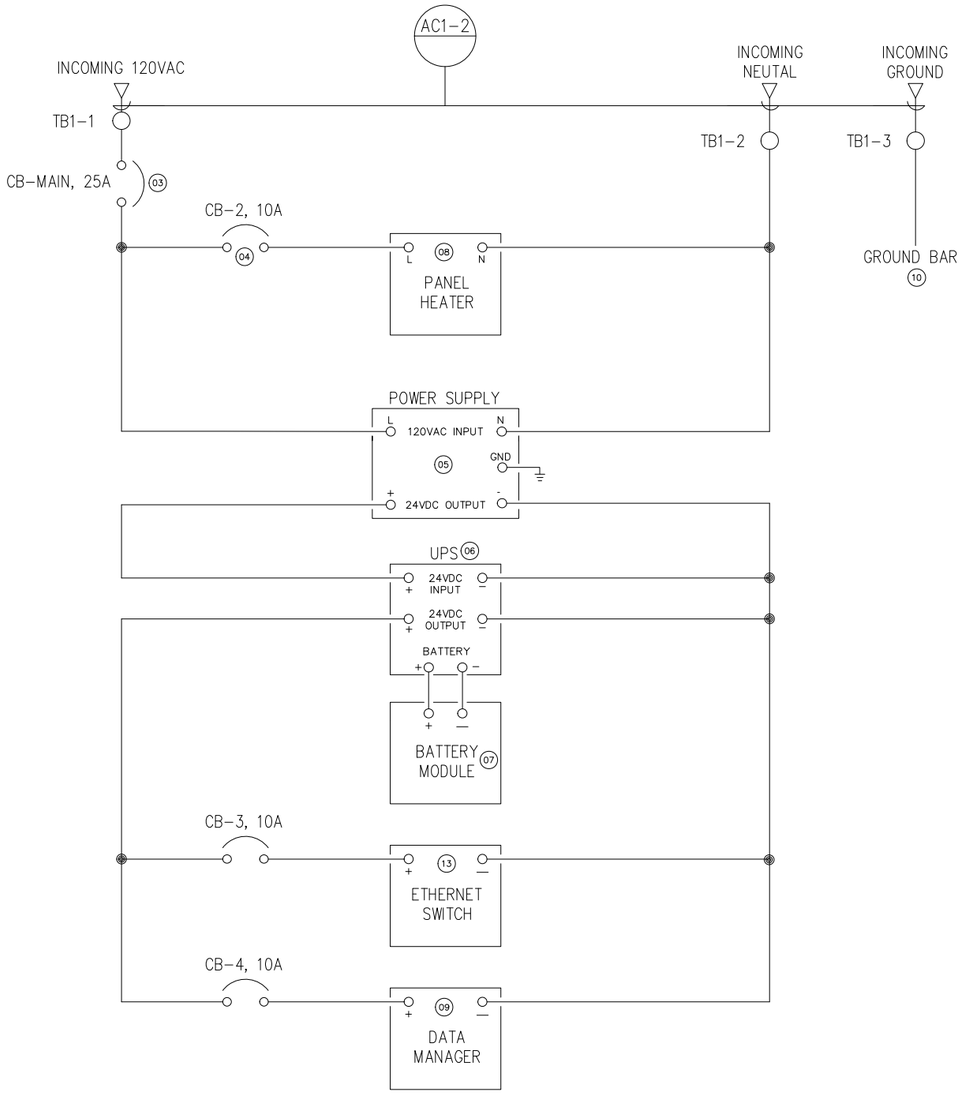
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	HPVD-EL-2500/4	COMMUNICATIONS PANEL DETAILS
2	HPVD-EL-2000/5	EQUIPMENT NAMEPLATE SCHEDULE

DRAWING NAME:
TANANA CHIEFS CONFERENCE
HUSLIA PV/BESS ENERGY
POWER CONVERSION HUT
LAYOUT DIAGRAM
hpvd-el-2500_4.dwg

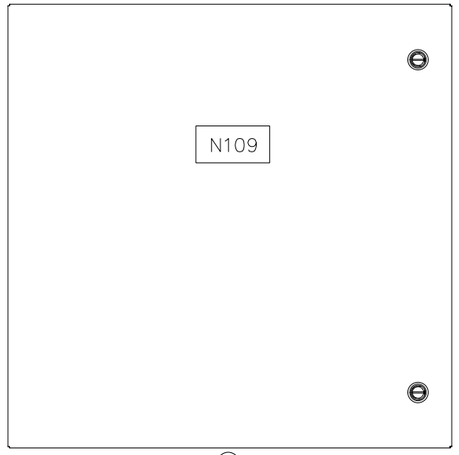
REF DWG(S):

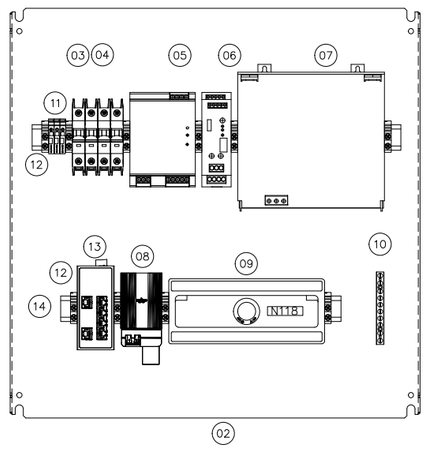
DRAWING NO.: HPVD-EL-2500

SHEET 4 OF 5



1 ONE-LINE DIAGRAM





2 PANEL ELEVATION – INSIDE

1:4 – 1" = 4" 4 0 4 8

1

BILL OF MATERIAL

REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	EA	2	24" X 24" X 10" NEMA 1 MILD STEEL WALL MOUNTED ENCLOSURE	
02	EA	1	INNER PANEL FOR 24X24X10 ENCLOSURE	
2 03	EA	1	25A, 600V UL489 1-POLE BREAKER	
04	EA	3	10A, 600V UL489 1-POLE BREAKER	
05	EA	1	PHOENIX CONTACT 120VAC/24VDC PS, 20 AMP	PHOENIX CONTACT/ 2866776
06	EA	1	PHOENIX CONTACT 20 AMP UPS	PHOENIX CONTACT/ 2320238
07	EA	1	PHOENIX CONTACT 12 Ah BATTERY	PHOENIX CONTACT/ 1274119
08	EA	1	150W PANEL HEATER W/BUILT IN REGULATION ON: 41°F – OFF: 59	STEGO/06021.0-00
09	EA	1	DATA MANAGER	SMA/EDMM-20
10	EA	1	UL467 GROUND BAR, 6 POLE MINIMUM	
11	EA	3	6MM DINRAIL MOUNTED TERMINAL BLOCK	
12	EA	10	6MM DINRAIL MOUNTED TERMINAL BLOCK END STOP	
13	EA	1	UNMANAGED ETHERNET SWITCH, 2 FIBER PORTS	MOXA/EDS-G308-2SPF
14	EA	1	35MM DIN MOUNTING RAIL	

3 PANEL BOM

NOTES:

1 ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN CAN BE CONTRACTOR DETERMINED, PROVIDED THAT THE CONTRACTOR DETERMINED PRODUCT MATCHES THE PRODUCT DESCRIPTION IN THE CENTER COLUMN, AND THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.

2 PROVIDE 1 SPARE CIRCUIT BREAKER FOR EACH SIZE (REF. NO. 3, AND RE. NO. 4) AND STORE IN BOTTOM OF ENCLOSURE

NOT FOR CONSTRUCTION

PROJECT: HUSLIA PV/BESS ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0360

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A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	HPVD-SS-2000/5	EQUIPMENT NAMEPLATE SCHEDULE

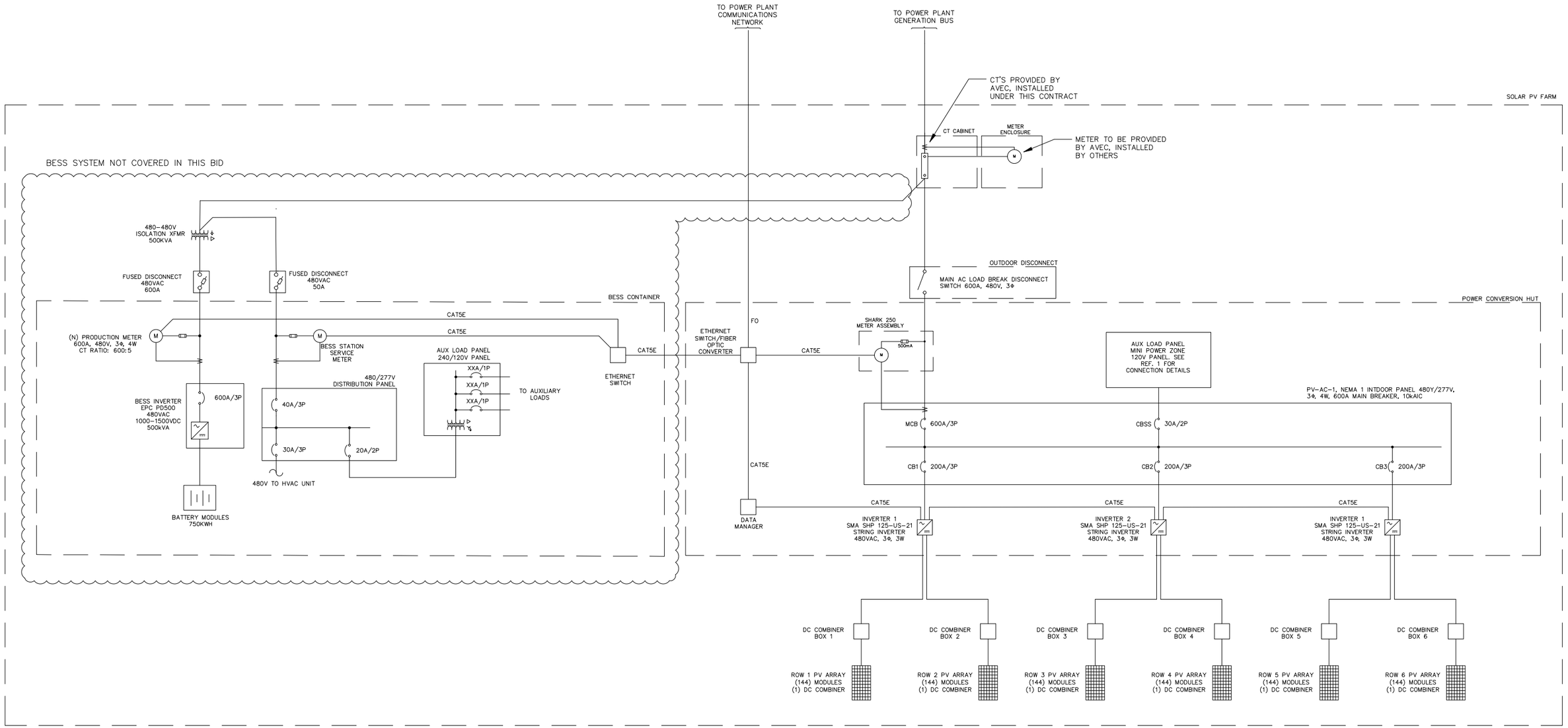
DRAWING NAME: TANANA CHIEFS CONFERENCE HUSLIA PV/BESS ENERGY COMMUNICATIONS PANEL DETAILS

hpvd-el-2500_5.dwg

REF DWG(S):

DRAWING NO.: HPVD-EL-2500

SHEET 5 OF 5



NOT FOR CONSTRUCTION

PROJECT: HUSLIA PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0360

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	MED/ 08-22-2025	MED/ 08-22-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

Electric Power Systems Inc.
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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

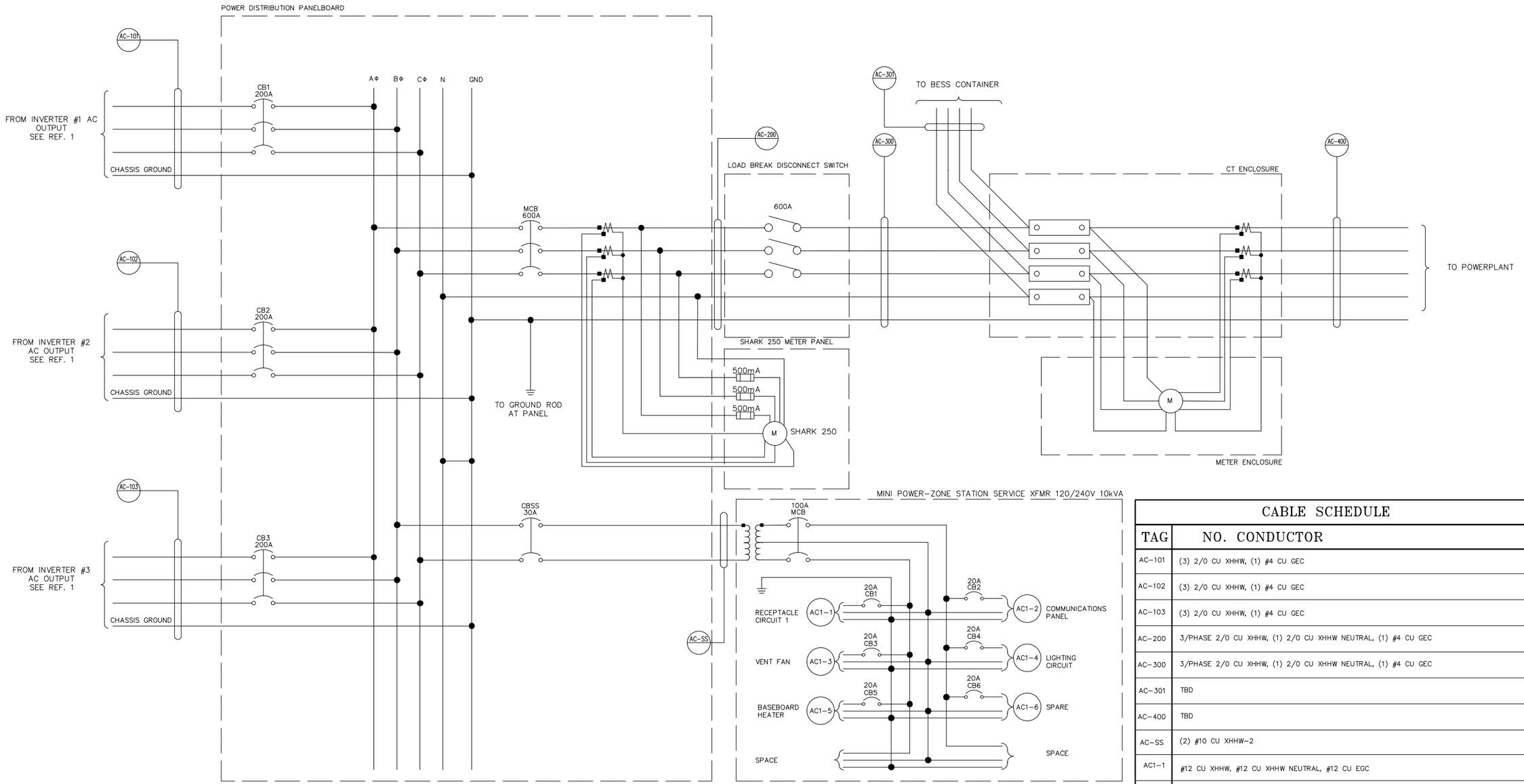
DRAWING NAME:
TANANA CHIEFS CONFERENCE HUSLIA PV/BESS DESIGN SITE ONELINE DIAGRAM

hpvd-el-0010_1.dwg

REF DWG(S):

DRAWING NO.: HPVD-EL-0010

SHEET 1 OF 1



NOT FOR CONSTRUCTION

NOTE:
- LOW VOLTAGE AC CONDUCTOR SIZING BASED ON A COPPER CONDUCTOR WITH A TEMPERATURE RATING OF 75°C.
- USE OF CABLE LARGER THAN SPECIFIED IN THE CABLE SCHEDULE IS ALLOWED, PROVIDED THAT THE TEMPERATURE RATING OF THE CONDUCTOR IS MAINTAINED.
- IF LARGER-THAN-SPECIFIED CABLE IS USED, CONFIRM THAT THE CONDUIT SIZE IN THE ASSOCIATED RACEWAY MAINTAINS A MAXIMUM 40% FILL RATIO
- SEE REF. 2 FOR CONDUIT SCHEDULE

CABLE SCHEDULE

TAG	NO. CONDUCTOR	RACEWAY
AC-101	(3) 2/0 CU XHHW, (1) #4 CU GEC	AC-0101
AC-102	(3) 2/0 CU XHHW, (1) #4 CU GEC	AC-0102
AC-103	(3) 2/0 CU XHHW, (1) #4 CU GEC	AC-0103
AC-200	3/PHASE 2/0 CU XHHW, (1) 2/0 CU XHHW NEUTRAL, (1) #4 CU GEC	AC-0200
AC-300	3/PHASE 2/0 CU XHHW, (1) 2/0 CU XHHW NEUTRAL, (1) #4 CU GEC	AC-0300
AC-301	TBD	TBD
AC-400	TBD	TBD
AC-SS	(2) #10 CU XHHW-2	1/2" EMT
AC1-1	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-2	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-3	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-4	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-5	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT

PROJECT: HUSLIA PV/BESS ENEGRY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0360

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A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

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Consulting Engineers
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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	HPVD-EL-0011/1	PV ARRAY DC WIRING DIAGRAM
2	HPVD-EL-2000/2	WIREWAY DETAILS

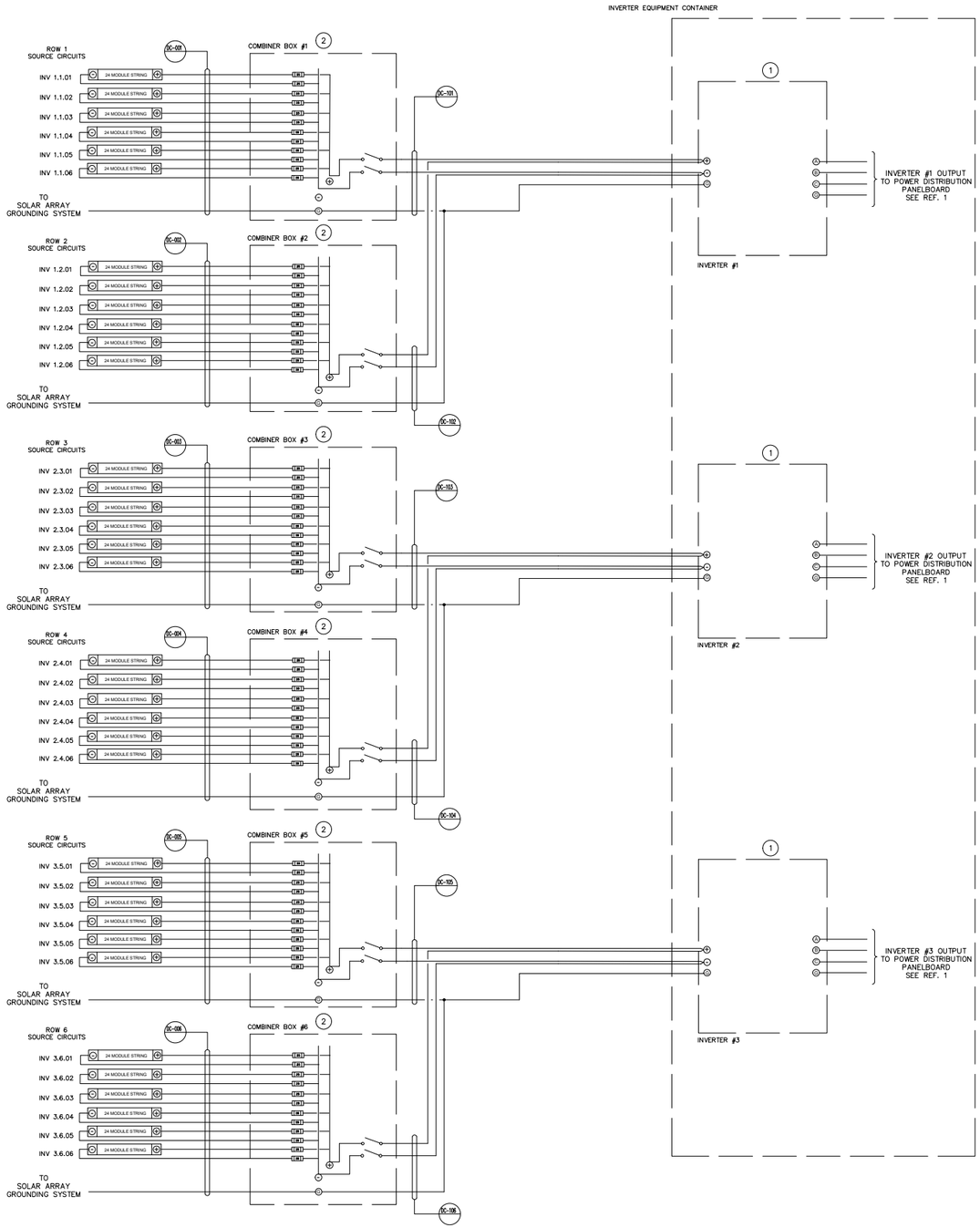
DRAWING NAME:
TANANA CHIEFS CONFERENCE HUSLIA PV/BESS DESIGN SITE THREE-LINE DIAGRAM

hpvd-el-0100_1.dwg

REF DWG(S):

DRAWING NO.: HPVD-EL-0100

SHEET 1 OF 1



LEGEND

INV X.X.XX
- DESTINATION INVERTER NO.
- DESTINATION COMBINER NO.
- SOURCE CIRCUIT NUMBER

CABLE SCHEDULE

TAG	NO. CONDUCTOR	RACEWAY
DC-001	(12) #10 CU PV WIRE, (1) #8 CU EGC	FREE AIR
DC-002	(12) #10 CU PV WIRE, (1) #8 CU EGC	FREE AIR
DC-003	(12) #10 CU PV WIRE, (1) #8 CU EGC	FREE AIR
DC-004	(12) #10 CU PV WIRE, (1) #8 CU EGC	FREE AIR
DC-005	(12) #10 CU PV WIRE, (1) #8 CU EGC	FREE AIR
DC-006	(12) #10 CU PV WIRE, (1) #8 CU EGC	FREE AIR
DC-101	(2) 1/0 AL PV WIRE, (1) #8 CU EGC	FREE AIR
DC-102	(2) 1/0 AL PV WIRE, (1) #8 CU EGC	FREE AIR
DC-103	(2) 1/0 AL PV WIRE, (1) #8 CU EGC	FREE AIR
DC-104	(2) 1/0 AL PV WIRE, (1) #8 CU EGC	FREE AIR
DC-105	(2) 1/0 AL PV WIRE, (1) #8 CU EGC	FREE AIR
DC-106	(2) 1/0 AL PV WIRE, (1) #8 CU EGC	FREE AIR

NOTE: DC CONDUCTOR SIZING BASED ON UL 4703 PV WIRE WITH A TEMPERATURE RATING OF 90°C, SEE CABLE SCHEDULE FOR

NOT FOR CONSTRUCTION

EQUIPMENT SCHEDULE

TAG	QUANTITY	DESCRIPTION
1	3	PV INVERTER; SMA SUNNY HIGHPOWER PEAK3 125-US
2	6	12 INPUT DC COMBINER; TERRASMART FSFT275-12-N4-CD OR EQUIVALENT

PROJECT: HUSLIA PV/BESS ENEGRY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0360

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	HPVD-EL-0100/1	AC THREE LINE DIAGRAM

DRAWING NAME:
TANANA CHIEFS CONFERENCE HUSLIA PV/BESS ENERGY PV ARRAY DC WIRING DIAGRAM

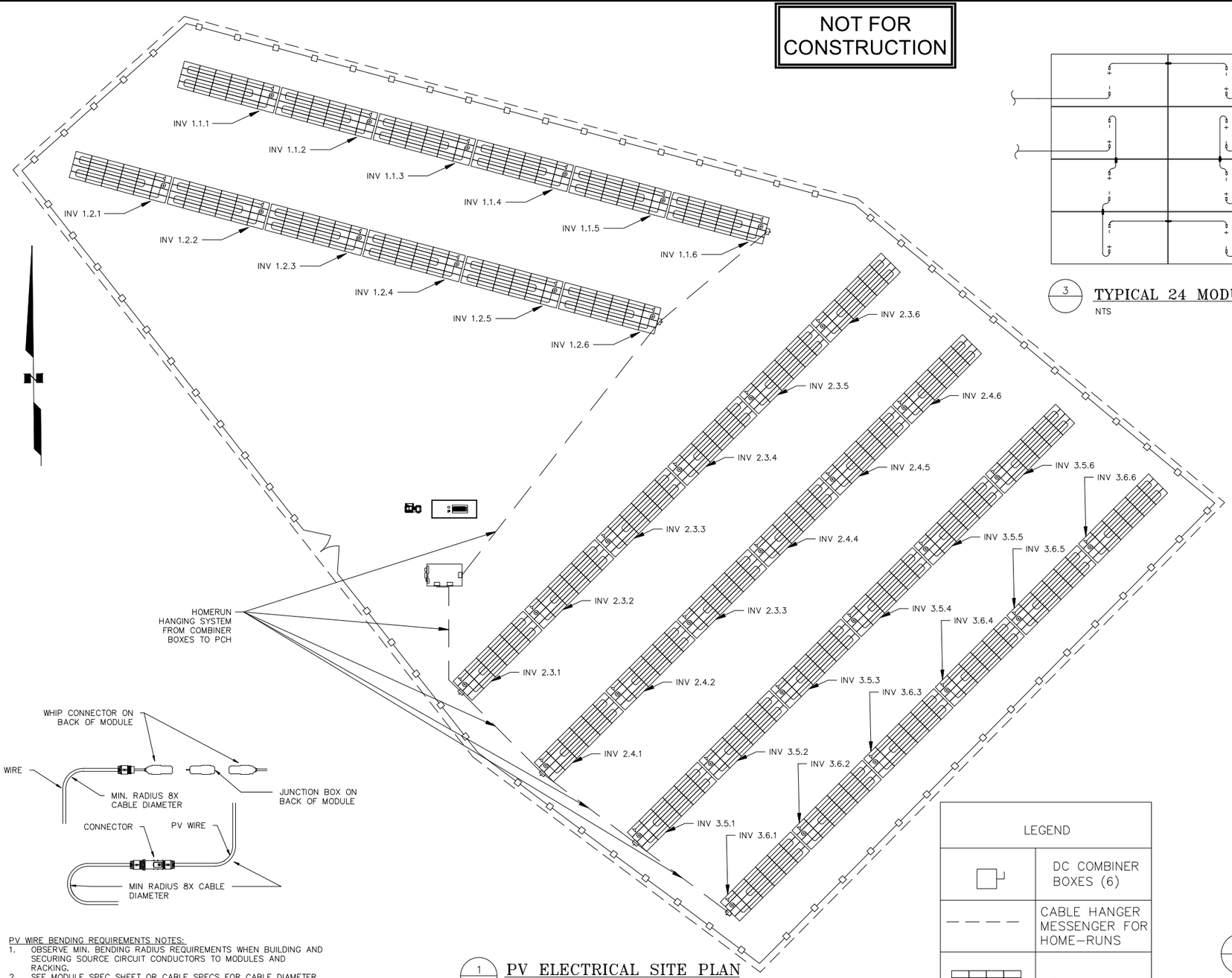
hpvd-el-0011_1.dwg

REF DWG(S):

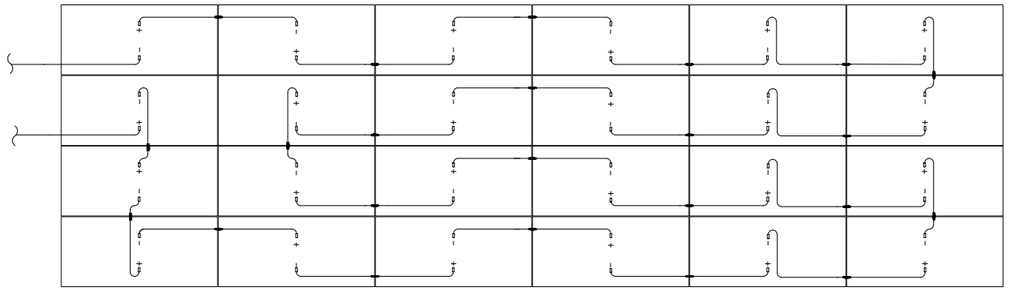
DRAWING NO.: HPVD-EL-0011

SHEET 1 OF 1

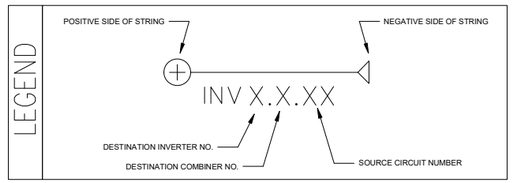
NOT FOR CONSTRUCTION



1 PV ELECTRICAL SITE PLAN
NTS



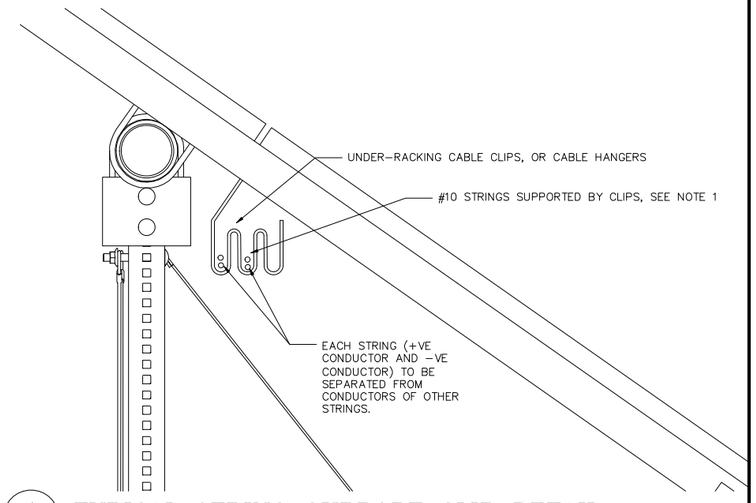
3 TYPICAL 24 MODULE SERIES WIRING
NTS



PV WIRE BENDING REQUIREMENTS NOTES:
1. OBSERVE MIN. BENDING RADIUS REQUIREMENTS WHEN BUILDING AND SECURING SOURCE CIRCUIT CONDUCTORS TO MODULES AND RACKING.
2. SEE MODULE SPEC SHEET OR CABLE SPECS FOR CABLE DIAMETER.

2 PV WIRE BENDING REQUIREMENTS
NTS

LEGEND	
	DC COMBINER BOXES (6)
— — — —	CABLE HANGER MESSENGER FOR HOME–RUNS
	PV ARRAY



4 TYPICAL STRING SUPPORT CLIP DETAIL

TYPICAL 24 MODULE SERIES WIRING NOTES:
1. SUPPORT #10 STRINGS WITH CABLE CLIPS, OR OTHER TCC APPROVED UNDER–RACKING CABLE MANAGEMENT SYSTEM AT MOST EVERY 4' (48"). INSTALL PER MANUFACTURERS RECOMMENDATIONS. EXACT PLACEMENT AND CONNECTION METHOD TO BE DETERMINED BY CONTRACTOR ON–SITE

PROJECT: HUSLIA PV/BESS ENEGRY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25–0360

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	FYRE–EL–0100/1	AC THREELINE DIAGRAM

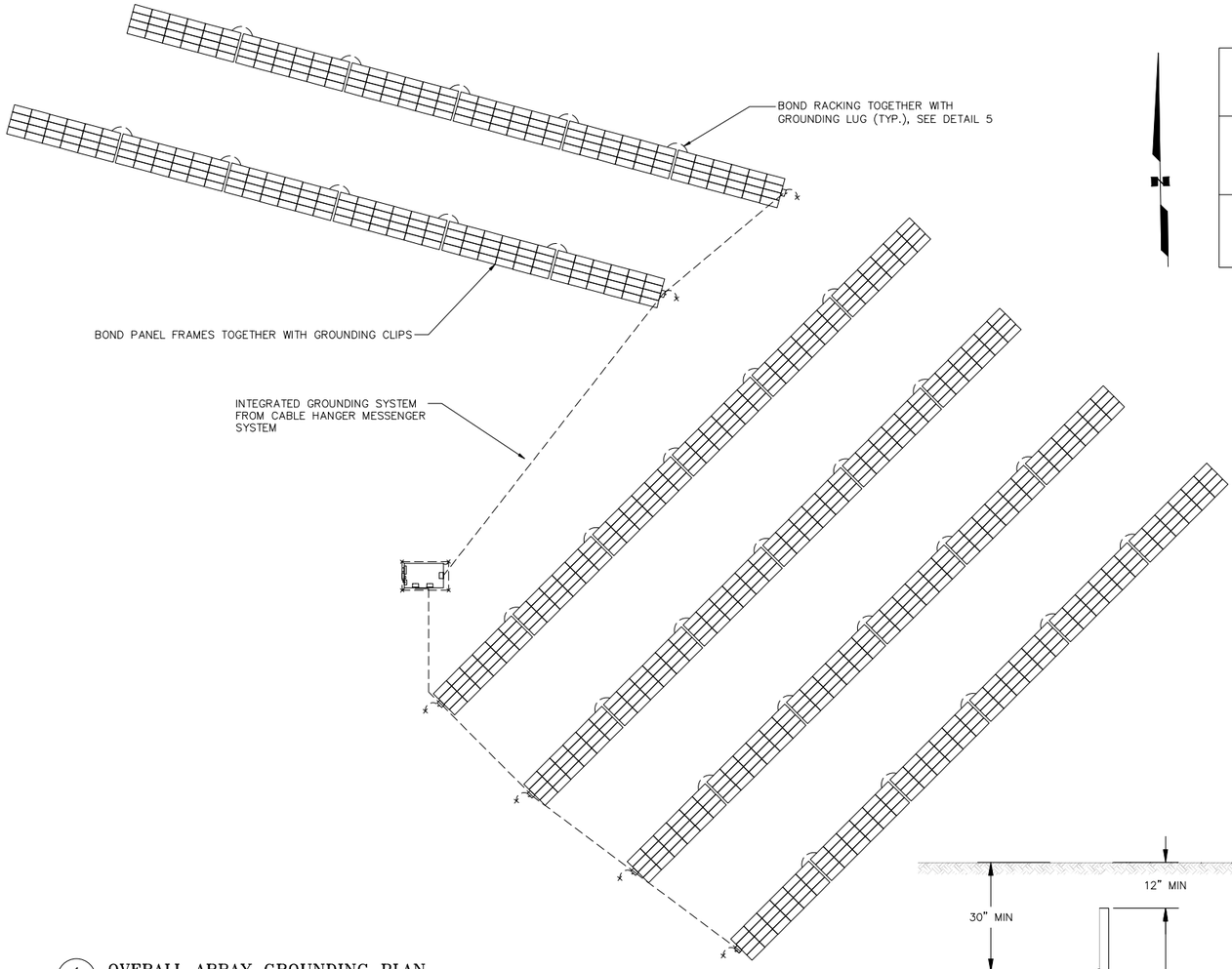
DRAWING NAME:
TANANA CHIEFS CONFERENCE
HUSLIA PV/BESS ENERGY
PV ELECTRICAL PLAN

hpvd–el–0020_1.dwg

REF DWG(S):

DRAWING NO.: HPVD–EL–0020

SHEET 1 OF 1

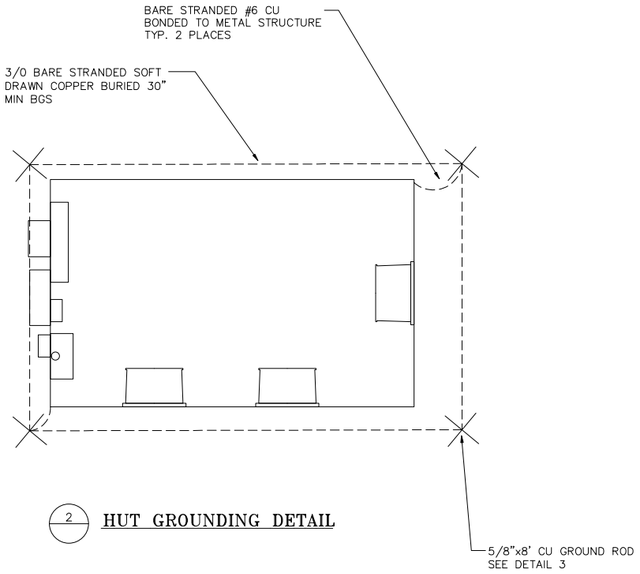


1 OVERALL ARRAY GROUNDING PLAN

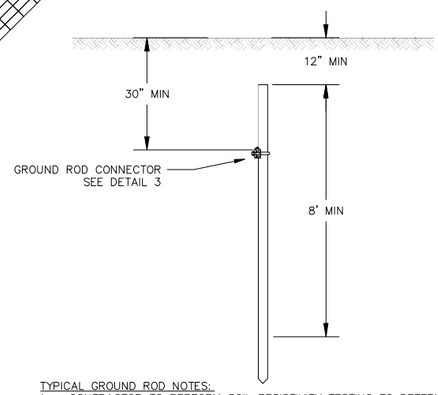
GROUNDING PLAN NOTES:

1. CONTRACTOR TO TEST EACH GROUNDING ELECTRODE USING THE FALL OF POTENTIAL TEST. GROUND RODS SPACED 6' MIN APART SHALL BE ADDED AS NECESSARY UNTIL A RESISTANCE TO GROUND VALUE OF 25 OHMS OR LESS IS ACHIEVED.
2. MIN. BARE COPPER GROUND WIRE SIZE SHALL BE #6.

LEGEND	
X	GROUNDING RODS
------	GROUNDING GRID

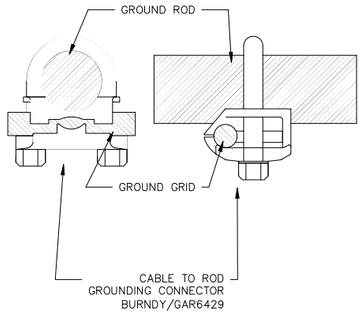


2 HUT GROUNDING DETAIL

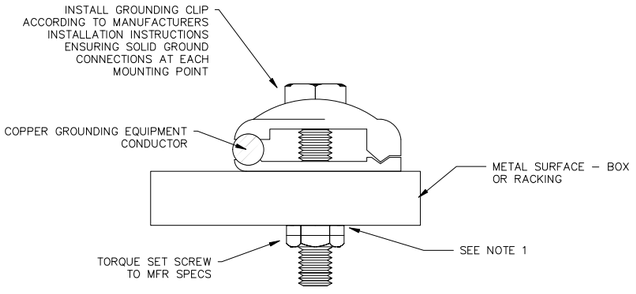


TYPICAL GROUND ROD NOTES:
1. CONTRACTOR TO PERFORM SOIL RESISTIVITY TESTING TO DETERMINE AMOUNT OF GROUND RODS NEEDED TO KEEP RESISTANCE BELOW 5 OHMS

3 TYPICAL GROUND ROD
NTS



4 GROUND ROD CONNECTION
NTS



TYPICAL METAL RACKING GROUNDING NOTES:
1. PRIOR TO MOUNTING LUGS ON ANODIZED ALUMINUM OR PAINTED METAL SURFACES, THE SURFACE MUST BE STRIPPED AND THEN COVERED WITH BURDNY PENETROX A-13 ANTI-OXIDANT COMPOUND BELOW THE LUG TO ENSURE CONDUCTIVITY
2. ON ANODIZED AL SURFACES, THE ANODIZATION SHALL BE GROUND OFF.
3. ON PAINTED SURFACES, THE PAINT LAYER SHALL BE GROUND OR SCRATCHED OFF.

5 TYPICAL METAL RACKING BONDING
NTS

NOT FOR CONSTRUCTION

PROJECT: HUSLIA PV/BESS ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0360

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

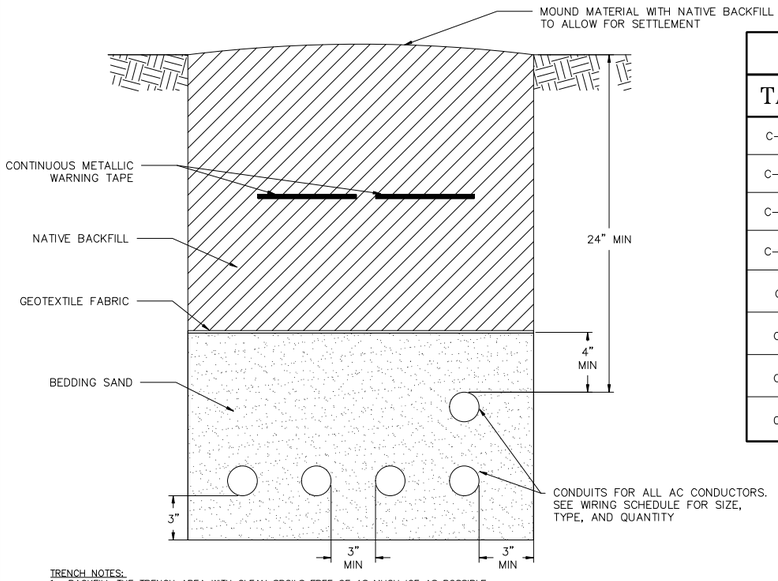
DRAWING NAME:
TANANA CHIEFS CONFERENCE
HUSLIA PV/BESS ENERGY
GROUNDING PLAN

hpvd-ss-2000_1.dwg

REF DWG(S):

DRAWING NO.: HPVD-SS-2000

SHEET 1 OF 5



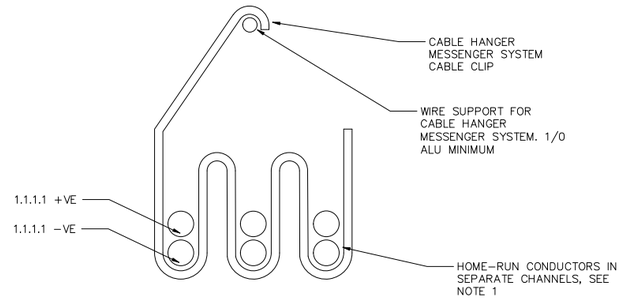
TRENCH NOTES:
1. BACKFILL THE TRENCH AREA WITH CLEAN SPOILS FREE OF AS MUCH ICE AS POSSIBLE.
2. CONSOLIDATION OF BACK FILL MATERIALS SHALL BE COMPLETED IN 12 INCH LIFTS MAXIMUM. INTENT OF THE CONSOLIDATION IS TO ENSURE ELIMINATION OF VOIDS.
3. FOR TRENCH IN GRAVEL, THE TRENCH CAP SHALL NOT EXCEED 4 INCHES. FOR TRENCH IN TUNDRA, THE TRENCH CAP SHOULD BE 35% – 40% OF THE TRENCH DEPTH (1.75' TO 2' FOR A 5' DEEP TRENCH), TO ALLOW FOR SETTLING AND ICE THAW. CONTRACTOR SHALL DISPOSE OF EXCESS EXCAVATED MATERIALS. FINAL CONTOURING OF THE TRENCH CAP IN TUNDRA SHOULD BE CONDUCTED BY HAND (MATCHING SURROUNDING DRAINAGE PATTERNS), TO ENSURE NO DIVERSION OF WATER OCCURS, RESULTING IN EROSION.
4. TRENCHES 1' WIDE SHOULD NOT NEED ANY SEEDING. FINAL REHABILITATION DETERMINATION TO BE MADE BY AGENCY REPRESENTATIVES.
5. COMPANY REPRESENTATIVE SHALL BE NOTIFIED AND PRESENT FOR ACCEPTANCE OF TRENCH PRIOR TO PLACEMENT OF CABLE AND BACKFILLING OF TRENCH (24–HOUR NOTICE REQUIRED). AGENCY REPRESENTATIVE SHALL ALSO PROVIDE ACCEPTANCE OF CABLE PRIOR TO BACKFILLING.
6. BEDDING SHALL BE 3/8" MINUS MATERIAL, NO CRUSHED OR SHARP ROCK. BEDDING MATERIAL SHALL NOT BE MACHINE COMPACTED WITHIN 6" OF CABLES. SLURRY OF A COMPOSITION THAT WILL NOT DAMAGE THE CABLE IS AN ACCEPTABLE BEDDING MATERIAL.
7. MAINTAIN 1" MIN. SEPARATION BETWEEN POWER CONDUCTORS AND COMMUNICATION CABLES

1 TYPICAL CONDUIT TRENCH
NTS

CONDUIT SCHEDULE (1)

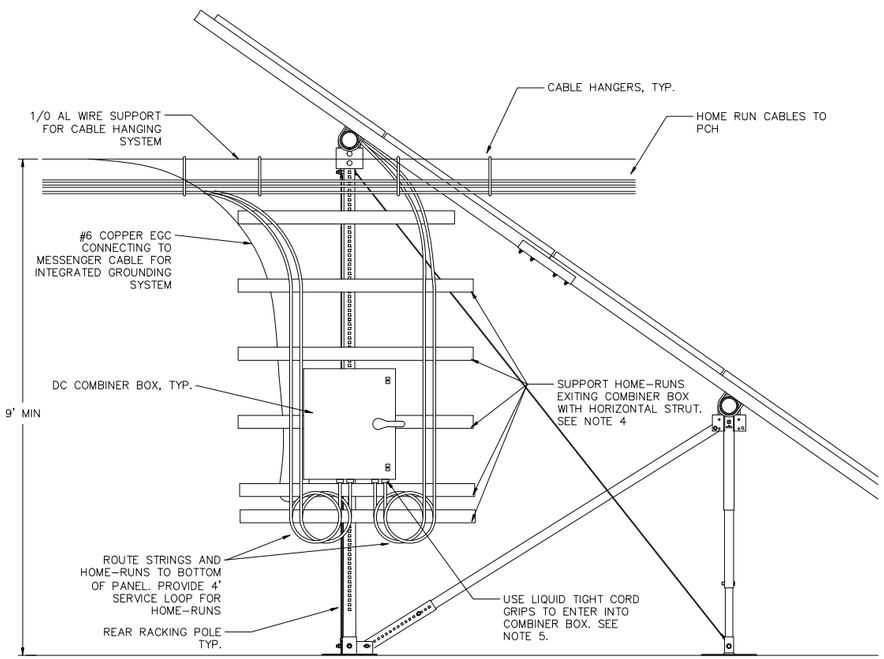
TAG	FUNCTION	CONDUIT TYPE	TRADE SIZE
C–0111	INV1 TO CB1	EMT	2"
C–0112	INV2 TO CB2	EMT	2"
C–0113	INV3 TO CB3	EMT	2"
C–0115	MCB1 TO LBDS	PVC	3"
C–1	LBDS TO CT.ENC.	PVC	3"
C–2	CT.ENC. TO PP	PVC	TBD
C–3	BESS TO CTENC	PVC	TBD
C–C	COMM PANEL TO PP	PVC	1"

LEGEND	
	DC COMBINER BOXES (2)
	CABLE HANGER MESSENGER
	UG POWER CABLE
	UG COMM CABLE
	CONDUIT STUB–UP AREA
	PV ARRAY



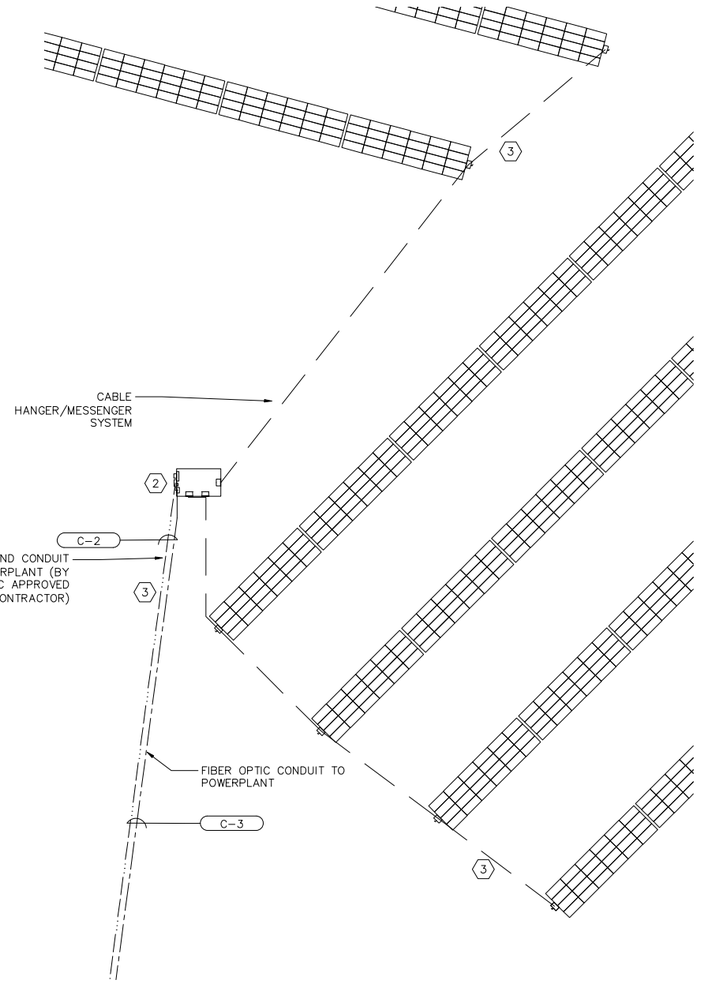
2 TYPICAL HOME–RUN CABLE HANGER DETAIL
NTS

TYPICAL HOME–RUN CABLE HANGER DETAIL NOTES:
1. HOME–RUN CONDUCTORS OF DIFFERENT CIRCUITS TO BE ROUTED IN SEPARATE CHANNELS IN CABLE HANGER MESSENGER SYSTEM. THE +VE AND –VE CONDUCTORS OF A SINGLE HOME–RUN CIRCUIT MAY BE ROUTED IN THE SAME CHANNEL.
2. INSTALL CABLE HANGERS IN REGULAR INTERVALS AS DIRECTED BY MANUFACTURERS INSTALLATION INSTRUCTIONS, OR, A DISTANCE OF NO MORE THAN 5' APART FROM EACH OTHER.
3. IF HOME–RUNS AND STRINGS ARE ROUTED IN THE SAME CABLE HANGER MESSENGER SYSTEM, SEPARATE HOME–RUNS AND STRINGS IN SEPARATE CHANNELS.



3 TYPICAL HOME RUN CABLE RUNWAY DETAIL
NTS

TYPICAL COMBINER BOX DETAIL NOTES:
1. ENSURE THAT CABLES ROUTED FROM HANGING SYSTEM TO COMBINER BOXES DO NOT EXCEED CONDUCTOR BENDING RADIUS
2. INSTALL CABLE HANGING SYSTEM ACCORDING TO MANUFACTURERS INSTALLATION INSTRUCTIONS
3. CONTRACTOR TO DETERMINE MOST SUITABLE MOUNTING SOLUTION FOR OVERHEAD CABLE MANAGEMENT SYSTEM
4. SUPPORT DC CABLES EXITING THE DC COMBINER BOX WITH A UV RESISTANT, OUTDOOR RATED CABLE TIE CONNECTED TO A HORIZONTAL STRUT. INSTALL CLOSEST CABLE SUPPORT A DISTANCE OF NO MORE THAN 12" AWAY FROM THE COMBINER BOX, AS MEASURED BY THE CABLE PATH. SUPPORT HOME–RUNS EVERY 12" UNTIL SUPPORTED BY CABLE HANGER MESSENGER SYSTEM. SUPPORT STRINGS EVERY 12" UNTIL SUPPORTED BY UNDER–RACKING CABLE MANAGEMENT SYSTEM.
5. USE A LIQUID TIGHT CORD GRIP OR CABLE GLAND FOR HOME–RUNS AND STRINGS WHEN ENTERING COMBINER BOX.



4 SITE WIREWAY LAYOUT
NTS

NOTES:
1. TRADE SIZE OF CONDUITS SHOWN IN CONDUIT SCHEDULE ARE MINIMUM SIZES BASED ON NEC CONDUIT FILL % (CHAPTER 9 TABLE 1). USE OF CONDUIT THAT IS LARGER IN TRADE SIZE THAN SPECIFIED IN CONDUIT SCHEDULE IS PERMITTED.
2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM PRODUCT DIMENSIONS, AND ROUTE CONDUITS TO APPROPRIATE STUB–UP AREAS.
3. CONDUIT AND WIREWAY ROUTING SHOWN ON DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. EXACT WIREWAY ROUTING TO BE DETERMINED BY CONTRACTOR ON–SITE.

NOT FOR CONSTRUCTION

PROJECT: HUSLIA PV/BESS ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25–0360

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10–08–2025	MED/10–08–2025

ENG. STAMP

Electric Power Systems Inc
Consulting Engineers
TEL: (907) 522–1953
FAX: (907) 522–1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
HUSLIA PV/BESS ENERGY
WIREWAY DETAILS
hpvd–ss–2000_2.dwg

REF DWG(S):

DRAWING NO.: HPVD–SS–2000

SHEET 2 OF 5

4"

3/8 MIN. TEXT

MANUAL DISCONNECT FOR PARALLEL GENERATION

3" (RED BACKGROUND)

LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECT. LABEL TO BE ENGRAVED PLASTIC.
(1) TOTAL

NOTICE

PHOTOVOLTAIC SYSTEM
GENERATION METER

LABEL TO BE LOCATED ON THE PV SYSTEM GENERATION METER.
(1) TOTAL

NEC 2023 690.13(B), 690.54

NOTICE

PHOTOVOLTAIC SYSTEM AC
DISCONNECT AND POWER SOURCE
RATED OUTPUT CURRENT: 453A
NOMINAL OPERATING VOLTAGE: 480VAC

LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECT. (1) TOTAL

NEC 2023 705.12(B)(3)(3)

⚠ *WARNING*

THIS EQUIPMENT FED BY MULTIPLE SOURCES

TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR.

PERMANENT WARNING LABEL SHALL BE APPLIED TO DISTRIBUTION EQUIPMENT WHERE THE PV SYSTEM INTERCONNECTS. (1) TOTAL

NEC 2023 690.7(D)

MAXIMUM DC VOLTAGE OF PV SYSTEM

MAXIMUM VOLTAGE: 1072VDC

LABEL TO BE LOCATED ON COVER OF DC DISCONNECTING MEANS. (6) TOTAL

NEC 2023 690.31(D)(2)

WARNING: PHOTOVOLTAIC POWER SOURCE

3/8 MIN.

RED BACKGROUND

LABEL SHALL BE LOCATED ON ALL EXPOSED RACEWAYS, CABLE TRAYS, OTHER WIRING METHODS, COVERS OR ENCLOSURES OF PULL BOXES AND JUNCTION BOXES AND ON CONDUIT BODIES IN WHICH ANY OF THE AVAILABLE CONDUIT OPENINGS ARE UNUSED. LABEL SHALL BE REFLECTIVE, AND ALL LETTERS CAPITALIZED AND SHALL BE MINIMUM HEIGHT OF 3/8" IN WHITE ON A RED BACKGROUND. SPACING BETWEEN LABELS OR MARKINGS, OR BETWEEN A LABEL AND MARKING, SHALL NOT BE MORE THAN 10FT.

NOT FOR CONSTRUCTION

PROJECT: HUSLIA PV/BESS ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0360

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

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WEB: WWW.EPSINC.COM

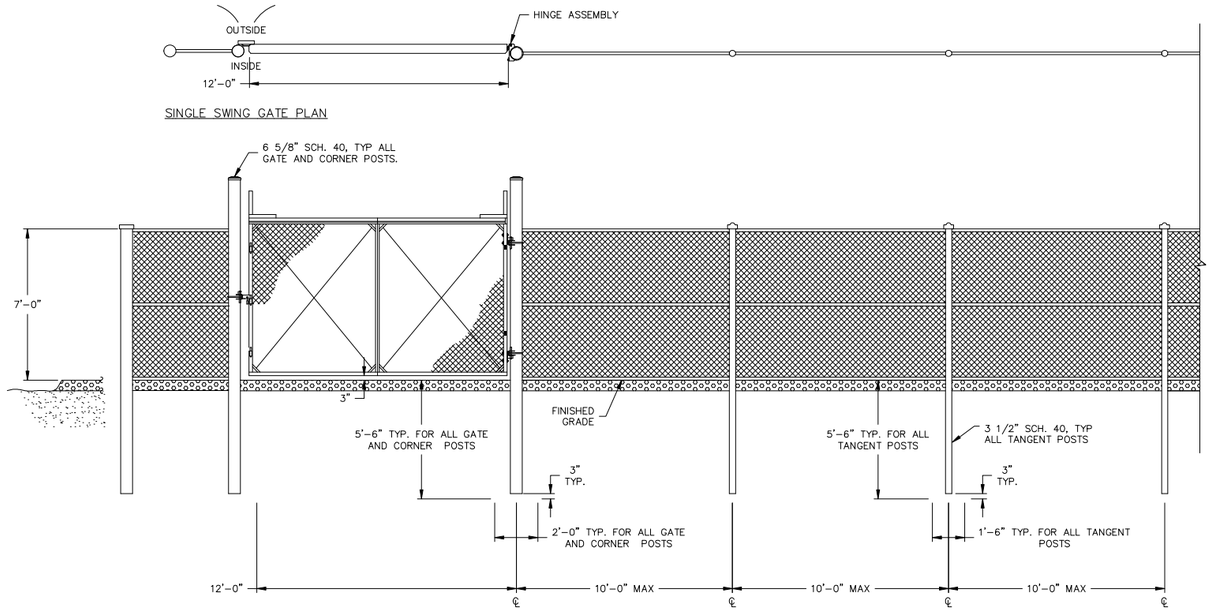
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
HUSLIA PV/BESS ENERGY
EQUIPMENT SAFETY LABEL SCHEDULE

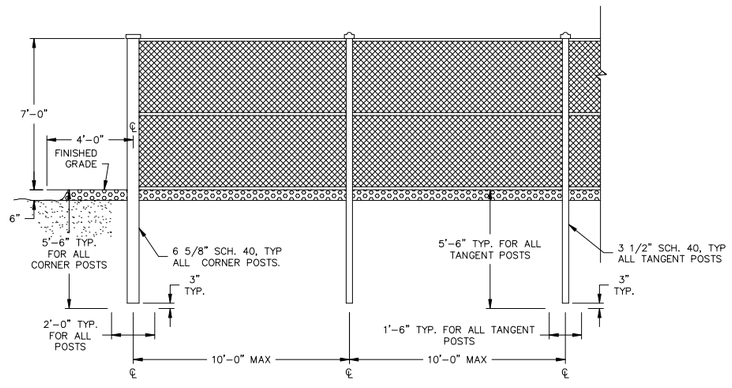
hpvd-ss-2000_3.dwg

REF DWG(S):

DRAWING NO.: HPVD-SS-2000



1 FENCE DOUBLE GATE ELEVATION



2 CORNER/TERMINAL FENCE POST ELEVATION

NOT FOR CONSTRUCTION

PROJECT: HUSLIA PV/BESS ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0360

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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
HUSLIA PV/BESS ENERGY
SITE FENCING
DETAILS
hpvd-ss-2000_4.dwg

REF DWG(S):

DRAWING NO.: HPVD-SS-2000

NAMEPLATE NUMBER	QTY	LINE 1 TEXT	LINE 2 TEXT	LINE 3 TEXT	NAMEPLATE SIZE HEIGHT x WIDTH (IN)	TEXT HEIGHT (IN)
N100	1	INVERTER 1			2 x 4	3/8
N101	1	INVERTER 2			2 x 4	3/8
N102	1	INVERTER 3			2 x 4	3/8
N103	1	DC COMBINER	BOX 1		2 x 4	3/8
N104	1	DC COMBINER	BOX 2		2 x 4	3/8
N105	1	DC COMBINER	BOX 3		2 x 4	3/8
N106	1	DC COMBINER	BOX 4		2 x 4	3/8
N107	1	DC COMBINER	BOX 5		2 x 4	3/8
N108	1	DC COMBINER	BOX 6		2 x 4	3/8
N109	1	COMMUNICATIONS	PANEL		2 x 4	3/8
N110	1	600A	MAIN AC PANEL		2 x 4	3/8
N111	1	POWER DISTRIBUTION	PANELBOARD		2 x 4	3/8
N112	1	CB 1			1 x 3	1/8
N113	1	CB 2			1 x 3	1/8
N114	1	CB 3			1 x 3	1/8
N115	1	CB SS			1 x 3	1/8
N116	1	MCB			1 x 3	1/8
N117	1	120V STATION SERVICE PANEL			2 x 4	3/8
N118	1	DATA MANAGER			1 x 3	1/8
N119	1	METER PANEL			2 x 4	3/8
N120	1	CT ENCLOSURE			2 x 4	3/8
N121	1	METER ENCLOSURE			2 x 4	3/8

NOTES:

1) ALL NAMEPLATES SHALL BE 1/16" THICK MINIMUM PLASTIC.
2) ALL NAMEPLATES SHALL HAVE EXTERIOR RATED HIGH-TACK ADHESIVE.
3) ALL NAMEPLATES SHALL BE BLACK SURFACE WTH WHITE TEXT.
4) ALL TEXT SHALL BE "ARIAL BOLD" FONT.
5) EACH LINE OF TEXT SHALL BE CENTERED ON THE NAMEPLATE.
6) ALL TEXT SHALL BE UPPER CASE.
7) ALL DIMENSIONS SHOWN IN INCHES.

NOT FOR CONSTRUCTION

PROJECT: HUSLIA PV/BESS ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0360

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE
HUSLIA PV/BESS ENERGY
EQUIPMENT NAMEPLATE SCHEDULE

hpvd-ss-2000_5.dwg

REF DWG(S):

DRAWING NO.: HPVD-SS-2000

SHEET 5 OF 5

Circuit Information			Electrical calculations													System Information								
Destination Inverter No.	Destination Combiner No.	Source Circuit No.	Modules (#)	Open Circuit Voltage (VOC)	Maximum Power Voltage (Vmp)	Short Circuit Current (Isc)	Continuous Current (1.25*Isc)	Irradiance Current (1.25*CC)	Mininum Fuse Size (A)	Selected Fuse Size (A)	Minimum Wire Ampacity (A)	Selected String Wire Size (UL4703, CU, AWG)	Maximum Wire Distance (FT)	Voltage Drop (V)	Voltage Drop (%)	Circuit Information from	to	Continuous Current (A)	Minimum Wire Ampacity From Selected Device (A)	Selected Wire Size (UL 4703 Al PV Wire) (AWG)	Distance (ft)	Voltage Drop (V)	Voltage Drop (%)	
1	1	1	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	10	0.56	0.05	DS1	INV1	131.16	132	1/0	405	0.20	2.01	
1	1	2	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29	DS2	INV1	131.16	132	1/0	340	0.93	1.68	
1	1	3	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	105	5.92	0.55	DS3	INV2	131.16	132	1/0	280	1.46	1.39	
1	1	4	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82	DS4	INV2	131.16	132	1/0	215	1.65	1.06	
1	1	5	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03	DS5	INV3	131.16	132	1/0	145	1.40	0.72	
1	1	6	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	250	14.10	1.32	DS6	INV3	131.16	132	1/0	80	0.99	0.40	
1	2	1	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	10	0.56	0.05									
1	2	2	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29			PANEL CHARACTERISTICS						
1	2	3	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	105	5.92	0.55			Voc (V)	52.58					
1	2	4	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82			Voc Coef. (%/°C)	−0.25					
1	2	5	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03			Vmp (V)	44.64					
1	2	6	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	250	14.10	1.32			Pmax Coef. (%/°C)	−0.3					
2	3	1	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	10	0.56	0.05									
2	3	2	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29			SITE CHARACTERISTICS						
2	3	3	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	105	5.92	0.55			T_Amb Min (°C)	−30					
2	3	4	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82			T_Amb Max (°C)	25					
2	3	5	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
2	3	6	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	250	14.10	1.32									
2	4	1	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	10	0.56	0.05									
2	4	2	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29									
2	4	3	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	105	5.92	0.55									
2	4	4	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82									
2	4	5	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
2	4	6	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	250	14.10	1.32									
3	5	1	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	10	0.56	0.05									
3	5	2	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29									
3	5	3	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	105	5.92	0.55									
3	5	4	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82									
3	5	5	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
3	5	6	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	250	14.10	1.32									
3	6	1	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	10	0.56	0.05									
3	6	2	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29									
3	6	3	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	105	5.92	0.55									
3	6	4	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82									
3	6	5	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
3	6	6	24	1435	1071.4	13.99	17.49	21.86	21.86	25	25	10	250	14.10	1.32									

NOTES:

1) TEMPERATURE CORRECTED OPEN CIRCUIT VOLTAGE CALCULATIONS ARE AS FOLLOWS: VOC = ((Voc * # MODULES) * (1 + ((T_AMB MIN − T_AMB MAX) * (VOC COEF.))

NOT FOR CONSTRUCTION

PROJECT: HUSLIA PV/BESS ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0360

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE
HUSLIA PV/BESS ENERGY
PV STRING CALCULATIONS

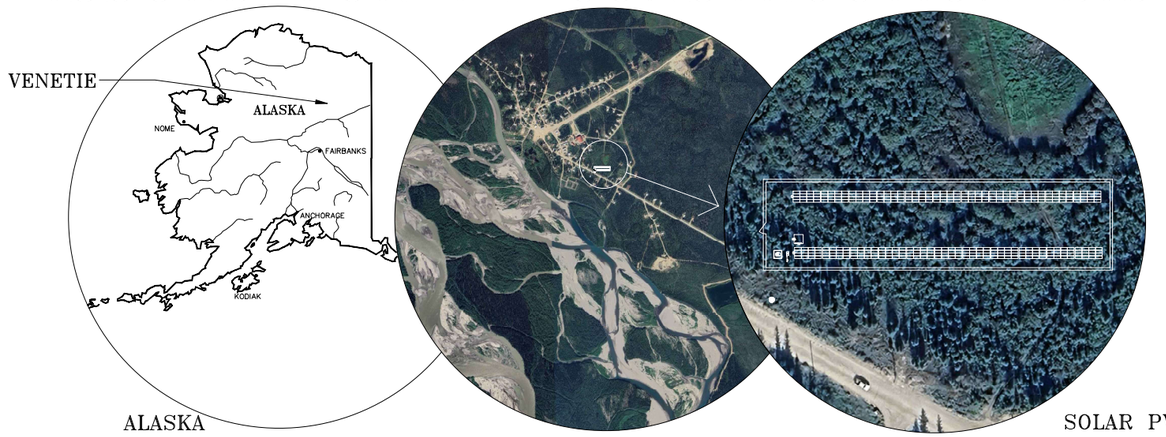
hpvd-ss-0700_1.dwg

REF DWG(S):

DRAWING NO.: HPVD-SS-0700

SHEET 1 OF 1

TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY DESIGN
ISSUED FOR PV CONSTRUCTION BID



ALASKA

VENETIE

SOLAR PV SITE

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182

DRAWING INDEX

TITLE	DRAWING NUMBER	SHEET	REVISION
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	VPBD-EL-0000	1	A
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	VPBD-EL-0000	2	A
~~SITE LAYOUT DIAGRAM~~	~~VPBD-EL-2500~~	~~1~~	~~D~~
SITE LAYOUT - PV	VPBD-EL-2500	2	B
SITE LAYOUT - INTERCONNECTION	VPBD-EL-2500	3	D
SITE LAYOUT - POWER CONVERSION HUT	VPBD-EL-2500	4	C
SITE LAYOUT - COMMUNICATIONS PANEL	VPBD-EL-2500	5	A
ONE LINE DIAGRAM	VPBD-EL-0010	1	B
THREE LINE DIAGRAM	VPBD-EL-0100	1	B
PV ARRAY DC WIRING DIAGRAM	VPBD-EL-0011	1	D
PV ELECTRICAL SITE PLAN	VPBD-EL-0020	1	C
GROUNDING PLAN	VPBD-SS-2000	1	A
WIREWAY DETAILS	VPBD-SS-2000	2	A
EQUIPMENT SAFETY LABEL SCHEDULE	VPBD-SS-2000	3	A
SITE FENCING DETAILS	VPBD-SS-2000	4	A
EQUIPMENT NAMEPLATE SCHEDULE	VPBD-SS-2000	5	A
TRANSFORMER DETAILS	VPBD-SS-2000	6	A
PV STRING CALCULATIONS	VPBD-EL-0700	1	C

BESS DRAWINGS NOT INCLUDED IN THIS DRAWING SET

SCOPE OF WORK

THE PROJECT SCOPE IS TO INSTALL A GRID-TIED SOLAR PHOTOVOLTAIC ~~AND BATTERY ENERGY STORAGE SYSTEM~~ IN VENETIE, AK.

THE SYSTEM CONSISTS OF GROUND MOUNTED SOLAR ARRAYS AND 1 STRING INVERTERS MOUNTED INSIDE A CONTAINER. ~~THE BATTERY MODULES AND INVERTER WILL BE HOUSED INSIDE A CONTAINER AND HAVE SELF-SERVING AUXILIARY LOADS.~~ BOTH SYSTEMS WILL OPERATE IN PARALLEL WITH THE LOCAL UTILITY AND HAVE RELATED ELECTRICAL SAFETY AND METERING SYSTEMS.

SYSTEM SUMMARY

PV SYSTEM SIZE: 209.44kWdc / 125kWac
INTERCONNECTION VOLTAGE: 12.47kV, 3 PHASE, 4 WIRE

GENERAL NOTES

ALL ELECTRICAL WORK TO BE INSTALLED BY A QUALIFIED AND LICENSED ELECTRICAL CONTRACTOR.

CONTRACTOR WILL FOLLOW IBC 2021 AND NFPA 70 NEC 2023 AS WELL AS ALL APPLICABLE LOCAL, STATE, MUNICIPAL AND CITY CODES, ORDINANCES AND REGULATIONS.

ALL MODULES AND INVERTERS SHALL BE UL LISTED 1703 & CEC APPROVED. ALL ELECTRICAL COMPONENTS AND MATERIALS SHALL BE LISTED FOR ITS PURPOSE AND INSTALLED IN A WORKMAN LIKE MANNER.

PRIOR TO INSTALLATION, THE CONTRACTOR SHALL UNDERSTAND ALL DRAWINGS AND PRODUCT MANUALS.

ALL DESIGN AND SPECIFICATIONS OF STRUCTURAL COMPONENTS ARE OUTSIDE THE SCOPE OF THESE PLANS.

PROJECT ENTITIES

OWNER: TANANA CHIEFS CONFERENCE

ENGINEER OF RECORD: ELECTRIC POWER SYSTEMS, INC.

ELECTRIC SERVICE PROVIDER: VILLAGE OF VENETIE ELECTRIC UTILITY

NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
COVER SHEET AND INDEX

vpbd-el-0001_1.dwg

REF DWG(S):

DRAWING NO.: VPBD-EL-0001

SHEET 1 OF 1

ELECTRICAL SPECIFICATIONS

GENERAL

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL A COMPLETE, TESTED, COMMISSIONED, AND SATISFACTORY ELECTRIC INSTALLATION IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS. THE INTENT OF THE DRAWINGS IS NOT TO SHOW OR LIST EVERY ITEM TO BE PROVIDED BY THE CONTRACTOR. IF AN ITEM IS NOT SHOWN OR LISTED THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE MISSING ITEMS TO ALLOW THE SYSTEM TO FUNCTION PROPERLY.

2. ALL DIMENSIONS AND LOCATIONS OF EXISTING CONDITIONS MUST BE VERIFIED PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES NOTED

3. ALL CONTRACTOR INITIATED CHANGES SHALL BE SUBMITTED IN WRITING TO THE ENGINEER OF RECORD FOR APPROVAL PRIOR TO ANY CHANGES IN THE FIELD.

4. EXACT LOCATION AND MOUNTING OF ALL EQUIPMENT SHALL BE VERIFIED IN THE FIELD.

5. THE CONTRACTOR SHALL READ AND UNDERSTAND ALL DRAWINGS AND EQUIPMENT MANUALS PRIOR TO INSTALLATION OR OPERATION OF EQUIPMENT. CONTRACTOR IS TO PROVIDE SKILLED LABOR FOR EACH TRADE WHOSE WORK RELATES TO THE DRAWINGS AND SPECIFICATIONS.

6. ALL OUTDOOR EQUIPMENT ENCLOSURES SHALL BE RATED NEMA 3R MINIMUM.

7. ALL THE EQUIPMENT SHOULD BE FREE FROM ANY DEBRIS, DAMAGED COMPONENTS AND ANY CONNECTION ISSUES.

8. THE CONTRACTOR SHALL KEEP ACCURATE RECORDS OF ALL DEVIATIONS IN WORK AS INSTALLED FROM WORK SPECIFIED ON THE DRAWINGS, OR IN THE SPECIFICATIONS, NOTING THE ORIGIN OF THE CHANGE.

9. SUFFICIENT ACCESS AND WORKING SPACE SHALL BE PROVIDED NEAR ELECTRICAL EQUIPMENT PER NEC ARTICLE 110.

10. CONTRACTOR SHALL PREPARE AN OPERATION AND MAINTENANCE MANUAL FOR ALL EQUIPMENT AND SYSTEMS INSTALLED.

11. CONDUIT JOINTS SHALL BE CUT SQUARE AND DE-BURRED UNTIL SMOOTH. BENDS SHALL BE MADE SO THAT THE CONDUIT IS NOT DAMAGED. THERE SHOULD NOT BE MORE THAN THE EQUIVALENT OF FOUR QUARTER-BENDS (360 DEGREES) BETWEEN PULL POINTS.

12. METALIC CONDUIT GROUNDS SHALL BE INSULATED AND SOLIDLY GROUNDED TO THE EGC SYSTEM. GROUNDS SHALL BE SIZED ACCORDING TO THE NEC.

13. CONDUCTORS SHALL BE COLOR-CODED, FACTORY OR FIELD APPLIED, WITH AN INDUSTRY STANDARD COLOR FOR EACH PHASE AND THE NEUTRAL.

RECORD DOCUMENTS

14. ON COMPLETION OF THE PROJECT, A COMPLETE SET OF MARKED-UP PRINTS SHOWING ANY DEVIATIONS SHALL BE DELIVERED TO THE ENGINEER OF RECORD. UNTIL THESE DRAWINGS ARE REVIEWED BY THE ENGINEER, THE CONTRACT SHALL REMAIN INCOMPLETE.

WIRING METHODS

15. EXPOSED PV WIRING SHALL BE PV WIRE TYPE, 90 DEGREE C, WET RATED AND UV RESISTANT.

16. PV SOURCE AND OUTPUT CIRCUIT CONDUCTORS SHALL BE RED FOR POSITIVE, BLACK FOR NEGATIVE, AND GREEN FOR GROUND. FIELD WIRING THAT IS NOT COLOR CODED SHALL BE MARKED AT BOTH ENDS SHOWING CIRCUIT POLARITY.

17. DC EQUIPMENT SHALL BE LISTED WITH A DC VOLTAGE GREATER THAN OR EQUAL TO THE MAXIMUM DC SYSTEM VOLTAGE.

18. INTERCONNECT WIRING AND POWER CONDUCTORS MUST BE IN ACCORDANCE WITH NEC NFPA 70. CONDUCTORS MUST CONFORM TO THE MINIMUM BEND RADIUS SPECIFIED IN THE SPECIFIC NEC ARTICLE. WIRE BUNDLES SHALL BE KEPT AWAY FROM SHARP EDGES TO AVOID DAMAGE TO WIRE INSULATION. CONDUCTORS SHALL BE COPPER RATED AT 90 DEGREES C UNLESS OTHERWISE NOTED IN THE DRAWINGS. FOR OUTDOOR INSTALLATIONS, CONDUITS AND FITTINGS SHALL BE PROPERLY NEMA RATED AS REQUIRED BY THE NEC.

19. CONNECTORS SHALL BE TORQUED PER DEVICE LISTING OR MANUFACTURER'S RECOMMENDATION.

20. AC WIRING SHALL BE COPPER RATED AT 90 DEGREES C, RATED 600VAC UNLESS OTHERWISE NOTED IN THE DRAWINGS.

21. PV SOURCE CIRCUITS IN FREE AIR SHALL BE PROPERLY SUPPORTED AND SEPARATED TO MAINTAIN AMPACITY RATINGS AND INSULATION INTEGRITY.

25. FIELD MADE CONNECTORS FOR PV QUICK CONNECTS SHALL BE THE SAME TYPE AND MANUFACTURER AS THE PV MODULES AND USE THE MANUFACTURER SPECIFIED CRIMPING TOOL.

GROUNDING

26. ONLY ONE CONNECTION TO DC CIRCUITS AND ONE CONNECTION TO AC CIRCUITS SHALL BE MADE FOR SYSTEM GROUNDING.

27. NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER EQUIPMENT GROUNDING TO ENSURE THE TERMINAL LUG IS PROPERTY BOLTED AND METAL-METAL CONTACT IS MADE. PAINT AND/OR FINISH AT THE POINT OF CONTACT IS TO BE REMOVED.

28. MODULES SHALL BE BONDED WITH EQUIPMENT GROUNDING CONDUCTORS BONDED TO A LOCATION APPROVED BY THE MANUFACTURER WITH A MEANS OF BONDING LISTED FOR THIS PURPOSE.

29. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, INCLUDING BUT NOT LIMITED TO GROUND RODS, GROUNDING LUGS, GROUNDING CLAMPS, ETC.

30. GROUNDING CONDUCTORS SHALL MEET THE FOLLOW SPECIFICATIONS:
 30.1. SOLID CONDUCTORS: ASTM B 3.
 30.2. STRANDED CONDUCTORS: ASTM B 8.
 30.3. TINNED CONDUCTORS: ASTM B 33.

31. GROUNDING BUS WHERE SPECIFIED SHALL BE RECTANGULAR BARS OF ANNEALED COPPER, CROSS SECTION SIZED FOR APPLICATION PER NEC, UNLESS OTHERWISE INDICATED; WITH INSULATORS.

32. GROUNDING CONDUCTORS SHALL BE ROUTED ALONG THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE. AVOID OBSTRUCTING ACCESS OR PLACING CONDUCTORS WHERE THEY MAY BE SUBJECTED TO STRAIN, IMPACT, OR DAMAGE.

33. INSTALL A GROUND CONDUCTOR LOOP AND GROUND RODS, ELECTRICALLY CONNECTED TO BUILDING STRUCTURE, GROUND RODS, AND EXTERIOR EQUIPMENT AS SHOWN ON DRAWINGS.

RACEWAYS

34. METAL CONDUIT AND TUBING SHALL MEET THE FOLLOWING STANDARDS:
 34.1. RIGID STEEL CONDUIT: ANSI C80.1.
 34.2. EMT: ANSI C80.3. (FOR INDOOR USE ONLY).
 34.3. LFMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.

35. FITTINGS FOR CONDUIT SHALL BE LISTED FOR TYPE AND SIZE RACEWAY WITH WHICH USED, AND FOR APPLICATION AND ENVIRONMENT IN WHICH INSTALLED.

36. COATED FITTINGS FOR PVC-COATED CONDUIT SHALL HAVE MINIMUM THICKNESS OF 0.040 INCHES WITH OVERLAPPING SLEEVES PROTECTING THREADED JOINTS.

37. NONMETALIC WIREWAY SHALL BE PROVIDED AS FIBERGLASS POLYESTER, EXTRUDED AND FABRICATED TO SIZE AND SHAPE INDICATED, WITH NO HOLES OR KNOCKOUTS. COVER IS GASKETED WITH OIL-RESISTANT GASKET MATERIAL AND FASTENED WITH CAPTIVE SCREWS TREATED FOR CORROSION RESISTANCE. CONNECTIONS ARE FLANGED, WITH STAINLESS-STEEL SCREWS AND OIL-RESISTANT GASKETS.

38. RACEWAYS FOR OPTICAL FIBER AND COMMUNICATIONS CIRCUITS SHALL BE INSTALLED AS FOLLOWS:
 38.1. 3/4-INCH TRADE SIZE AND SMALLER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 50 FEET.
 38.2. 1-INCH TRADE SIZE AND LARGER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 75 FEET.
 38.3. INSTALL WITH A MAXIMUM OF TWO 90-DEGREE BENDS OR EQUIVALENT FOR EACH LENGTH OF RACEWAY UNLESS DRAWINGS SHOW STRICTER REQUIREMENTS. SEPARATE LENGTHS WITH PULL OR JUNCTION BOXES OR TERMINATIONS AT DISTRIBUTION FRAMES OR CABINETS WHERE NECESSARY TO COMPLY WITH THESE REQUIREMENTS.

DISCONNECTING MEANS

39. MEANS SHALL BE PROVIDED TO DISCONNECT THE PV SYSTEM FROM WIRING SYSTEMS INCLUDING POWER SYSTEMS AND ENERGY STORAGE SYSTEMS.

40. PV DISCONNECTS SHALL NOT BE REQUIRED TO BE SUITABLE AS SERVICE EQUIPMENT AND SHALL BE RATED IN ACCORDANCE WITH ARTICLE 690 PART III: DISCONNECTING MEANS.

PANELBOARDS

41. CONTRACTOR SHALL PROVIDE THE FOLLOWING SUBMITTALS:

 41.1. EACH TYPE OF PANELBOARD, OVERCURRENT PROTECTIVE DEVICE, TRANSIENT VOLTAGE SUPPRESSION DEVICE, ACCESSORY, AND COMPONENT INDICATED. INCLUDE DIMENSIONS AND MANUFACTURERS' TECHNICAL DATA ON FEATURES, PERFORMANCE, ELECTRICAL CHARACTERISTICS, RATINGS, AND FINISHES.

 41.2. MANUFACTURER SEISMIC QUALIFICATION CERTIFICATION: SUBMIT CERTIFICATION THAT PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, ACCESSORIES, AND COMPONENTS WILL WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS" INCLUDE THE FOLLOWING:
  41.2.1. BASIS OF CERTIFICATION: INDICATE WHETHER WITHSTAND CERTIFICATION IS BASED ON ACTUAL TEST OF ASSEMBLED COMPONENTS OR ON CALCULATION.
  41.2.2. DIMENSIONED OUTLINE DRAWINGS OF EQUIPMENT UNIT: IDENTIFY CENTER OF GRAVITY AND LOCATE AND DESCRIBE MOUNTING AND ANCHORAGE PROVISIONS.
  41.2.3. DETAILED DESCRIPTION OF EQUIPMENT ANCHORAGE DEVICES ON WHICH THE CERTIFICATION IS BASED AND THEIR INSTALLATION REQUIREMENTS.

 41.3. FIELD QUALITY-CONTROL TEST REPORTS INCLUDING THE FOLLOWING:
  41.3.1. TEST PROCEDURES USED.
  41.3.2. TEST RESULTS THAT COMPLY WITH REQUIREMENTS.
  41.3.3. RESULTS OF FAILED TESTS AND CORRECTIVE ACTION TAKEN TO ACHIEVE TEST RESULTS THAT COMPLY WITH REQUIREMENTS.

 41.4. PANELBOARD SCHEDULES: FOR INSTALLATION IN PANELBOARDS. SUBMIT FINAL VERSIONS AFTER LOAD BALANCING.

 41.5. OPERATION AND MAINTENANCE DATA: FOR PANELBOARDS AND COMPONENTS TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS. IN ADDITION TO ITEMS SPECIFIED IN DIVISION 01 SECTION "OPERATION AND MAINTENANCE DATA," INCLUDE THE FOLLOWING:
  41.5.1. MANUFACTURER'S WRITTEN INSTRUCTIONS FOR TESTING AND ADJUSTING OVERCURRENT PROTECTIVE DEVICES.
  41.5.2. TIME-CURRENT CURVES, INCLUDING SELECTABLE RANGES FOR EACH TYPE OF OVERCURRENT PROTECTIVE DEVICE

42. CONTRACTOR SHALL MEET THE FOLLOWING QUALITY ASSURANCE STANDARDS:

 42.1. SOURCE LIMITATIONS: OBTAIN PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, COMPONENTS, AND ACCESSORIES THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER.
 42.2. PRODUCT OPTIONS: DRAWINGS INDICATE SIZE, PROFILES, AND DIMENSIONAL REQUIREMENTS OF PANELBOARDS AND ARE BASED ON THE SPECIFIC SYSTEM INDICATED. REFER TO DIVISION 01 SECTION "PRODUCT REQUIREMENTS."
 42.3. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
 42.4. COMPLY WITH NEMA PB 1.
 42.5. COMPLY WITH NFPA 70.

43. CONTRACTOR SHALL COORDINATE LAYOUT AND INSTALLATION OF PANELBOARDS AND COMPONENTS WITH OTHER CONSTRUCTION THAT PENETRATES WALLS OR IS SUPPORTED BY THEM, INCLUDING ELECTRICAL AND OTHER TYPES OF EQUIPMENT, RACEWAYS, PIPING, AND ENCUMBRANCES TO WORKSPACE CLEARANCE REQUIREMENTS.

44. CONTRACTOR SHALL PROVIDE PANELBOARD PRODUCTS THAT MEET THE FOLLOWING CRITERIA
 44.1. MANUFACTURER SHALL BE AS SHOWN ON DRAWINGS OR EQUAL.
 44.2. FABRICATE AND TEST PANELBOARDS ACCORDING TO IEEE 344 TO WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS."
 44.3. ENCLOSURES: SURFACE MOUNTED CABINETS. NEMA PB 1, TYPE 1.
  44.3.1. RATED FOR ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.
  44.3.2. OUTDOOR LOCATIONS: NEMA 250, TYPE 4X STAINLESS.
  44.3.3. OTHER WET OR DAMP INDOOR LOCATIONS: NEMA 250, TYPE 4X.
  44.3.4. FRONT: SECURED TO BOX WITH CONCEALED TRIM CLAMPS. FOR SURFACE-MOUNTED FRONTS, MATCH BOX DIMENSIONS; FOR FLUSH-MOUNTED FRONTS, OVERLAP BOX.
  44.3.5. FINISH:MANUFACTURER'S STANDARD ENAMEL FINISH OVER CORROSION-RESISTANT TREATMENT OR PRIMER COAT.
  44.3.6. DIRECTORY CARD: WITH TRANSPARENT PROTECTIVE COVER, MOUNTED IN METAL FRAME, INSIDE PANELBOARD DOOR

 44.4. PHASE AND GROUND BUSES:
  44.4.1. MATERIAL: HARD-DRAWN COPPER, 98 PERCENT CONDUCTIVITY.
  44.4.2. EQUIPMENT GROUND BUS: ADEQUATE FOR FEEDER AND BRANCH-CIRCUIT EQUIPMENT GROUND CONDUCTORS; BONDED TO BOX.

 44.5. CONDUCTOR CONNECTORS: SUITABLE FOR USE WITH CONDUCTOR MATERIAL.
  44.5.1. LUGS: MECHANICAL TYPE.

 44.6. SERVICE EQUIPMENT LABEL: UL LABELED FOR USE AS SERVICE EQUIPMENT FOR PANELBOARDS WITH MAIN SERVICE DISCONNECT SWITCHES.

 44.7. UL LABEL INDICATING SERIES-CONNECTED RATING WITH INTEGRAL OR REMOTE UPSTREAM OVERCURRENT PROTECTIVE DEVICES. INCLUDE SIZE AND TYPE OF UPSTREAM DEVICE ALLOWABLE, BRANCH DEVICES ALLOWABLE, AND UL SERIES-CONNECTED SHORT-CIRCUIT RATING.

45. CONTRACTOR SHALL PROVIDE OVERCURRENT PROTECTIVE DEVICES THAT MEET THE FOLLOWING CRITERIA:

 45.1. MOLDED-CASE CIRCUIT BREAKER: PROVIDE BREAKERS FROM PANELBOARD MANUFACTURER. UL 489, WITH SERIES-CONNECTED RATING TO MEET AVAILABLE FAULT CURRENTS

 45.2. THERMAL-MAGNETIC CIRCUIT BREAKERS: INVERSE TIME-CURRENT ELEMENT FOR LOW-LEVEL OVERLOADS, AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS. ADJUSTABLE MAGNETIC TRIP SETTING FOR CIRCUIT-BREAKER FRAME SIZES 250 A AND LARGER

 45.3. ADJUSTABLE INSTANTANEOUS-TRIP CIRCUIT BREAKERS: MAGNETIC TRIP ELEMENT WITH FRONT-MOUNTED, FIELD-ADJUSTABLE TRIP SETTING.

 45.4. ELECTRONIC TRIP-UNIT CIRCUIT BREAKERS SHALL HAVE RMS SENSING; FIELD-REPLACEABLE RATING PLUG; AND WITH THE FOLLOWING FIELD-ADJUSTABLE SETTINGS:
  45.4.1. INSTANTANEOUS TRIP.
  45.4.2. LONG- AND SHORT-TIME PICKUP LEVELS.
  45.4.3. LONG- AND SHORT-TIME TIME ADJUSTMENTS.
  45.4.4. GROUND-FAULT PICKUP LEVEL, TIME DELAY, AND I2/T RESPONSE.

 45.5. GFCI CIRCUIT BREAKERS: SINGLE- AND TWO-POLE CONFIGURATIONS WITH 5-MA WHERE INSTALLED PROTECTION OF GENERAL USE RECEPTACLES. WHERE REQUIRED, 30-MA TRIP SENSITIVITY FOR CIRCUITS INSTALLED TO SUPPLY SPECIFIC EQUIPMENT.

REQUIRED SAFETY SIGNS AND LABELS

1. THE MARKING SHALL ADEQUATELY WARN OF THE HAZARD USING EFFECTIVE WORDS AND/OR COLORS AND/OR SYMBOLS PER NEC 110.21.

2. THE LABEL SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN PER NEC 110.21.

3. THE LABEL SHALL BE OF SUFFICIENT DURABILITY ABLE TO WITHSTAND THE ENVIRONMENT INSTALLED IN PER NEC 110.21.

4. LABELS AND MARKINGS SHALL BE APPLIED TO THE APPROPRIATE COMPONENTS IN ACCORDANCE WITH THE NEC.

5. PV MODULES AND INVERTERS ARE TO BE SUPPLIED FROM THE MANUFACTURER WITH PRE-APPLIED MARKINGS TO MEET THE REQUIREMENTS OF NEC 690.51 & 690.41(B)(1).

6. UNLESS OTHERWISE SPECIFIED ON THE LABELING SHEET, OSHA 1910.145 AND ANSI Z535 RECOMMENDED SPECIFICATIONS ARE AS FOLLOWS:
 6.1. ROUNDED OR BLUNT CORNERS FREE OF SHARP EDGES.
 6.2. VISIBLE AT A MINIMUM DISTANCE OF 5FT. OR GREATER.
 6.3. "DANGER" HEADER; RED BACKGROUND WITH WHITE LETTERING.
 6.4. "WARNING" HEADER; ORANGE BACKGROUND WITH BLACK LETTERING.
 6.5. "CAUTION" HEADER; YELLOW BACKGROUND WITH BLACK LETTERING.
 6.6. "NOTICE" LABEL HEADER TO BE IN BLUE WITH WHITE LETTERING.
 6.7. OTHER TEXT TO BE BLACK ON A WHITE BACKGROUND.

7. ALL RELEVANT COMPONENTS OF THE PHOTOVOLTAIC SYSTEM SHALL BE CLEARLY MARKED AND LABELED IN ACCORDANCE WITH NEC ARTICLE 690.

NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

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DRAWING NAME:
TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
GENERAL INFORMATION AND SPECIFICATIONS

vpbd-el-0000_2.dwg

REF DWG(S):

DRAWING NO.: VPBD-EL-0000

SHEET 2 OF 2

STANDARD BLOCKS – ELECTRICAL

STANDARD ABBREVIATIONS – ELECTRICAL

A	AMPERE
ACB	AIR CIRCUIT BREAKER
AB	AIR BREAK
ABV	ABOVE
AC	ALTERNATING CURRENT
ADJ	ADJUSTABLE
ADJT	ADJACENT
ALT	ALTERNATE
AL	ALUMINUM
APPRX	APPROXIMATE
B	BUS
BF	BREAKER FAIL
BFI	BREAKER FAIL INITIATE
BKR	BREAKER
BLDG	BUILDING
BLK	BLOCK
BOT	BOTTOM
BTU	BRITISH THERMAL UNIT
BTWN	BETWEEN
BU	BACKUP
C	COLOUMB
CAP	CAPACITOR OR CAPACITANCE
CAP	CORRUGATED ALUMINUM PIPE
CB	CENTER BREAK
CBL	CABLE
CEM	CEMENT
CF	CUBIC FOOT
CHK	CHECK
CI	CAST IRON
CIP	CAST IRON PIPE
CIPC	CAST–IN–PLACE CONCRETE
CIR	CIRCLE
CKT	CIRCUIT
CLK	CLOCK
CLS	CLOSE
CMIL	CIRCULAR MIL
CMP	CORRUGATED METAL PIPE
COS	COSINE
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CS	
CSP	CORRUGATED STEEL PIPE
CT	CURRENT TRANSFORMER
CTRL	CONTROLSWITCHER OR CONTROL SWITCH
CTS	CLEAR TO SEND
CU	COPPER
DC	DIRECT CURRENT
DCD	DATA CARRIER DETECT
DCE	DATA COMMUNICATIONS EQUIPMENT
DDE	DOUBLE DEAD END
DE	DEAD END
DEM	DEMOLISH, DEMOLITION
DEMOB	DEMOBILIZE
DET	DETAIL
DFR	DISTURBANCE FAULT RECORDER
DI	DIGITAL INPUT
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIST	DISTRIBUTION
DNP	DISTRIBUTED NETWORK PROTOCOL
DO	DIGITAL OUTPUT
DSSS	D STREET SUBSTATION
DTE	DATA TERMINAL EQUIPMENT
DWG	DRAWING
EA	EACH
EIA	ELECTRONICS INDUSTRY ASSOCIATION
EJ	EXPANSION JOINT
EL	ELECTRICAL
ELEV	ELEVATION
ENCL	ENCLOSURE
EQ	EQUAL
EQUIP	EQUIPMENT
EST	ESTIMATE
EXIST	EXISTING
F	FARAD
F	FUSE
FREQ	FREQUENCY
FT	FEET
FT	FEED THROUGH
FUT	FUTURE
G	CONDUCTANCE OR GROUND
GA	GAUGE
GALV	GALVANIZED
GB	GROUND BUS
GCB	GAS CIRCUIT BREAKER
GEN	GENERATOR
GI	GALVANIZED IRON
GND	GROUND
GOAB	GANG OPERATED AIR–BREAK SWITCH
GRC	GALVANIZED RIGID CONDUIT
GRD	GRADE, GRADING
GRSC	GALVANIZED RIGID STEEL CONDUIT
H	HENERY
HDPE	HIGH–DENSITY POLYETHYLENE
HLO	HOT LINE ORDER
HORIZ	HORIZONTAL
HP	HORSEPOWER
HZ	HERTZ
IA	PHASE A CURRENT
IB	PHASE B CURRENT
IC	PHASE C CURRENT
ID	INSIDE DIAMETER
IN	INPUT
IN	INCH
IN	NEUTRAL CURRENT
INCL	INCLUDE(D), INCLUDING
IND	INDUSTRY
INT	INTERSECTION
INV	INVERT
IP	POLARIZING CURRENT
j	COMPLEX NUMBER
J	JOULE
JB	JUNCTION BOX
KA	KILOAMPRERE
KV	KILOVOLT
KW	KILOWATT
L	INDUCTANCE
L	LINE
L	LOAD
LB	LOAD BREAK
LGPP	LANDFILL GAS POWER PLANT
LT	LIGHT
M	METER(S)
MAT	MATERIAL
MAX	MAXIMUM
MFG	MANUFACTURER
MI	MILE
MIN	MINIMUM
MISC	MISCELLANEOUS
MM	MILLIMETER(S)
MO	MOTOR OPERATED (OR)
MOB	MOBILIZE
MTR	METER
MW	MEGAWATT
N	NEUTRAL
N	NEWTON
N	NORTH
NC	NORMALLY CLOSED
NCC	NORMALLY CLOSED CONTACT
N/C	NO CONNECTION
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOC	NORMALLY OPEN CONTACT
NS	SYNCHRONIZING NEUTRAL
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
OUT	OUTPUT
P	REAL POWER OR PRIMARY
PB	PUSH BUTTON
PF	POWER FACTOR
PLC	PROGRAMMABLE LOGIC CONTROLLER
PM	PAD–MOUNT TRANSFORMER
PSSS	PROVIDER SWITCHYARD
PT	POINT
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER
Q	REACTIVE POWER
R	RESISTANCE OR RESISTOR
RCLS	RECLOSE
RAD	RADIUS
RAD	RADIAN
RD	ROAD
RE	REMOTE END
REF	REFERENCE
REQD	REQUIRED
RET	REMOTE END TRIP
RET	RETURN
REV	REVISION
RLY	RELAY
RR	RAILROAD
ROW	RIGHT OF WAY
RTS	READY TO SEND
RTU	REMOTE TERMINAL UNIT
RX	RECEIVE
S	APPARENT POWER
S	SOUTH
S	SOURCE
S–L	SOURCE–LOAD
SA	SURGE ARRESTOR
SC	SWITCH CABINET
SEC	SECTION
SEC	SECONDARY
SVC	SERVICE
SVC	STATIC VAR COMPENSATOR
SHT	SHEET
SIM	SIMILAR
SIN	SINE
SPEC	SPECIFICATION
SPECS	SPECIFICATIONS
SPSS	SPARTAN SUBSTATION
SS	SYNCHRONIZING SWITCH
STA	STATION
STD	STANDARD
SW	SWITCH
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
SYNCH	SYNCHRONIZE
T	TIME OR TRANSFORMER
TAN	TANGENT
TCM	TRIP COIL MONITOR
TEL	TELEPHONE
TERM	TERMINAL
TEMP	TEMPORARY
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
TRP	TRIP
TURB	TURBINE
TX	TRANSMIT
TYP	TYPICAL
UG	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
V	VOLT
VA	VOLTAMPERE
VA	PHASE A VOLTAGE
VAR	REACTIVE POWER
VB	PHASE B VOLTAGE
VAC	ALTERNATING CURRENT VOLTAGE
VC	PHASE C VOLTAGE
VCB	VACUUM CIRCUIT BREAKER
VDC	DIRECT CURRENT VOLTAGE
VERT	VERTICAL
VIF	VERIFY IN FIELD
VN	NEUTRAL VOLTAGE
VR	VOLTAGE REGULATOR
VREG	VOLTAGE REGULATOR
VS	SYNCHRONIZING VOLTAGE
VT	VOLTAGE TRANSFORMER
W	WEST
W	WATT
W/	WITH
W/O	WITHOUT
X	REACTANCE
XFMR	TRANSFORMER
XMSSN	TRANSMISSION
Y	ADMITTANCE
YL	YELLOW
Z	IMPEDANCE
2	TIME–DELAY
21	DISTANCE
25	SYNCHRONISM CHECK
27	UNDERVOLTAGE
30	ANNUNCIATOR
32	DIRECTIONAL POWER
37	UNDERCURRENT OR UNDERPOWER
38	BEARING
40	FIELD
43	MANUAL TRANSFER OR SELECTOR DEVICE
46	REVERSE–PHASE
47	PHASE–SEQUENCE VOLTAGE
49	MACHINE OR TRANSFORMER THERMAL RELAY
50	INSTANTANEOUS OVERCURRENT
51	AC TIME OVERCURRENT
52	AC CIRCUIT BREAKER
52a	NORMALLY OPEN BREAKER CONTACT
52b	NORMALLY CLOSED BREAKER CONTACT
59	OVERVOLTAGE
60	VOLTAGE BALANCE
63	PRESSURE SWITCH
64	APPARATUS GROUND
67	AC DIRECTIONAL OVERCURRENT
68	BLOCKING
69	PERMISSIVE
71	LEVEL SWITCH
74	ALARM
76	DC OVERCURRENT
78	OUT–OF–STEP
79	RECLOSING RELAY
81	FREQUENCY
85	CARRIER OR PILOT WIRE
86	LOCK OUT
87	DIFFERENTIAL
94	TRIPPING

NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: MAX DONALDSON/JOHN VENABLES JOB #: 25–0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10–08–2025	MED/10–08–2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522–1953
FAX: (907) 522–1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
GENERAL INFORMATION AND SPECIFICATIONS
vpbd–el–0000_2.dwg

REF DWG(S):

DRAWING NO.: VPBD–EL–0000

SHEET 2 OF 2

1 PV ARRAY SITE OVERVIEW

32 0 32 64 FEET

SCALE: 1" = 32'-0"

LEGEND	
	DC COMBINER BOXES (2)
	FENCE LINE
	LIMIT OF DISTURBANCE
	PV ARRAY
	SOLAR INVERTER (1)

NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENEGRY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	MED/05-01-2025	JRV/05-01-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

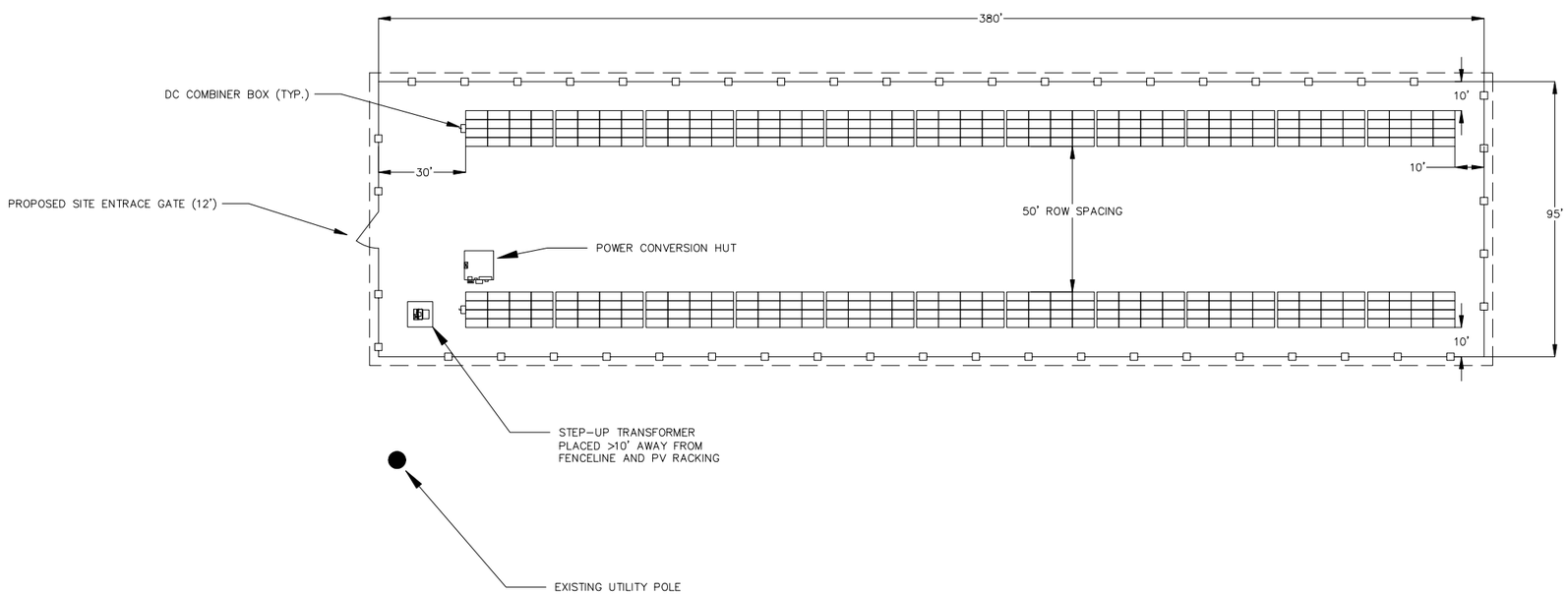
DRAWING NAME: TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
PV ARRAY LAYOUT DIAGRAM

vpbd-el-2500_2.dwg

REF DWG(S):

DRAWING NO.: VPBD-EL-2500

SHEET 2 OF 5



1 PV ARRAY SITE OVERVIEW

0 25 50 75

SCALE: 1" = 25'-0"

System Summary

Physical Arrangement

Methodology	Fixed Tilt, Ground Mount
Tilt	35°
Azimuth	180°
Racking System / Model	Nuance Osprey PowerRACK

Electrical Arrangement

Watts per Module	595W
22 Module Strings	16
Quantity of Modules	352
Total DC System Size	209,440W

Inverter Arrangement

Manufacturer	SMA
Model	Sunny Highpower PEAK3 125-US
Inverter Size	125kW
Quantity of Inverters	1
Strings per Inverter	16

PV Modules

Manufacturer	SEG Solar
Model	SEG-595-BTA-BG
Peak Power	595W
Quantity of Modules	352

LEGEND	
	DC COMBINER BOXES (2)
	FENCE LINE
	LIMIT OF DISTURBANCE
	PV ARRAY
	SOLAR INVERTER (1)

NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENEGRY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR DISTRIBUTION DESIGN	MED/09-04-2025	JRV/09-04-2025
D	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

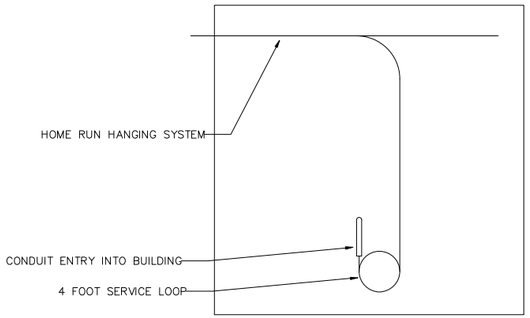
DRAWING NAME: TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
PV ARRAY LAYOUT DIAGRAM

vpbd-el-2500_3.dwg

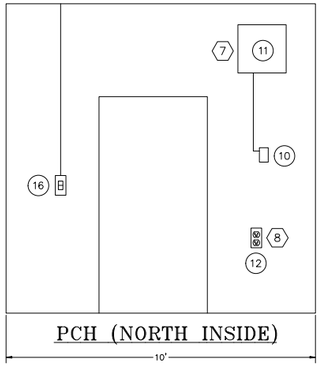
REF DWG(S):

DRAWING NO.: VPBD-EL-2500

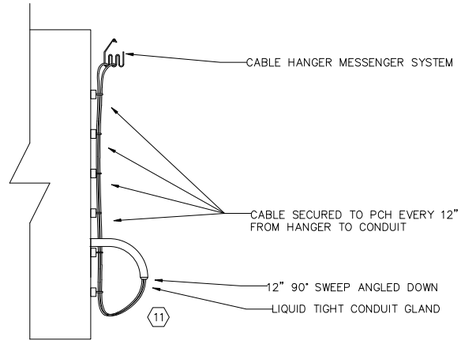
SHEET 3 OF 5



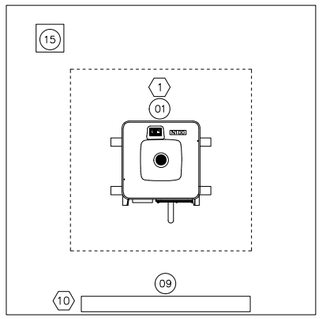
PCH (WEST OUTSIDE)



PCH (NORTH INSIDE)



HOME-RUN ENTRY



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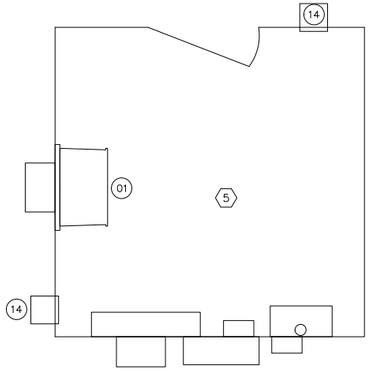
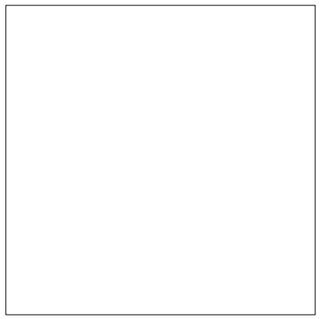
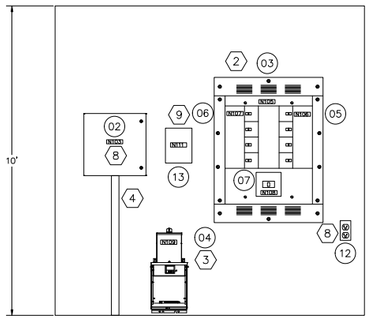
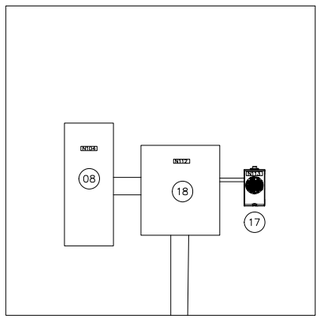




PCH (EAST INSIDE)



PCH (SOUTH INSIDE)



PCH (SOUTH OUTSIDE)

BUILDING MANUFACTURER TO PROVIDE PRE-FABRICATED METAL BUILDING PER FOLLOWING SPECIFICATIONS:
STRUCTURAL:
-ROOF PITCH: 3:12
-ROOF DEAD LOAD 30PSF MINIMUM
-MAX WALL LOAD: 220LBS (INVERTER)
-MAX FLOOR LOAD: 210LBS (STATION SERVICE SUBSTATION)
INSULATION:
-WALL INSULATION: R22 MINIMUM
-CEILING INSULATION: R30 MINIMUM

ALL INTERIOR CONDUITS SHALL BE GALVANIZED RIGID CONDUIT (GRC) OR ELECTRICAL METALLIC TUBING (EMT). EXTERIOR CONDUIT SHALL BE RIGID GALVANIZED CONDUIT ONLY. EMT TYPE COUPLERS AND FITTINGS SHALL BE RAIN-TIGHT COMPRESSION TYPE. GROUNDING BUSHINGS SHALL BE INSTALLED AT THE SOURCE END OF THE EMT CONDUIT RUNS FROM THE AC PANEL.

6

BILL OF MATERIAL

REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	EA	1	SUNNY HIGHPOWER PEAK3-125KW	SMA/SHP 125-US-21
02	EA	1	COMMUNICATION PANEL	SEE REF. 1
03	EA	1	POWER DISTRIBUTION PANELBOARD	SQUARED/HCJ23734M
04	EA	1	STATION SERVICE SUBSTATION, 10kVA	HAMMOND/M1PC010LESF
05	EA	1	200A CIRCUIT BREAKER	
06	EA	1	30A/2P CIRCUIT BREAKER	
07	EA	1	200A MAIN CIRCUIT BREAKER	
08	EA	1	200A LOAD BREAK DISCONNECT	
09	EA	1	ELECTRIC BASEBOARD HEATER, 1000W, 120VAC W/ BUILD-IN THERMOSTAT	
10	EA	1	ADJUSTABLE THERMOSTAT	
11	EA	1	WALL MOUNT SHUTTER FAN, >2500CFM, 120VAC W/ DAMPER MOTOR CONTROLLED BY THERMOSTAT	
12	EA	2	GFCI RECEPTACLE	
13	EA	1	SHARK 250 SELF-ENCLOSED METER ASSEMBLY	ELECTRO INDUSTRIES /ENCSHK250-277-60-10-V3-D2-INP100S-X
14	EA	2	90° VENTILATION HOOD WITH INSECT SCREEN	
15	EA	1	10" MOTORIZED INTAKE DAMPER	
16	EA	1	LIGHT SWTICH	
17	EA	1	600V 20A METER SOCKET W/SELF-SHUNTING BYPASS	MILBANK/UC7237-XL
18	EA	1	400A CT ENCLOSURE	

NOTES:

1. MOUNT SMA SHP-125-US INVERTERS SUCH THAT THEY ARE 4" AWAY FROM THE WALL, AND 20" ON ALL OTHER SIDES FROM WALLS, FLOORS, CEILINGS, AND OTHER DEVICES. MAINTAIN 4' WORKING CLEARANCE ZONE IN FRONT OF INVERTERS, PER NEC. PROVIDE A 4" X 4" WIREWAY (MINIMUM) BETWEEN INVERTERS AND PANELBOARD
2. MOUNT POWER DISTRIBUTION PANELBOARD SUCH THAT MANUFACTURER RECOMMENDED CLEARANCE DISTANCES BETWEEN THE PANELBOARD AND WALLS, FLOORS, CEILINGS, AND OTHER DEVICES IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE IN FRONT OF THE PANELBOARD, PER NEC
3. MOUNT STATION SERVICE SUBSTATION SUCH THAT ALL MANUFACTURER RECOMMENDED CLEARANCE ZONES AWAY FROM EQUIPMENT IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE ZONE IN FRONT OF THE DEVICE, PER NEC
4. ROUTE CONDUITS SUCH THAT THE STUB-UP AREA IS DIRECTLY UNDER ALL DESTINATION DEVICES IN THE POWER CONVERSION HUT
5. PROVIDE CEILING MOUNTED LIGHTING SUCH THAT 30 FOOTCANDLES IS MAINTAINED. MOUNT LIGHT SWITCH NEXT TO DOOR AT LEAST 40" FROM FLOOR.
6. ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN CAN BE CONTRACTOR DETERMINED, PROVIDED THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.
7. VENTILATION FOR THE ENCLOSURE SHALL BE PROVIDED BY A WEATHERPROOF 120VAC EXHAUST FAN WITH A MINIMUM FLOW RATE OF 2500CRFM, CONTROLLED BY AN ADJUSTABLE THERMOSTAT FOR FAN OPERATION OF INTERIOR AIR TEMPERATURES OF 35°C AND ABOVE, AND BY A 10" MOTORIZED INTAKE DAMPER. EXHAUST SHALL BE PROVIDED WITH A 90° EXTERIOR HOOD WITH A 900° EXTERIOR HOOD WITH INSECT SCREENS TO PREVENT INTRUSIONS OF WIND DRIVEN RAIN/SNOW.
8. MOUNT RECEPTACLES ON INSIDE WALLS OF PCH AT LEAST 18" FROM FLOOR. MOUNT ONE RECEPTACLE ON EAST SIDE OF DOOR (NORTH WALL), AND ONE RECEPTACLE NEXT TO POWER DISTRIBUTION PANELBOARD (SOUTH WALL).
9. CONNECT SHARK 250 CURRENT TRANSFORMERS AND POTENTIAL TRANSFORMERS TO THE 400A OUTPUT BREAKER AT POWER DISTRIBUTION PANELBOARD THROUGH A 1" CONDUIT.
10. HEATING TO BE PROVIDED BY ELECTRIC BASEBOARD HEATER WITH BUILT-IN THERMOSTAT. HEATER OT TURN ON BELOW 10°F.
11. HOME-RUN CABLES TO ENTER INTO PCH VIA CONDUIT SWEEP ANGLED DOWN. MIN CONDUIT RADIUS TO BE 8 X THE DIAMETER OF THE LARGEST CABLE. SUPPORT CABLES EVERY 12"AS MEASURED BY THE CABLES PATH FROM HANGER, TO CONDUIT WITH UV RESISTANT, OUTDOOR RATED CABLE TIES. ADD IN A 4FT SERVICE LOOP BEFORE ENTERING INTO THE CONDUIT. EXACT HEIGHT AND PLACEMENT OF CONDUIT TO BE DETERMINED BY CONTRACTOR ON-SITE.

NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

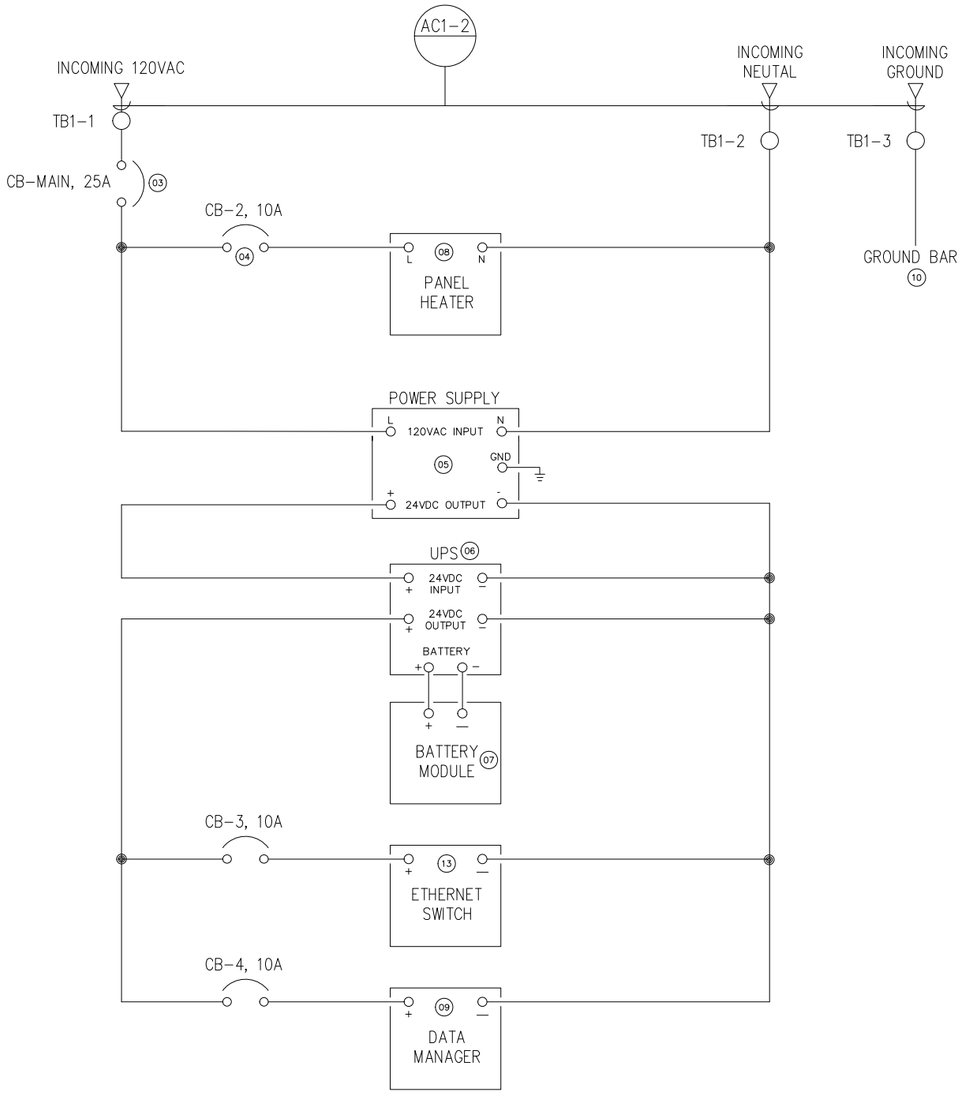
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	VPBD-EL-2500/4	COMMUNICATIONS PANEL DETAILS
2	VPBD-EL-2000/5	EQUIPMENT NAMEPLATE SCHEDULE

DRAWING NAME:
TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
POWER CONVERSION HUT
LAYOUT DIAGRAM
vpbd-el-2500_4.dwg

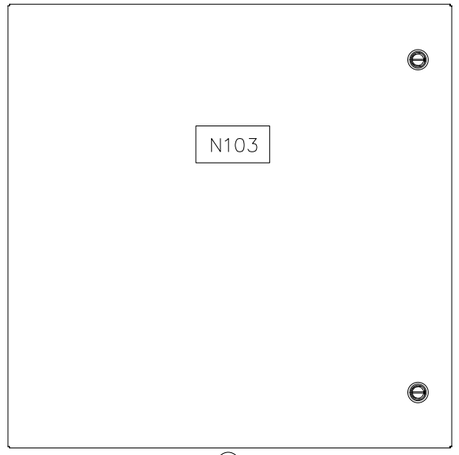
REF DWG(S):

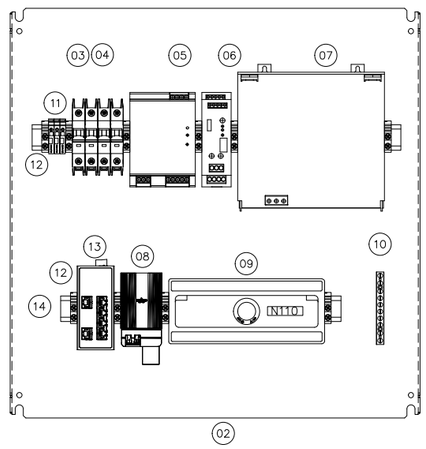
DRAWING NO.: VPBD-EL-2500

SHEET 4 OF 5



1 ONE-LINE DIAGRAM





2 PANEL ELEVATION – INSIDE

1:4 – 1" = 4" 4 0 4 8

1

BILL OF MATERIAL

REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	EA	2	24" X 24" X 10" NEMA 1 MILD STEEL WALL MOUNTED ENCLOSURE	
02	EA	1	INNER PANEL FOR 24X24X10 ENCLOSURE	
2 03	EA	1	25A, 600V UL489 1-POLE BREAKER	
04	EA	3	10A, 600V UL489 1-POLE BREAKER	
05	EA	1	PHOENIX CONTACT 120VAC/24VDC PS, 20 AMP	PHOENIX CONTACT/ 2866776
06	EA	1	PHOENIX CONTACT 20 AMP UPS	PHOENIX CONTACT/ 2320238
07	EA	1	PHOENIX CONTACT 12 Ah BATTERY	PHOENIX CONTACT/ 1274119
08	EA	1	150W PANEL HEATER W/BUILT IN REGULATION ON: 41°F – OFF: 59	STEGO/06021.0-00
09	EA	1	DATA MANAGER	SMA/EDMM-20
10	EA	1	UL467 GROUND BAR, 6 POLE MINIMUM	
11	EA	3	6MM DINRAIL MOUNTED TERMINAL BLOCK	
12	EA	10	6MM DINRAIL MOUNTED TERMINAL BLOCK END STOP	
13	EA	1	UNMANAGED ETHERNET SWITCH, 2 FIBER PORTS	MOXA/EDS-G308-2SPF
14	EA	1	35MM DIN MOUNTING RAIL	

3 PANEL BOM

NOTES:

1 ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN CAN BE CONTRACTOR DETERMINED, PROVIDED THAT THE CONTRACTOR DETERMINED PRODUCT MATCHES THE PRODUCT DESCRIPTION IN THE CENTER COLUMN, AND THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.

2 PROVIDE 1 SPARE CIRCUIT BREAKER FOR EACH SIZE (REF. NO. 3, AND RE. NO. 4) AND STORE IN BOTTOM OF ENCLOSURE

NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

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Consulting Engineers
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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	VPBD-SS-2000/5	EQUIPMENT NAMEPLATE SCHEDULE

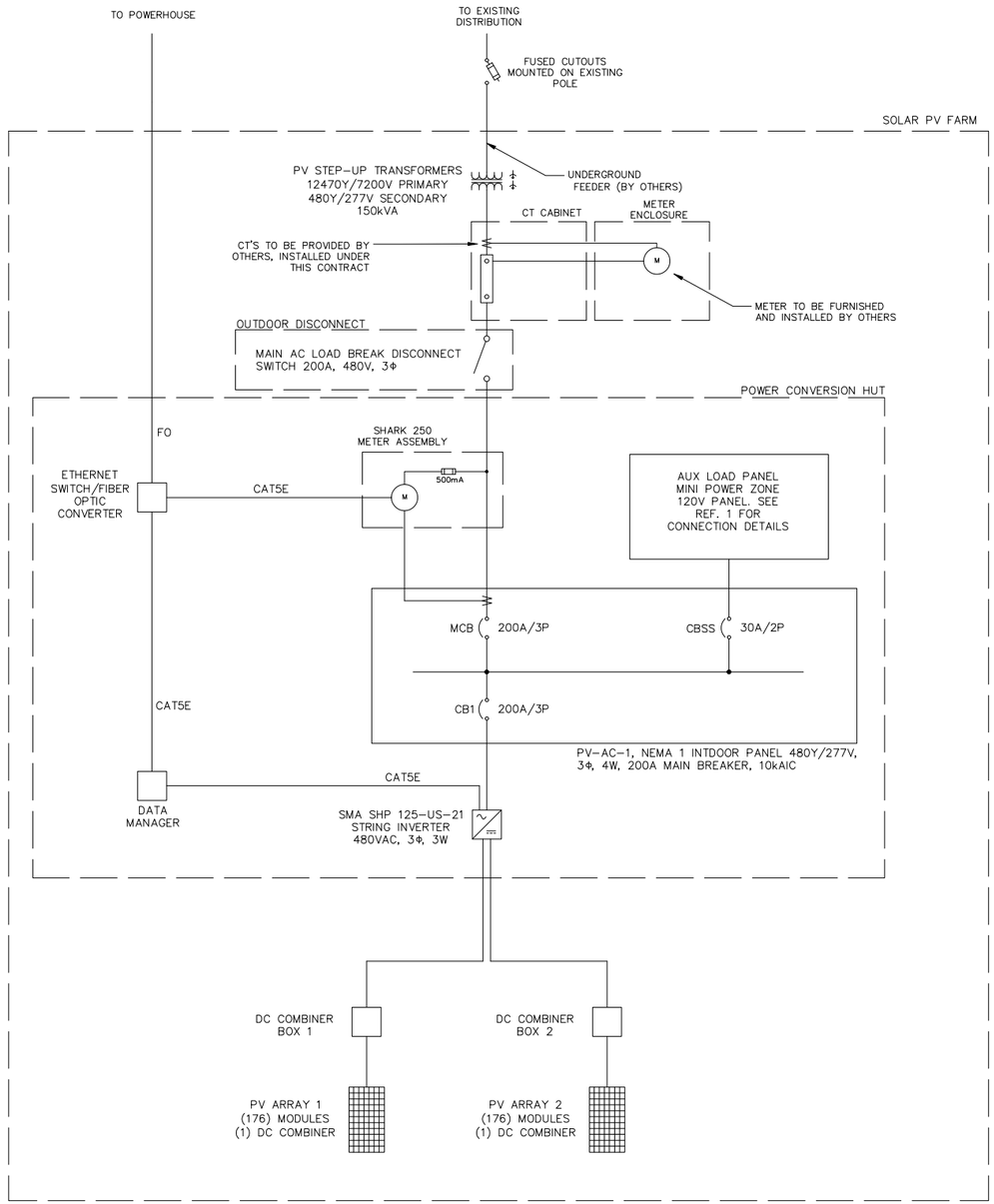
DRAWING NAME: TANANA CHIEFS CONFERENCE VENETIE RENEWABLE ENERGY COMMUNICATIONS PANEL DETAILS

vpbd-el-2500_5.dwg

REF DWG(S):

DRAWING NO.: VPBD-EL-2500

SHEET 5 OF 5



NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENEGRY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	MED/ 05-01-2025	JRV/ 05-01-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

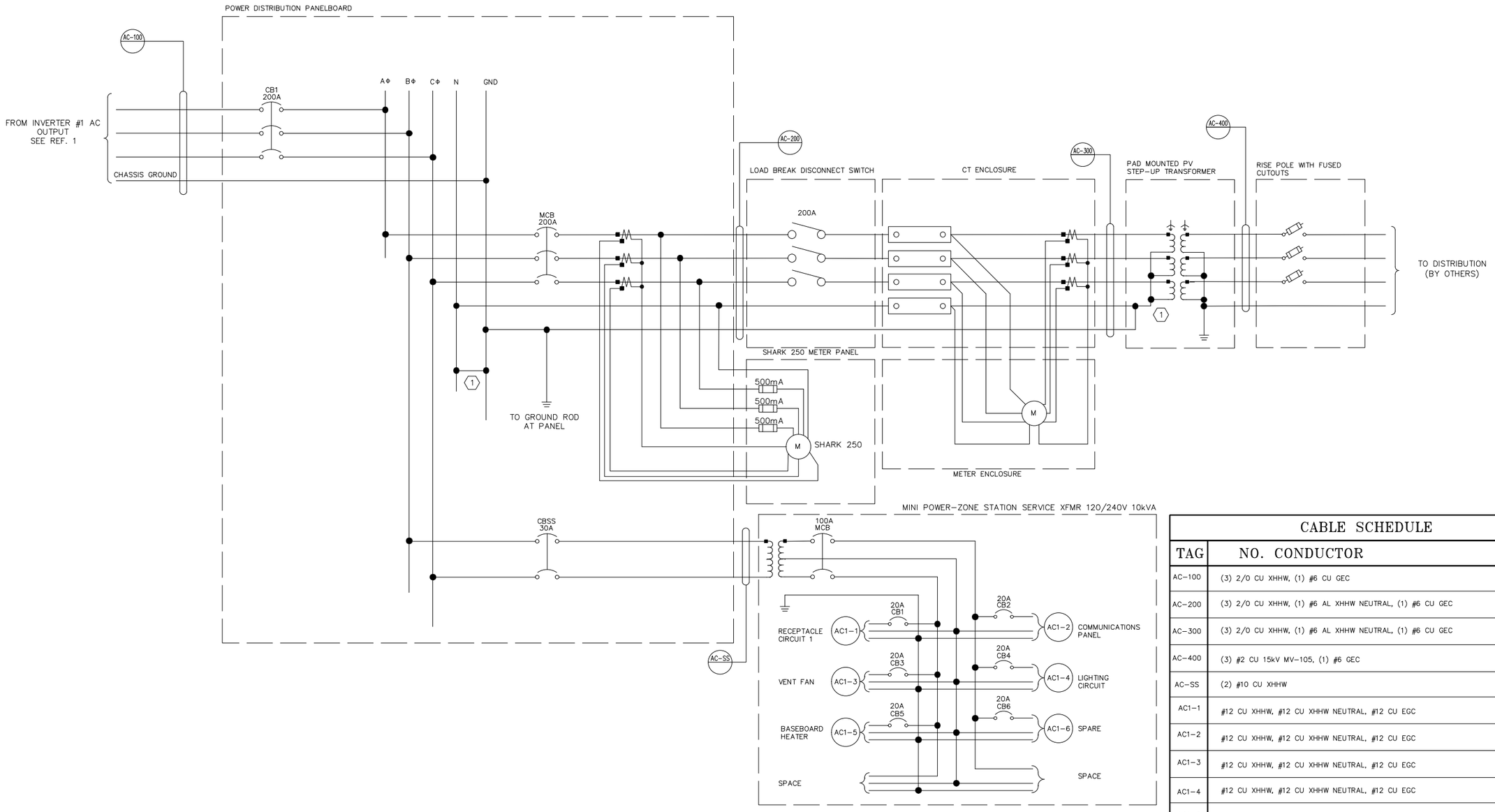
DRAWING NAME:
TANANA CHIEFS CONFERENCE VENETIE RENEWABLE ENERGY SITE ONELINE DIAGRAM

vpbd-el-0010_1.dwg

REF DWG(S):

DRAWING NO.: VPBD-EL-0010

SHEET 1 OF 1



CABLE SCHEDULE

TAG	NO. CONDUCTOR	RACEWAY
AC-100	(3) 2/0 CU XHHW, (1) #6 CU GEC	C-0111
AC-200	(3) 2/0 CU XHHW, (1) #6 AL XHHW NEUTRAL, (1) #6 CU GEC	C-0112
AC-300	(3) 2/0 CU XHHW, (1) #6 AL XHHW NEUTRAL, (1) #6 CU GEC	C-1
AC-400	(3) #2 CU 15kV MV-105, (1) #6 GEC	C-2
AC-SS	(2) #10 CU XHHW	1/2" EMT
AC1-1	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-2	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-3	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-4	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-5	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT

NOTE:
- LOW VOLTAGE AC CONDUCTOR SIZING BASED ON A COPPER CONDUCTOR WITH A TEMPERATURE RATING OF 75°C.
- MEDIUM VOLTAGE AC CABLES BASED ON A TEMPERATURE RATING OF 105°C.
- USE OF CABLE LARGER THAN SPECIFIED IN THE CABLE SCHEDULE IS ALLOWED, PROVIDED THAT THE TEMPERATURE RATING OF THE CONDUCTOR IS MAINTAINED.
- IF LARGER-THAN-SPECIFIED CABLE IS USED, CONFIRM THAT THE CONDUIT SIZE IN THE ASSOCIATED RACEWAY MAINTAINS A MAXIMUM 40% FILL RATIO
- SEE REF. 2 FOR CONDUIT SCHEDULE

NOTES:

(1) LIFT X0 BUSHING BOND JUMPER AND ISOLATE ALL X0 CONNECTIONS FROM ANY GROUNDING AT THE UTILITY SERVICE POLE. INSTALL N-G BOND JUMPER ONLY IN THE POWER DISTRIBUTION PANELBOARD TO GROUND SECONDARY OF TRANSFORMER AT PCH

NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENEGRY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	MED/ 05-01-2025	JRV/ 05-01-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	VPBD-EL-0011/1	PV ARRAY DC WIRING DIAGRAM
2	VPBD-EL-2000/2	WIREWAY DETAILS

DRAWING NAME:
TANANA CHIEFS CONFERENCE VENETIE RENEABLE ENERGY SITE THREE-LINE DIAGRAM

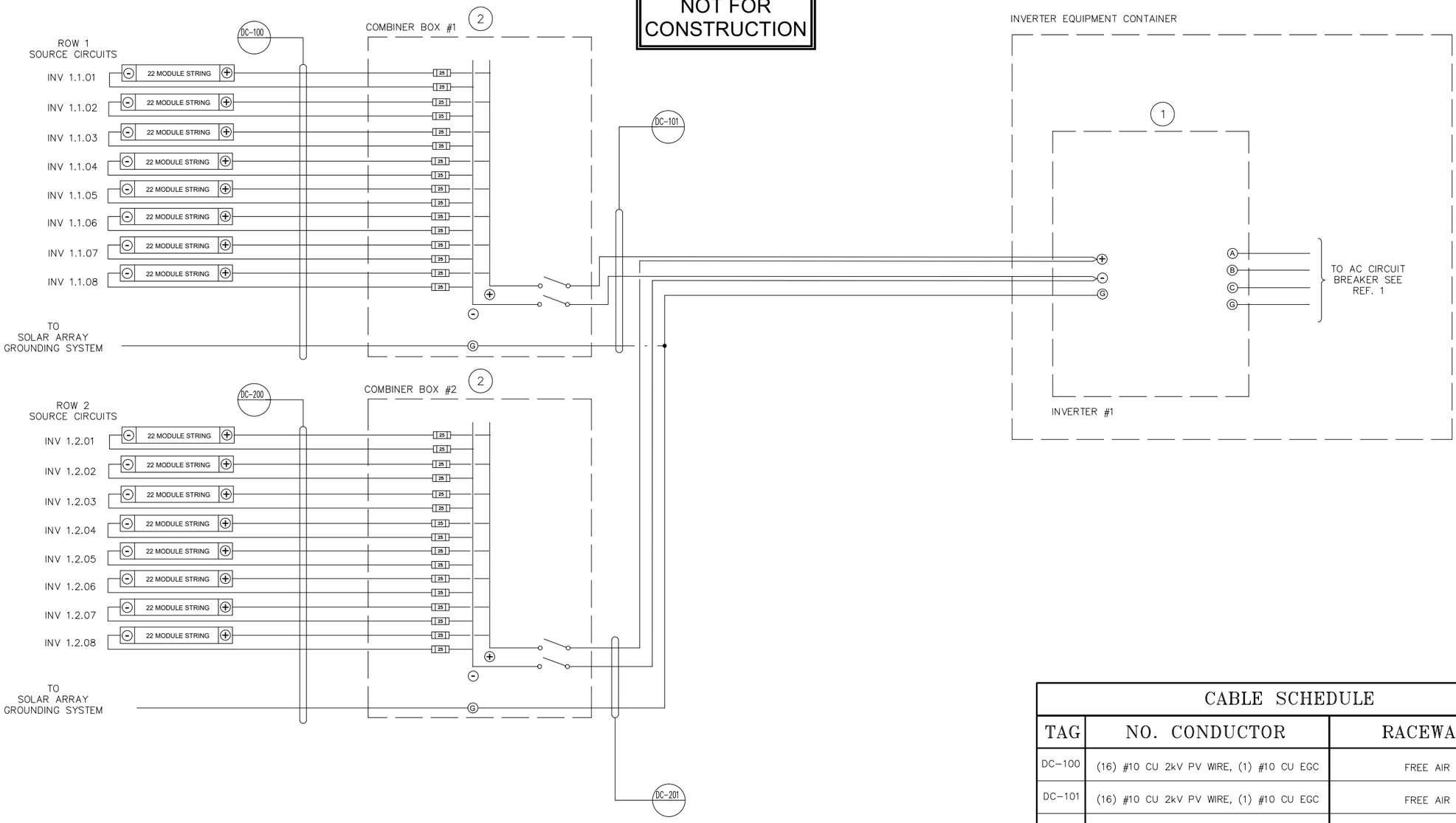
vpbd-el-0100_1.dwg

REF DWG(S):

DRAWING NO.: VPBD-EL-0100

SHEET 1 OF 1

NOT FOR CONSTRUCTION



LEGEND

INV X.X.XX

DESTINATION INVERTER NO.
DESTINATION COMBINER NO.
SOURCE CIRCUIT NUMBER

EQUIPMENT SCHEDULE		
TAG	QUANTITY	DESCRIPTION
1	1	PV INVERTER; SMA SUNNY HIGHPOWER PEAK3 125-US
2	2	16 INPUT DC COMBINER; TERRASMART FSFT275-16-25-N4-CD OR EQUIVALENT

CABLE SCHEDULE		
TAG	NO. CONDUCTOR	RACEWAY
DC-100	(16) #10 CU 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC-101	(16) #10 CU 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC-200	(2) 1/0 AL PV WIRE, (1) #4 CU EGC	FREE AIR
DC-201	(2) 1/0 AL PV WIRE, (1) #4 CU EGC	FREE AIR

NOTE:
1) DC STRING CONDUCTOR SIZING BASED ON CU UL4703 2KV PV WIRE WITH A TEMPERATURE RATING OF 90°C
2) DC CABLE SIZING FOR HOME-RUNS BASED ON AL 2KV PV WIRE AMPACITY WITH A TEMPERATURE RATING OF 75°C IN FREE AIR (TABLE 310.15(B)(17)) AND A VOLTAGE DROP OF LESS THAN 2%. USE OF CABLE LARGER THAN SPECIFIED IN THE CABLE SCHEDULE IS ALLOWED, PROVIDED THAT THE CONDUCTOR DESCRIPTION IS MAINTAINED.

PROJECT: VENETIE RENEWABLE ENEGRY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	RE-ISSUED FOR 95% REVIEW	MED/04-30-2025	JRV/04-30-2025
D	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	VPBD-EL-0100/1	AC THREE LINE DIAGRAM

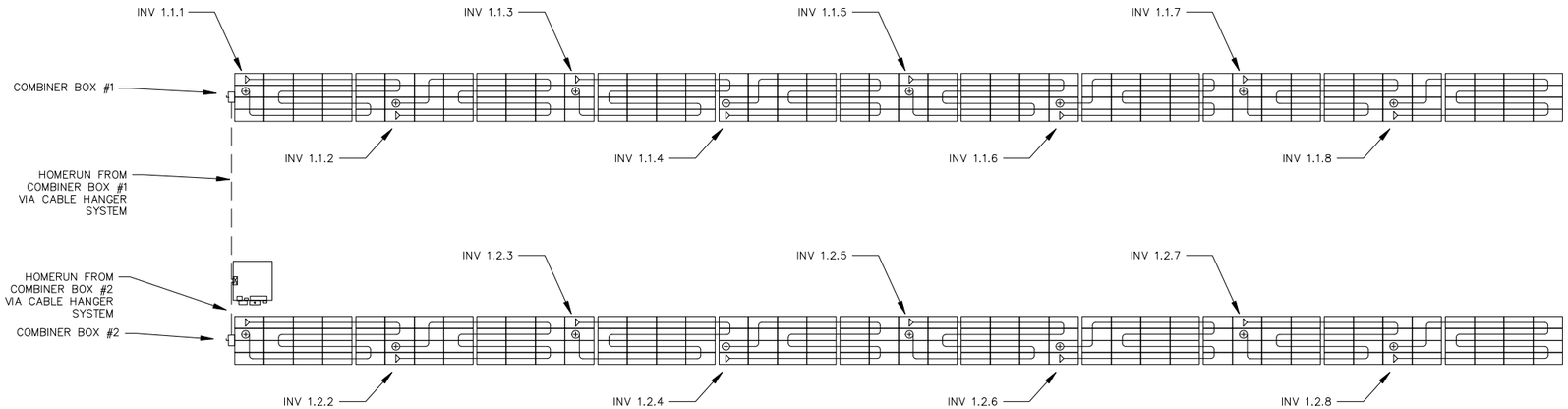
DRAWING NAME:
TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
PV ARRAY DC WIRING DIAGRAM

vpbd-el-0011_1.dwg

REF DWG(S):

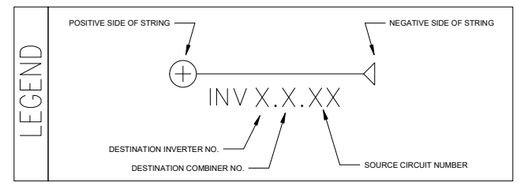
DRAWING NO.: VPBD-EL-0011

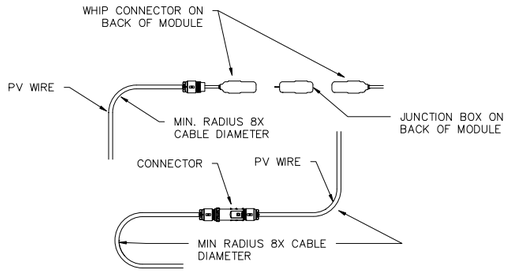
SHEET 1 OF 1



1 PV ELECTRICAL SITE PLAN
NTS

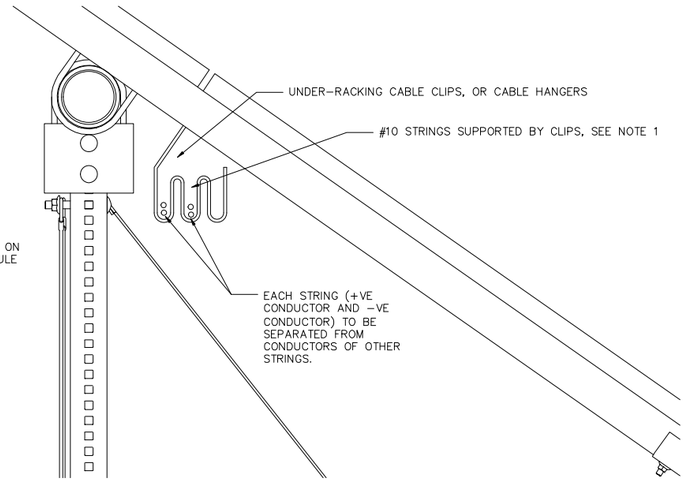
LEGEND	
	DC COMBINER BOXES (4)
	CABLE HANGER MESSENGER
	PV ARRAY





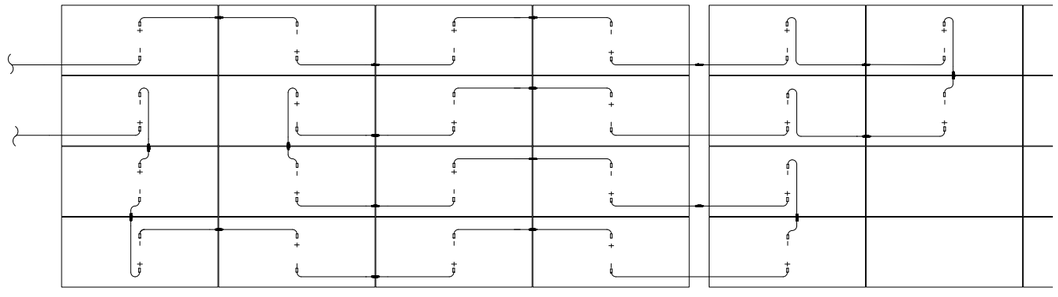
PV WIRE BENDING REQUIREMENTS NOTES:
1. OBSERVE MIN. BENDING RADIUS REQUIREMENTS WHEN BUILDING AND SECURING SOURCE CIRCUIT CONDUCTORS TO MODULES AND RACKING.
2. SEE MODULE SPEC SHEET OR CABLE SPECS FOR CABLE DIAMETER.

2 PV WIRE BENDING REQUIREMENTS
NTS



3 TYPICAL STRING SUPPORT CLIP DETAIL

TYPICAL 24 MODULE SERIES WIRING NOTES:
1. SUPPORT #10 STRINGS WITH CABLE CLIPS, OR OTHER TCC APPROVED UNDER-RACKING CABLE MANAGEMENT SYSTEM AT MOST EVERY 4' (48"). INSTALL PER MANUFACTURERS RECOMMENDATIONS. EXACT PLACEMENT AND CONNECTION METHOD TO BE DETERMINED BY CONTRACTOR ON-SITE



4 TYPICAL 22 MODULE SERIES WIRING
NTS

NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENEGRY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/04-23-2025	JRV/04-23-2025
B	ISSUED FOR 95% REVIEW	MED/05-02-2025	JRV/05-02-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

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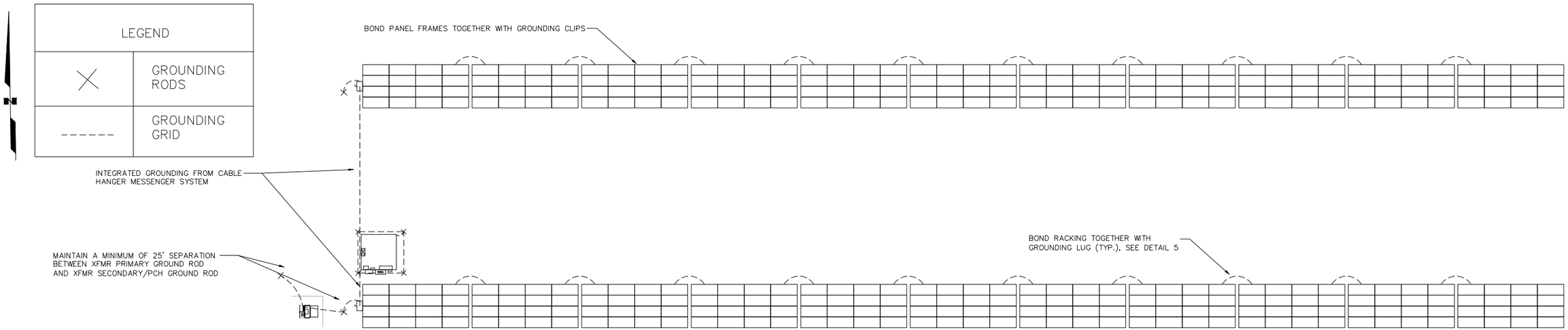
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	FYRE-EL-0100/1	AC THREELINE DIAGRAM

DRAWING NAME:
TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
PV ELECTRICAL PLAN
vpbd-el-0020_1.dwg

REF DWG(S):

DRAWING NO.: VPBD-EL-0020

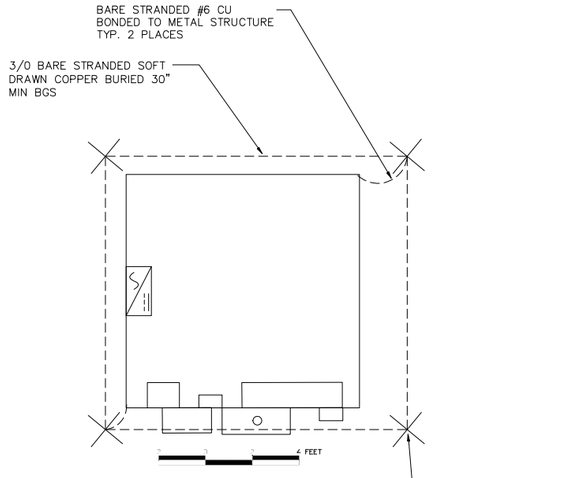
SHEET 1 OF 1



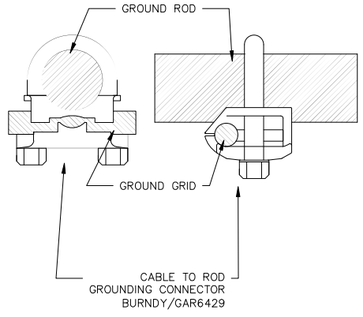
GROUNDING PLAN NOTES:

1. CONTRACTOR TO TEST EACH GROUNDING ELECTRODE USING THE FALL OF POTENTIAL TEST. GROUND RODS SPACED 6' MIN APART SHALL BE ADDED AS NECESSARY UNTIL A RESISTANCE TO GROUND VALUE OF 25 OHMS OR LESS IS ACHIEVED.
2. MIN. BARE COPPER GROUND WIRE SIZE SHALL BE #6.

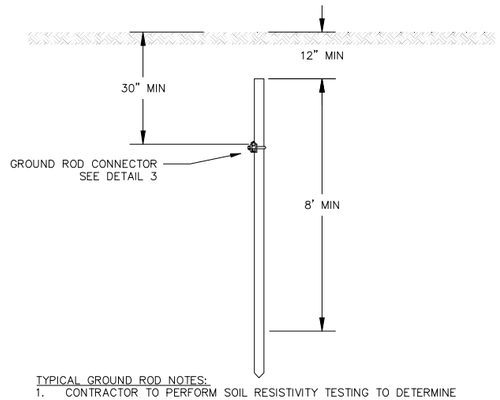
(1) OVERALL ARRAY GROUNDING PLAN



(2) HUT GROUNDING DETAIL

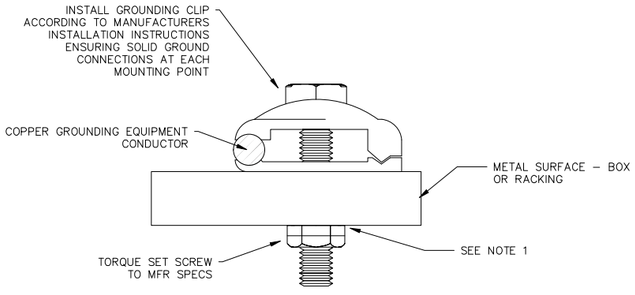


(3) GROUND ROD CONNECTION
NTS



TYPICAL GROUND ROD NOTES:
1. CONTRACTOR TO PERFORM SOIL RESISTIVITY TESTING TO DETERMINE AMOUNT OF GROUND RODS NEEDED TO KEEP RESISTANCE BELOW 5 OHMS

(4) TYPICAL GROUND ROD
NTS



TYPICAL METAL RACKING GROUNDING NOTES:
1. PRIOR TO MOUNTING LUGS ON ANODIZED ALUMINUM OR PAINTED METAL SURFACES, THE SURFACE MUST BE STRIPPED AND THEN COVERED WITH BURDNY PENETROX A-13 ANTI-OXIDANT COMPOUND BELOW THE LUG TO ENSURE CONDUCTIVITY
2. ON ANODIZED AL SURFACES, THE ANODIZATION SHALL BE GROUND OFF.
3. ON PAINTED SURFACES, THE PAINT LAYER SHALL BE GROUND OR SCRATCHED OFF.

(5) TYPICAL METAL RACKING BONDING
NTS

NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
GROUNDING PLAN

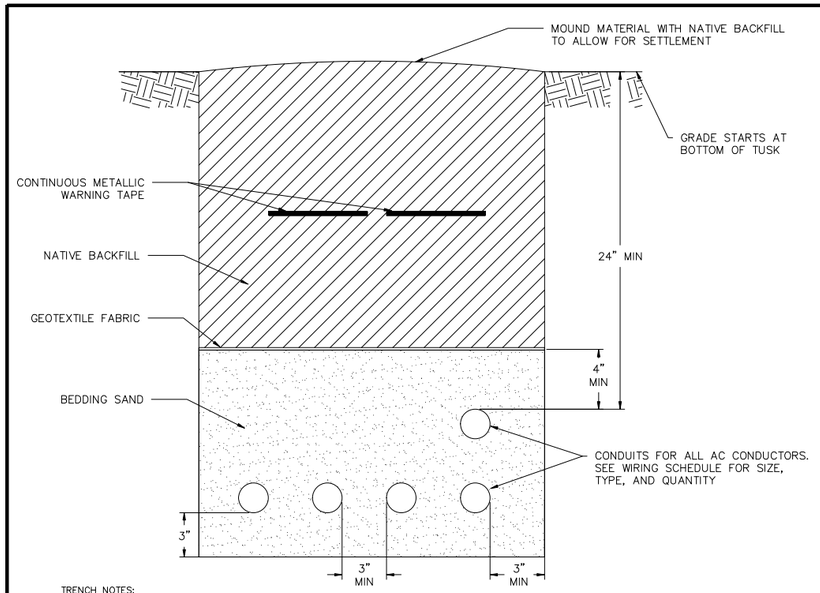
vpbd-ss-2000_1.dwg

REF DWG(S):

DRAWING NO.: VPBD-SS-2000

SHEET 1 OF 6

NOT FOR CONSTRUCTION



TRENCH NOTES:
1. BACKFILL THE TRENCH AREA WITH CLEAN SPOILS FREE OF AS MUCH ICE AS POSSIBLE.
2. CONSOLIDATION OF BACK FILL MATERIALS SHALL BE COMPLETED IN 12 INCH LIFTS MAXIMUM. INTENT OF THE CONSOLIDATION IS TO ENSURE ELIMINATION OF VOIDS.
3. FOR TRENCH IN GRAVEL, THE TRENCH CAP SHALL NOT EXCEED 4 INCHES. FOR TRENCH IN TUNDRA, THE TRENCH CAP SHOULD BE 35% – 40% OF THE TRENCH DEPTH (1.75' TO 2' FOR A 5' DEEP TRENCH), TO ALLOW FOR SETTLING AND ICE THAW. CONTRACTOR SHALL DISPOSE OF EXCESS EXCAVATED MATERIALS. FINAL CONTOURING OF THE TRENCH CAP IN TUNDRA SHOULD BE CONDUCTED BY HAND (MATCHING SURROUNDING DRAINAGE PATTERNS), TO ENSURE NO DIVERSION OF WATER OCCURS, RESULTING IN EROSION.
4. TRENCHES 1' WIDE SHOULD NOT NEED ANY SEEDING. FINAL REHABILITATION DETERMINATION TO BE MADE BY AGENCY REPRESENTATIVES.
5. COMPANY REPRESENTATIVE SHALL BE NOTIFIED AND PRESENT FOR ACCEPTANCE OF TRENCH PRIOR TO PLACEMENT OF CABLE AND BACKFILLING OF TRENCH (24–HOUR NOTICE REQUIRED). AGENCY REPRESENTATIVE SHALL ALSO PROVIDE ACCEPTANCE OF CABLE PRIOR TO BACKFILLING.
6. BEDDING SHALL BE 3/8" MINUS MATERIAL, NO CRUSHED OR SHARP ROCK. BEDDING MATERIAL SHALL NOT BE MACHINE COMPACTED WITHIN 6" OF CABLES. SLURRY OF A COMPOSITION THAT WILL NOT DAMAGE THE CABLE IS AN ACCEPTABLE BEDDING MATERIAL.
7. MAINTAIN 1" MIN. SEPARATION BETWEEN POWER CONDUCTORS AND COMMUNICATION CABLES

1 TYPICAL CONDUIT TRENCH
NTS

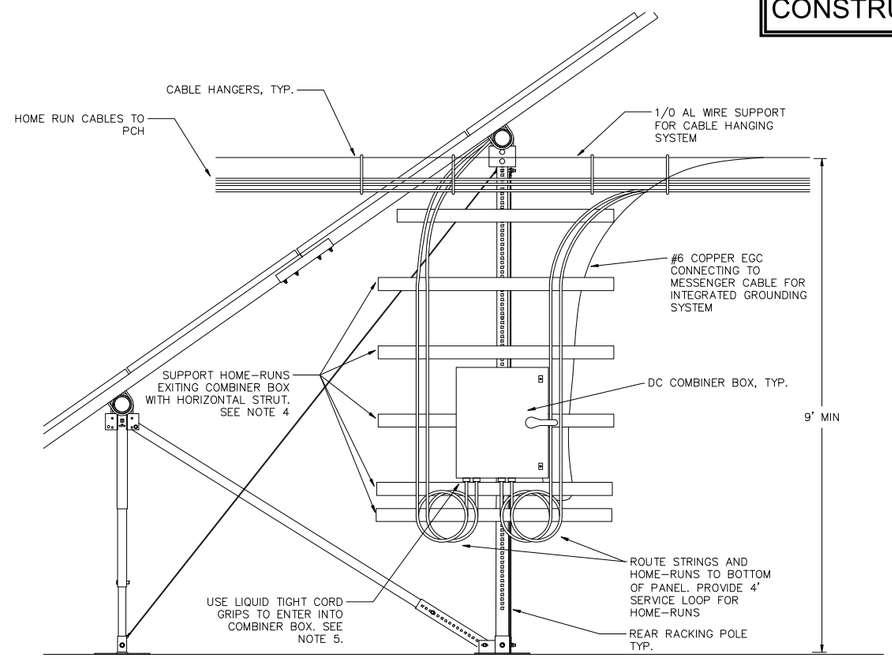
LEGEND	
	DC COMBINER BOXES (2)
— — — —	CABLE HANGER MESSENGER
—···—···—	UG POWER CABLE
—— – ——	UG COMM CABLE
○	CONDUIT STUB–UP AREA
	PV ARRAY

NOTES:

〈1〉 TRADE SIZE OF CONDUITS SHOWN IN CONDUIT SCHEDULE ARE MINIMUM SIZES BASED ON NEC CONDUIT FILL % (CHAPTER 9 TABLE 1). USE OF CONDUIT THAT IS LARGER IN TRADE SIZE THAN SPECIFIED IN CONDUIT SCHEDULE IS PERMITTED.

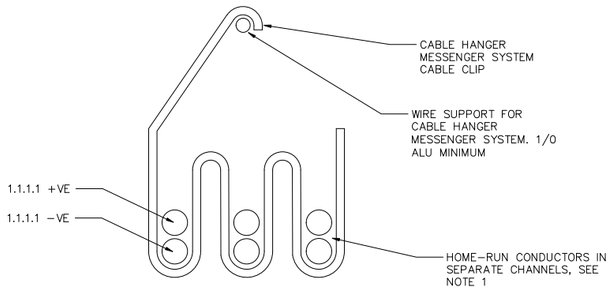
〈2〉 IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM PRODUCT DIMENSIONS, AND ROUTE CONDUITS TO APPROPRIATE STUB–UP AREAS.

〈3〉 CONDUIT AND WIREWAY ROUTING SHOWN ON DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. EXACT WIREWAY ROUTING TO BE DETERMINED BY CONTRACTOR ON–SITE.



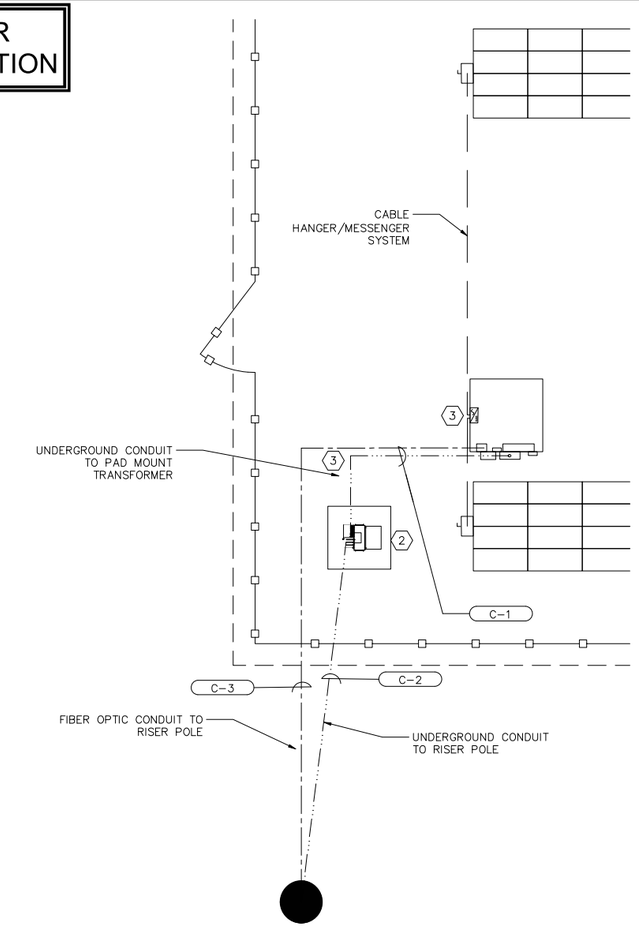
2 TYPICAL COMBINER BOX DETAIL
NTS

TYPICAL COMBINER BOX DETAIL NOTES:
1. ENSURE THAT CABLES ROUTED FROM HANGING SYSTEM TO COMBINER BOXES DO NOT EXCEED CONDUCTOR BENDING RADIUS
2. INSTALL CABLE HANGING SYSTEM ACCORDING TO MANUFACTURERS INSTALLATION INSTRUCTIONS
3. CONTRACTOR TO DETERMINE MOST SUITABLE MOUNTING SOLUTION FOR OVERHEAD CABLE MANAGEMENT SYSTEM
4. SUPPORT DC CABLES EXITING THE DC COMBINER BOX WITH A UV RESISTANT, OUTDOOR RATED CABLE TIE CONNECTED TO A HORIZONTAL STRUT. INSTALL CLOSEST CABLE SUPPORT A DISTANCE OF NO MORE THAN 12" AWAY FROM THE COMBINER BOX, AS MEASURED BY THE CABLE PATH. SUPPORT HOME–RUNS EVERY 12" UNTIL SUPPORTED BY CABLE HANGER MESSENGER SYSTEM. SUPPORT STRINGS EVERY 12" UNTIL SUPPORTED BY UNDER–RACKING CABLE MANAGEMENT SYSTEM.
5. USE A LIQUID TIGHT CORD GRIP OR CABLE GLAND FOR HOME–RUNS AND STRINGS WHEN ENTERING COMBINER BOX.



4 TYPICAL HOME–RUN CABLE HANGER DETAIL
NTS

TYPICAL HOME–RUN CABLE HANGER DETAIL NOTES:
1. HOME–RUN CONDUCTORS OF DIFFERENT CIRCUITS TO BE ROUTED IN SEPARATE CHANNELS IN CABLE HANGER MESSENGER SYSTEM. THE +VE AND –VE CONDUCTORS OF A SINGLE HOME–RUN CIRCUIT MAY BE ROUTED IN THE SAME CHANNEL.
2. INSTALL CABLE HANGERS IN REGULAR INTERVALS AS DIRECTED BY MANUFACTURERS INSTALLATION INSTRUCTIONS, OR, A DISTANCE OF NO MORE THAN 5' APART FROM EACH OTHER.
3. IF HOME–RUNS AND STRINGS ARE ROUTED IN THE SAME CABLE HANGER MESSENGER SYSTEM, SEPARATE HOME–RUNS AND STRINGS IN SEPARATE CHANNELS.



3 SITE WIREWAY LAYOUT
NTS

CONDUIT SCHEDULE 〈1〉

TAG	FUNCTION	CONDUIT TYPE	TRADE SIZE
C–0111	INV1 TO CB1	EMT	2"
C–0112	MCB1 TO LBDS	PVC	2"
C–1	LBDS TO XFMR1	PVC	2"
C–2	XFMR1 TO POLE	PVC	3"
C–3	COMM PANEL TO POLE	HDPE	1"

PROJECT: VENETIE RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25–0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10–08–2025	MED/10–08–2025

ENG. STAMP

Electric Power Systems Inc
Consulting Engineers
TEL: (907) 522–1953
FAX: (907) 522–1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
WIREWAY DETAILS
vpbd–ss–2000_2.dwg

REF DWG(S):

DRAWING NO.: VPBD–SS–2000

SHEET 2 OF 6

4"

3/8 MIN. TEXT

MANUAL DISCONNECT FOR PARALLEL GENERATION

3" (RED BACKGROUND)

LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECT. LABEL TO BE ENGRAVED PLASTIC.
(1) TOTAL

NOTICE

PHOTOVOLTAIC SYSTEM
GENERATION METER

LABEL TO BE LOCATED ON THE PV SYSTEM GENERATION METER.
(1) TOTAL

NEC 2023 690.13(B), 690.54

NOTICE

PHOTOVOLTAIC SYSTEM AC
DISCONNECT AND POWER SOURCE
RATED OUTPUT CURRENT: 151A
NOMINAL OPERATING VOLTAGE: 480VAC

LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECT. (1) TOTAL

NEC 2023 705.12(B)(3)(3)

⚠ *WARNING*

THIS EQUIPMENT FED BY MULTIPLE SOURCES

TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR.

PERMANENT WARNING LABEL SHALL BE APPLIED TO DISTRIBUTION EQUIPMENT WHERE THE PV SYSTEM INTERCONNECTS. (1) TOTAL

NEC 2023 690.7(D)

MAXIMUM DC VOLTAGE OF PV SYSTEM

MAXIMUM VOLTAGE: 985VDC

LABEL TO BE LOCATED ON COVER OF DC DISCONNECTING MEANS. (2) TOTAL

NEC 2023 690.31(D)(2)

WARNING: PHOTOVOLTAIC POWER SOURCE

3/8 MIN.

RED BACKGROUND

LABEL SHALL BE LOCATED ON ALL EXPOSED RACEWAYS, CABLE TRAYS, OTHER WIRING METHODS, COVERS OR ENCLOSURES OF PULL BOXES AND JUNCTION BOXES AND ON CONDUIT BODIES IN WHICH ANY OF THE AVAILABLE CONDUIT OPENINGS ARE UNUSED. LABEL SHALL BE REFLECTIVE, AND ALL LETTERS CAPITALIZED AND SHALL BE MINIMUM HEIGHT OF 3/8" IN WHITE ON A RED BACKGROUND. SPACING BETWEEN LABELS OR MARKINGS, OR BETWEEN A LABEL AND MARKING, SHALL NOT BE MORE THAN 10FT.

NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

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WEB: WWW.EPSINC.COM

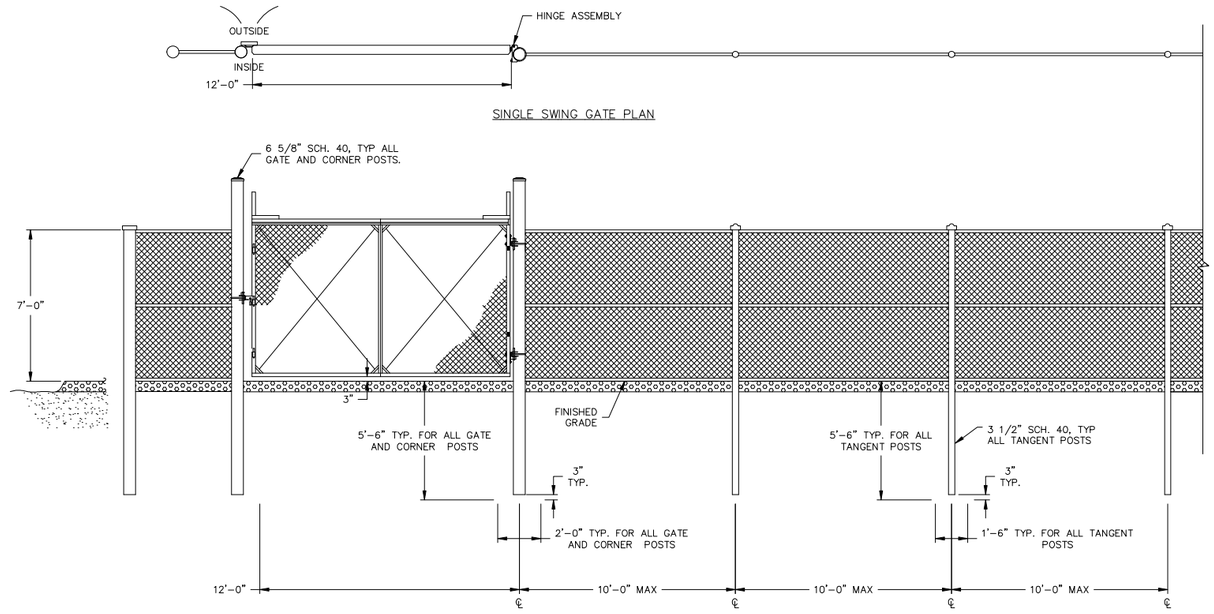
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
EQUIPMENT SAFETY LABEL SCHEDULE

vpbd-ss-2000_3.dwg

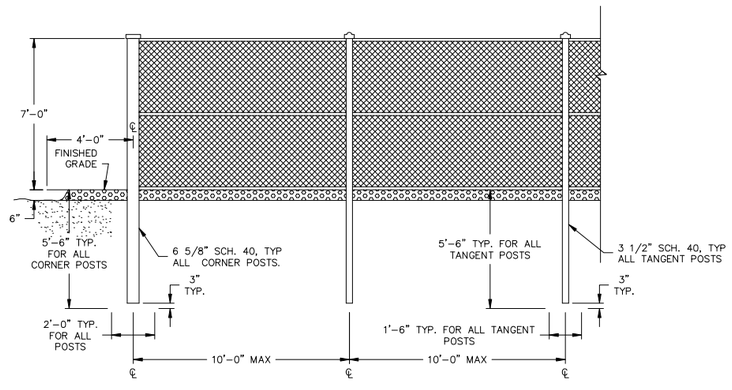
REF DWG(S):

DRAWING NO.: VPBD-SS-2000



SINGLE SWING GATE PLAN

1 FENCE DOUBLE GATE ELEVATION



2 CORNER/TERMINAL FENCE POST ELEVATION

NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
SITE FENCING
DETAILS
vpbd-ss-2000_4.dwg

REF DWG(S):

DRAWING NO.: VPBD-SS-2000

SHEET 4 OF 6

NAMEPLATE NUMBER	QTY	LINE 1 TEXT	LINE 2 TEXT	LINE 3 TEXT	NAMEPLATE SIZE HEIGHT x WIDTH (IN)	TEXT HEIGHT (IN)
N100	1	INVERTER 1			2 x 4	3/8
N101	1	DC COMBINER	BOX 1		2 x 4	3/8
N102	1	DC COMBINER	BOX 2		2 x 4	3/8
N103	1	COMMUNICATIONS	PANEL		2 x 4	3/8
N104	1	200A	MAIN AC PANEL		2 x 4	3/8
N105	1	POWER DISTRIBUTION	PANELBOARD		2 x 4	3/8
N106	1	CB 1			1 x 3	1/8
N107	1	CB SS			1 x 3	1/8
N108	1	MCB			1 x 3	1/8
N109	1	120V STATION SERVICE PANEL			2 x 4	3/8
N110	1	DATA MANAGER			1 x 3	1/8
N111	1	METER PANEL			2 x 4	3/8
N112	1	CT ENCLOSURE			2 x 4	3/8
N113	1	METER ENCLOSURE			2 x 4	3/8

NOTES:

1) ALL NAMEPLATES SHALL BE 1/16" THICK MINIMUM PLASTIC.
2) ALL NAMEPLATES SHALL HAVE EXTERIOR RATED HIGH-TACK ADHESIVE.
3) ALL NAMEPLATES SHALL BE BLACK SURFACE WTH WHITE TEXT.
4) ALL TEXT SHALL BE "ARIAL BOLD" FONT.
5) EACH LINE OF TEXT SHALL BE CENTERED ON THE NAMEPLATE.
6) ALL TEXT SHALL BE UPPER CASE.
7) ALL DIMENSIONS SHOWN IN INCHES.

NOT FOR CONSTRUCTION

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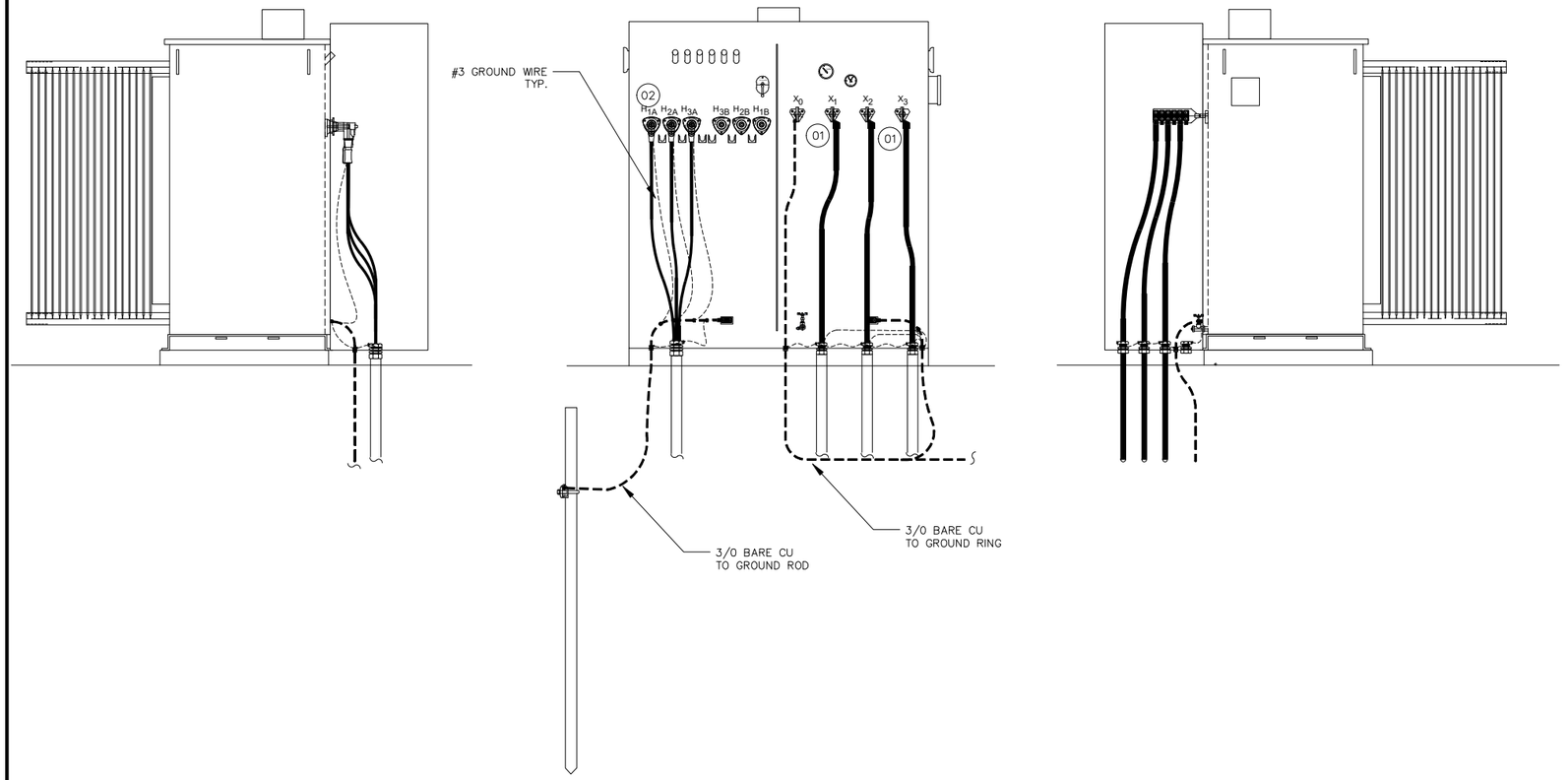
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
EQUIPMENT NAMEPLATE SCHEDULE

vpbd-ss-2000_5.dwg

REF DWG(S):

DRAWING NO.: VPBD-SS-2000



BILL OF MATERIAL

REF. NO.	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	–	CABLE LUG, NEMA 2–HOLE, 4/0 AWG CU	BURNDY/YA282N
02	–	CONNECTOR, COMPRESSION, 4/0 CU TO #6–#2 CU	BURNDY/YGHC29C26
03			
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NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

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DRAWING NAME:
TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
TRANSFORMER DETAILS

vpbd-ss-2000_6.dwg

REF DWG(S):

DRAWING NO.: VPBD-SS-2000

SHEET 6 OF 6

Circuit Information			Electrical calculations												System Information				
Destination Inverter No.	Destination Combiner No.	Source Circuit No.	Modules (#)	Open Circuit Voltage (VOC)	Maximum Power Voltage (Vmp)	Short Circuit Current (Isc)	Continuous Current (1.25*Isc)	Irradiance Current (1.25*CC)	Mininum Fuse Size (A)	Selected Fuse Size (A)	Minimum Wire Ampacity (A)	Selected String Wire Size (cu 2kV PV Wire, 90°C, <2% Voltage Drop, AWG)	Maximum Wire Distance (FT)	Voltage Drop (V)	Voltage Drop (%)	Circuit Information from	to	Continuous Current (A)	Minimum Wire Ampacity From Selected Device (A)	Selected Wire Size (AL 2KV PV Wire, 75°CM <2% Voltage Drop, AWG)
1	1	1	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	310	17.48	1.77	DS1	INV1	174.88	175	1/0
1	1	2	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	270	15.23	1.55	DS2	INV1	174.88	175	1/0
1	1	3	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	225	12.69	1.29					
1	1	4	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	185	10.43	1.06					
1	1	5	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	140	7.90	0.80					
1	1	6	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.57					
1	1	7	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	50	2.82	0.29					
1	1	8	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03			PANEL CHARACTERISTICS		
1	2	1	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	310	17.48	1.77			Voc (V)	52.58	
1	2	2	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	270	15.23	1.55			Voc Coef. (%/°C)	−0.25	
1	2	3	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	225	12.69	1.29			Vmp (V)	44.64	
1	2	4	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	185	10.43	1.06			Pmax Coef. (%/°C)	−0.3	
1	2	5	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	140	7.90	0.80					
1	2	6	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.57			SITE CHARACTERISTICS		
1	2	7	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	50	2.82	0.29			T_Amb Min (°C)	−45	
1	2	8	22	1359	985.0	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03			T_Amb Max (°C)	24	

NOTES:

1) TEMPERATURE CORRECTED OPEN CIRCUIT VOLTAGE CALCULATIONS ARE AS FOLLOWS: VOC = ((Voc * # MODULES) * (1 + ((T_AMB MIN − T_AMB MAX) * (VOC COEF.))

NOT FOR CONSTRUCTION

PROJECT: VENETIE RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0173

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-08-2025	MED/10-08-2025

ENG. STAMP

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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE
VENETIE RENEWABLE ENERGY
PV STRING CALCULATIONS

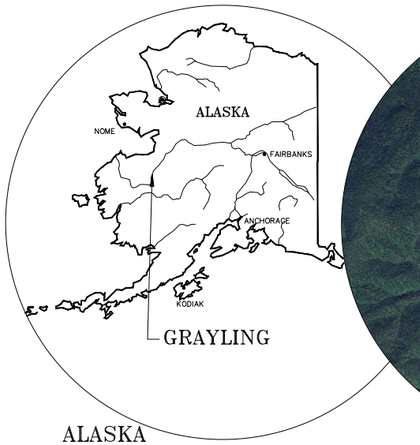
vpbd-ss-0700_1.dwg

REF DWG(S):

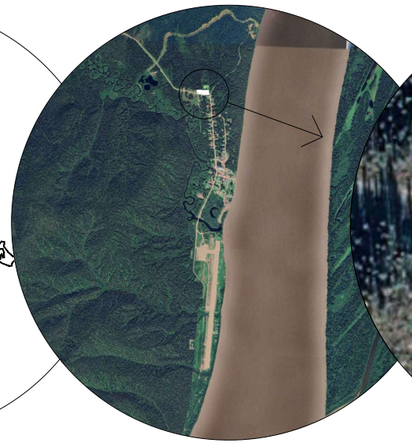
DRAWING NO.: VPBD-SS-0700

SHEET 1 OF 1

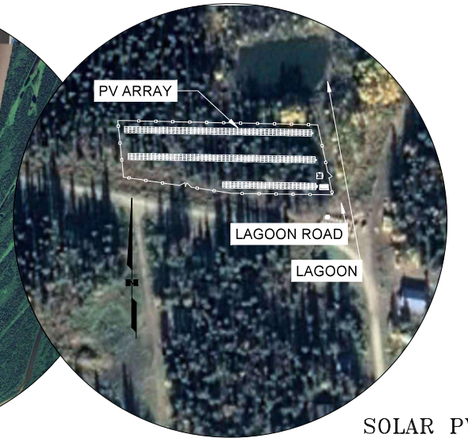
TANANA CHIEFS CONFERENCE
GRAYLING RENEWABLE ENERGY DESIGN
ISSUED FOR PV CONSTRUCTION BID



ALASKA



GRAYLING



SOLAR PV SITE

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DRAWING INDEX

TITLE	DRAWING NUMBER	SHEET	REVISION
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	GRRE-EL-0000	1	C
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	GRRE-EL-0000	2	C
~~SITE LAYOUT DIAGRAM~~	~~GRRE-EL-2500~~	~~1~~	~~D~~
SITE LAYOUT - PV	GRRE-EL-2500	2	D
~~SITE LAYOUT - BESS LAYOUT DIAGRAM~~	~~GRRE-EL-2500~~	~~3~~	~~C~~
SITE LAYOUT - INTERCONNECTION	GRRE-EL-2500	4	C
SITE LAYOUT - POWER CONVERSION HUT	GRRE-EL-2500	5	C
SITE LAYOUT - COMMUNICATIONS PANEL	GRRE-EL-2500	6	A
ONE LINE DIAGRAM	GRRE-EL-0010	1	D
THREE LINE DIAGRAM	GRRE-EL-0100	1	C
PV ARRAY DC WIRING DIAGRAM	GRRE-EL-0011	1	D
PV ELECTRICAL SITE PLAN	GRRE-EL-0020	1	C
GROUNDING PLAN	GRRE-SS-2000	1	C
CONDUIT DETAILS	GRRE-SS-2000	2	B
EQUIPMENT SAFETY LABEL SCHEDULE	GRRE-SS-2000	3	B
SITE FENCING DETAILS	GRRE-SS-2000	4	A
EQUIPMENT NAMEPLATE SCHEDULE	GRRE-SS-2000	5	A
PV STRING CALCULATIONS	GRRE-EL-0700	1	C

BESS DRAWINGS NOT INCLUDED IN THIS DRAWING SET

SCOPE OF WORK

THE PROJECT SCOPE IS TO INSTALL A GRID-TIED SOLAR PHOTOVOLTAIC AND BATTERY ENERGY STORAGE SYSTEM IN GRAYLING, AK.

THE SYSTEM CONSISTS OF GROUND MOUNTED SOLAR ARRAYS AND 2 STRING INVERTERS MOUNTED INSIDE A CONTAINER. ~~THE BATTERY MODULES AND INVERTER WILL BE HOUSED INSIDE A CONTAINER AND HAVE SELF-SERVING AUXILIARY LOADS.~~ BOTH SYSTEMS WILL OPERATE IN PARALLEL WITH THE LOCAL UTILITY AND HAVE RELATED ELECTRICAL SAFETY AND METERING SYSTEMS.

SYSTEM SUMMARY

PV SYSTEM SIZE: 285.60kWdc / 250kWac
INTERCONNECTION VOLTAGE: 12.47kV, 3 PHASE, 4 WIRE

GENERAL NOTES

ALL ELECTRICAL WORK TO BE INSTALLED BY A QUALIFIED AND LICENSED ELECTRICAL CONTRACTOR.

CONTRACTOR WILL FOLLOW IBC 2021 AND NFPA 70 NEC 2023 AS WELL AS ALL APPLICABLE LOCAL, STATE, MUNICIPAL AND CITY CODES, ORDINANCES AND REGULATIONS.

ALL MODULES AND INVERTERS SHALL BE UL LISTED 1703 & CEC APPROVED. ALL ELECTRICAL COMPONENTS AND MATERIALS SHALL BE LISTED FOR ITS PURPOSE AND INSTALLED IN A WORKMAN LIKE MANNER.

PRIOR TO INSTALLATION, THE CONTRACTOR SHALL UNDERSTAND ALL DRAWINGS AND PRODUCT MANUALS.

ALL DESIGN AND SPECIFICATIONS OF STRUCTURAL COMPONENTS ARE OUTSIDE THE SCOPE OF THESE PLANS.

PROJECT ENTITIES

OWNER: TANANA CHIEFS CONFERENCE

ENGINEER OF RECORD: ELECTRIC POWER SYSTEMS, INC.

ELECTRIC SERVICE PROVIDER: ALASKA VILLAGE ELECTRIC COOPERATIVE

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE GRAYLING RENEWABLE ENERGY COVER SHEET AND INDEX

grre-pr-0001_1.dwg

REF DWG(S):

DRAWING NO.: GRRE-PR-0001

SHEET 1 OF 2

ELECTRICAL SPECIFICATIONS

GENERAL

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL A COMPLETE, TESTED, COMMISSIONED, AND SATISFACTORY ELECTRIC INSTALLATION IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS. THE INTENT OF THE DRAWINGS IS NOT TO SHOW OR LIST EVERY ITEM TO BE PROVIDED BY THE CONTRACTOR. IF AN ITEM IS NOT SHOWN OR LISTED THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE MISSING ITEMS TO ALLOW THE SYSTEM TO FUNCTION PROPERLY.

2. ALL DIMENSIONS AND LOCATIONS OF EXISTING CONDITIONS MUST BE VERIFIED PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES NOTED

3. ALL CONTRACTOR INITIATED CHANGES SHALL BE SUBMITTED IN WRITING TO THE ENGINEER OF RECORD FOR APPROVAL PRIOR TO ANY CHANGES IN THE FIELD.

4. EXACT LOCATION AND MOUNTING OF ALL EQUIPMENT SHALL BE VERIFIED IN THE FIELD.

5. THE CONTRACTOR SHALL READ AND UNDERSTAND ALL DRAWINGS AND EQUIPMENT MANUALS PRIOR TO INSTALLATION OR OPERATION OF EQUIPMENT. CONTRACTOR IS TO PROVIDE SKILLED LABOR FOR EACH TRADE WHOSE WORK RELATES TO THE DRAWINGS AND SPECIFICATIONS.

6. ALL OUTDOOR EQUIPMENT ENCLOSURES SHALL BE RATED NEMA 3R MINIMUM.

7. ALL THE EQUIPMENT SHOULD BE FREE FROM ANY DEBRIS, DAMAGED COMPONENTS AND ANY CONNECTION ISSUES.

8. THE CONTRACTOR SHALL KEEP ACCURATE RECORDS OF ALL DEVIATIONS IN WORK AS INSTALLED FROM WORK SPECIFIED ON THE DRAWINGS, OR IN THE SPECIFICATIONS, NOTING THE ORIGIN OF THE CHANGE.

9. SUFFICIENT ACCESS AND WORKING SPACE SHALL BE PROVIDED NEAR ELECTRICAL EQUIPMENT PER NEC ARTICLE 110.

10. CONTRACTOR SHALL PREPARE AN OPERATION AND MAINTENANCE MANUAL FOR ALL EQUIPMENT AND SYSTEMS INSTALLED.

11. CONDUIT JOINTS SHALL BE CUT SQUARE AND DE-BURRED UNTIL SMOOTH. BENDS SHALL BE MADE SO THAT THE CONDUIT IS NOT DAMAGED. THERE SHOULD NOT BE MORE THAN THE EQUIVALENT OF FOUR QUARTER-BENDS (360 DEGREES) BETWEEN PULL POINTS.

12. METALIC CONDUIT GROUNDS SHALL BE INSULATED AND SOLIDLY GROUNDED TO THE EGC SYSTEM. GROUNDS SHALL BE SIZED ACCORDING TO THE NEC.

13. CONDUCTORS SHALL BE COLOR-CODED, FACTORY OR FIELD APPLIED, WITH AN INDUSTRY STANDARD COLOR FOR EACH PHASE AND THE NEUTRAL.

RECORD DOCUMENTS

14. ON COMPLETION OF THE PROJECT, A COMPLETE SET OF MARKED-UP PRINTS SHOWING ANY DEVIATIONS SHALL BE DELIVERED TO THE ENGINEER OF RECORD. UNTIL THESE DRAWINGS ARE REVIEWED BY THE ENGINEER, THE CONTRACT SHALL REMAIN INCOMPLETE.

WIRING METHODS

15. EXPOSED PV WIRING SHALL BE PV WIRE TYPE, 90 DEGREE C, WET RATED AND UV RESISTANT.

16. PV SOURCE AND OUTPUT CIRCUIT CONDUCTORS SHALL BE RED FOR POSITIVE, BLACK FOR NEGATIVE, AND GREEN FOR GROUND. FIELD WIRING THAT IS NOT COLOR CODED SHALL BE MARKED AT BOTH ENDS SHOWING CIRCUIT POLARITY.

17. DC EQUIPMENT SHALL BE LISTED WITH A DC VOLTAGE GREATER THAN OR EQUAL TO THE MAXIMUM DC SYSTEM VOLTAGE.

18. INTERCONNECT WIRING AND POWER CONDUCTORS MUST BE IN ACCORDANCE WITH NEC NFPA 70. CONDUCTORS MUST CONFORM TO THE MINIMUM BEND RADIUS SPECIFIED IN THE SPECIFIC NEC ARTICLE. WIRE BUNDLES SHALL BE KEPT AWAY FROM SHARP EDGES TO AVOID DAMAGE TO WIRE INSULATION. CONDUCTORS SHALL BE COPPER RATED AT 90 DEGREES C UNLESS OTHERWISE NOTED IN THE DRAWINGS. FOR OUTDOOR INSTALLATIONS, CONDUITS AND FITTINGS SHALL BE PROPERLY NEMA RATED AS REQUIRED BY THE NEC.

19. CONNECTORS SHALL BE TORQUED PER DEVICE LISTING OR MANUFACTURER'S RECOMMENDATION.

20. AC WIRING SHALL BE COPPER RATED AT 90 DEGREES C, RATED 600VAC UNLESS OTHERWISE NOTED IN THE DRAWINGS.

21. PV SOURCE CIRCUITS IN FREE AIR SHALL BE PROPERLY SUPPORTED AND SEPARATED TO MAINTAIN AMPACITY RATINGS AND INSULATION INTEGRITY.

25. FIELD MADE CONNECTORS FOR PV QUICK CONNECTS SHALL BE THE SAME TYPE AND MANUFACTURER AS THE PV MODULES AND USE THE MANUFACTURER SPECIFIED CRIMPING TOOL.

GROUNDING

26. ONLY ONE CONNECTION TO DC CIRCUITS AND ONE CONNECTION TO AC CIRCUITS SHALL BE MADE FOR SYSTEM GROUNDING.

27. NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER EQUIPMENT GROUNDING TO ENSURE THE TERMINAL LUG IS PROPERTY BOLTED AND METAL-METAL CONTACT IS MADE. PAINT AND/OR FINISH AT THE POINT OF CONTACT IS TO BE REMOVED.

28. MODULES SHALL BE BONDED WITH EQUIPMENT GROUNDING CONDUCTORS BONDED TO A LOCATION APPROVED BY THE MANUFACTURER WITH A MEANS OF BONDING LISTED FOR THIS PURPOSE.

29. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, INCLUDING BUT NOT LIMITED TO GROUND RODS, GROUNDING LUGS, GROUNDING CLAMPS, ETC.

30. GROUNDING CONDUCTORS SHALL MEET THE FOLLOW SPECIFICATIONS:
 30.1. SOLID CONDUCTORS: ASTM B 3.
 30.2. STRANDED CONDUCTORS: ASTM B 8.
 30.3. TINNED CONDUCTORS: ASTM B 33.

31. GROUNDING BUS WHERE SPECIFIED SHALL BE RECTANGULAR BARS OF ANNEALED COPPER, CROSS SECTION SIZED FOR APPLICATION PER NEC, UNLESS OTHERWISE INDICATED; WITH INSULATORS.

32. GROUNDING CONDUCTORS SHALL BE ROUTED ALONG THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE. AVOID OBSTRUCTING ACCESS OR PLACING CONDUCTORS WHERE THEY MAY BE SUBJECTED TO STRAIN, IMPACT, OR DAMAGE.

33. INSTALL A GROUND CONDUCTOR LOOP AND GROUND RODS, ELECTRICALLY CONNECTED TO BUILDING STRUCTURE, GROUND RODS, AND EXTERIOR EQUIPMENT AS SHOWN ON DRAWINGS.

RACEWAYS

34. METAL CONDUIT AND TUBING SHALL MEET THE FOLLOWING STANDARDS:
 34.1. RIGID STEEL CONDUIT: ANSI C80.1.
 34.2. EMT: ANSI C80.3. (FOR INDOOR USE ONLY).
 34.3. LFMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.

35. FITTINGS FOR CONDUIT SHALL BE LISTED FOR TYPE AND SIZE RACEWAY WITH WHICH USED, AND FOR APPLICATION AND ENVIRONMENT IN WHICH INSTALLED.

36. COATED FITTINGS FOR PVC-COATED CONDUIT SHALL HAVE MINIMUM THICKNESS OF 0.040 INCHES WITH OVERLAPPING SLEEVES PROTECTING THREADED JOINTS.

37. NONMETALIC WIREWAY SHALL BE PROVIDED AS FIBERGLASS POLYESTER, EXTRUDED AND FABRICATED TO SIZE AND SHAPE INDICATED, WITH NO HOLES OR KNOCKOUTS. COVER IS GASKETED WITH OIL-RESISTANT GASKET MATERIAL AND FASTENED WITH CAPTIVE SCREWS TREATED FOR CORROSION RESISTANCE. CONNECTIONS ARE FLANGED, WITH STAINLESS-STEEL SCREWS AND OIL-RESISTANT GASKETS.

38. RACEWAYS FOR OPTICAL FIBER AND COMMUNICATIONS CIRCUITS SHALL BE INSTALLED AS FOLLOWS:
 38.1. 3/4-INCH TRADE SIZE AND SMALLER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 50 FEET.
 38.2. 1-INCH TRADE SIZE AND LARGER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 75 FEET.
 38.3. INSTALL WITH A MAXIMUM OF TWO 90-DEGREE BENDS OR EQUIVALENT FOR EACH LENGTH OF RACEWAY UNLESS DRAWINGS SHOW STRICTER REQUIREMENTS. SEPARATE LENGTHS WITH PULL OR JUNCTION BOXES OR TERMINATIONS AT DISTRIBUTION FRAMES OR CABINETS WHERE NECESSARY TO COMPLY WITH THESE REQUIREMENTS.

DISCONNECTING MEANS

39. MEANS SHALL BE PROVIDED TO DISCONNECT THE PV SYSTEM FROM WIRING SYSTEMS INCLUDING POWER SYSTEMS AND ENERGY STORAGE SYSTEMS.

40. PV DISCONNECTS SHALL NOT BE REQUIRED TO BE SUITABLE AS SERVICE EQUIPMENT AND SHALL BE RATED IN ACCORDANCE WITH ARTICLE 690 PART III: DISCONNECTING MEANS.

PANELBOARDS

41. CONTRACTOR SHALL PROVIDE THE FOLLOWING SUBMITTALS:

 41.1. EACH TYPE OF PANELBOARD, OVERCURRENT PROTECTIVE DEVICE, TRANSIENT VOLTAGE SUPPRESSION DEVICE, ACCESSORY, AND COMPONENT INDICATED. INCLUDE DIMENSIONS AND MANUFACTURERS' TECHNICAL DATA ON FEATURES, PERFORMANCE, ELECTRICAL CHARACTERISTICS, RATINGS, AND FINISHES.

 41.2. MANUFACTURER SEISMIC QUALIFICATION CERTIFICATION: SUBMIT CERTIFICATION THAT PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, ACCESSORIES, AND COMPONENTS WILL WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS" INCLUDE THE FOLLOWING:
  41.2.1. BASIS OF CERTIFICATION: INDICATE WHETHER WITHSTAND CERTIFICATION IS BASED ON ACTUAL TEST OF ASSEMBLED COMPONENTS OR ON CALCULATION.
  41.2.2. DIMENSIONED OUTLINE DRAWINGS OF EQUIPMENT UNIT: IDENTIFY CENTER OF GRAVITY AND LOCATE AND DESCRIBE MOUNTING AND ANCHORAGE PROVISIONS.
  41.2.3. DETAILED DESCRIPTION OF EQUIPMENT ANCHORAGE DEVICES ON WHICH THE CERTIFICATION IS BASED AND THEIR INSTALLATION REQUIREMENTS.

 41.3. FIELD QUALITY-CONTROL TEST REPORTS INCLUDING THE FOLLOWING:
  41.3.1. TEST PROCEDURES USED.
  41.3.2. TEST RESULTS THAT COMPLY WITH REQUIREMENTS.
  41.3.3. RESULTS OF FAILED TESTS AND CORRECTIVE ACTION TAKEN TO ACHIEVE TEST RESULTS THAT COMPLY WITH REQUIREMENTS.

 41.4. PANELBOARD SCHEDULES: FOR INSTALLATION IN PANELBOARDS. SUBMIT FINAL VERSIONS AFTER LOAD BALANCING.

 41.5. OPERATION AND MAINTENANCE DATA: FOR PANELBOARDS AND COMPONENTS TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS. IN ADDITION TO ITEMS SPECIFIED IN DIVISION 01 SECTION "OPERATION AND MAINTENANCE DATA," INCLUDE THE FOLLOWING:
  41.5.1. MANUFACTURER'S WRITTEN INSTRUCTIONS FOR TESTING AND ADJUSTING OVERCURRENT PROTECTIVE DEVICES.
  41.5.2. TIME-CURRENT CURVES, INCLUDING SELECTABLE RANGES FOR EACH TYPE OF OVERCURRENT PROTECTIVE DEVICE

42. CONTRACTOR SHALL MEET THE FOLLOWING QUALITY ASSURANCE STANDARDS:

 42.1. SOURCE LIMITATIONS: OBTAIN PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, COMPONENTS, AND ACCESSORIES THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER.
 42.2. PRODUCT OPTIONS: DRAWINGS INDICATE SIZE, PROFILES, AND DIMENSIONAL REQUIREMENTS OF PANELBOARDS AND ARE BASED ON THE SPECIFIC SYSTEM INDICATED. REFER TO DIVISION 01 SECTION "PRODUCT REQUIREMENTS."
 42.3. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
 42.4. COMPLY WITH NEMA PB 1.
 42.5. COMPLY WITH NFPA 70.

43. CONTRACTOR SHALL COORDINATE LAYOUT AND INSTALLATION OF PANELBOARDS AND COMPONENTS WITH OTHER CONSTRUCTION THAT PENETRATES WALLS OR IS SUPPORTED BY THEM, INCLUDING ELECTRICAL AND OTHER TYPES OF EQUIPMENT, RACEWAYS, PIPING, AND ENCUMBRANCES TO WORKSPACE CLEARANCE REQUIREMENTS.

44. CONTRACTOR SHALL PROVIDE PANELBOARD PRODUCTS THAT MEET THE FOLLOWING CRITERIA
 44.1. MANUFACTURER SHALL BE AS SHOWN ON DRAWINGS OR EQUAL.
 44.2. FABRICATE AND TEST PANELBOARDS ACCORDING TO IEEE 344 TO WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS."
 44.3. ENCLOSURES: SURFACE MOUNTED CABINETS. NEMA PB 1, TYPE 1.
  44.3.1. RATED FOR ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.
  44.3.2. OUTDOOR LOCATIONS: NEMA 250, TYPE 4X STAINLESS.
  44.3.3. OTHER WET OR DAMP INDOOR LOCATIONS: NEMA 250, TYPE 4X.
  44.3.4. FRONT: SECURED TO BOX WITH CONCEALED TRIM CLAMPS. FOR SURFACE-MOUNTED FRONTS, MATCH BOX DIMENSIONS; FOR FLUSH-MOUNTED FRONTS, OVERLAP BOX.
  44.3.5. FINISH: MANUFACTURER'S STANDARD ENAMEL FINISH OVER CORROSION-RESISTANT TREATMENT OR PRIMER COAT.
  44.3.6. DIRECTORY CARD: WITH TRANSPARENT PROTECTIVE COVER, MOUNTED IN METAL FRAME, INSIDE PANELBOARD DOOR

 44.4. PHASE AND GROUND BUSES:
  44.4.1. MATERIAL: HARD-DRAWN COPPER, 98 PERCENT CONDUCTIVITY.
  44.4.2. EQUIPMENT GROUND BUS: ADEQUATE FOR FEEDER AND BRANCH-CIRCUIT EQUIPMENT GROUND CONDUCTORS; BONDED TO BOX.

 44.5. CONDUCTOR CONNECTORS: SUITABLE FOR USE WITH CONDUCTOR MATERIAL.
  44.5.1. LUGS: MECHANICAL TYPE.

 44.6. SERVICE EQUIPMENT LABEL: UL LABELED FOR USE AS SERVICE EQUIPMENT FOR PANELBOARDS WITH MAIN SERVICE DISCONNECT SWITCHES.

 44.7. UL LABEL INDICATING SERIES-CONNECTED RATING WITH INTEGRAL OR REMOTE UPSTREAM OVERCURRENT PROTECTIVE DEVICES. INCLUDE SIZE AND TYPE OF UPSTREAM DEVICE ALLOWABLE, BRANCH DEVICES ALLOWABLE, AND UL SERIES-CONNECTED SHORT-CIRCUIT RATING.

45. CONTRACTOR SHALL PROVIDE OVERCURRENT PROTECTIVE DEVICES THAT MEET THE FOLLOWING CRITERIA:

 45.1. MOLDED-CASE CIRCUIT BREAKER: PROVIDE BREAKERS FROM PANELBOARD MANUFACTURER. UL 489, WITH SERIES-CONNECTED RATING TO MEET AVAILABLE FAULT CURRENTS

 45.2. THERMAL-MAGNETIC CIRCUIT BREAKERS: INVERSE TIME-CURRENT ELEMENT FOR LOW-LEVEL OVERLOADS, AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS. ADJUSTABLE MAGNETIC TRIP SETTING FOR CIRCUIT-BREAKER FRAME SIZES 250 A AND LARGER

 45.3. ADJUSTABLE INSTANTANEOUS-TRIP CIRCUIT BREAKERS: MAGNETIC TRIP ELEMENT WITH FRONT-MOUNTED, FIELD-ADJUSTABLE TRIP SETTING.

 45.4. ELECTRONIC TRIP-UNIT CIRCUIT BREAKERS SHALL HAVE RMS SENSING; FIELD-REPLACEABLE RATING PLUG; AND WITH THE FOLLOWING FIELD-ADJUSTABLE SETTINGS:
  45.4.1. INSTANTANEOUS TRIP.
  45.4.2. LONG- AND SHORT-TIME PICKUP LEVELS.
  45.4.3. LONG- AND SHORT-TIME TIME ADJUSTMENTS.
  45.4.4. GROUND-FAULT PICKUP LEVEL, TIME DELAY, AND I2/T RESPONSE.

 45.5. GFCI CIRCUIT BREAKERS: SINGLE- AND TWO-POLE CONFIGURATIONS WITH 5-MA WHERE INSTALLED PROTECTION OF GENERAL USE RECEPTACLES. WHERE REQUIRED, 30-MA TRIP SENSITIVITY FOR CIRCUITS INSTALLED TO SUPPLY SPECIFIC EQUIPMENT.

REQUIRED SAFETY SIGNS AND LABELS

1. THE MARKING SHALL ADEQUATELY WARN OF THE HAZARD USING EFFECTIVE WORDS AND/OR COLORS AND/OR SYMBOLS PER NEC 110.21.

2. THE LABEL SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN PER NEC 110.21.

3. THE LABEL SHALL BE OF SUFFICIENT DURABILITY ABLE TO WITHSTAND THE ENVIRONMENT INSTALLED IN PER NEC 110.21.

4. LABELS AND MARKINGS SHALL BE APPLIED TO THE APPROPRIATE COMPONENTS IN ACCORDANCE WITH THE NEC.

5. PV MODULES AND INVERTERS ARE TO BE SUPPLIED FROM THE MANUFACTURER WITH PRE-APPLIED MARKINGS TO MEET THE REQUIREMENTS OF NEC 690.51 & 690.41(B)(1).

6. UNLESS OTHERWISE SPECIFIED ON THE LABELING SHEET, OSHA 1910.145 AND ANSI Z535 RECOMMENDED SPECIFICATIONS ARE AS FOLLOWS:
 6.1. ROUNDED OR BLUNT CORNERS FREE OF SHARP EDGES.
 6.2. VISIBLE AT A MINIMUM DISTANCE OF 5FT. OR GREATER.
 6.3. "DANGER" HEADER; RED BACKGROUND WITH WHITE LETTERING.
 6.4. "WARNING" HEADER; ORANGE BACKGROUND WITH BLACK LETTERING.
 6.5. "CAUTION" HEADER; YELLOW BACKGROUND WITH BLACK LETTERING.
 6.6. "NOTICE" LABEL HEADER TO BE IN BLUE WITH WHITE LETTERING.
 6.7. OTHER TEXT TO BE BLACK ON A WHITE BACKGROUND.

7. ALL RELEVANT COMPONENTS OF THE PHOTOVOLTAIC SYSTEM SHALL BE CLEARLY MARKED AND LABELED IN ACCORDANCE WITH NEC ARTICLE 690.

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc
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FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
GRAYLING RENEWABLE ENERGY
GENERAL INFORMATION AND SPECIFICATIONS
grre-el-0000_1.dwg

REF DWG(S):

DRAWING NO.: GRRE-EL-0000

SHEET 1 OF 1

STANDARD BLOCKS – ELECTRICAL

CABLE TAG – WIRING DIAGRAMS & 3–LINES

STANDARD ABBREVIATIONS – ELECTRICAL

A	AMPERE
ACB	AIR CIRCUIT BREAKER
AB	AIR BREAK
ABV	ABOVE
AC	ALTERNATING CURRENT
ADJ	ADJUSTABLE
ADJT	ADJACENT
ALT	ALTERNATE
AL	ALUMINUM
APPRX	APPROXIMATE
B	BUS
BF	BREAKER FAIL
BFI	BREAKER FAIL INITIATE
BKR	BREAKER
BLDG	BUILDING
BLK	BLOCK
BOT	BOTTOM
BTU	BRITISH THERMAL UNIT
BTWN	BETWEEN
BU	BACKUP
C	COLOUMB
CAP	CAPACITOR OR CAPACITANCE
CAP	CORRUGATED ALUMINUM PIPE
CB	CENTER BREAK
CBL	CABLE
CEM	CEMENT
CF	CUBIC FOOT
CHK	CHECK
CI	CAST IRON
CIP	CAST IRON PIPE
CIPC	CAST–IN–PLACE CONCRETE
CIR	CIRCLE
CKT	CIRCUIT
CLK	CLOCK
CLS	CLOSE
CMIL	CIRCULAR MIL
CMP	CORRUGATED METAL PIPE
COS	COSINE
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CS	
CSP	CORRUGATED STEEL PIPE
CT	CURRENT TRANSFORMER
CTRL	CONTROLSWITCHER OR CONTROL SWITCH
CTS	CLEAR TO SEND
CU	COPPER
DC	DIRECT CURRENT
DCD	DATA CARRIER DETECT
DCE	DATA COMMUNICATIONS EQUIPMENT
DDE	DOUBLE DEAD END
DE	DEAD END
DEM	DEMOLISH, DEMOLITION
DEMOB	DEMOBILIZE
DET	DETAIL
DFR	DISTURBANCE FAULT RECORDER
DI	DIGITAL INPUT
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIST	DISTRIBUTION
DNP	DISTRIBUTED NETWORK PROTOCOL
DO	DIGITAL OUTPUT
DSSS	D STREET SUBSTATION
DTE	DATA TERMINAL EQUIPMENT
DWG	DRAWING
EA	EACH
EIA	ELECTRONICS INDUSTRY ASSOCIATION
EJ	EXPANSION JOINT
EL	ELECTRICAL
ELEV	ELEVATION
ENCL	ENCLOSURE
EQ	EQUAL
EQUIP	EQUIPMENT
EST	ESTIMATE
EXIST	EXISTING
F	FARAD
F	FUSE
FREQ	FREQUENCY
FT	FEET
FT	FEED THROUGH
FUT	FUTURE
G	CONDUCTANCE OR GROUND
GA	GAUGE
GALV	GALVANIZED
GB	GROUND BUS
GCB	GAS CIRCUIT BREAKER
GEN	GENERATOR
GI	GALVANIZED IRON
GND	GROUND
GOAB	GANG OPERATED AIR–BREAK SWITCH
GRC	GALVANIZED RIGID CONDUIT
GRD	GRADE, GRADING
GRSC	GALVANIZED RIGID STEEL CONDUIT
H	HENERY
HDPE	HIGH–DENSITY POLYETHYLENE
HLO	HOT LINE ORDER
HORIZ	HORIZONTAL
HP	HORSEPOWER
HZ	HERTZ
IA	PHASE A CURRENT
IB	PHASE B CURRENT
IC	PHASE C CURRENT
ID	INSIDE DIAMETER
IN	INPUT
IN	INCH
IN	NEUTRAL CURRENT
INCL	INCLUDE(D), INCLUDING
IND	INDUSTRY
INT	INTERSECTION
INV	INVERT
IP	POLARIZING CURRENT
j	COMPLEX NUMBER
J	JOULE
JB	JUNCTION BOX
KA	KILOAMPRERE
KV	KILOVOLT
KW	KILOWATT
L	INDUCTANCE
L	LINE
L	LOAD
LB	LOAD BREAK
LGPP	LANDFILL GAS POWER PLANT
LT	LIGHT
M	METER(S)
MAT	MATERIAL
MAX	MAXIMUM
MFG	MANUFACTURER
MI	MILE
MIN	MINIMUM
MISC	MISCELLANEOUS
MM	MILLIMETER(S)
MO	MOTOR OPERATED (OR)
MOB	MOBILIZE
MTR	METER
MW	MEGAWATT
N	NEUTRAL
N	NEWTON
N	NORTH
NC	NORMALLY CLOSED
NCC	NORMALLY CLOSED CONTACT
N/C	NO CONNECTION
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOC	NORMALLY OPEN CONTACT
NS	SYNCHRONIZING NEUTRAL
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
OUT	OUTPUT
P	REAL POWER OR PRIMARY
PB	PUSH BUTTON
PF	POWER FACTOR
PLC	PROGRAMMABLE LOGIC CONTROLLER
PM	PAD–MOUNT TRANSFORMER
PSSS	PROVIDER SWITCHYARD
PT	POINT
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER
Q	REACTIVE POWER
R	RESISTANCE OR RESISTOR
RCLS	RECLOSE
RAD	RADIUS
RAD	RADIAN
RD	ROAD
RE	REMOTE END
REF	REFERENCE
REQD	REQUIRED
RET	REMOTE END TRIP
RET	RETURN
REV	REVISION
RLY	RELAY
RR	RAILROAD
ROW	RIGHT OF WAY
RTS	READY TO SEND
RTU	REMOTE TERMINAL UNIT
RX	RECEIVE
S	APPARENT POWER
S	SOUTH
S	SOURCE
S–L	SOURCE–LOAD
SA	SURGE ARRESTOR
SC	SWITCH CABINET
SEC	SECTION
SEC	SECONDARY
SVC	SERVICE
SVC	STATIC VAR COMPENSATOR
SHT	SHEET
SIM	SIMILAR
SIN	SINE
SPEC	SPECIFICATION
SPECS	SPECIFICATIONS
SPSS	SPARTAN SUBSTATION
SS	SYNCHRONIZING SWITCH
STA	STATION
STD	STANDARD
SW	SWITCH
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
SYNCH	SYNCHRONIZE
T	TIME OR TRANSFORMER
TAN	TANGENT
TCM	TRIP COIL MONITOR
TEL	TELEPHONE
TERM	TERMINAL
TEMP	TEMPORARY
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
TRP	TRIP
TURB	TURBINE
TX	TRANSMIT
TYP	TYPICAL
UG	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
V	VOLT
VA	VOLTAMPERE
VA	PHASE A VOLTAGE
VAR	REACTIVE POWER
VB	PHASE B VOLTAGE
VAC	ALTERNATING CURRENT VOLTAGE
VC	PHASE C VOLTAGE
VCB	VACUUM CIRCUIT BREAKER
VDC	DIRECT CURRENT VOLTAGE
VERT	VERTICAL
VIF	VERIFY IN FIELD
VN	NEUTRAL VOLTAGE
VR	VOLTAGE REGULATOR
VREG	VOLTAGE REGULATOR
VS	SYNCHRONIZING VOLTAGE
VT	VOLTAGE TRANSFORMER
W	WEST
W	WATT
W/	WITH
W/O	WITHOUT
X	REACTANCE
XFMR	TRANSFORMER
XMSSN	TRANSMISSION
Y	ADMITTANCE
YL	YELLOW
Z	IMPEDANCE
2	TIME–DELAY
21	DISTANCE
25	SYNCHRONISM CHECK
27	UNDERVOLTAGE
30	ANNUNCIATOR
32	DIRECTIONAL POWER
37	UNDERCURRENT OR UNDERPOWER
38	BEARING
40	FIELD
43	MANUAL TRANSFER OR SELECTOR DEVICE
46	REVERSE–PHASE
47	PHASE–SEQUENCE VOLTAGE
49	MACHINE OR TRANSFORMER THERMAL RELAY
50	INSTANTANEOUS OVERCURRENT
51	AC TIME OVERCURRENT
52	AC CIRCUIT BREAKER
52a	NORMALLY OPEN BREAKER CONTACT
52b	NORMALLY CLOSED BREAKER CONTACT
59	OVERVOLTAGE
60	VOLTAGE BALANCE
63	PRESSURE SWITCH
64	APPARATUS GROUND
67	AC DIRECTIONAL OVERCURRENT
68	BLOCKING
69	PERMISSIVE
71	LEVEL SWITCH
74	ALARM
76	DC OVERCURRENT
78	OUT–OF–STEP
79	RECLOSING RELAY
81	FREQUENCY
85	CARRIER OR PILOT WIRE
86	LOCK OUT
87	DIFFERENTIAL
94	TRIPPING

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24–0560

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TANANA CHIEFS CONFERENCE
GRAYLING RENEWABLE ENERGY
GENERAL INFORMATION AND SPECIFICATIONS

grre–el–0000_2.dwg

REF DWG(S):

DRAWING NO.: GRRE–EL–0000

SHEET 2 OF 2

1 PV ARRAY SITE OVERVIEW
0 20 40 60 FEET
SCALE: 1" = 32'-0"

System Summary

Physical Arrangement	
Methodology	Fixed Tilt, Ground Mount
Tilt	35°
Azimuth	181°
Racking System / Model	Nuance Osprey PowerRACK
Electrical Arrangement	
Watts per Module	595W
24 Module Strings	20
Quantity of Modules	480
Total DC System Size	285,600W
Inverter Arrangement	
Manufacturer	SMA
Model	Sunny Highpower PEAK3 125-US
Inverter Size	125kW
Quantity of Inverters	2
Strings per Inverter	10
PV Modules	
Manufacturer	SEG Solar
Model	SEG-595-BTA-BG
Peak Power	595W
Quantity of Modules	480

LEGEND	
	DC COMBINER BOXES (4)
	FENCE LINE/LOD
	PV ARRAY
	SOLAR INVERTER (2)

NOT FOR CONSTRUCTION

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B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR DISTRIBUTION DESIGN	MED/09-04-2025	JRV/09-04-2025
D	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

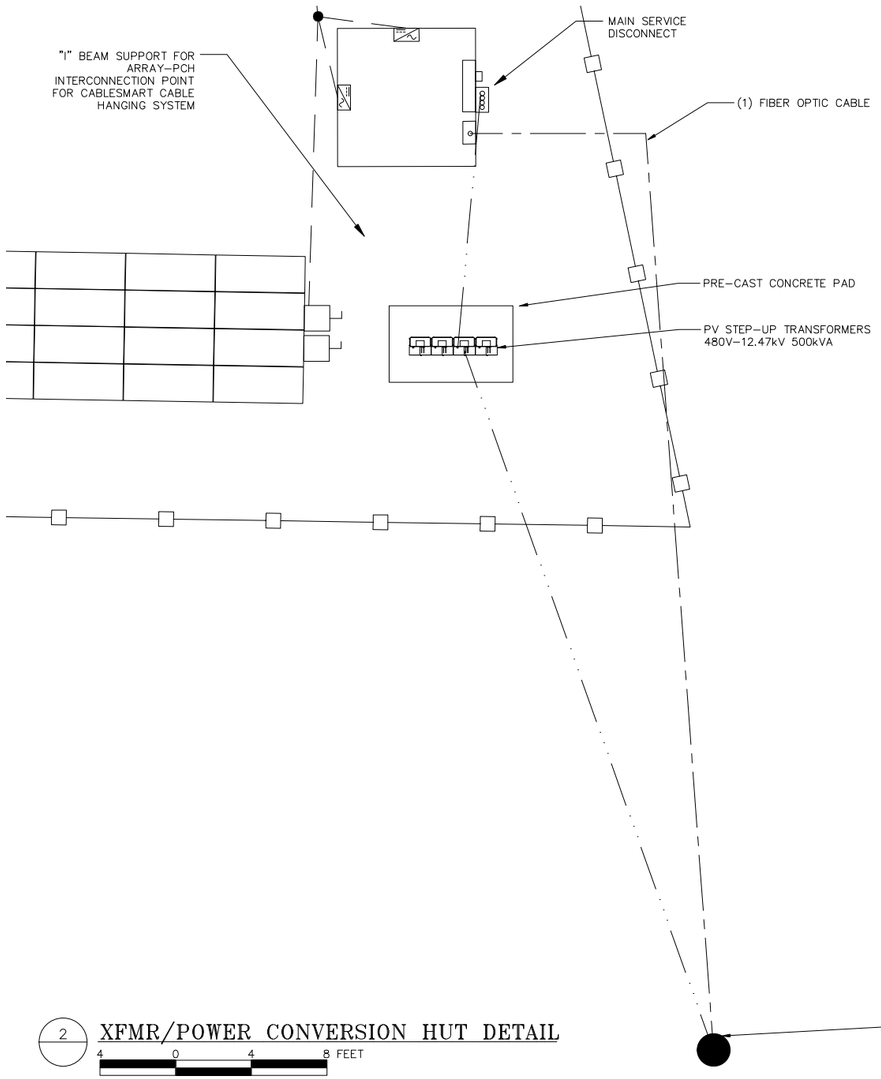
DRAWING NAME:
TANANA CHIEFS CONFERENCE
GRAYLING RENEWABLE ENERGY
PV ARRAY LAYOUT DIAGRAM

grre-el-2500_2.dwg

REF DWG(S):

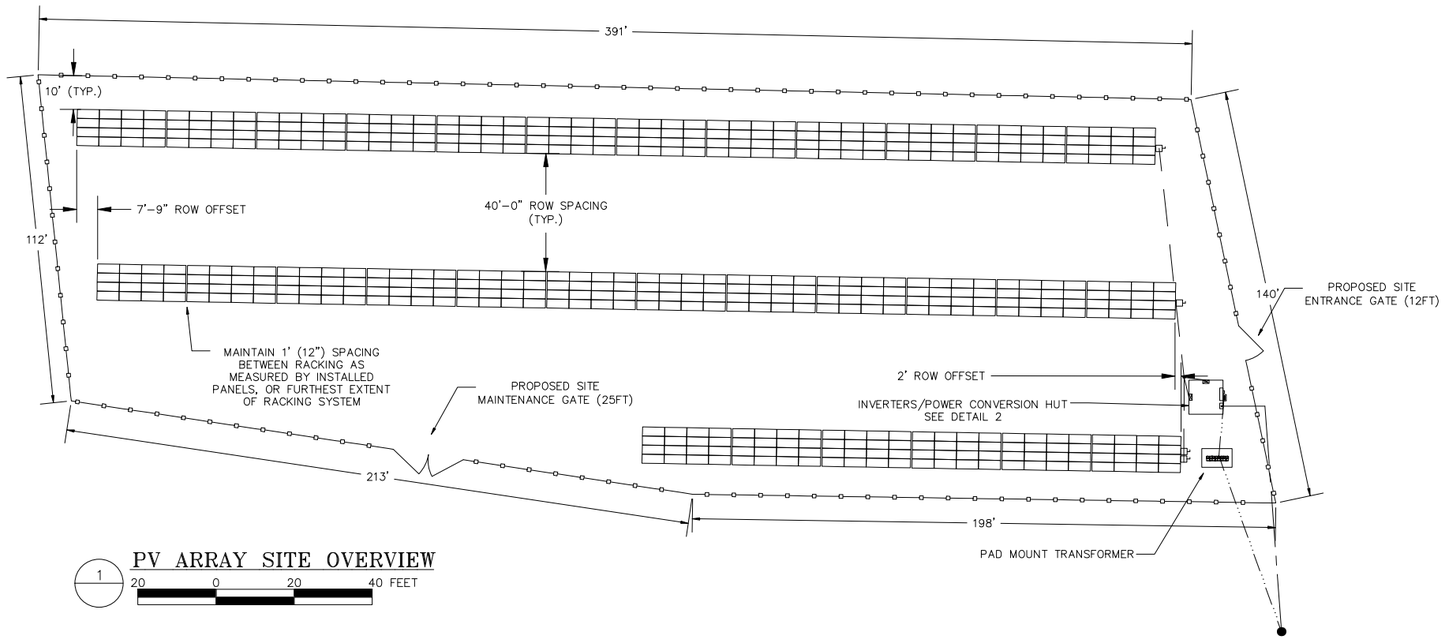
DRAWING NO.: GRRE-EL-2500

SHEET 2 OF 6



2 XFMR/POWER CONVERSION HUT DETAIL

4 0 4 8 FEET



1 PV ARRAY SITE OVERVIEW

20 0 20 40 FEET

LEGEND	
	DC COMBINER BOXES (4)
	FENCE LINE/LOD
	PV ARRAY
	SOLAR INVERTER (2)
— — — —	CABLE HANGER MESSENGER
—— · · ——	UG POWER CABLE
——·——·——	UG COMM CABLE

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24–0560

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

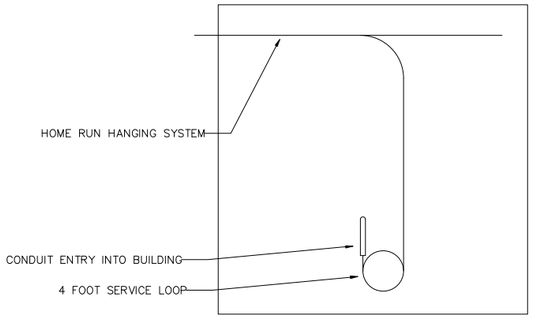
DRAWING NAME: TANANA CHIEFS CONFERENCE GRAYLING RENEWABLE ENERGY INTERCONNECTION LAYOUT

grre–el–2500_4.dwg

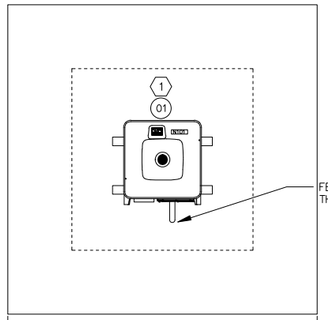
REF DWG(S):

DRAWING NO.: GRRE–EL–2500

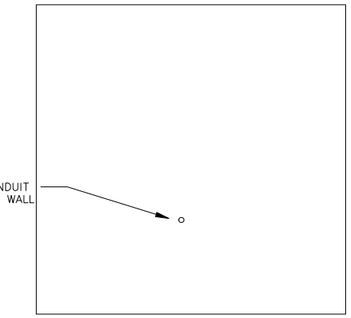
SHEET 4 OF 6



PCH (WEST OUTSIDE)



PCH (NORTH INSIDE)



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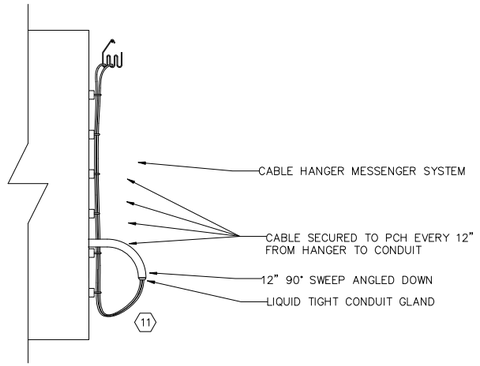
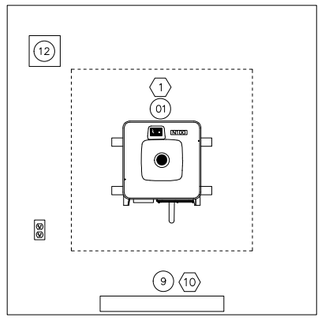


HOME-RUN ENTRY



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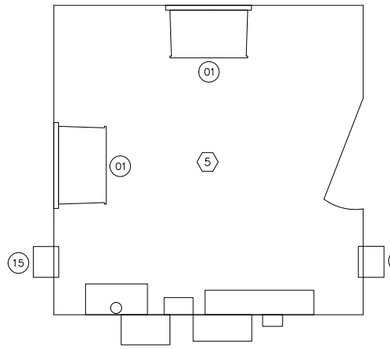
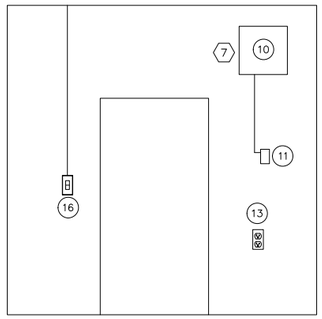
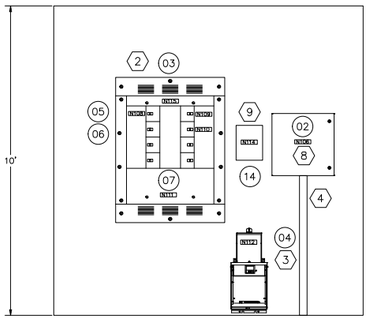
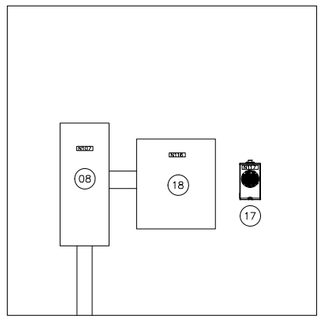




PCH (EAST INSIDE)



PCH (SOUTH INSIDE)



PCH (SOUTH OUTSIDE)

BUILDING MANUFACTURER TO PROVIDE PRE-FABRICATED METAL BUILDING PER FOLLOWING SPECIFICATIONS:
STRUCTURAL:
-ROOF PITCH: 3:12
-ROOF DEAD LOAD 30PSF MINIMUM
-MAX WALL LOAD: 220LBS (INVERTER)
-MAX FLOOR LOAD: 210LBS (STATION SERVICE SUBSTATION)
INSULATION:
-WALL INSULATION: R22 MINIMUM
-CEILING INSULATION: R30 MINIMUM

ALL INTERIOR CONDUITS SHALL BE GALVANIZED RIGID CONDUIT (GRC) OR ELECTRICAL METALLIC TUBING (EMT). EXTERIOR CONDUIT SHALL BE RIGID GALVANIZED CONDUIT ONLY. EMT TYPE COUPLERS AND FITTINGS SHALL BE RAIN-TIGHT COMPRESSION TYPE. GROUNDING BUSHINGS SHALL BE INSTALLED AT THE SOURCE END OF THE EMT CONDUIT RUNS FROM THE AC PANEL.

NOT FOR CONSTRUCTION

6

BILL OF MATERIAL

REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	EA	2	SUNNY HIGHPOWER PEAK3-125KW	SMA/SHP 125-US-21
02	EA	1	COMMUNICATION PANEL	SEE REF. 1
03	EA	1	POWER DISTRIBUTION PANELBOARD	SQUARED/HCJ23734M
04	EA	1	STATION SERVICE SUBSTATION, 10kVA	HAMMOND/M1PC010LESF
05	EA	2	200A CIRCUIT BREAKER	
06	EA	1	30A/2P CIRCUIT BREAKER	
07	EA	1	400A MAIN CIRCUIT BREAKER	
08	EA	1	400A LOAD BREAK DISCONNECT WITH PROVISIONS FOR PADLOCK	
09	EA	1	ELECTRIC BASEBOARD HEATER, 1000W, 120VAC W/ BUILT-IN THERMOSTAT	
10	EA	1	WALL MOUNT SHUTTER FAN, >2500CFM, 120VAC W/ DAMPER MOTOR CONTROLLED BY THERMOSTAT	
11	EA	1	PROGRAMMABLE THERMOSTAT	
12	EA	1	10" MOTORIZED INTAKE DAMPER	
13	EA	2	GFCI RECEPTACLE	
14	EA	1	SHARK 250 SELF-ENCLOSED METER ASSEMBLY	ELECTRO INDUSTRIES /ENCSHK250-277-60-10-V3-D2-INP100S-X
15	EA	2	90° VENTILATION HOOD WITH INSECT SCREEN	
16	EA	1	LIGHT SWITCH	
17	EA	1	600V 20A METER SOCKET W/SELF-SHUNTING BYPASS	MILBANK/UC7237-XL
18	EA	1	400A CT ENCLOSURE	

NOTES:

1. MOUNT SMA SHP-125-US INVERTERS SUCH THAT THEY ARE 4" AWAY FROM THE WALL, AND 20" ON ALL OTHER SIDES FROM WALLS, FLOORS, CEILINGS, AND OTHER DEVICES. MAINTAIN 4' WORKING CLEARANCE ZONE IN FRONT OF INVERTERS, PER NEC. PROVIDE A 4" X 4" WIREWAY (MINIMUM) BETWEEN INVERTERS AND PANELBOARD
2. MOUNT POWER DISTRIBUTION PANELBOARD SUCH THAT MANUFACTURER RECOMMENDED CLEARANCE DISTANCES BETWEEN THE PANELBOARD AND WALLS, FLOORS, CEILINGS, AND OTHER DEVICES IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE IN FRONT OF THE PANELBOARD, PER NEC
3. MOUNT STATION SERVICE SUBSTATION SUCH THAT ALL MANUFACTURER RECOMMENDED CLEARANCE ZONES AWAY FROM EQUIPMENT IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE ZONE IN FRONT OF THE DEVICE, PER NEC
4. ROUTE CONDUITS SUCH THAT THE STUB-UP AREA IS DIRECTLY UNDER ALL DESTINATION DEVICES IN THE POWER CONVERSION HUT
5. PROVIDE CEILING MOUNTED LIGHTING SUCH THAT 30 FOOTCANDLES IS MAINTAINED. MOUNT LIGHT SWITCH NEXT TO DOOR AT LEAST 40" FROM FLOOR.
6. ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN CAN BE CONTRACTOR DETERMINED, PROVIDED THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.
7. VENTILATION FOR THE ENCLOSURE SHALL BE PROVIDED BY A WEATHERPROOF 120VAC EXHAUST FAN WITH A MINIMUM FLOW RATE OF 2500CFM, CONTROLLED BY AN ADJUSTABLE THERMOSTAT FOR FAN OPERATION OF INTERIOR AIR TEMPERATURES OF 35°C AND ABOVE, AND BY A 10" MOTORIZED INTAKE DAMPER. EXHAUST FAN AND INTAKE DAMPER SHALL BE PROVIDED WITH A 90° EXTERIOR HOOD WITH INSECT SCREENS TO PREVENT INTRUSIONS OF WIND DRIVEN RAIN/SNOW.
8. MOUNT RECEPTACLES ON INSIDE WALLS OF PCH AT LEAST 18" FROM FLOOR. MOUNT ONE RECEPTACLE ON SOUTH SIDE OF DOOR (EAST WALL) AND ONE RECEPTACLE NEXT TO POWER BASEBOARD HEATER (WEST WALL).
9. CONNECT SHARK 250 CURRENT TRANSFORMERS AND POTENTIAL TRANSFORMERS TO THE 400A OUTPUT BREAKER AT POWER DISTRIBUTION PANELBOARD THROUGH A 1" CONDUIT.
10. HEATING TO BE PROVIDED BY ELECTRIC BASEBOARD HEATER WITH BUILT-IN THERMOSTAT. HEATER TO TURN ON BELOW 10°F.
11. HOME-RUN CABLES TO ENTER INTO PCH VIA CONDUIT SWEEP ANGLED DOWN. MIN CONDUIT RADIUS TO BE 8 X THE DIAMETER OF THE LARGEST CABLE. SUPPORT CABLES EVERY 12"AS MEASURED BY THE CABLES PATH FROM HANGER, TO CONDUIT WITH UV RESISTANT, OUTDOOR RATED CABLE TIES. ADD IN A 4FT SERVICE LOOP BEFORE ENTERING INTO THE CONDUIT. EXACT HEIGHT AND PLACEMENT OF CONDUIT TO BE DETERMINED BY CONTRACTOR ON-SITE.

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0560

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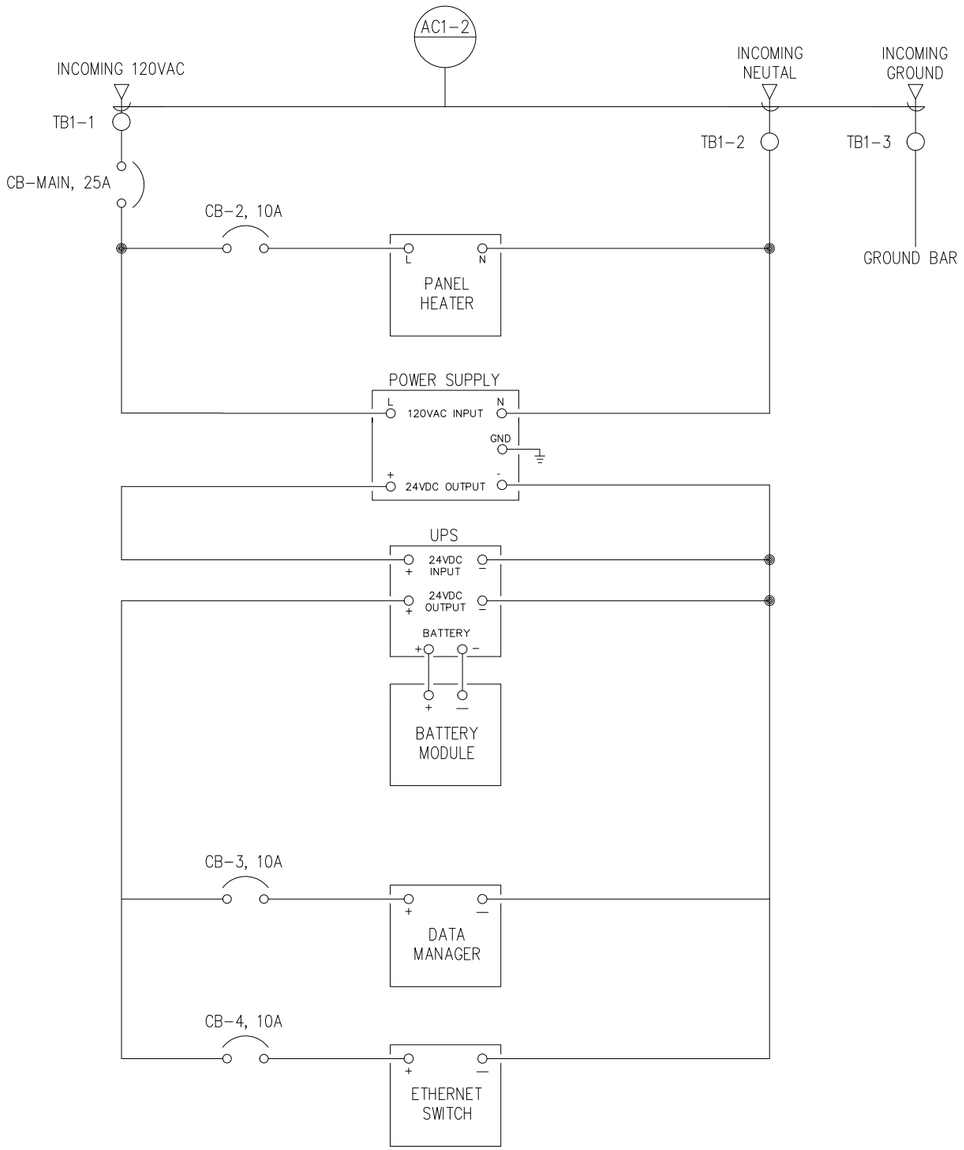
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	GRRE-EL-2500/6	COMMUNICATIONS PANEL
1	GRRE-SS-2000/5	EQUIPMENT NAMEPLATE SCHEDULE

DRAWING NAME:
TANANA CHIEFS CONFERENCE
GRAYLING RENEWABLE ENERGY
POWER CONVERSION HUT
LAYOUT DIAGRAM
grre-el-2500_5.dwg

REF DWG(S):

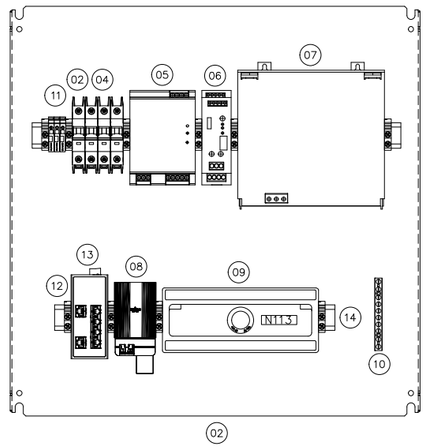
DRAWING NO.: GRRE-EL-2500

SHEET 5 OF 6



1 ONE-LINE DIAGRAM

01



02

2 PANEL ELEVATION – INSIDE

1:4 – 1" = 4" 4 0 4 8

1

BILL OF MATERIAL

REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	EA	1	24" X 24" X 10" NEMA 1 MILD STEEL WALL MOUNTED ENCLOSURE	
02	EA	1	INNER PANEL FOR 24X24X10 ENCLOSURE	
03	EA	1	25A, 600V UL489 1-POLE BREAKER	
04	EA	3	10A, 600V UL489 1-POLE BREAKER	
05	EA	1	PHOENIX CONTACT 120VAC/24VDC PS, 20 AMP	PHOENIX CONTACT/ 2866776
06	EA	1	PHOENIX CONTACT 20 AMP UPS	PHOENIX CONTACT/ 2320238
07	EA	1	PHOENIX CONTACT 12 Ah BATTERY	PHOENIX CONTACT/ 1274119
08	EA	1	150W PANEL HEATER W/BUILT IN REGULATION ON: 41°F – OFF: 59°	STEGO/06021.0-00
09	EA	1	DATA MANAGER	SMA/EDMM-20
10	EA	1	UL 467 GROUND BAR, 6 POLE MINIMUM	
11	EA	3	6MM DINRAIL MOUNTED TERMINAL BLOCK	
12	EA	10	6MM DINRAIL MOUNTED TERMINAL BLOCK END STOP	
13	EA	1	UNMANAGED ETHERNET SWITCH, 2 FIBER PORTS	MOXA/EDS-G308-2SPF
14	EA	1	35MM DIN MOUNTING RAIL	

NOTES:

1. ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN CAN BE CONTRACTOR DETERMINED, PROVIDED THAT THE CONTRACTOR DETERMINED PRODUCT MATCHES THE PRODUCT DESCRIPTION IN THE CENTER COLUMN, AND THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.
2. PROVIDE 1 SPARE CIRCUIT BREAKER FOR EACH SIZE (REF. NO. 3, AND REF. NO. 4) AND STORE IN BOTTOM OF ENCLOSURE

3 PANEL BOM

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

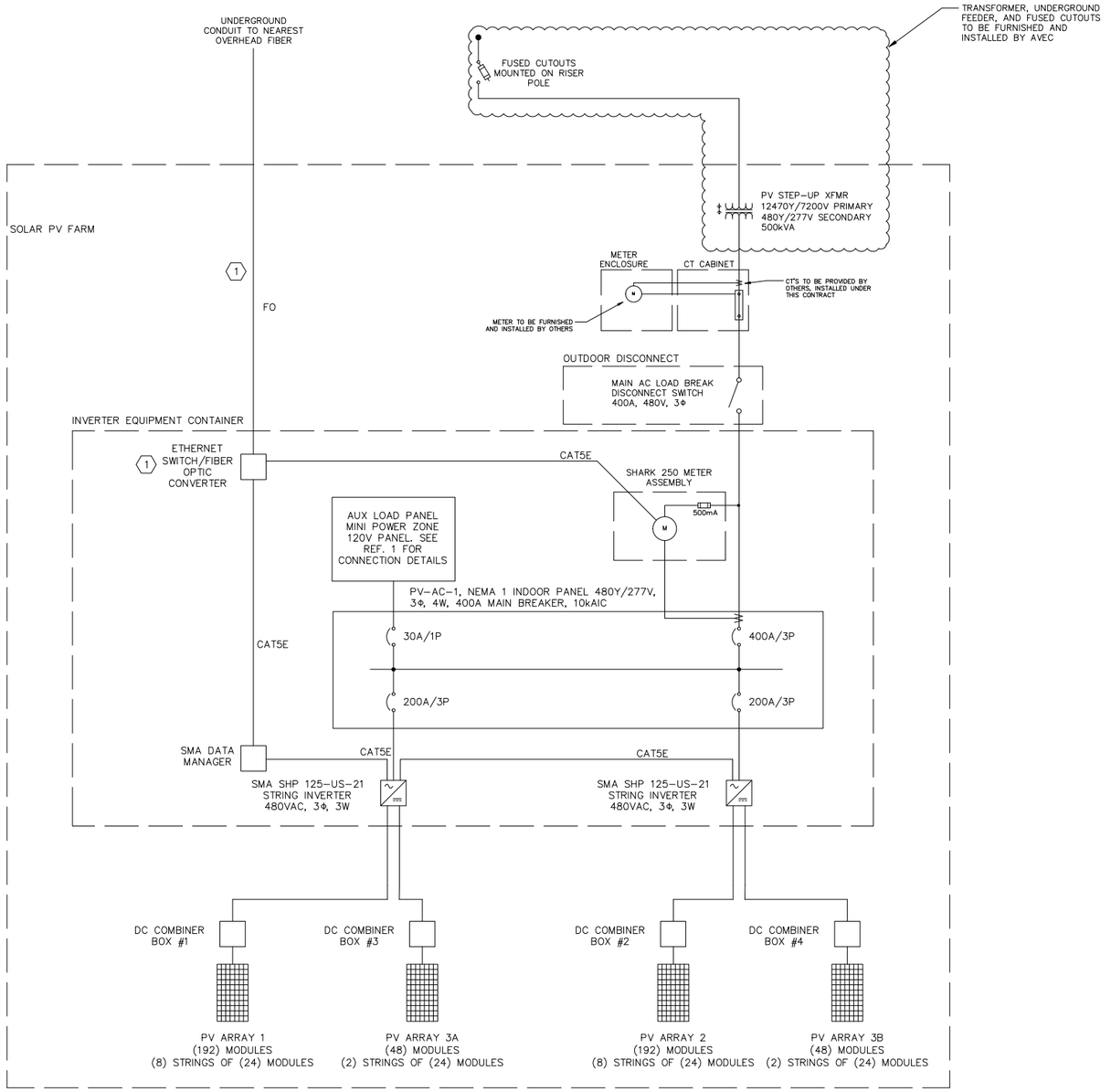
DRAWING NAME: TANANA CHIEFS CONFERENCE GRAYLING RENEWABLE ENERGY COMMUNICATIONS PANEL PANEL ELEVATION DRAWING

grre-el-2500_6.dwg

REF DWG(S):

DRAWING NO.: GRRE-EL-2500

SHEET 6 OF 6



NOTES:

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE SITE COMMUNICATIONS INTERCONNECTIONS WITH LOCAL UTILITY. CONTRACTOR IS RESPONSIBLE FOR FIBER OPTIC CABLE CONNECTION BETWEEN SOLAR PV EQUIPMENT AND UTILITY POWER PLANT.

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	GGL/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	GGL/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

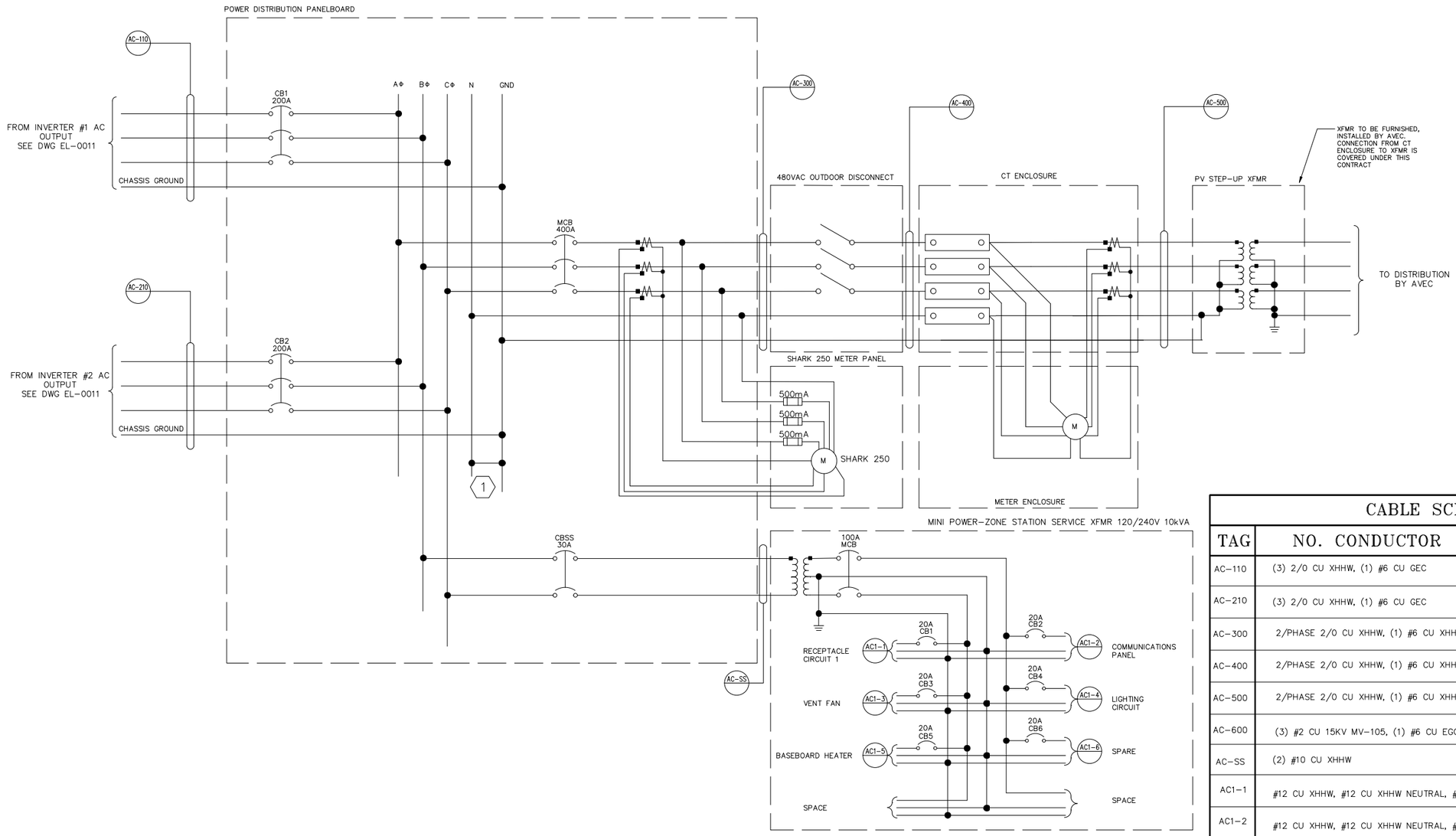
DRAWING NAME: TANANA CHIEFS CONFERENCE GRAYLING RENEWABLE ENERGY SYSTEM ONE-LINE DIAGRAM

grre-el-0010_1.dwg

REF DWG(S):

DRAWING NO.: GRRE-EL-0010

SHEET 1 OF 1



CABLE SCHEDULE

TAG	NO. CONDUCTOR	RACEWAY
AC-110	(3) 2/0 CU XHHW, (1) #6 CU GEC	C-0111
AC-210	(3) 2/0 CU XHHW, (1) #6 CU GEC	C-0112
AC-300	2/PHASE 2/0 CU XHHW, (1) #6 CU XHHW NEUTRAL, (1) #6 CU GEC	C-11 C-12 C-13
AC-400	2/PHASE 2/0 CU XHHW, (1) #6 CU XHHW NEUTRAL, (1) #6 CU GEC	C-21 C-22 C-23
AC-500	2/PHASE 2/0 CU XHHW, (1) #6 CU XHHW NEUTRAL, (1) #6 CU GEC	C-31 C-32 C-33
AC-600	(3) #2 CU 15KV MV-105, (1) #6 CU EGC	C-2
AC-SS	(2) #10 CU XHHW	1/2" EMT
AC1-1	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-2	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-3	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-4	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-5	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT

NOTE:
- -LOW VOLTAGE AC CONDUCTOR SIZING BASED ON A TEMPERATURE RATING OF 75°C.
- -MEDIUM VOLTAGE AC CABLES BASED ON A TEMPERATURE RATING OF 105°C.
- -USE OF CABLE LARGER THAN SPECIFIED IN THE CABLE SCHEDULE IS ALLOWED, PROVIDED THAT THE TEMPERATURE RATING OF THE CONDUCTOR IS MAINTAINED.
- -IF LARGER-THAN-SPECIFIED CABLE IS USED, CONFIRM THAT THE CONDUIT SIZE IN THE ASSOCIATED RACEWAY MAINTAINS A MAXIMUM 40% FILL RATIO
- -SEE REF. 2 FOR CONDUIT SCHEDULE

NOTES:

(1) INSTALL N-G BOND JUMPER ONLY IN THE POWER DISTRIBUTION PANELBOARD

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	GRRE-EL-0011/1	PV ARRAY DC WIRING DIAGRAM
1	GRRE-SS-2000/2	WIREWAY DETAILS

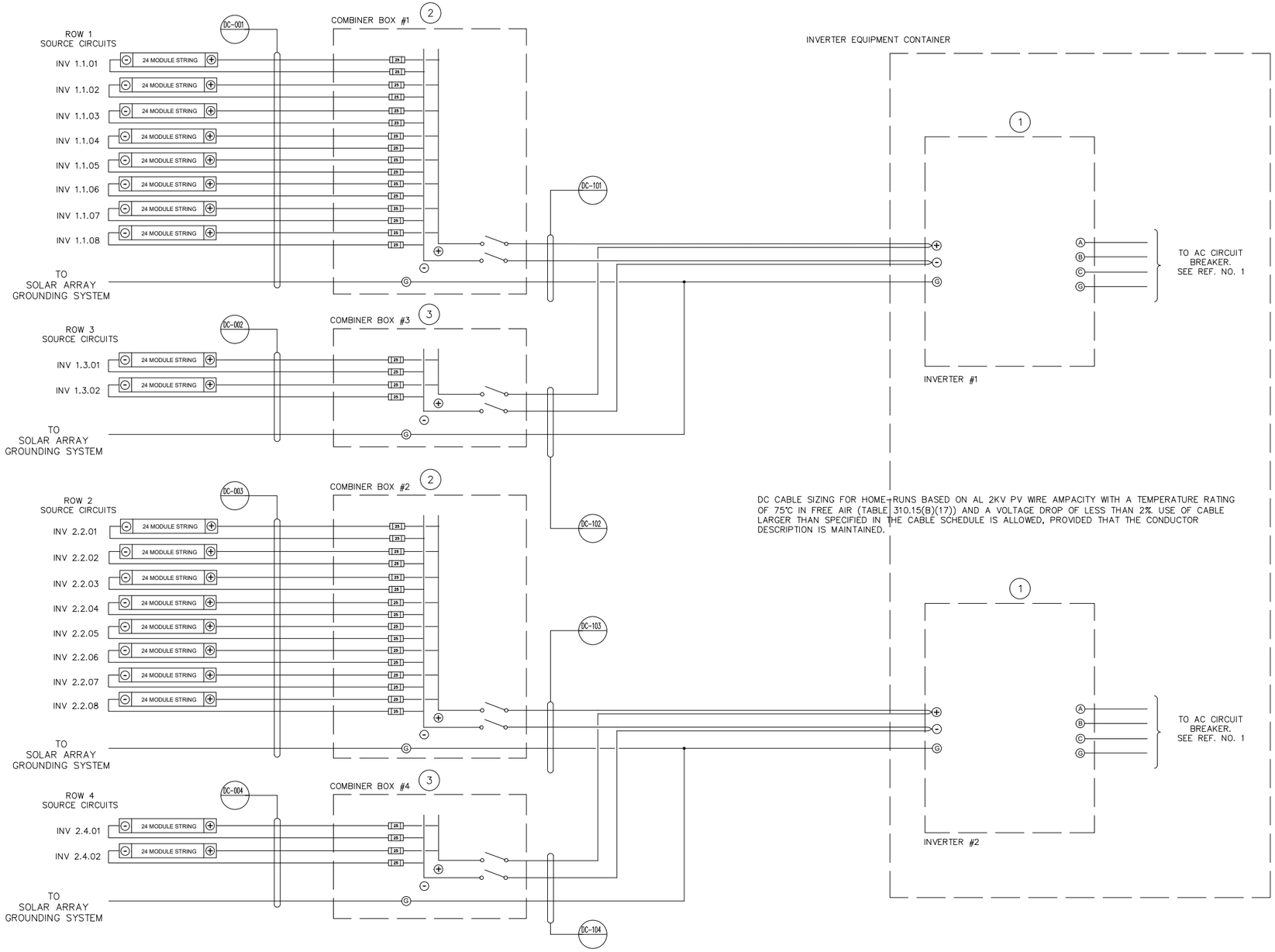
DRAWING NAME:
TANANA CHIEFS CONFERENCE
GRAYLING RENEWABLE ENERGY
PV ARRAY AC THREE LINE DIAGRAM

grre-el-0100_1.dwg

REF DWG(S):

DRAWING NO.: GRRE-EL-0100

SHEET 1 OF 1



DC CABLE SIZING FOR HOME-RUNS BASED ON AL 2KV PV WIRE AMPACITY WITH A TEMPERATURE RATING OF 75°C IN FREE AIR (TABLE 310.15(B)(17)) AND A VOLTAGE DROP OF LESS THAN 2%. USE OF CABLE LARGER THAN SPECIFIED IN THE CABLE SCHEDULE IS ALLOWED, PROVIDED THAT THE CONDUCTOR DESCRIPTION IS MAINTAINED.

LEGEND

INV X.X.XX

DESTINATION INVERTER NO.
DESTINATION COMBINER NO.
SOURCE CIRCUIT NUMBER

EQUIPMENT SCHEDULE

TAG	QUANTITY	DESCRIPTION
1	2	PV INVERTER; SMA SUNNY HIGHPOWER PEAK3 125-US
2	2	16 INPUT DC COMBINER; TERRASMART FSFT275-16-25-N4-CD OR EQUIVALENT
3	2	4 INPUT DC COMBINER; TERRASMART FSFT275-4-25-N4-CD OR EQUIVALENT

CABLE SCHEDULE

TAG	NO. CONDUCTOR	RACEWAY
DC-001	(16) #10 CU 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC-002	(4) #10 CU 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC-003	(16) #10 CU 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC-004	(4) #10 CU 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC-101	(2) 1/0 AL PV WIRE, (1) #6 CU EGC	FREE AIR
DC-102	(2) #8 AL PV WIRE, (1) #6 CU EGC	FREE AIR
DC-201	(2) 1/0 AL PV WIRE, (1) #6 CU EGC	FREE AIR
DC-202	(2) #8 AL PV WIRE, (1) #6 CU EGC	FREE AIR

NOTE:
1) DC STRING CONDUCTOR SIZING BASED ON CU UL4703 2KV PV WIRE WITH A TEMPERATURE RATING OF 90°C
2) DC CABLE SIZING FOR HOME-RUNS BASED ON AL 2KV PV WIRE AMPACITY WITH A TEMPERATURE RATING OF 75°C IN FREE AIR (TABLE 310.15(B)(17)) AND A VOLTAGE DROP OF LESS THAN 2%. USE OF CABLE LARGER THAN SPECIFIED IN THE CABLE SCHEDULE IS ALLOWED, PROVIDED THAT THE CONDUCTOR DESCRIPTION IS MAINTAINED.

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	RE-ISSUED FOR 95% REVIEW	MED/04-30-2025	JRV/04-30-2025
D	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	GRRE-EL-0100/1	AC THREE-LINE DIAGRAM

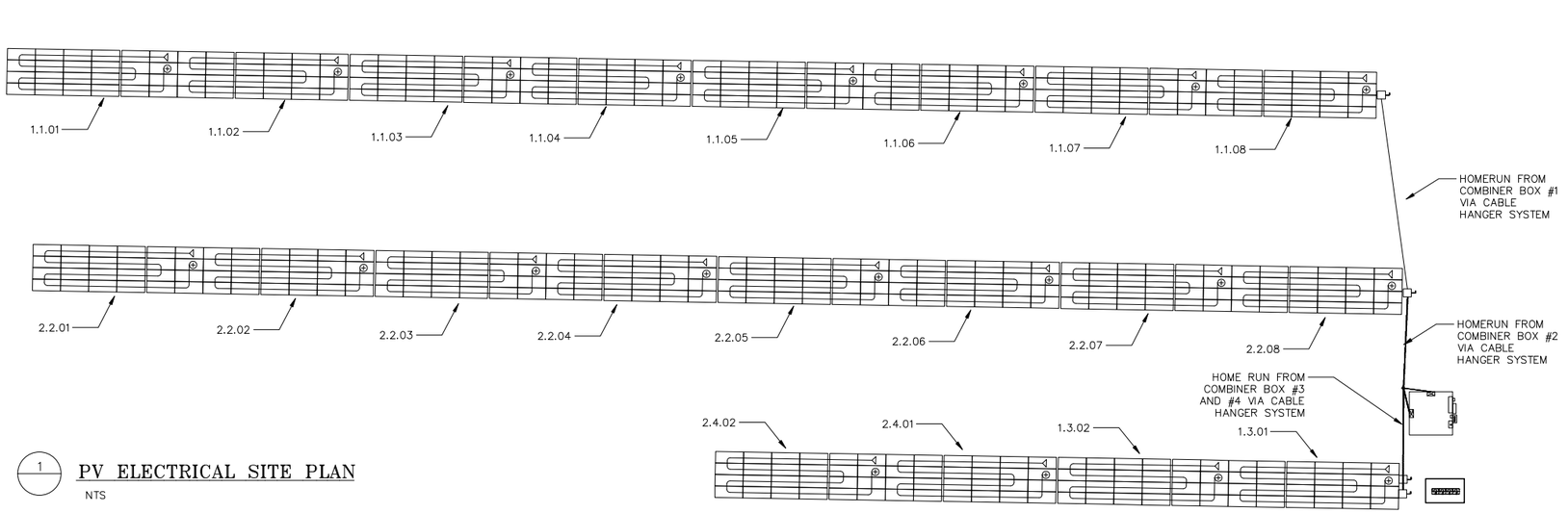
DRAWING NAME:
TANANA CHIEFS CONFERENCE GRAYLING RENEWABLE ENERGY PV ARRAY DC WIRING DIAGRAM

grre-el-0011_1.dwg

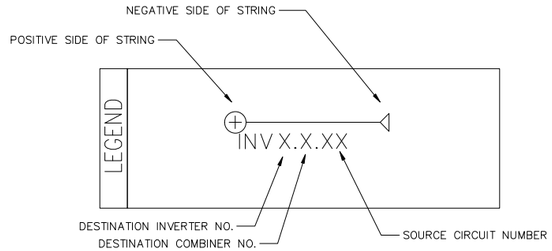
REF DWG(S):

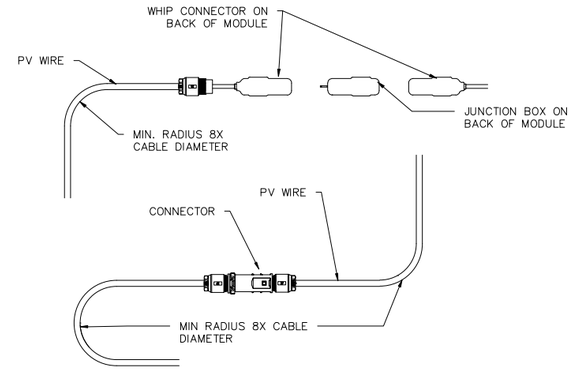
DRAWING NO.: GRRE-EL-0011

SHEET 1 OF 1



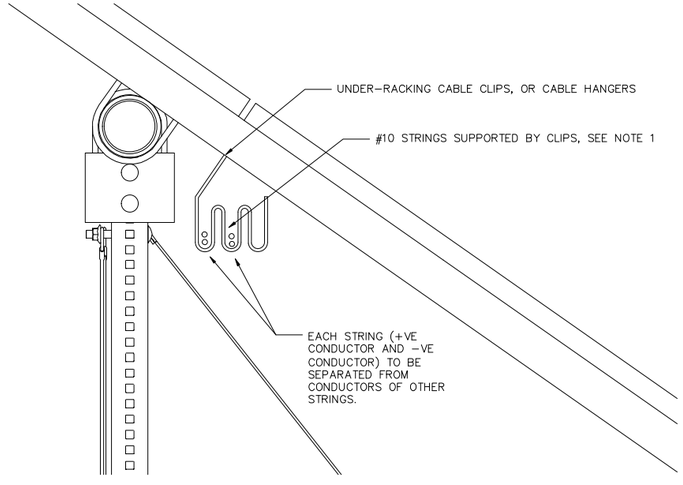
1 PV ELECTRICAL SITE PLAN
NTS





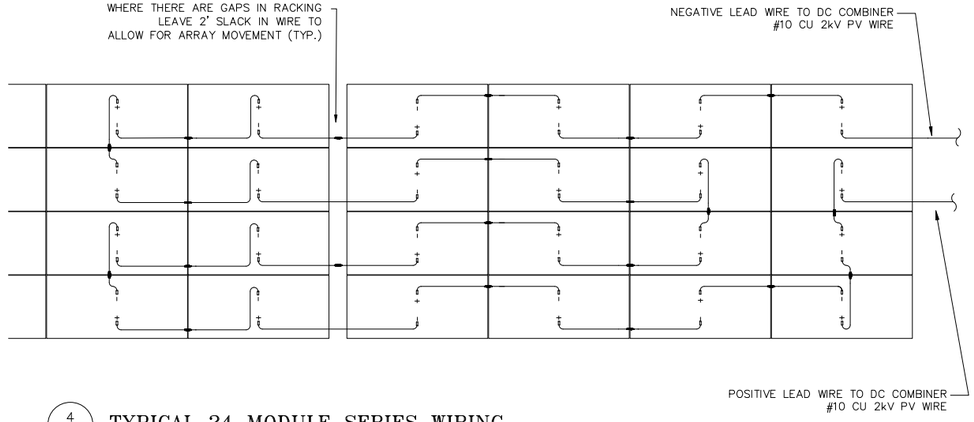
PV WIRE BENDING REQUIREMENTS NOTES:
1. OBSERVE MIN. BENDING RADIUS REQUIREMENTS WHEN BUILDING AND SECURING SOURCE CIRCUIT CONDUCTORS TO MODULES AND RACKING.
2. SEE MODULE SPEC SHEET OR CABLE SPECS FOR CABLE DIAMETER.

2 PV WIRE BENDING REQUIREMENTS
NTS



3 TYPICAL STRING SUPPORT CLIP DETAIL

TYPICAL 24 MODULE SERIES WIRING NOTES:
1. SUPPORT #10 STRINGS WITH CABLE CLIPS, OR OTHER TCC APPROVED UNDER-RACKING CABLE MANAGEMENT SYSTEM AT MOST EVERY 4' (48"). INSTALL PER MANUFACTURERS RECOMMENDATIONS. EXACT PLACEMENT AND CONNECTION METHOD TO BE DETERMINED BY CONTRACTOR ON-SITE



4 TYPICAL 24 MODULE SERIES WIRING
NTS

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

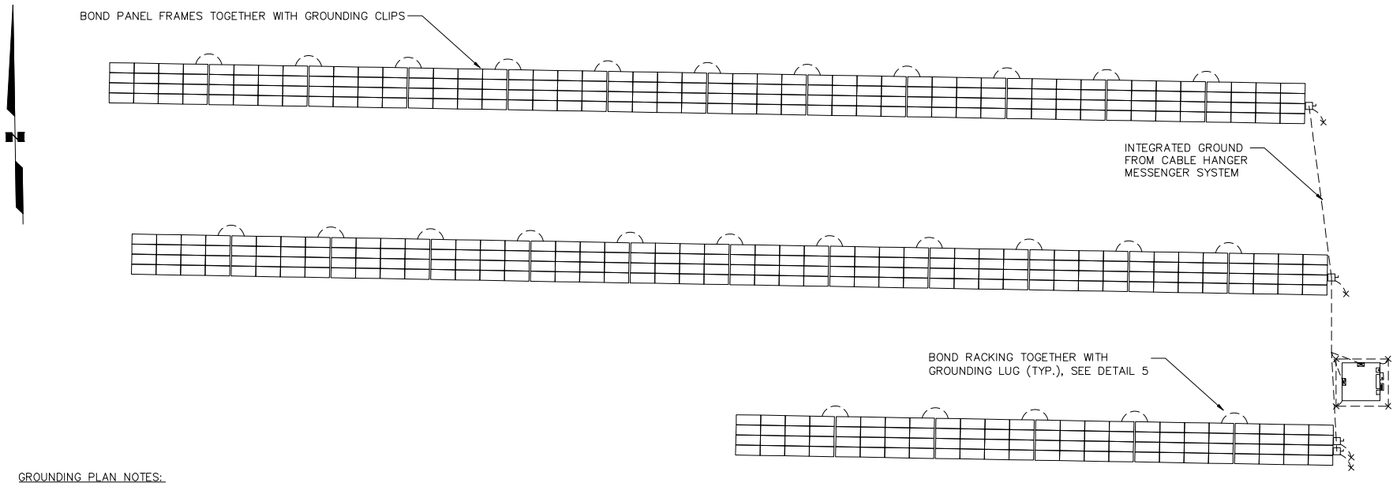
DRAWING NAME: TANANA CHIEFS CONFERENCE
GRAYLING RENEWABLE ENERGY
PV ELECTRICAL SITE PLAN

grre-el-0020_1.dwg

REF DWG(S):

DRAWING NO.: GRRE-EL-0020

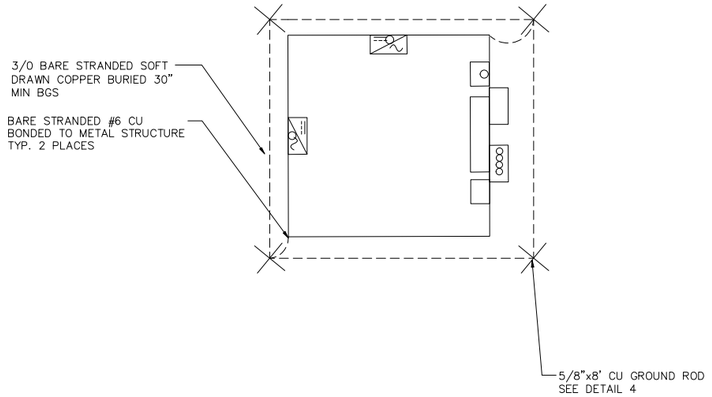
SHEET 1 OF 1



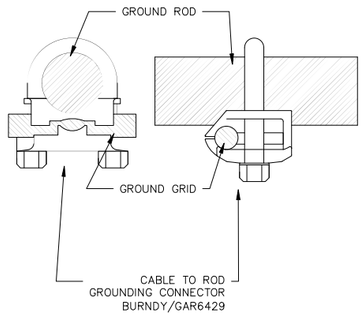
GROUNDING PLAN NOTES:

1. CONTRACTOR TO TEST EACH GROUNDING ELECTRODE USING THE FALL OF POTENTIAL TEST. GROUND RODS SPACED 6' MIN APART SHALL BE ADDED AS NECESSARY UNTIL A RESISTANCE TO GROUND VALUE OF 25 OHMS OR LESS IS ACHIEVED.
2. MIN. BARE COPPER GROUND WIRE SIZE SHALL BE #6.

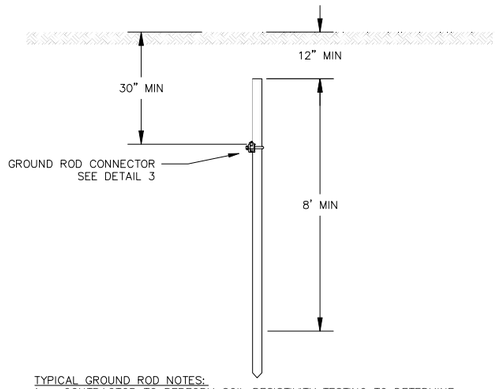
1 OVERALL ARRAY GROUNDING PLAN



2 PCH GROUNDING DETAIL

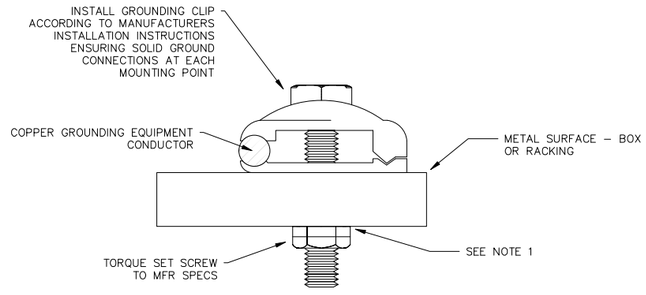


3 GROUND ROD CONNECTION
NTS



TYPICAL GROUND ROD NOTES:
1. CONTRACTOR TO PERFORM SOIL RESISTIVITY TESTING TO DETERMINE AMOUNT OF GROUND RODS NEEDED TO KEEP RESISTANCE BELOW 5 OHMS

4 TYPICAL GROUND ROD
NTS



TYPICAL METAL RACKING GROUNDING NOTES:
1. PRIOR TO MOUNTING LUGS ON ANODIZED ALUMINUM OR PAINTED METAL SURFACES, THE SURFACE MUST BE STRIPPED AND THEN COVERED WITH BURDNY PENETROX A-13 ANTI-OXIDANT COMPOUND BELOW THE LUG TO ENSURE CONDUCTIVITY
2. ON ANODIZED AL SURFACES, THE ANODIZATION SHALL BE GROUND OFF.
3. ON PAINTED SURFACES, THE PAINT LAYER SHALL BE GROUND OR SCRATCHED OFF.

5 TYPICAL METAL RACKING BONDING
NTS

LEGEND	
×	GROUNDING RODS
------	GROUNDING GRID

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

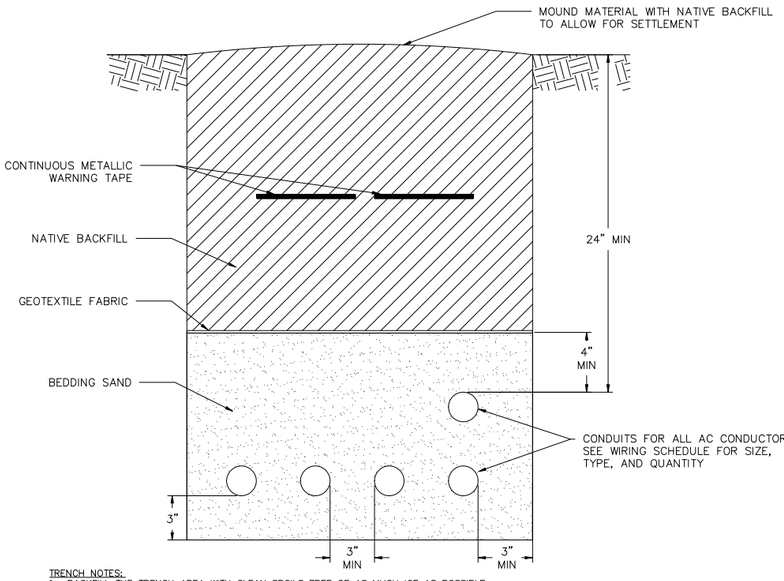
DRAWING NAME:
TANANA CHIEFS CONFERENCE
GRAYLING RENEWABLE ENERGY
GROUNDING PLAN

qrre-ss-2000_1.dwg

REF DWG(S):

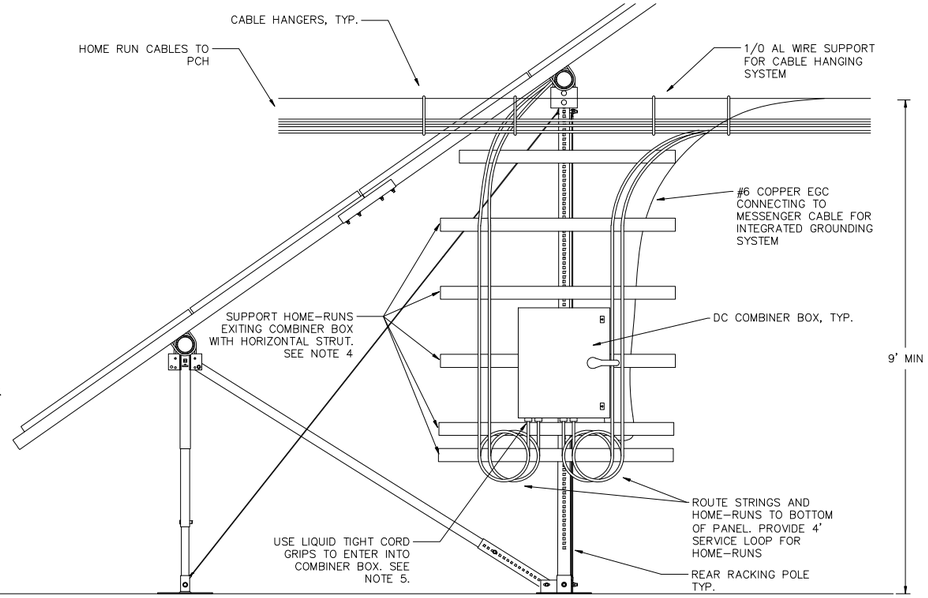
DRAWING NO.: GRRE-SS-2000

SHEET 1 OF 5



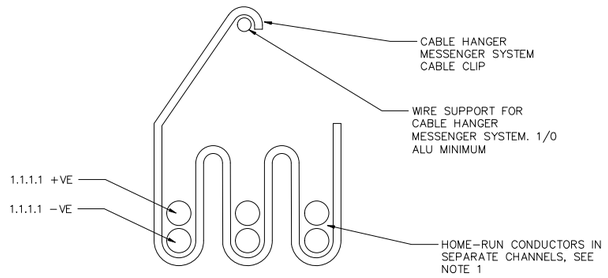
TRENCH NOTES:
1. BACKFILL THE TRENCH AREA WITH CLEAN SPOILS FREE OF AS MUCH ICE AS POSSIBLE.
2. CONSOLIDATION OF BACK FILL MATERIALS SHALL BE COMPLETED IN 12 INCH LIFTS MAXIMUM. INTENT OF THE CONSOLIDATION IS TO ENSURE ELIMINATION OF VOIDS.
3. FOR TRENCH IN GRAVEL, THE TRENCH CAP SHALL NOT EXCEED 4 INCHES. FOR TRENCH IN TUNDRA, THE TRENCH CAP SHOULD BE 35% – 40% OF THE TRENCH DEPTH (1.75' TO 2' FOR A 5' DEEP TRENCH), TO ALLOW FOR SETTLING AND ICE THAW. CONTRACTOR SHALL DISPOSE OF EXCESS EXCAVATED MATERIALS. FINAL CONTOURING OF THE TRENCH CAP IN TUNDRA SHOULD BE CONDUCTED BY HAND (MATCHING SURROUNDING DRAINAGE PATTERNS), TO ENSURE NO DIVERSION OF WATER OCCURS, RESULTING IN EROSION.
4. TRENCHES 1' WIDE SHOULD NOT NEED ANY SEEDING. FINAL REHABILITATION DETERMINATION TO BE MADE BY AGENCY REPRESENTATIVES.
5. COMPANY REPRESENTATIVE SHALL BE NOTIFIED AND PRESENT FOR ACCEPTANCE OF TRENCH PRIOR TO PLACEMENT OF CABLE AND BACKFILLING OF TRENCH (24–HOUR NOTICE REQUIRED). AGENCY REPRESENTATIVE SHALL ALSO PROVIDE ACCEPTANCE OF CABLE PRIOR TO BACKFILLING.
6. BEDDING SHALL BE 3/8" MINUS MATERIAL, NO CRUSHED OR SHARP ROCK. BEDDING MATERIAL SHALL NOT BE MACHINE COMPACTED WITHIN 6" OF CABLES. SLURRY OF A COMPOSITION THAT WILL NOT DAMAGE THE CABLE IS AN ACCEPTABLE BEDDING MATERIAL.
7. MAINTAIN 1" MIN. SEPARATION BETWEEN POWER CONDUCTORS AND COMMUNICATION CABLES

1 TYPICAL CONDUIT TRENCH
NTS



2 TYPICAL COMBINER BOX DETAIL
NTS

TYPICAL COMBINER BOX DETAIL NOTES:
1. ENSURE THAT CABLES ROUTED FROM HANGING SYSTEM TO COMBINER BOXES DO NOT EXCEED CONDUCTOR BENDING RADIUS
2. INSTALL CABLE HANGING SYSTEM ACCORDING TO MANUFACTURERS INSTALLATION INSTRUCTIONS
3. CONTRACTOR TO DETERMINE MOST SUITABLE MOUNTING SOLUTION FOR OVERHEAD CABLE MANAGEMENT SYSTEM
4. SUPPORT DC CABLES EXITING THE DC COMBINER BOX WITH A UV RESISTANT, OUTDOOR RATED CABLE TIE CONNECTED TO A HORIZONTAL STRUT. INSTALL CLOSEST CABLE SUPPORT A DISTANCE OF NO MORE THAN 12" AWAY FROM THE COMBINER BOX, AS MEASURED BY THE CABLE PATH. SUPPORT HOME–RUNS EVERY 12" UNTIL SUPPORTED BY CABLE HANGER MESSENGER SYSTEM. SUPPORT STRINGS EVERY 12" UNTIL SUPPORTED BY UNDER–RACKING CABLE MANAGEMENT SYSTEM.
5. USE A LIQUID TIGHT CORD GRIP OR CABLE GLAND FOR HOME–RUNS AND STRINGS WHEN ENTERING COMBINER BOX.



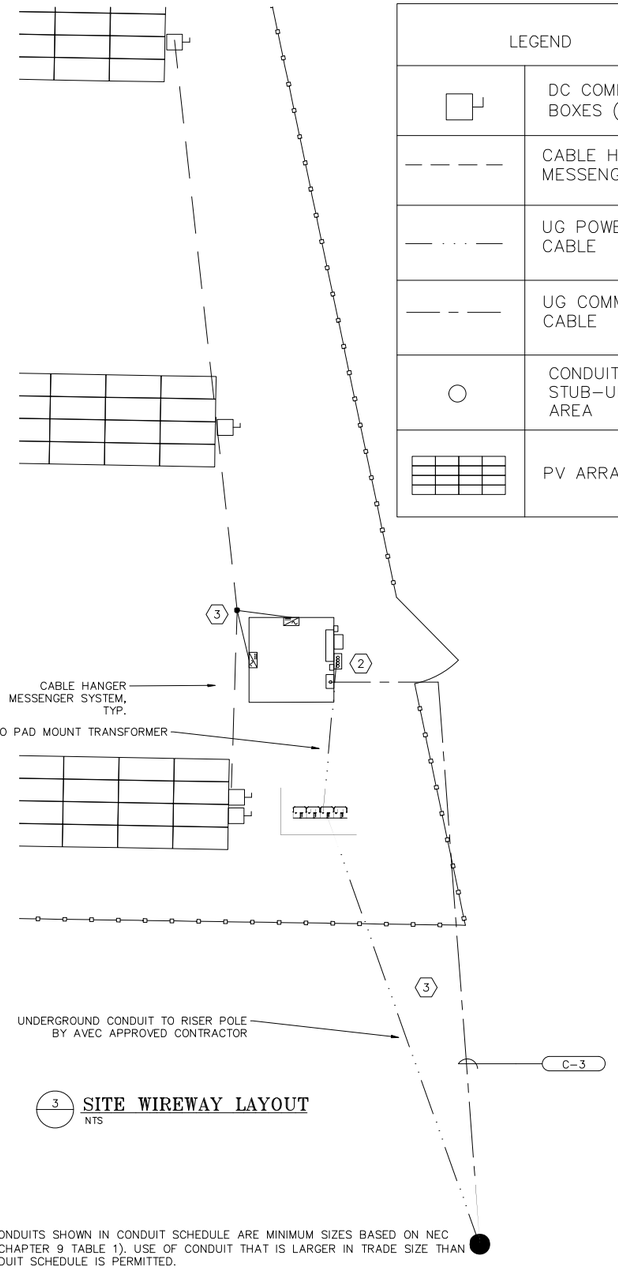
2 TYPICAL HOME–RUN CABLE HANGER DETAIL
NTS

TYPICAL HOME–RUN CABLE HANGER DETAIL NOTES:
1. HOME–RUN CONDUCTORS OF DIFFERENT CIRCUITS TO BE ROUTED IN SEPARATE CHANNELS IN CABLE HANGER MESSENGER SYSTEM. THE +VE AND –VE CONDUCTORS OF A SINGLE HOME–RUN CIRCUIT MAY BE ROUTED IN THE SAME CHANNEL.
2. INSTALL CABLE HANGERS IN REGULAR INTERVALS AS DIRECTED BY MANUFACTURERS INSTALLATION INSTRUCTIONS, OR, A DISTANCE OF NO MORE THAN 5' APART FROM EACH OTHER.
3. IF HOME–RUNS AND STRINGS ARE ROUTED IN THE SAME CABLE HANGER MESSENGER SYSTEM, SEPARATE HOME–RUNS AND STRINGS IN SEPARATE CHANNELS.

NOT FOR CONSTRUCTION

CONDUIT SCHEDULE (1)

TAG	FUNCTION	CONDUIT TYPE	TRADE SIZE
C–0111	INV1 TO CB1	EMT	2"
C–0112	INV2 TO CB2	EMT	2"
C–11 – C13	MCB1 TO AC D.S.	PVC	3 X 3"
C–21 – C23	AC D.S. TO CT CAB.	PVC	3 X 3"
C–31 – C33	CT CAB. TO XFMR	PVC	3 X 3"
C–3	COMM PANEL TO POLE	HDPE	1"



3 SITE WIREWAY LAYOUT
NTS

NOTES:
1. TRADE SIZE OF CONDUITS SHOWN IN CONDUIT SCHEDULE ARE MINIMUM SIZES BASED ON NEC CONDUIT FILL % (CHAPTER 9 TABLE 1). USE OF CONDUIT THAT IS LARGER IN TRADE SIZE THAN SPECIFIED IN CONDUIT SCHEDULE IS PERMITTED.
2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM PRODUCT DIMENSIONS AND ROUTE CONDUITS TO APPROPRIATE STUB–UP AREAS.
3. CONDUIT AND WIREWAY ROUTING SHOWN ON DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. EXACT WIREWAY ROUTING TO BE DETERMINED BY CONTRACTOR ON–SITE.

LEGEND	
	DC COMBINER BOXES (4)
	CABLE HANGER MESSENGER
	UG POWER CABLE
	UG COMM CABLE
	CONDUIT STUB–UP AREA
	PV ARRAY

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24–0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03–07–2025	JRV/03–07–2025
B	ISSUED FOR 95% REVIEW	MED/04–29–2025	JRV/04–29–2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10–11–2025	MED/10–11–2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522–1953
FAX: (907) 522–1182
WEB: WWW.EPSINC.COM

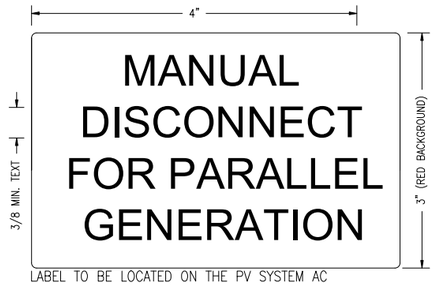
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE GRAYLING RENEWABLE ENERGY WIREWAY DETAILS
grre–ss–2000_2.dwg

REF DWG(S):

DRAWING NO.: GRRE–SS–2000

SHEET 2 OF 5



LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECT. LABEL TO BE ENGRAVED PLASTIC.
(1) TOTAL

NOTICE

PHOTOVOLTAIC SYSTEM
GENERATION METER

LABEL TO BE LOCATED ON THE PV SYSTEM GENERATION METER.
(1) TOTAL

NEC 2023 690.13(B), 690.54

NOTICE

PHOTOVOLTAIC SYSTEM AC
DISCONNECT AND POWER SOURCE
RATED OUTPUT CURRENT: 302A
NOMINAL OPERATING VOLTAGE: 480VAC

LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECT. (1) TOTAL

NEC 2023 690.7(D)

MAXIMUM DC VOLTAGE OF PV SYSTEM

MAXIMUM VOLTAGE: 1069VDC

LABEL TO BE LOCATED ON COVER OF DC DISCONNECTING MEANS. (4) TOTAL

NEC 2023 705.12(B)(3)(3)

⚠ *WARNING*

THIS EQUIPMENT FED BY MULTIPLE SOURCES

TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR.

PERMANENT WARNING LABEL SHALL BE APPLIED TO DISTRIBUTION EQUIPMENT WHERE THE PV SYSTEM INTERCONNECTS. (1) TOTAL

NEC 2023 690.31(D)(2)

LABEL SHALL BE LOCATED ON ALL EXPOSED RACEWAYS, CABLE TRAYS, OTHER WIRING METHODS, COVERS OR ENCLOSURES OF PULL BOXES AND JUNCTION BOXES AND ON CONDUIT BODIES IN WHICH ANY OF THE AVAILABLE CONDUIT OPENINGS ARE UNUSED. LABEL SHALL BE REFLECTIVE, AND ALL LETTERS CAPITALIZED AND SHALL BE MINIMUM HEIGHT OF 3/8" IN WHITE ON A RED BACKGROUND. SPACING BETWEEN LABELS OR MARKINGS, OR BETWEEN A LABEL AND MARKING, SHALL NOT BE MORE THAN 10FT.

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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WEB: WWW.EPSINC.COM

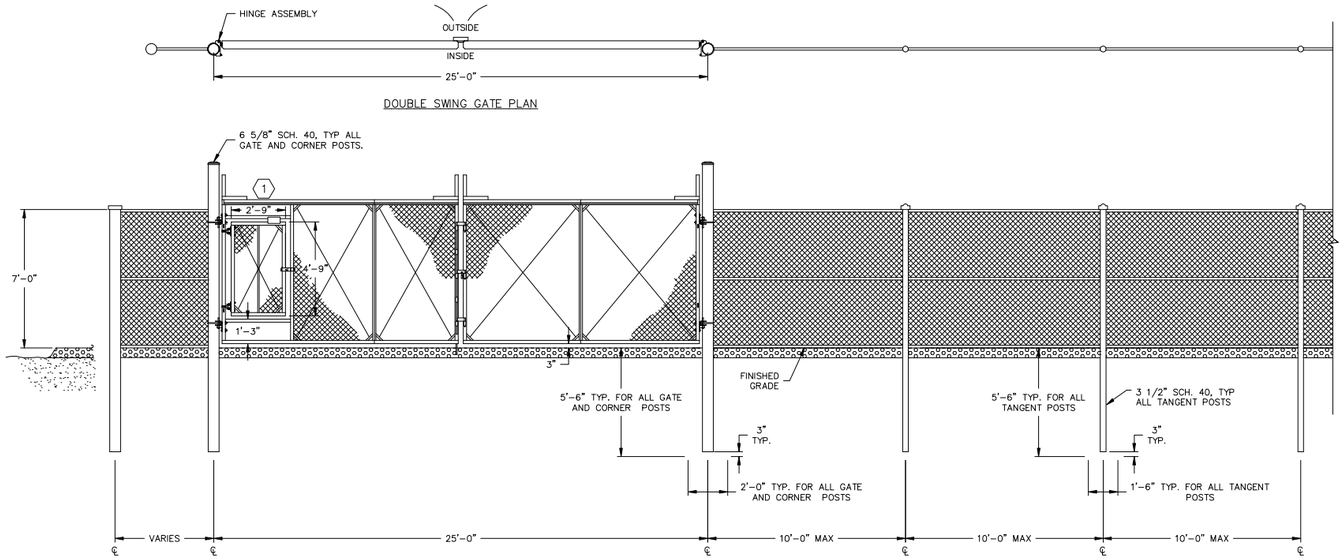
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
GRAYLING RENEWABLE ENERGY
EQUIPMENT SAFETY LABEL SCHEDULE

grre-ss-2000_3.dwg

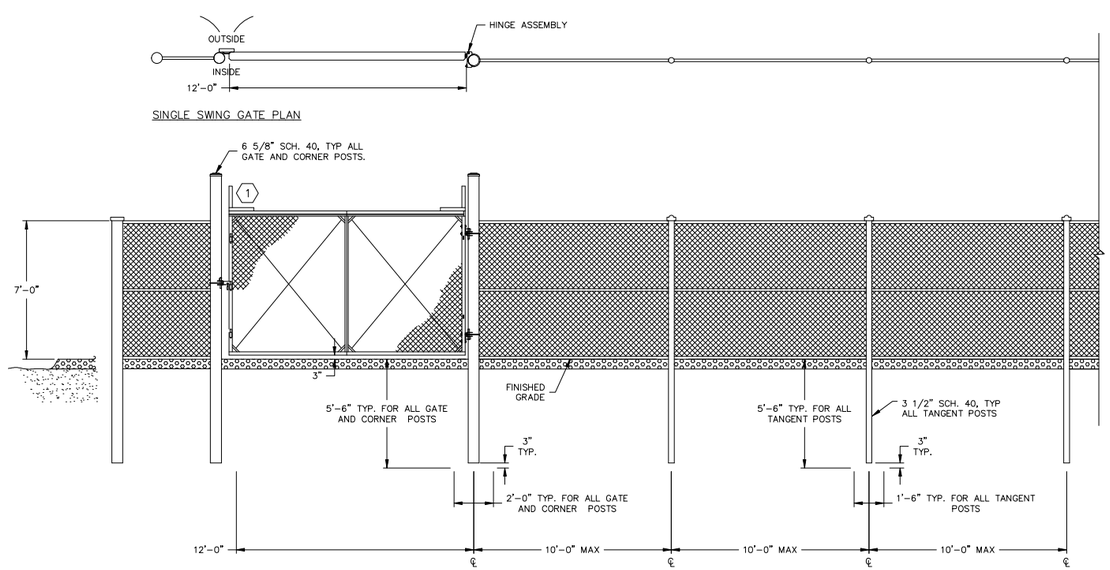
REF DWG(S):

DRAWING NO.: GRRE-SS-2000



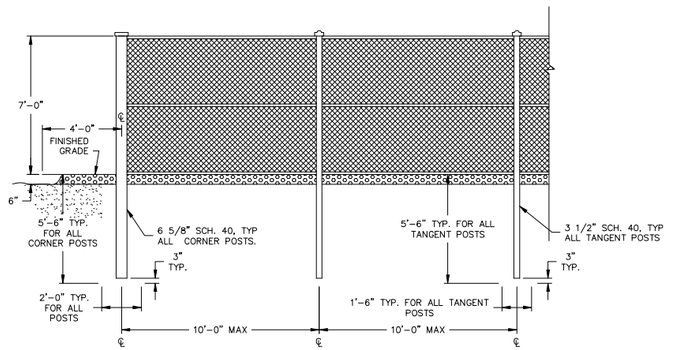
DOUBLE SWING GATE PLAN

1 FENCE DOUBLE GATE ELEVATION



SINGLE SWING GATE PLAN

2 FENCE SINGLE GATE ELEVATION



3 CORNER/TERMINAL FENCE POST ELEVATION

NOTES:

1 WHERE APPLICABLE, PROVIDE DUAL CUSTODY PADLOCK ON ENTRY GATE TO ALLOW BOTH AVEC, AND LOCAL UTILITY TO ENTER INDEPENDENTLY

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
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FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
GRAYLING RENEWABLE ENERGY
SITE FENCING
DETAILS
grre-ss-2000_4.dwg

REF DWG(S):

DRAWING NO.: GRRE-SS-2000

SHEET 4 OF 5

NAMEPLATE NUMBER	QTY	LINE 1 TEXT	LINE 2 TEXT	LINE 3 TEXT	NAMEPLATE SIZE HEIGHT x WIDTH (IN)	TEXT HEIGHT (IN)
N100	1	INVERTER 1			2 x 4	3/8
N101	1	INVERTER 2			2 x 4	3/8
N102	1	DC COMBINER	BOX 1		2 x 4	3/8
N103	1	DC COMBINER	BOX 2		2 x 4	3/8
N104	1	DC COMBINER	BOX 3		2 x 4	3/8
N105	1	DC COMBINER	BOX 4		2 x 4	3/8
N106	1	COMMUNICATIONS	PANEL		2 x 4	3/8
N107	1	400A	MAIN AC PANEL		2 x 4	3/8
N108	1	CB 1			1 x 3	1/8
N109	1	CB 2			1 x 3	1/8
N110	1	CB SS			1 x 3	1/8
N111	1	MCB			1 x 3	1/8
N112	1	120V STATION SERVICE PANEL			2 x 4	3/8
N113	1	DATA MANAGER			2 x 4	3/8
N114	1	METER PANEL			2 x 4	3/8
N115	1	POWER DISTRIBUTION	PANELBOARD		2 x 4	3/8
N116	1	CT ENCLOSURE			2 x 4	3/8
N117	1	METER ENCLOSURE			2 x 4	3/8

NOTES:

1) ALL NAMEPLATES SHALL BE 1/16" THICK MINIMUM PLASTIC.
2) ALL NAMEPLATES SHALL HAVE EXTERIOR RATED HIGH-TACK ADHESIVE.
3) ALL NAMEPLATES SHALL BE BLACK SURFACE WTH WHITE TEXT.
4) ALL TEXT SHALL BE "ARIAL BOLD" FONT.
5) EACH LINE OF TEXT SHALL BE CENTERED ON THE NAMEPLATE.
6) ALL TEXT SHALL BE UPPER CASE.
7) ALL DIMENSIONS SHOWN IN INCHES.

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

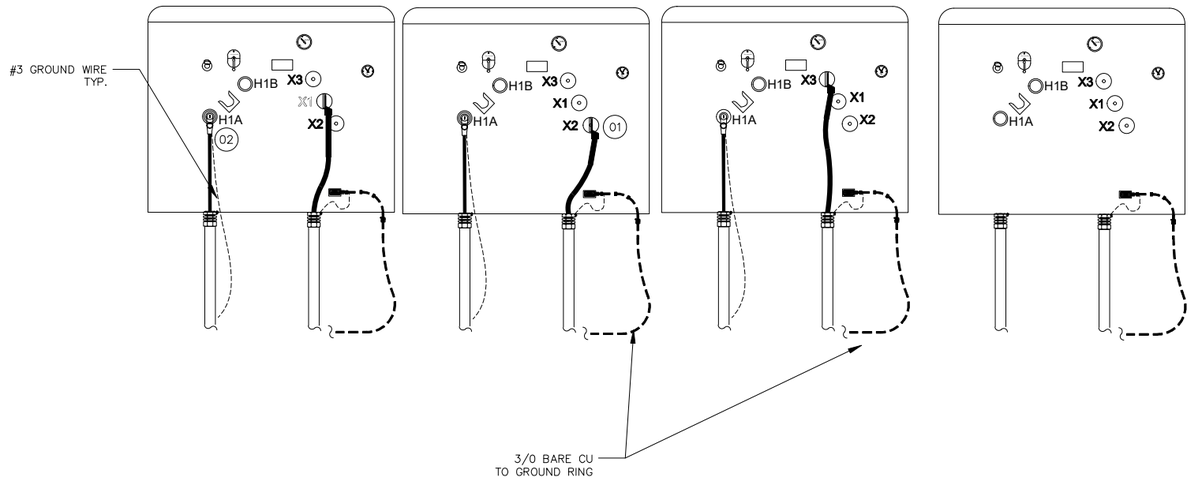
DRAWING NAME:
TANANA CHIEFS CONFERENCE
GRAYLING RENEWABLE ENERGY
EQUIPMENT NAMEPLATE SCHEDULE

grre-ss-2000_5.dwg

REF DWG(S):

DRAWING NO.: GRRE-SS-2000

SHEET 5 OF 5



BILL OF MATERIAL

REF. NO.	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	–	CABLE LUG, NEMA 2–HOLE, 4/0 AWG CU	BURNDY/YA282N
02	–	CONNECTOR, COMPRESSION, 4/0 CU TO #6–#2 CU	BURNDY/YGHC29C26
03			
04			
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30			

NOTES:

(1) LIFT X0 BUSHING BOND JUMPER AND ISOLATE ALL X0 CONNECTIONS FROM ANY GROUNDING AT THE UTILITY SERVICE POLE.

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
GRAYLING RENEWABLE ENERGY
TRANSFORMER DETAILS

grre-ss-2000_6.dwg

REF DWG(S):

DRAWING NO.: GRRE-SS-2000

SHEET 6 OF 6

Circuit Information			Electrical calculations												System Information				
Destination Inverter No.	Destination Combiner No.	Source Circuit No.	Modules (#)	Open Circuit Voltage (VOC)	Maximum Power Voltage (Vmp)	Short Circuit Current (Isc)	Continuous Current (1.25*Isc)	Irradiance Current (1.25*CC)	Mininum Fuse Size (A)	Selected Fuse Size (A)	Minimum Wire Ampacity (A)	Selected String Wire Size (CU 2KV PV Wire, 90°C, <2% Voltage Drop) (AWG)	Maximum Wire Distance (FT)	Voltage Drop (V)	Voltage Drop (%)	Circuit Information from	to	Continuous Current (A)	Minimum Wire Ampacity From Selected Device (A)	Selected Wire Size (AL 2KV PV Wire, 75°C, <2% Voltage Drop)(AWG)
1	1	1	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	325	18.33	1.72	DS1	INV1	174.88	175	1/0
1	1	2	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	280	15.79	1.48	DS3	INV1	43.72	44	#8
1	1	3	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	235	13.25	1.24	DS2	INV2	174.88	175	1/0
1	1	4	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	190	10.72	1.00	DS4	INV2	43.72	44	#8
1	1	5	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	140	7.90	0.74					
1	1	6	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	95	5.36	0.50					
1	1	7	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	50	2.82	0.26					
1	1	8	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03					
1	3	1	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03			PANEL CHARACTERISTICS		
1	3	2	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	50	2.82	0.26			Voc (V)	52.58	
2	2	1	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	325	18.33	1.72			Voc Coef. (%/°C)	−0.25	
2	2	2	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	280	15.79	1.48			Vmp (V)	44.64	
2	2	3	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	235	13.25	1.24			Pmax Coef. (%/°C)	−0.3	
2	2	4	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	190	10.72	1.00					
2	2	5	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	140	7.90	0.74			SITE CHARACTERISTICS		
2	2	6	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	95	5.36	0.50			T_Amb Min (°C)	−33.6	
2	2	7	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	50	2.82	0.26			T_Amb Max (°C)	26	
2	2	8	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03					
2	4	1	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	95	5.36	0.50					
2	4	2	24	1447	1068.1	13.99	17.49	21.86	21.86	25	25	10	140	7.90	0.74					

NOTES:

1) TEMPERATURE CORRECTED OPEN CIRCUIT VOLTAGE CALCULATIONS ARE AS FOLLOWS: VOC = ((Voc * # MODULES) * (1 + ((T_AMB MIN − T_AMB MAX) * (VOC COEF.))

NOT FOR CONSTRUCTION

PROJECT: GRAYLING RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
GRAYLING RENEWABLE ENERGY
PV STRING CALCULATIONS

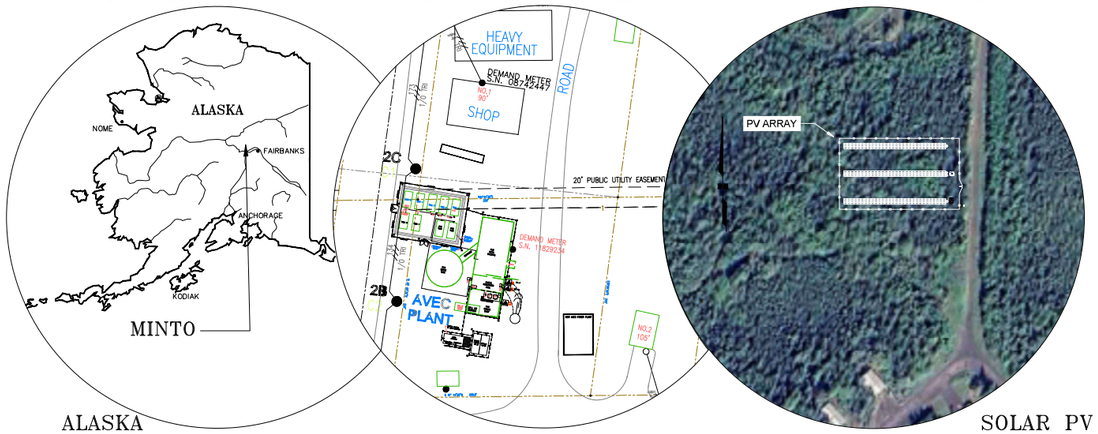
grre-el-0700_1.dwg

REF DWG(S):

DRAWING NO.: GRRE-EL-0700

SHEET 1 OF 1

TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY DESIGN
JOB NO. 24-0560 - ISSUED FOR PV CONSTRUCTION BID



ALASKA

MINTO POWER PLANT

SOLAR PV SITE

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182

DRAWING INDEX

TITLE	DRAWING NUMBER	SHEET	REVISION
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	MNRE-EL-0000	1	C
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	MNRE-EL-0000	2	C
SITE LAYOUT - OVERALL	MNRE-EL-2500	1	D
SITE LAYOUT - PV	MNRE-EL-2500	2	D
~~SITE LAYOUT - BESS~~	~~MNRE-EL-2500~~	~~2~~	~~C~~
SITE LAYOUT - INTERCONNECTION	MNRE-EL-2500	4	C
SITE LAYOUT - POWER CONVERSION HUT	MNRE-EL-2500	5	C
SITE LAYOUT - COMMUNICATIONS PANEL	MNRE-EL-2500	6	C
ONE LINE DIAGRAM	MNRE-EL-0010	1	D
THREE LINE DIAGRAM	MNRE-EL-0100	1	C
PV ARRAY DC WIRING DIAGRAM	MNRE-EL-0011	1	D
PV ELECTRICAL SITE PLAN	MNRE-EL-0020	1	C
GROUNDING PLAN	MNRE-SS-2000	1	C
RACEWAY DETAILS	MNRE-SS-2000	2	B
EQUIPMENT SAFETY LABEL SCHEDULE	MNRE-SS-2000	3	B
SITE FENCING DETAILS	MNRE-SS-2000	4	A
EQUIPMENT NAMEPLATE SCHEDULE	MNRE-SS-2000	5	A
PV STRING CALCULATIONS	MNRE-EL-0700	1	C

BESS DRAWING NOT INCLUDED IN THIS DRAWING SET

SCOPE OF WORK

THE PROJECT SCOPE IS TO INSTALL A GRID-TIED SOLAR PHOTOVOLTAIC ~~AND BATTERY ENERGY STORAGE SYSTEM~~ IN MINTO, AK.

THE SYSTEM CONSISTS OF GROUND MOUNTED SOLAR ARRAYS AND 2 STRING INVERTERS MOUNTED INSIDE A CONTAINER. THE SYSTEM WILL OPERATE IN PARALLEL WITH THE LOCAL UTILITY AND HAVE RELATED ELECTRICAL SAFETY AND METERING SYSTEMS.

SYSTEM SUMMARY

PV SYSTEM SIZE: 214.2kWdc / 250kWac
INTERCONNECTION VOLTAGE: 12.47kV, 3 PHASE, 4 WIRE

GENERAL NOTES

ALL ELECTRICAL WORK TO BE INSTALLED BY A QUALIFIED AND LICENSED ELECTRICAL CONTRACTOR.

CONTRACTOR WILL FOLLOW IBC 2021 AND NFPA 70 NEC 2023 AS WELL AS ALL APPLICABLE LOCAL, STATE, MUNICIPAL AND CITY CODES, ORDINANCES AND REGULATIONS.

ALL MODULES AND INVERTERS SHALL BE UL LISTED 1703 & CEC APPROVED. ALL ELECTRICAL COMPONENTS AND MATERIALS SHALL BE LISTED FOR ITS PURPOSE AND INSTALLED IN A WORKMAN LIKE MANNER.

PRIOR TO INSTALLATION, THE CONTRACTOR SHALL UNDERSTAND ALL DRAWINGS AND PRODUCT MANUALS.

ALL DESIGN AND SPECIFICATIONS OF STRUCTURAL COMPONENTS ARE OUTSIDE THE SCOPE OF THESE PLANS.

PROJECT ENTITIES

OWNER: TANANA CHIEFS CONFERENCE

ENGINEER OF RECORD: ELECTRIC POWER SYSTEMS, INC.

ELECTRIC SERVICE PROVIDER: ALASKA VILLAGE ELECTRIC COOPERATIVE

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE MINTO RENEWABLE ENERGY COVER SHEET AND INDEX

mnre-pr-0001_1.dwg

REF DWG(S):

DRAWING NO.: MNRE-PR-0001

SHEET 1 OF 1

ELECTRICAL SPECIFICATIONS

GENERAL

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL A COMPLETE, TESTED, COMMISSIONED, AND SATISFACTORY ELECTRIC INSTALLATION IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS. THE INTENT OF THE DRAWINGS IS NOT TO SHOW OR LIST EVERY ITEM TO BE PROVIDED BY THE CONTRACTOR. IF AN ITEM IS NOT SHOWN OR LISTED THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE MISSING ITEMS TO ALLOW THE SYSTEM TO FUNCTION PROPERLY.

2. ALL DIMENSIONS AND LOCATIONS OF EXISTING CONDITIONS MUST BE VERIFIED PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES NOTED

3. ALL CONTRACTOR INITIATED CHANGES SHALL BE SUBMITTED IN WRITING TO THE ENGINEER OF RECORD FOR APPROVAL PRIOR TO ANY CHANGES IN THE FIELD.

4. EXACT LOCATION AND MOUNTING OF ALL EQUIPMENT SHALL BE VERIFIED IN THE FIELD.

5. THE CONTRACTOR SHALL READ AND UNDERSTAND ALL DRAWINGS AND EQUIPMENT MANUALS PRIOR TO INSTALLATION OR OPERATION OF EQUIPMENT. CONTRACTOR IS TO PROVIDE SKILLED LABOR FOR EACH TRADE WHOSE WORK RELATES TO THE DRAWINGS AND SPECIFICATIONS.

6. ALL OUTDOOR EQUIPMENT ENCLOSURES SHALL BE RATED NEMA 3R MINIMUM.

7. ALL THE EQUIPMENT SHOULD BE FREE FROM ANY DEBRIS, DAMAGED COMPONENTS AND ANY CONNECTION ISSUES.

8. THE CONTRACTOR SHALL KEEP ACCURATE RECORDS OF ALL DEVIATIONS IN WORK AS INSTALLED FROM WORK SPECIFIED ON THE DRAWINGS, OR IN THE SPECIFICATIONS, NOTING THE ORIGIN OF THE CHANGE.

9. SUFFICIENT ACCESS AND WORKING SPACE SHALL BE PROVIDED NEAR ELECTRICAL EQUIPMENT PER NEC ARTICLE 110.

10. CONTRACTOR SHALL PREPARE AN OPERATION AND MAINTENANCE MANUAL FOR ALL EQUIPMENT AND SYSTEMS INSTALLED.

11. CONDUIT JOINTS SHALL BE CUT SQUARE AND DE-BURRED UNTIL SMOOTH. BENDS SHALL BE MADE SO THAT THE CONDUIT IS NOT DAMAGED. THERE SHOULD NOT BE MORE THAN THE EQUIVALENT OF FOUR QUARTER-BENDS (360 DEGREES) BETWEEN PULL POINTS.

12. METALIC CONDUIT GROUNDS SHALL BE INSULATED AND SOLIDLY GROUNDED TO THE EGC SYSTEM. GROUNDS SHALL BE SIZED ACCORDING TO THE NEC.

13. CONDUCTORS SHALL BE COLOR-CODED, FACTORY OR FIELD APPLIED, WITH AN INDUSTRY STANDARD COLOR FOR EACH PHASE AND THE NEUTRAL.

RECORD DOCUMENTS

14. ON COMPLETION OF THE PROJECT, A COMPLETE SET OF MARKED-UP PRINTS SHOWING ANY DEVIATIONS SHALL BE DELIVERED TO THE ENGINEER OF RECORD. UNTIL THESE DRAWINGS ARE REVIEWED BY THE ENGINEER, THE CONTRACT SHALL REMAIN INCOMPLETE.

WIRING METHODS

15. EXPOSED PV WIRING SHALL BE PV WIRE TYPE, 90 DEGREE C, WET RATED AND UV RESISTANT.

16. PV SOURCE AND OUTPUT CIRCUIT CONDUCTORS SHALL BE RED FOR POSITIVE, BLACK FOR NEGATIVE, AND GREEN FOR GROUND. FIELD WIRING THAT IS NOT COLOR CODED SHALL BE MARKED AT BOTH ENDS SHOWING CIRCUIT POLARITY.

17. DC EQUIPMENT SHALL BE LISTED WITH A DC VOLTAGE GREATER THAN OR EQUAL TO THE MAXIMUM DC SYSTEM VOLTAGE.

18. INTERCONNECT WIRING AND POWER CONDUCTORS MUST BE IN ACCORDANCE WITH NEC NFPA 70. CONDUCTORS MUST CONFORM TO THE MINIMUM BEND RADIUS SPECIFIED IN THE SPECIFIC NEC ARTICLE. WIRE BUNDLES SHALL BE KEPT AWAY FROM SHARP EDGES TO AVOID DAMAGE TO WIRE INSULATION. CONDUCTORS SHALL BE COPPER RATED AT 90 DEGREES C UNLESS OTHERWISE NOTED IN THE DRAWINGS. FOR OUTDOOR INSTALLATIONS, CONDUITS AND FITTINGS SHALL BE PROPERLY NEMA RATED AS REQUIRED BY THE NEC.

19. CONNECTORS SHALL BE TORQUED PER DEVICE LISTING OR MANUFACTURER'S RECOMMENDATION.

20. AC WIRING SHALL BE COPPER RATED AT 90 DEGREES C, RATED 600VAC UNLESS OTHERWISE NOTED IN THE DRAWINGS.

21. PV SOURCE CIRCUITS IN FREE AIR SHALL BE PROPERLY SUPPORTED AND SEPARATED TO MAINTAIN AMPACITY RATINGS AND INSULATION INTEGRITY.

25. FIELD MADE CONNECTORS FOR PV QUICK CONNECTS SHALL BE THE SAME TYPE AND MANUFACTURER AS THE PV MODULES AND USE THE MANUFACTURER SPECIFIED CRIMPING TOOL.

GROUNDING

26. ONLY ONE CONNECTION TO DC CIRCUITS AND ONE CONNECTION TO AC CIRCUITS SHALL BE MADE FOR SYSTEM GROUNDING.

27. NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER EQUIPMENT GROUNDING TO ENSURE THE TERMINAL LUG IS PROPERTY BOLTED AND METAL-METAL CONTACT IS MADE. PAINT AND/OR FINISH AT THE POINT OF CONTACT IS TO BE REMOVED.

28. MODULES SHALL BE BONDED WITH EQUIPMENT GROUNDING CONDUCTORS BONDED TO A LOCATION APPROVED BY THE MANUFACTURER WITH A MEANS OF BONDING LISTED FOR THIS PURPOSE.

29. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, INCLUDING BUT NOT LIMITED TO GROUND RODS, GROUNDING LUGS, GROUNDING CLAMPS, ETC.

30. GROUNDING CONDUCTORS SHALL MEET THE FOLLOW SPECIFICATIONS:
 30.1. SOLID CONDUCTORS: ASTM B 3.
 30.2. STRANDED CONDUCTORS: ASTM B 8.
 30.3. TINNED CONDUCTORS: ASTM B 33.

31. GROUNDING BUS WHERE SPECIFIED SHALL BE RECTANGULAR BARS OF ANNEALED COPPER, CROSS SECTION SIZED FOR APPLICATION PER NEC, UNLESS OTHERWISE INDICATED; WITH INSULATORS.

32. GROUNDING CONDUCTORS SHALL BE ROUTED ALONG THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE. AVOID OBSTRUCTING ACCESS OR PLACING CONDUCTORS WHERE THEY MAY BE SUBJECTED TO STRAIN, IMPACT, OR DAMAGE.

33. INSTALL A GROUND CONDUCTOR LOOP AND GROUND RODS, ELECTRICALLY CONNECTED TO BUILDING STRUCTURE, GROUND RODS, AND EXTERIOR EQUIPMENT AS SHOWN ON DRAWINGS.

RACEWAYS

34. METAL CONDUIT AND TUBING SHALL MEET THE FOLLOWING STANDARDS:
 34.1. RIGID STEEL CONDUIT: ANSI C80.1.
 34.2. EMT: ANSI C80.3. (FOR INDOOR USE ONLY).
 34.3. LFMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.

35. FITTINGS FOR CONDUIT SHALL BE LISTED FOR TYPE AND SIZE RACEWAY WITH WHICH USED, AND FOR APPLICATION AND ENVIRONMENT IN WHICH INSTALLED.

36. COATED FITTINGS FOR PVC-COATED CONDUIT SHALL HAVE MINIMUM THICKNESS OF 0.040 INCHES WITH OVERLAPPING SLEEVES PROTECTING THREADED JOINTS.

37. NONMETALIC WIREWAY SHALL BE PROVIDED AS FIBERGLASS POLYESTER, EXTRUDED AND FABRICATED TO SIZE AND SHAPE INDICATED, WITH NO HOLES OR KNOCKOUTS. COVER IS GASKETED WITH OIL-RESISTANT GASKET MATERIAL AND FASTENED WITH CAPTIVE SCREWS TREATED FOR CORROSION RESISTANCE. CONNECTIONS ARE FLANGED, WITH STAINLESS-STEEL SCREWS AND OIL-RESISTANT GASKETS.

38. RACEWAYS FOR OPTICAL FIBER AND COMMUNICATIONS CIRCUITS SHALL BE INSTALLED AS FOLLOWS:
 38.1. 3/4-INCH TRADE SIZE AND SMALLER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 50 FEET.
 38.2. 1-INCH TRADE SIZE AND LARGER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 75 FEET.
 38.3. INSTALL WITH A MAXIMUM OF TWO 90-DEGREE BENDS OR EQUIVALENT FOR EACH LENGTH OF RACEWAY UNLESS DRAWINGS SHOW STRICTER REQUIREMENTS. SEPARATE LENGTHS WITH PULL OR JUNCTION BOXES OR TERMINATIONS AT DISTRIBUTION FRAMES OR CABINETS WHERE NECESSARY TO COMPLY WITH THESE REQUIREMENTS.

DISCONNECTING MEANS

39. MEANS SHALL BE PROVIDED TO DISCONNECT THE PV SYSTEM FROM WIRING SYSTEMS INCLUDING POWER SYSTEMS AND ENERGY STORAGE SYSTEMS.

40. PV DISCONNECTS SHALL NOT BE REQUIRED TO BE SUITABLE AS SERVICE EQUIPMENT AND SHALL BE RATED IN ACCORDANCE WITH ARTICLE 690 PART III: DISCONNECTING MEANS.

PANELBOARDS

41. CONTRACTOR SHALL PROVIDE THE FOLLOWING SUBMITTALS:

 41.1. EACH TYPE OF PANELBOARD, OVERCURRENT PROTECTIVE DEVICE, TRANSIENT VOLTAGE SUPPRESSION DEVICE, ACCESSORY, AND COMPONENT INDICATED. INCLUDE DIMENSIONS AND MANUFACTURERS' TECHNICAL DATA ON FEATURES, PERFORMANCE, ELECTRICAL CHARACTERISTICS, RATINGS, AND FINISHES.

 41.2. MANUFACTURER SEISMIC QUALIFICATION CERTIFICATION: SUBMIT CERTIFICATION THAT PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, ACCESSORIES, AND COMPONENTS WILL WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS" INCLUDE THE FOLLOWING:
  41.2.1. BASIS OF CERTIFICATION: INDICATE WHETHER WITHSTAND CERTIFICATION IS BASED ON ACTUAL TEST OF ASSEMBLED COMPONENTS OR ON CALCULATION.
  41.2.2. DIMENSIONED OUTLINE DRAWINGS OF EQUIPMENT UNIT: IDENTIFY CENTER OF GRAVITY AND LOCATE AND DESCRIBE MOUNTING AND ANCHORAGE PROVISIONS.
  41.2.3. DETAILED DESCRIPTION OF EQUIPMENT ANCHORAGE DEVICES ON WHICH THE CERTIFICATION IS BASED AND THEIR INSTALLATION REQUIREMENTS.

 41.3. FIELD QUALITY-CONTROL TEST REPORTS INCLUDING THE FOLLOWING:
  41.3.1. TEST PROCEDURES USED.
  41.3.2. TEST RESULTS THAT COMPLY WITH REQUIREMENTS.
  41.3.3. RESULTS OF FAILED TESTS AND CORRECTIVE ACTION TAKEN TO ACHIEVE TEST RESULTS THAT COMPLY WITH REQUIREMENTS.

 41.4. PANELBOARD SCHEDULES: FOR INSTALLATION IN PANELBOARDS. SUBMIT FINAL VERSIONS AFTER LOAD BALANCING.

 41.5. OPERATION AND MAINTENANCE DATA: FOR PANELBOARDS AND COMPONENTS TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS. IN ADDITION TO ITEMS SPECIFIED IN DIVISION 01 SECTION "OPERATION AND MAINTENANCE DATA," INCLUDE THE FOLLOWING:
  41.5.1. MANUFACTURER'S WRITTEN INSTRUCTIONS FOR TESTING AND ADJUSTING OVERCURRENT PROTECTIVE DEVICES.
  41.5.2. TIME-CURRENT CURVES, INCLUDING SELECTABLE RANGES FOR EACH TYPE OF OVERCURRENT PROTECTIVE DEVICE

42. CONTRACTOR SHALL MEET THE FOLLOWING QUALITY ASSURANCE STANDARDS:

 42.1. SOURCE LIMITATIONS: OBTAIN PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, COMPONENTS, AND ACCESSORIES THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER.
 42.2. PRODUCT OPTIONS: DRAWINGS INDICATE SIZE, PROFILES, AND DIMENSIONAL REQUIREMENTS OF PANELBOARDS AND ARE BASED ON THE SPECIFIC SYSTEM INDICATED. REFER TO DIVISION 01 SECTION "PRODUCT REQUIREMENTS."
 42.3. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
 42.4. COMPLY WITH NEMA PB 1.
 42.5. COMPLY WITH NFPA 70.

43. CONTRACTOR SHALL COORDINATE LAYOUT AND INSTALLATION OF PANELBOARDS AND COMPONENTS WITH OTHER CONSTRUCTION THAT PENETRATES WALLS OR IS SUPPORTED BY THEM, INCLUDING ELECTRICAL AND OTHER TYPES OF EQUIPMENT, RACEWAYS, PIPING, AND ENCUMBRANCES TO WORKSPACE CLEARANCE REQUIREMENTS.

44. CONTRACTOR SHALL PROVIDE PANELBOARD PRODUCTS THAT MEET THE FOLLOWING CRITERIA
 44.1. MANUFACTURER SHALL BE AS SHOWN ON DRAWINGS OR EQUAL.
 44.2. FABRICATE AND TEST PANELBOARDS ACCORDING TO IEEE 344 TO WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS."
 44.3. ENCLOSURES: SURFACE MOUNTED CABINETS. NEMA PB 1, TYPE 1.
  44.3.1. RATED FOR ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.
  44.3.2. OUTDOOR LOCATIONS: NEMA 250, TYPE 4X STAINLESS.
  44.3.3. OTHER WET OR DAMP INDOOR LOCATIONS: NEMA 250, TYPE 4X.
  44.3.4. FRONT: SECURED TO BOX WITH CONCEALED TRIM CLAMPS. FOR SURFACE-MOUNTED FRONTS, MATCH BOX DIMENSIONS; FOR FLUSH-MOUNTED FRONTS, OVERLAP BOX.
  44.3.5. FINISH: MANUFACTURER'S STANDARD ENAMEL FINISH OVER CORROSION-RESISTANT TREATMENT OR PRIMER COAT.
  44.3.6. DIRECTORY CARD: WITH TRANSPARENT PROTECTIVE COVER, MOUNTED IN METAL FRAME, INSIDE PANELBOARD DOOR

 44.4. PHASE AND GROUND BUSES:
  44.4.1. MATERIAL: HARD-DRAWN COPPER, 98 PERCENT CONDUCTIVITY.
  44.4.2. EQUIPMENT GROUND BUS: ADEQUATE FOR FEEDER AND BRANCH-CIRCUIT EQUIPMENT GROUND CONDUCTORS; BONDED TO BOX.

 44.5. CONDUCTOR CONNECTORS: SUITABLE FOR USE WITH CONDUCTOR MATERIAL.
  44.5.1. LUGS: MECHANICAL TYPE.

 44.6. SERVICE EQUIPMENT LABEL: UL LABELED FOR USE AS SERVICE EQUIPMENT FOR PANELBOARDS WITH MAIN SERVICE DISCONNECT SWITCHES.

 44.7. UL LABEL INDICATING SERIES-CONNECTED RATING WITH INTEGRAL OR REMOTE UPSTREAM OVERCURRENT PROTECTIVE DEVICES. INCLUDE SIZE AND TYPE OF UPSTREAM DEVICE ALLOWABLE, BRANCH DEVICES ALLOWABLE, AND UL SERIES-CONNECTED SHORT-CIRCUIT RATING.

45. CONTRACTOR SHALL PROVIDE OVERCURRENT PROTECTIVE DEVICES THAT MEET THE FOLLOWING CRITERIA:

 45.1. MOLDED-CASE CIRCUIT BREAKER: PROVIDE BREAKERS FROM PANELBOARD MANUFACTURER. UL 489, WITH SERIES-CONNECTED RATING TO MEET AVAILABLE FAULT CURRENTS

 45.2. THERMAL-MAGNETIC CIRCUIT BREAKERS: INVERSE TIME-CURRENT ELEMENT FOR LOW-LEVEL OVERLOADS, AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS. ADJUSTABLE MAGNETIC TRIP SETTING FOR CIRCUIT-BREAKER FRAME SIZES 250 A AND LARGER

 45.3. ADJUSTABLE INSTANTANEOUS-TRIP CIRCUIT BREAKERS: MAGNETIC TRIP ELEMENT WITH FRONT-MOUNTED, FIELD-ADJUSTABLE TRIP SETTING.

 45.4. ELECTRONIC TRIP-UNIT CIRCUIT BREAKERS SHALL HAVE RMS SENSING; FIELD-REPLACEABLE RATING PLUG; AND WITH THE FOLLOWING FIELD-ADJUSTABLE SETTINGS:
  45.4.1. INSTANTANEOUS TRIP.
  45.4.2. LONG- AND SHORT-TIME PICKUP LEVELS.
  45.4.3. LONG- AND SHORT-TIME TIME ADJUSTMENTS.
  45.4.4. GROUND-FAULT PICKUP LEVEL, TIME DELAY, AND I2/T RESPONSE.

 45.5. GFCI CIRCUIT BREAKERS: SINGLE- AND TWO-POLE CONFIGURATIONS WITH 5-MA WHERE INSTALLED PROTECTION OF GENERAL USE RECEPTACLES. WHERE REQUIRED, 30-MA TRIP SENSITIVITY FOR CIRCUITS INSTALLED TO SUPPLY SPECIFIC EQUIPMENT.

REQUIRED SAFETY SIGNS AND LABELS

1. THE MARKING SHALL ADEQUATELY WARN OF THE HAZARD USING EFFECTIVE WORDS AND/OR COLORS AND/OR SYMBOLS PER NEC 110.21.

2. THE LABEL SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN PER NEC 110.21.

3. THE LABEL SHALL BE OF SUFFICIENT DURABILITY ABLE TO WITHSTAND THE ENVIRONMENT INSTALLED IN PER NEC 110.21.

4. LABELS AND MARKINGS SHALL BE APPLIED TO THE APPROPRIATE COMPONENTS IN ACCORDANCE WITH THE NEC.

5. PV MODULES AND INVERTERS ARE TO BE SUPPLIED FROM THE MANUFACTURER WITH PRE-APPLIED MARKINGS TO MEET THE REQUIREMENTS OF NEC 690.51 & 690.41(B)(1).

6. UNLESS OTHERWISE SPECIFIED ON THE LABELING SHEET, OSHA 1910.145 AND ANSI Z535 RECOMMENDED SPECIFICATIONS ARE AS FOLLOWS:
 6.1. ROUNDED OR BLUNT CORNERS FREE OF SHARP EDGES.
 6.2. VISIBLE AT A MINIMUM DISTANCE OF 5FT. OR GREATER.
 6.3. "DANGER" HEADER; RED BACKGROUND WITH WHITE LETTERING.
 6.4. "WARNING" HEADER; ORANGE BACKGROUND WITH BLACK LETTERING.
 6.5. "CAUTION" HEADER; YELLOW BACKGROUND WITH BLACK LETTERING.
 6.6. "NOTICE" LABEL HEADER TO BE IN BLUE WITH WHITE LETTERING.
 6.7. OTHER TEXT TO BE BLACK ON A WHITE BACKGROUND.

7. ALL RELEVANT COMPONENTS OF THE PHOTOVOLTAIC SYSTEM SHALL BE CLEARLY MARKED AND LABELED IN ACCORDANCE WITH NEC ARTICLE 690.

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
GENERAL INFORMATION AND SPECIFICATIONS
mnre-el-0000_1.dwg

REF DWG(S):

DRAWING NO.: MNRE-EL-0000

STANDARD BLOCKS – ELECTRICAL

CABLE # → XX
EQUIPMENT → XX

CABLE TAG – WIRING DIAGRAMS & 3–LINES

STANDARD ABBREVIATIONS – ELECTRICAL

A	AMPERE
ACB	AIR CIRCUIT BREAKER
AB	AIR BREAK
ABV	ABOVE
AC	ALTERNATING CURRENT
ADJ	ADJUSTABLE
ADJT	ADJACENT
ALT	ALTERNATE
AL	ALUMINUM
APPRX	APPROXIMATE
B	BUS
BF	BREAKER FAIL
BFI	BREAKER FAIL INITIATE
BKR	BREAKER
BLDG	BUILDING
BLK	BLOCK
BOT	BOTTOM
BTU	BRITISH THERMAL UNIT
BTWN	BETWEEN
BU	BACKUP
C	COLOUMB
CAP	CAPACITOR OR CAPACITANCE
CAP	CORRUGATED ALUMINUM PIPE
CB	CENTER BREAK
CBL	CABLE
CEM	CEMENT
CF	CUBIC FOOT
CHK	CHECK
CI	CAST IRON
CIP	CAST IRON PIPE
CIPC	CAST–IN–PLACE CONCRETE
CIR	CIRCLE
CKT	CIRCUIT
CLK	CLOCK
CLS	CLOSE
CMIL	CIRCULAR MIL
CMP	CORRUGATED METAL PIPE
COS	COSINE
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CS	
CSP	CORRUGATED STEEL PIPE
CT	CURRENT TRANSFORMER
CTRL	CONTROLSWITCHER OR CONTROL SWITCH
CTS	CLEAR TO SEND
CU	COPPER
DC	DIRECT CURRENT
DCD	DATA CARRIER DETECT
DCE	DATA COMMUNICATIONS EQUIPMENT
DDE	DOUBLE DEAD END
DE	DEAD END
DEM	DEMOLISH, DEMOLITION
DEMOB	DEMOBILIZE
DET	DETAIL
DFR	DISTURBANCE FAULT RECORDER
DI	DIGITAL INPUT
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIST	DISTRIBUTION
DNP	DISTRIBUTED NETWORK PROTOCOL
DO	DIGITAL OUTPUT
DSSS	D STREET SUBSTATION
DTE	DATA TERMINAL EQUIPMENT
DWG	DRAWING
EA	EACH
EIA	ELECTRONICS INDUSTRY ASSOCIATION
EJ	EXPANSION JOINT
EL	ELECTRICAL
ELEV	ELEVATION
ENCL	ENCLOSURE
EQ	EQUAL
EQUIP	EQUIPMENT
EST	ESTIMATE
EXIST	EXISTING
F	FARAD
F	FUSE
FREQ	FREQUENCY
FT	FEET
FT	FEED THROUGH
FUT	FUTURE
G	CONDUCTANCE OR GROUND
GA	GAUGE
GALV	GALVANIZED
GB	GROUND BUS
GCB	GAS CIRCUIT BREAKER
GEN	GENERATOR
GI	GALVANIZED IRON
GND	GROUND
GOAB	GANG OPERATED AIR–BREAK SWITCH
GRC	GALVANIZED RIGID CONDUIT
GRD	GRADE, GRADING
GRSC	GALVANIZED RIGID STEEL CONDUIT
H	HENERY
HDPE	HIGH–DENSITY POLYETHYLENE
HLO	HOT LINE ORDER
HORIZ	HORIZONTAL
HP	HORSEPOWER
HZ	HERTZ
IA	PHASE A CURRENT
IB	PHASE B CURRENT
IC	PHASE C CURRENT
ID	INSIDE DIAMETER
IN	INPUT
IN	INCH
IN	NEUTRAL CURRENT
INCL	INCLUDE(D), INCLUDING
IND	INDUSTRY
INT	INTERSECTION
INV	INVERT
IP	POLARIZING CURRENT
j	COMPLEX NUMBER
J	JOULE
JB	JUNCTION BOX
KA	KILOAMPRERE
KV	KILOVOLT
KW	KILOWATT
L	INDUCTANCE
L	LINE
L	LOAD
LB	LOAD BREAK
LGPP	LANDFILL GAS POWER PLANT
LT	LIGHT
M	METER(S)
MAT	MATERIAL
MAX	MAXIMUM
MFG	MANUFACTURER
MI	MILE
MIN	MINIMUM
MISC	MISCELLANEOUS
MM	MILLIMETER(S)
MO	MOTOR OPERATED (OR)
MOB	MOBILIZE
MTR	METER
MW	MEGAWATT
N	NEUTRAL
N	NEWTON
N	NORTH
NC	NORMALLY CLOSED
NCC	NORMALLY CLOSED CONTACT
N/C	NO CONNECTION
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOC	NORMALLY OPEN CONTACT
NS	SYNCHRONIZING NEUTRAL
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
OUT	OUTPUT
P	REAL POWER OR PRIMARY
PB	PUSH BUTTON
PF	POWER FACTOR
PLC	PROGRAMMABLE LOGIC CONTROLLER
PM	PAD–MOUNT TRANSFORMER
PSSS	PROVIDER SWITCHYARD
PT	POINT
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER
Q	REACTIVE POWER
R	RESISTANCE OR RESISTOR
RCLS	RECLOSE
RAD	RADIUS
RAD	RADIAN
RD	ROAD
RE	REMOTE END
REF	REFERENCE
REQD	REQUIRED
RET	REMOTE END TRIP
RET	RETURN
REV	REVISION
RLY	RELAY
RR	RAILROAD
ROW	RIGHT OF WAY
RTS	READY TO SEND
RTU	REMOTE TERMINAL UNIT
RX	RECEIVE
S	APPARENT POWER
S	SOUTH
S	SOURCE
S–L	SOURCE–LOAD
SA	SURGE ARRESTOR
SC	SWITCH CABINET
SEC	SECTION
SEC	SECONDARY
SVC	SERVICE
SVC	STATIC VAR COMPENSATOR
SHT	SHEET
SIM	SIMILAR
SIN	SINE
SPEC	SPECIFICATION
SPECS	SPECIFICATIONS
SPSS	SPARTAN SUBSTATION
SS	SYNCHRONIZING SWITCH
STA	STATION
STD	STANDARD
SW	SWITCH
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
SYNCH	SYNCHRONIZE
T	TIME OR TRANSFORMER
TAN	TANGENT
TCM	TRIP COIL MONITOR
TEL	TELEPHONE
TERM	TERMINAL
TEMP	TEMPORARY
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
TRP	TRIP
TURB	TURBINE
TX	TRANSMIT
TYP	TYPICAL
UG	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
V	VOLT
VA	VOLTAMPERE
VA	PHASE A VOLTAGE
VAR	REACTIVE POWER
VB	PHASE B VOLTAGE
VAC	ALTERNATING CURRENT VOLTAGE
VC	PHASE C VOLTAGE
VCB	VACUUM CIRCUIT BREAKER
VDC	DIRECT CURRENT VOLTAGE
VERT	VERTICAL
VIF	VERIFY IN FIELD
VN	NEUTRAL VOLTAGE
VR	VOLTAGE REGULATOR
VREG	VOLTAGE REGULATOR
VS	SYNCHRONIZING VOLTAGE
VT	VOLTAGE TRANSFORMER
W	WEST
W	WATT
W/	WITH
W/O	WITHOUT
X	REACTANCE
XFMR	TRANSFORMER
XMSSN	TRANSMISSION
Y	ADMITTANCE
YL	YELLOW
Z	IMPEDANCE
2	TIME–DELAY
21	DISTANCE
25	SYNCHRONISM CHECK
27	UNDERVOLTAGE
30	ANNUNCIATOR
32	DIRECTIONAL POWER
37	UNDERCURRENT OR UNDERPOWER
38	BEARING
40	FIELD
43	MANUAL TRANSFER OR SELECTOR DEVICE
46	REVERSE–PHASE
47	PHASE–SEQUENCE VOLTAGE
49	MACHINE OR TRANSFORMER THERMAL RELAY
50	INSTANTANEOUS OVERCURRENT
51	AC TIME OVERCURRENT
52	AC CIRCUIT BREAKER
52a	NORMALLY OPEN BREAKER CONTACT
52b	NORMALLY CLOSED BREAKER CONTACT
59	OVERVOLTAGE
60	VOLTAGE BALANCE
63	PRESSURE SWITCH
64	APPARATUS GROUND
67	AC DIRECTIONAL OVERCURRENT
68	BLOCKING
69	PERMISSIVE
71	LEVEL SWITCH
74	ALARM
76	DC OVERCURRENT
78	OUT–OF–STEP
79	RECLOSING RELAY
81	FREQUENCY
85	CARRIER OR PILOT WIRE
86	LOCK OUT
87	DIFFERENTIAL
94	TRIPPING

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24–0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03–07–2025	JRV/03–07–2025
B	ISSUED FOR 95% REVIEW	MED/04–29–2025	JRV/04–29–2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10–11–2025	MED/10–11–2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
GENERAL INFORMATION AND SPECIFICATIONS

mnre–el–0000_2.dwg

REF DWG(S):

DRAWING NO.: MNRE–EL–0000

SHEET 2 OF 2

1 OVERALL SITE PLAN

200 0 200 400 FEET

SCALE: 1" = 256'-0"

2 PV LAYOUT SITE PLAN

20 0 20 40 FEET

SCALE 1" = 32'-0"

NOT FOR CONSTRUCTION

SEE REFERENCE 1 FOR FURTHER DETAILS

BESS DOCUMENTS NOT COVERED IN THIS DRAWING SET

SEE REFERENCE 2 FOR FURTHER DETAILS

SEE REFERENCE 3 FOR FURTHER DETAILS

SHEET NOTES

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE LOCATIONS OF EXISTING PROPERTY LINES AND CORNERS PRIOR TO CONSTRUCTION.
2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE ALL UNDERGROUND UTILITIES MARKED PRIOR TO CONSTRUCTION.
3. ALL DIMENSIONS ARE FOR REFERENCE ONLY. PLEASE REFER TO MANUFACTURERS DRAWINGS TO CONFIRM ALL DIMENSIONS.

PROJECT: MINTO RENEWABLE ENERGY DESIGN

DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	GGL/02-07-2025	JRV/02-07-2025
B	ISSUED FOR 65% REVIEW	GGL/03-07-2025	JRV/03-07-2025
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D	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	MNRE-EL-2500/2	PV ARRAY LAYOUT DIAGRAM
~~2~~	~~MNRE-EL-2500/3~~	~~BESS LAYOUT DIAGRAM~~
3	MNRE-EL-2500/4	INTERCONNECTION LAYOUT

DRAWING NAME:

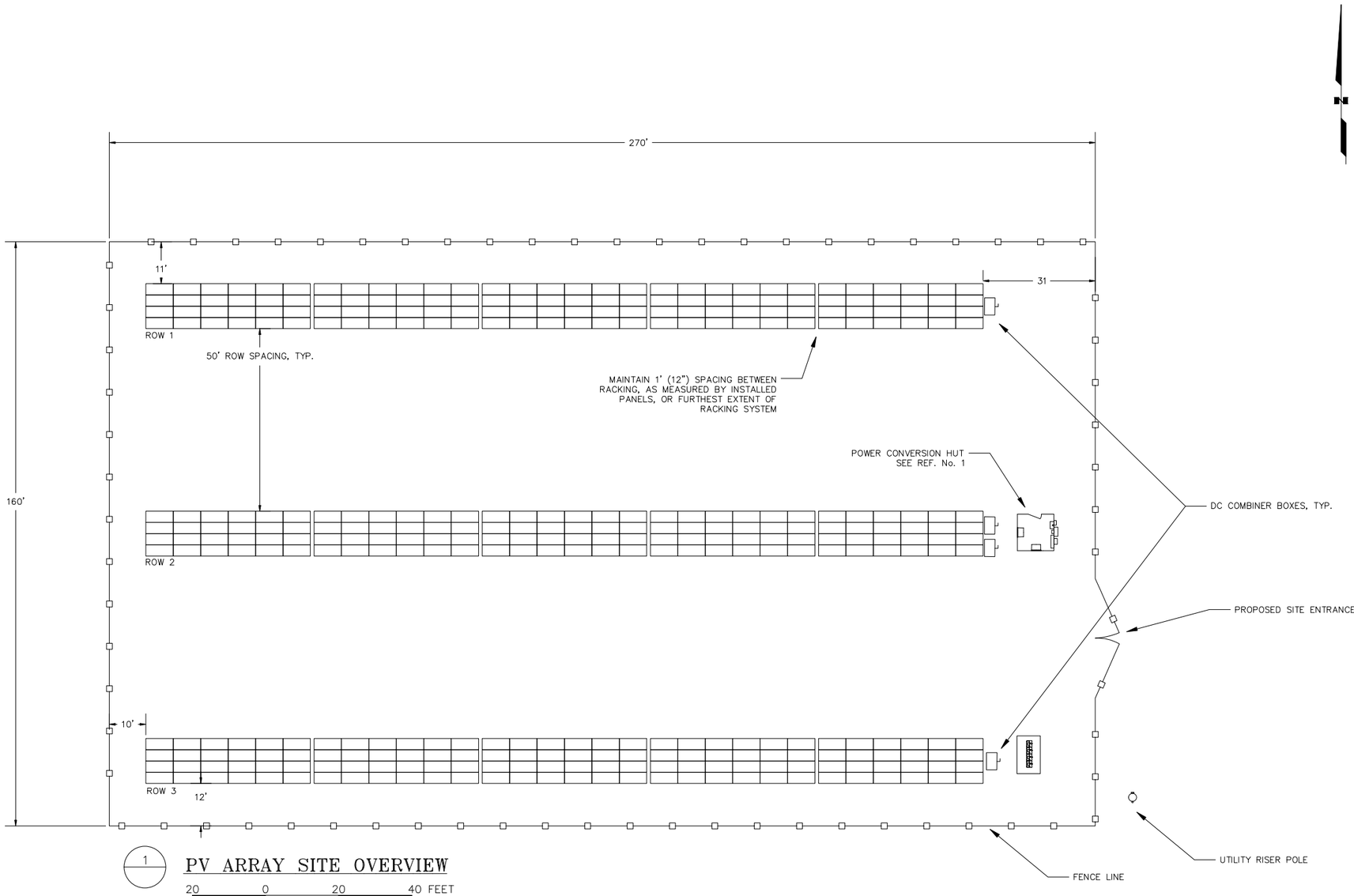
TANANA CHIEFS CONFERENCE MINTO RENEWABLE ENERGY SITE LAYOUT DIAGRAM

mnre-el-2500_1.dwg

REF DWG(S):

DRAWING NO.: MNRE-EL-2500

SHEET 1 OF 6



1 PV ARRAY SITE OVERVIEW

20 0 20 40 FEET

SCALE: 1/16" = 1'-0"

System Summary

Physical Arrangement

Methodology	Fixed Tilt, Ground Mount
Tilt	35°
Racking System / Model	Nuance Osprey PowerRACK 4x6

Electrical Arrangement

Watts per Module	595W
24 Module Strings (#)	15
Quantity of Modules	360
Total DC System Size	214,200W

Inverter Arrangement

Manufacturer	SMA
Model	Sunny Highpower PEAK3 125-US
Inverter Size	125kW
Quantity of Inverters	2
Strings per Inverter	7|8

PV Modules

Manufacturer	SEG Solar
Model	SEG-595-BTA-BG
Peak Power	595W
Quantity of Modules	360

LEGEND	
	DC COMBINER BOXES (4)
	FENCE LINE
	PV ARRAY

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	GGL/02-07-2025	JRV/02-07-2025
B	ISSUED FOR 65% REVIEW	GGL/03-07-2025	JRV/03-07-2025
C	ISSUED FOR 95% REVIEW	GGL/04-29-2025	JRV/04-29-2025
D	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

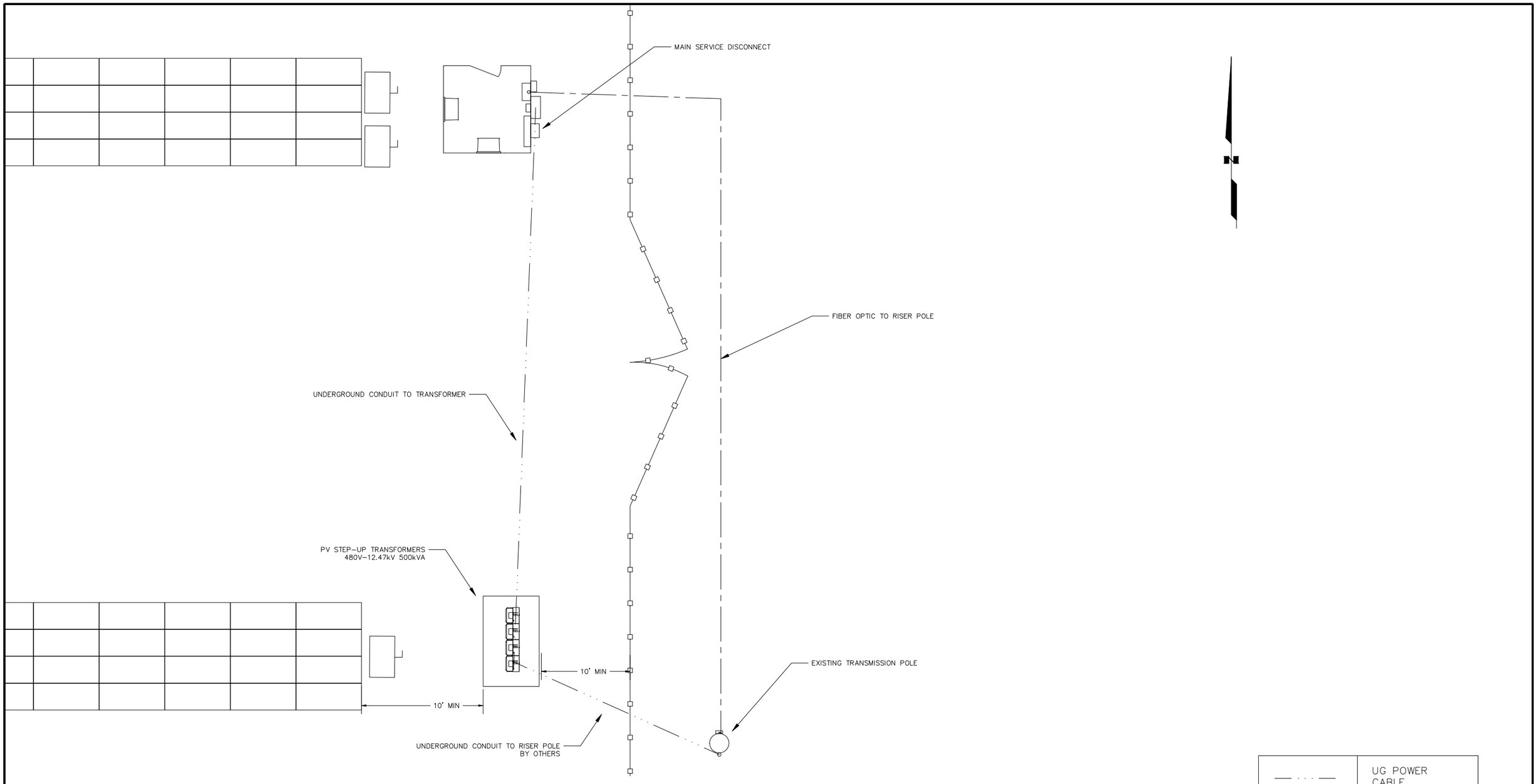
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	MNRE-EL-2500/5	POWER CONVERSION HUT LAYOUT DIAGRAM

DRAWING NAME: TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
PV ARRAY LAYOUT DIAGRAM

mnre-el-2500_2.dwg

REF DWG(S):

DRAWING NO.: MNRE-EL-2500



1 PV INTERCONNECTION LAYOUT

10 0 10 20 FEET

— · · · —	UG POWER CABLE
— - - —	UG COMM CABLE

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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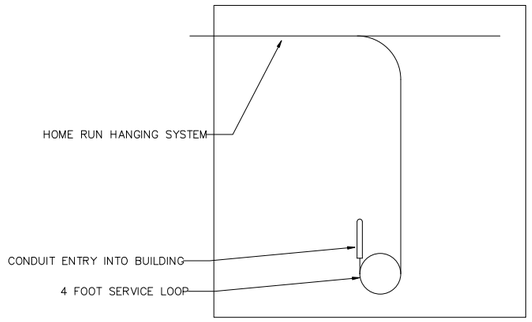
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
INTERCONNECTION LAYOUT

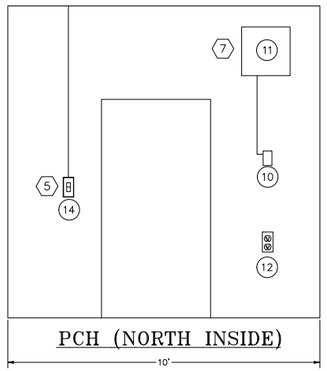
mnre-el-2500_4.dwg

REF DWG(S):

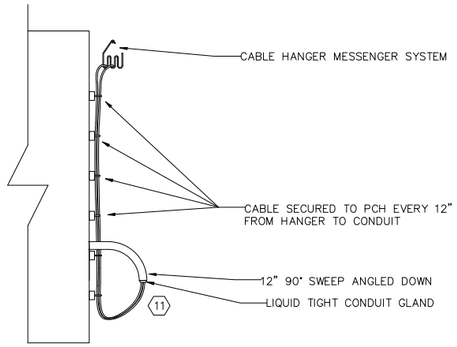
DRAWING NO.: MNRE-EL-2500



PCH (WEST OUTSIDE)

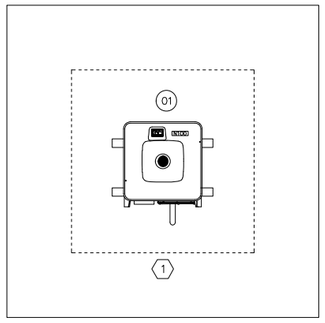


PCH (NORTH INSIDE)

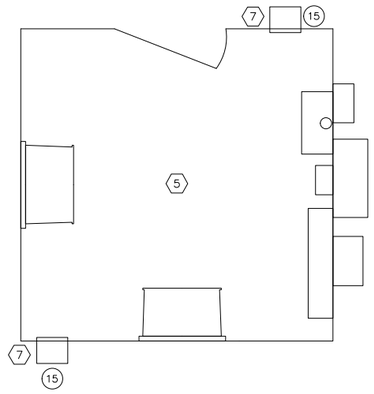


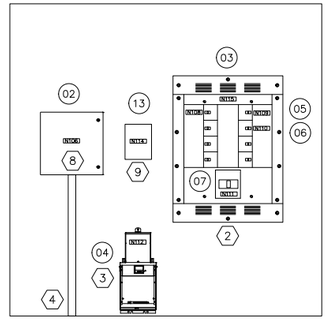
HOME-RUN ENTRY

BILL OF MATERIAL (6)				
REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	EA	2	SUNNY HIGHPOWER PEAK3-125KW	SMA/SHP 125-US-21
02	EA	1	COMMUNICATION PANEL	SEE REF. 1
03	EA	1	POWER DISTRIBUTION PANELBOARD	SQUARED/HCJ23734M
04	EA	1	STATION SERVICE SUBSTATION, 10kVA	HAMMOND/M1PC010LESF
05	EA	2	200A CIRCUIT BREAKER	
06	EA	1	30A/2P CIRCUIT BREAKER	
07	EA	1	400A MAIN CIRCUIT BREAKER	
08	EA	1	400A LOAD BREAK DISCONNECT W/ PROVISIONS FOR PADLOCK	
09	EA	1	10IN MOTORIZED INTAKE DAMPER	
10	EA	1	ADJUSTABLE THERMOSTAT	
11	EA	1	WALL MOUNT SHUTTER FAN, >2500CFM, 120VAC W/ DAMPER MOTOR CONTROLLED BY THERMOSTAT	
12	EA	2	GFCI RECEPTACLE	
13	EA	1	SHARK 250 SELF-ENCLOSED METER ASSEMBLY	ELECTRO INDUSTRIES /ENCSHK250-277-60-10-V3-D2-INP100S-X
14	EA	1	LIGHT SWITCH	
15	EA	2	90° VENTILATION HOOD WITH INSECT SCREEN	
16	EA	1	ELECTRIC BASEBOARD HEATER, 1000W, 120VAC W/ BUILT-IN THERMOSTAT	
17	EA	1	600V 20A METER SOCKET W/SELF-SHUNTING BYPASS	MILBANK/UC7237-XL
18	EA	1	400A CT ENCLOSURE	



PCH (WEST INSIDE)

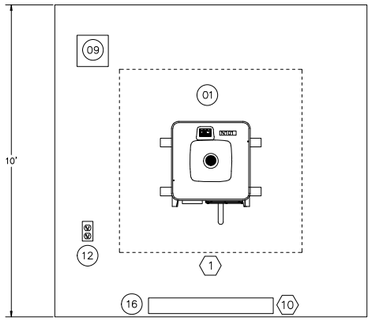




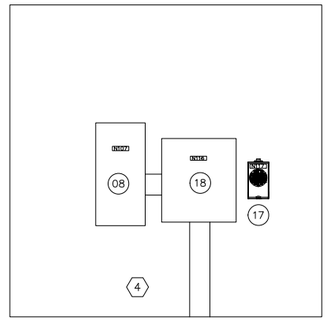
PCH (EAST INSIDE)

NOTES:

1. MOUNT SMA SHP-125-US INVERTERS SUCH THAT THEY ARE 4" AWAY FROM THE WALL, AND 20" ON ALL OTHER SIDES FROM WALLS, FLOORS, CEILINGS, AND OTHER DEVICES. MAINTAIN 4' WORKING CLEARANCE ZONE IN FRONT OF INVERTERS, PER NEC. PROVIDE A 4" X 4" WIREWAY (MINIMUM) BETWEEN INVERTERS AND PANELBOARD
2. MOUNT POWER DISTRIBUTION PANELBOARD SUCH THAT MANUFACTURER RECOMMENDED CLEARANCE DISTANCES BETWEEN THE PANELBOARD AND WALLS, FLOORS, CEILINGS, AND OTHER DEVICES IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE IN FRONT OF THE PANELBOARD, PER NEC
3. MOUNT STATION SERVICE SUBSTATION SUCH THAT ALL MANUFACTURER RECOMMENDED CLEARANCE ZONES AWAY FROM EQUIPMENT IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE ZONE IN FRONT OF THE DEVICE, PER NEC
4. ROUTE CONDUITS SUCH THAT THE STUB-UP AREA IS DIRECTLY UNDER ALL DESTINATION DEVICES IN THE POWER CONVERSION HUT
5. PROVIDE CEILING MOUNTED LIGHTING SUCH THAT 30 FOOTCANDLES IS MAINTAINED. MOUNT LIGHT SWITCH NEXT TO DOOR AT LEAST 40" FROM FLOOR.
6. ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN CAN BE CONTRACTOR DETERMINED, PROVIDED THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.
7. VENTILATION FOR THE ENCLOSURE SHALL BE PROVIDED BY A WEATHERPROOF 120VAC EXHAUST FAN WITH A MINIMUM FLOW RATE OF 2500CFM, CONTROLLED BY AN ADJUSTABLE THERMOSTAT FOR FAN OPERATION OF INTERIOR AIR TEMPERATURES OF 35°C AND ABOVE, AND BY A 10" MOTORIZED INTAKE DAMPER. EXHAUST FAN AND INTAKE DAMPER SHALL BE PROVIDED WITH A 90° EXTERIOR HOOD WITH INSECT SCREENS TO PREVENT INTRUSIONS OF WIND DRIVEN RAIN/SNOW.
8. MOUNT RECEPTACLES ON INSIDE WALLS OF PCH AT LEAST 18" FROM FLOOR. MOUNT ONE RECEPTACLE ON EAST SIDE OF DOOR (NORTH WALL), AND ONE RECEPTACLE NEXT TO BASEBOARD HEATER (SOUTH WALL).
9. CONNECT SHARK 250 CURRENT TRANSFORMERS AND POTENTIAL TRANSFORMERS TO THE 400A OUTPUT BREAKER AT POWER DISTRIBUTION PANELBOARD THROUGH A 1" CONDUIT.
10. HEATING TO BE PROVIDED BY ELECTRIC BASEBOARD HEATER WITH BUILT-IN THERMOSTAT. HEATER TO TURN ON BELOW 10°F
11. HOME-RUN CABLES TO ENTER INTO PCH VIA CONDUIT SWEEP ANGLED DOWN. MIN CONDUIT RADIUS TO BE 8 X THE DIAMETER OF THE LARGEST CABLE. SUPPORT CABLES EVERY 12"AS MEASURED BY THE CABLES PATH FROM HANGER, TO CONDUIT WITH UV RESISTANT, OUTDOOR RATED CABLE TIES. ADD IN A 4FT SERVICE LOOP BEFORE ENTERING INTO THE CONDUIT. EXACT HEIGHT AND PLACEMENT OF CONDUIT TO BE DETERMINED BY CONTRACTOR ON-SITE.



PCH (SOUTH INSIDE)



PCH (SOUTH OUTSIDE)

BUILDING MANUFACTURER TO PROVIDE PRE-FABRICATED METAL BUILDING PER FOLLOWING SPECIFICATIONS:
STRUCTURAL:
-ROOF PITCH: 3:12
-ROOF DEAD LOAD 30PSF MINIMUM
-MAX WALL LOAD: 220LBS (INVERTER)
-MAX FLOOR LOAD: 210LBS (STATION SERVICE SUBSTATION)
INSULATION:
-WALL INSULATION: R22 MINIMUM
-CEILING INSULATION: R30 MINIMUM

ALL INTERIOR CONDUITS SHALL BE GALVANIZED RIGID CONDUIT (GRC) OR ELECTRICAL METALLIC TUBING (EMT). EXTERIOR CONDUIT SHALL BE RIGID GALVANIZED CONDUIT ONLY. EMT TYPE COUPLERS AND FITTINGS SHALL BE RAIN-TIGHT COMPRESSION TYPE. GROUNDING BUSHINGS SHALL BE INSTALLED AT THE SOURCE END OF THE EMT CONDUIT RUNS FROM THE AC PANEL.

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0560

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A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	MNRE-EL-2500/6	COMMUNICATIONS PANEL
1	MNRE-SS-2000/5	EQUIPMENT NAMEPLATE SCHEDULE

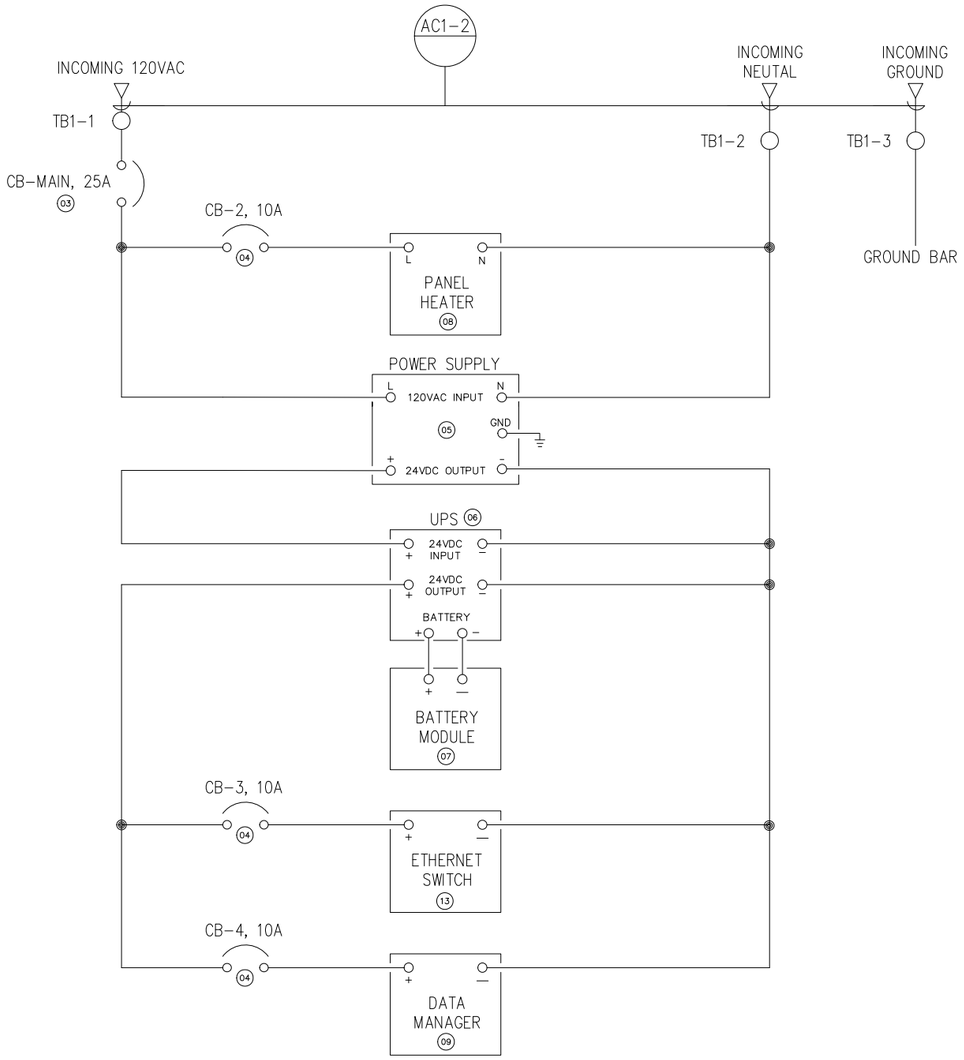
DRAWING NAME:
TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
POWER CONVERSION HUT
LAYOUT DIAGRAM

mnre-el-2500_5.dwg

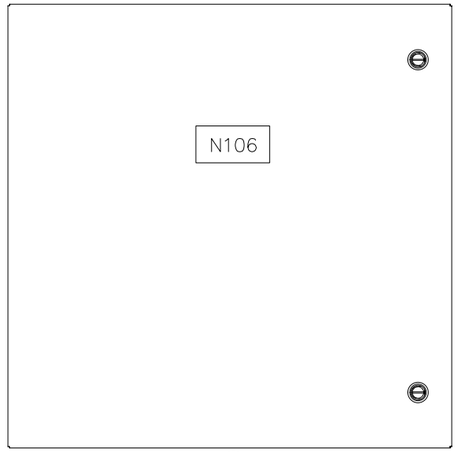
REF DWG(S):

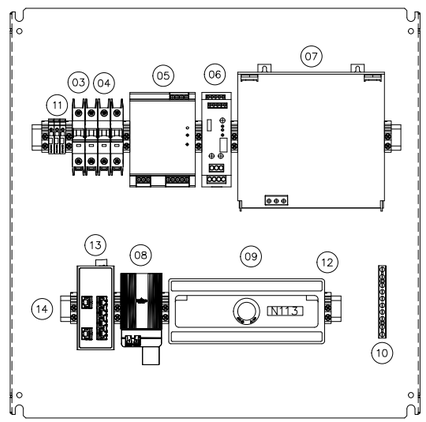
DRAWING NO.: MNRE-EL-2500

SHEET 5 OF 6



1 ONE-LINE DIAGRAM





2 PANEL ELEVATION – INSIDE

1:4 – 1" = 4" 4 0 4 8

1

BILL OF MATERIAL

REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	EA	1	24" X 24" X 10" NEMA 1 MILD STEEL WALL MOUNTED ENCLOSURE	
02	EA	1	INNER PANEL FOR 24X24X10 ENCLOSURE	
03	EA	1	25A, 600V UL489 1-POLE BREAKER	
04	EA	3	10A, 600V UL489 1-POLE BREAKER	
05	EA	1	PHOENIX CONTACT 120VAC/24VDC PS, 20 AMP	PHOENIX CONTACT/ 2866776
06	EA	1	PHOENIX CONTACT 20 AMP UPS	PHOENIX CONTACT/ 2320238
07	EA	1	PHOENIX CONTACT 12 Ah BATTERY	PHOENIX CONTACT/ 1274119
08	EA	1	150W PANEL HEATER W/BUILT IN REGULATION ON: 41°F – OFF: 59°	STEGO/06021.0-00
09	EA	1	DATA MANAGER	SMA/EDMM-20
10	EA	1	UL 467 GROUND BAR, 6 POLE MINIMUM	
11	EA	3	6MM DINRAIL MOUNTED TERMINAL BLOCK	
12	EA	10	6MM DINRAIL MOUNTED TERMINAL BLOCK END STOP	
13	EA	1	UNMANAGED ETHERNET SWITCH, 2 FIBER PORTS	MOXA/EDS-G308-2SPF
14	EA	1	35MM DIN MOUNTING RAIL	

2

NOTES:

1. ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN CAN BE CONTRACTOR DETERMINED, PROVIDED THAT THE CONTRACTOR DETERMINED PRODUCT MATCHES THE PRODUCT DESCRIPTION IN THE CENTER COLUMN, AND THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.
2. PROVIDE 1 SPARE CIRCUIT BREAKER FOR EACH SIZE (REF. NO. 3, AND REF. NO. 4) AND STORE IN BOTTOM OF ENCLOSURE

3 PANEL BOM

NOT FOR CONSTRUCTION

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DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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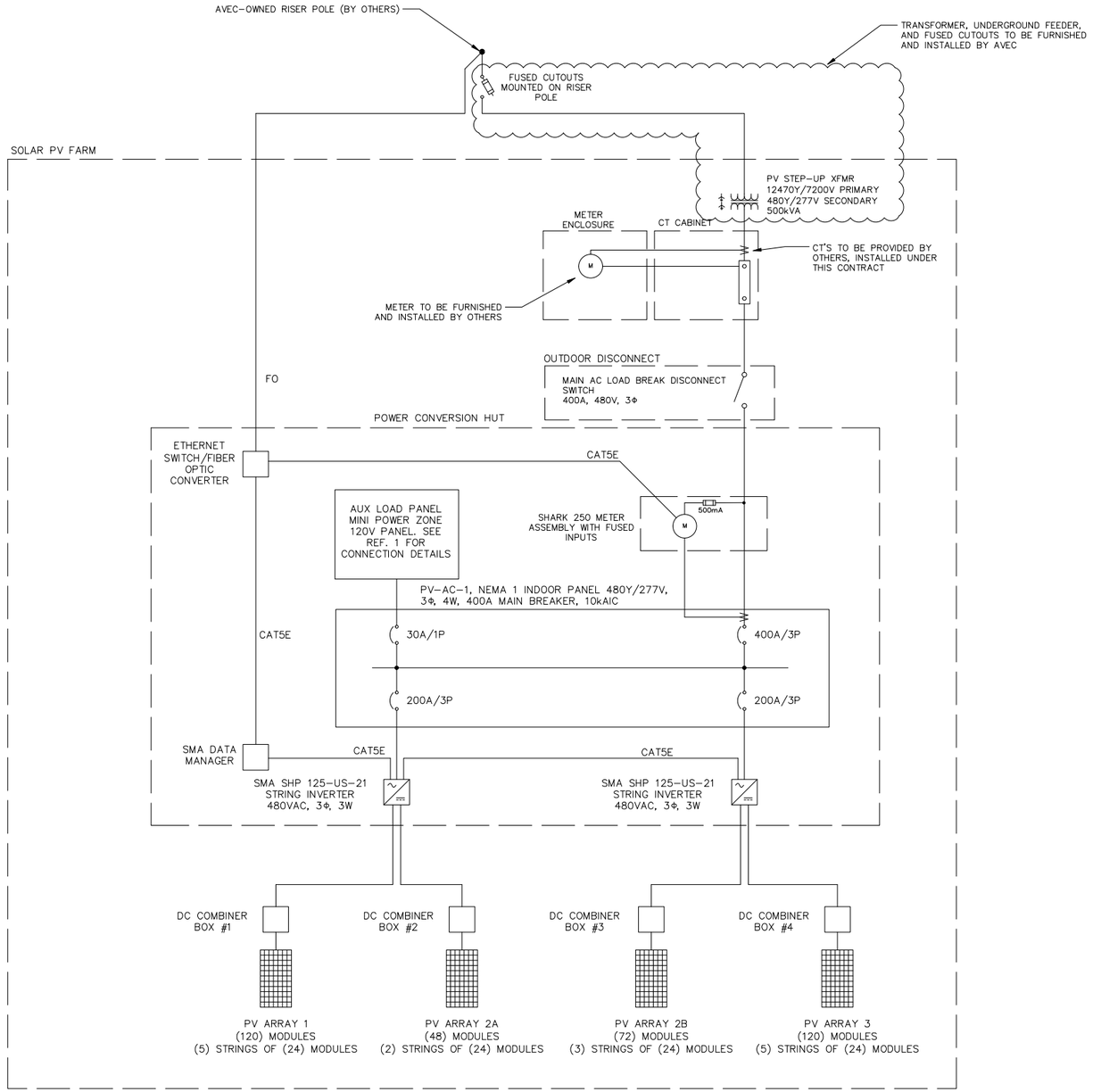
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
COMMUNICATIONS PANEL
ELEVATION AND DETAILS
mnre-el-2500_6.dwg

REF DWG(S):

DRAWING NO.: MNRE-EL-2500

SHEET 6 OF 6



NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	GGL/02-07-2025	JRV/02-07-2025
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C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

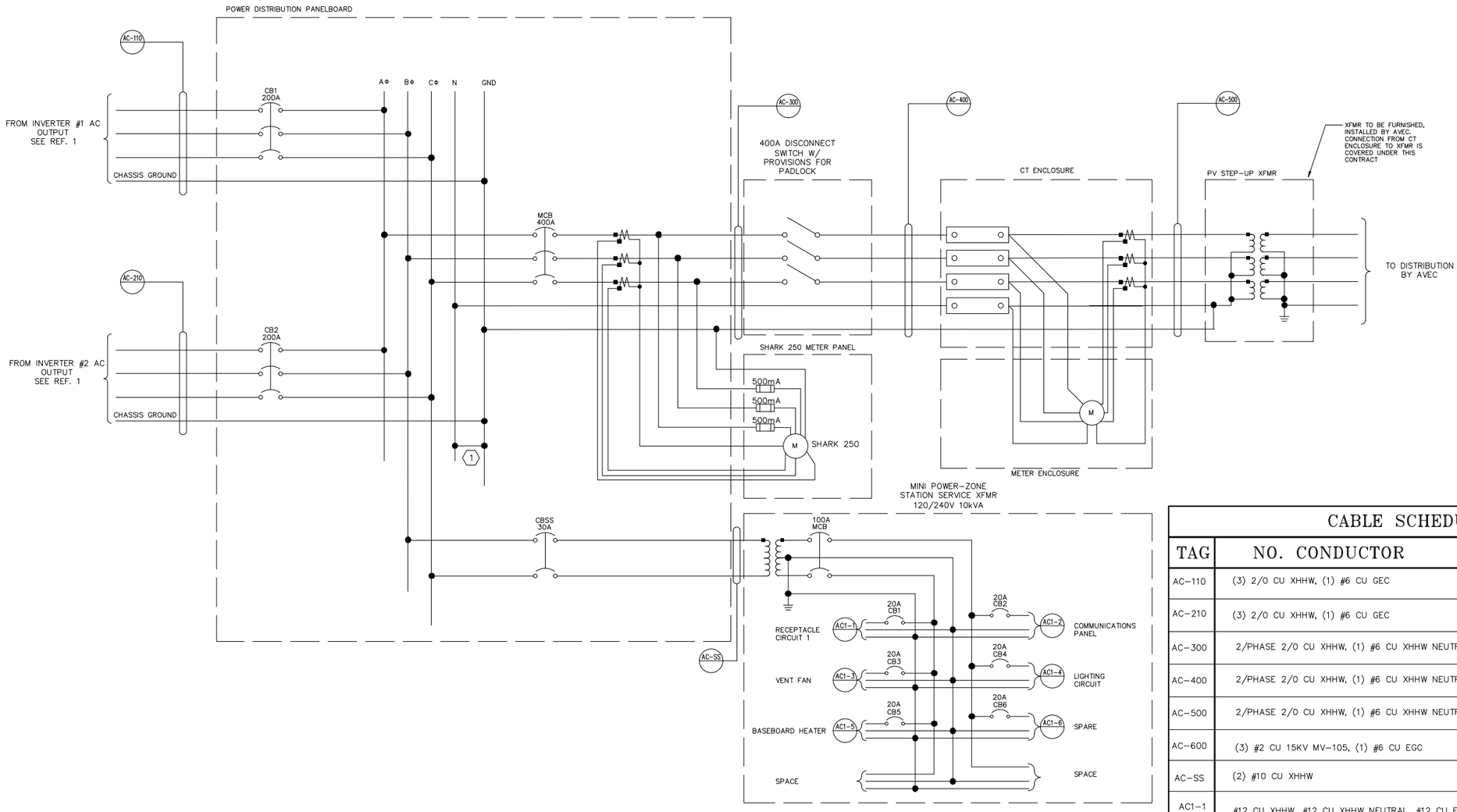
DRAWING NAME:
TANANA CHIEFS CONFERENCE MINTO RENEWABLE ENERGY SITE ONELINE DIAGRAM

mnre-el-0010_1.dwg

REF DWG(S):

DRAWING NO.: MNRE-EL-0010

SHEET 1 OF 1



CABLE SCHEDULE		
TAG	NO. CONDUCTOR	RACEWAY
AC-110	(3) 2/0 CU XHHW, (1) #6 CU GEC	C-0111
AC-210	(3) 2/0 CU XHHW, (1) #6 CU GEC	C-0112
AC-300	2/PHASE 2/0 CU XHHW, (1) #6 CU XHHW NEUTRAL, (1) #6 CU GEC	C-11 C-12 C-13
AC-400	2/PHASE 2/0 CU XHHW, (1) #6 CU XHHW NEUTRAL, (1) #6 CU GEC	C-21 C-22 C-23
AC-500	2/PHASE 2/0 CU XHHW, (1) #6 CU XHHW NEUTRAL, (1) #6 CU GEC	C-31 C-32 C-33
AC-600	(3) #2 CU 15KV MV-105, (1) #6 CU EGC	C-2
AC-SS	(2) #10 CU XHHW	1/2" EMT
AC1-1	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-2	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-3	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-4	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-5	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT

NOTE:
- LOW VOLTAGE AC CONDUCTOR SIZING BASED ON A TEMPERATURE RATING OF 75°C.
- MEDIUM VOLTAGE AC CABLES BASED ON A TEMPERATURE RATING OF 105°C.
- USE OF CABLE LARGER THAN SPECIFIED IN THE CABLE SCHEDULE IS ALLOWED, PROVIDED THAT THE TEMPERATURE RATING OF THE CONDUCTOR IS MAINTAINED.
- IF LARGER-THAN-SPECIFIED CABLE IS USED, CONFIRM THAT THE CONDUIT SIZE IN THE ASSOCIATED RACEWAY MAINTAINS A MAXIMUM 40% FILL RATIO
- SEE REF. 2 FOR CONDUIT SCHEDULE

NOTES:

(1) INSTALL N-G BOND JUMPER ONLY IN THE POWER DISTRIBUTION PANELBOARD.

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	MNRE-EL-0011/1	WIRING DIAGRAM
1	MNRE-SS-2000/2	RACEWAY DETAILS

DRAWING NAME:
TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
PV ARRAY AC THREE LINE DIAGRAM

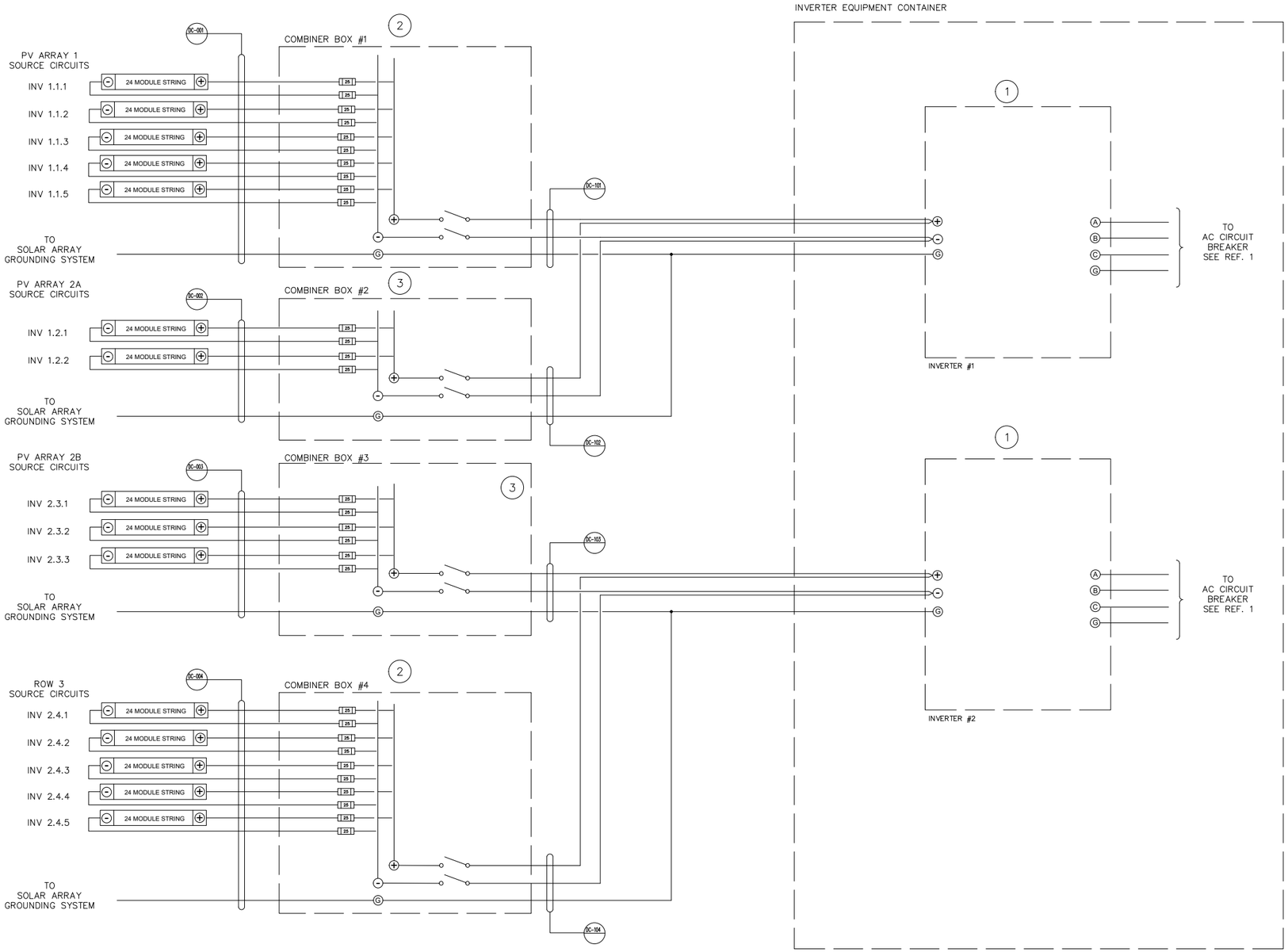
mnre-el-0100_1.dwg

REF DWG(S):

DRAWING NO.: MNRE-EL-0100

SHEET 1 OF 1

NOT FOR CONSTRUCTION



LEGEND

INV X.X.XX

DESTINATION INVERTER NO.

DESTINATION COMBINER NO.

SOURCE CIRCUIT NUMBER

EQUIPMENT SCHEDULE		
TAG	QUANTITY	DESCRIPTION
1	2	PV INVERTER; SMA SUNNY HIGHPOWER PEAK3 125-US
2	2	10 INPUT DC COMBINER; TERRASMART FSFT275-10-25-N4-CD OR EQUIVALENT
3	2	6 INPUT DC COMBINER; TERRASMART FSFT-275-6-25-N4-CD OR EQUIVALENT

CABLE SCHEDULE		
TAG	NO. CONDUCTOR	RACEWAY
DC-001	(10) #10 CU PV WIRE, (1) #6 CU EGC	FREE AIR
DC-002	(4) #10 CU PV WIRE, (1) #6 CU EGC	FREE AIR
DC-003	(6) #10 CU PV WIRE, (1) #6 CU EGC	FREE AIR
DC-004	(10) #10 CU PV WIRE, (1) #6 CU EGC	FREE AIR
DC-101	(2) #2 AL PV WIRE, (1) #6 CU EGC	FREE AIR
DC-102	(2) #8 AL PV WIRE, (1) #6 CU EGC	FREE AIR
DC-103	(2) #6 AL PV WIRE, (1) #6 CU EGC	FREE AIR
DC-104	(2) #2 AL PV WIRE, (1) #6 CU EGC	FREE AIR

NOTE: 1) DC STRING CONDUCTOR SIZING BASED ON COPPER UL 4703 PV WIRE WITH A TEMPERATURE RATING OF 90°C
2) DC CABLE SIZING FOR HOME-RUNS BASED ON AL 2KV PV WIRE AMPACITY WITH A TEMPERATURE RATING OF 75°C IN FREE AIR (TABLE 310.15(B)(17)) AND A VOLTAGE DROP OF LESS THAN 2%. USE OF CABLE LARGER THAN SPECIFIED IN THE CABLE SCHEDULE IS ALLOWED, PROVIDED THAT THE CONDUCTOR DESCRIPTION IS MAINTAINED.

PROJECT: MINTO RENEWABLE ENERGY DESIGN
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A	ISSUED FOR 35% REVIEW	GGL/02-07-2025	JRV/02-07-2025
B	ISSUED FOR 65% REVIEW	GGL/03-07-2025	JRV/03-07-2025
C	ISSUED FOR 95% REVIEW	GGL/04-29-2025	JRV/04-29-2025
D	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	MNRE-EL-0100/1	AC THREE LINE DIAGRAM

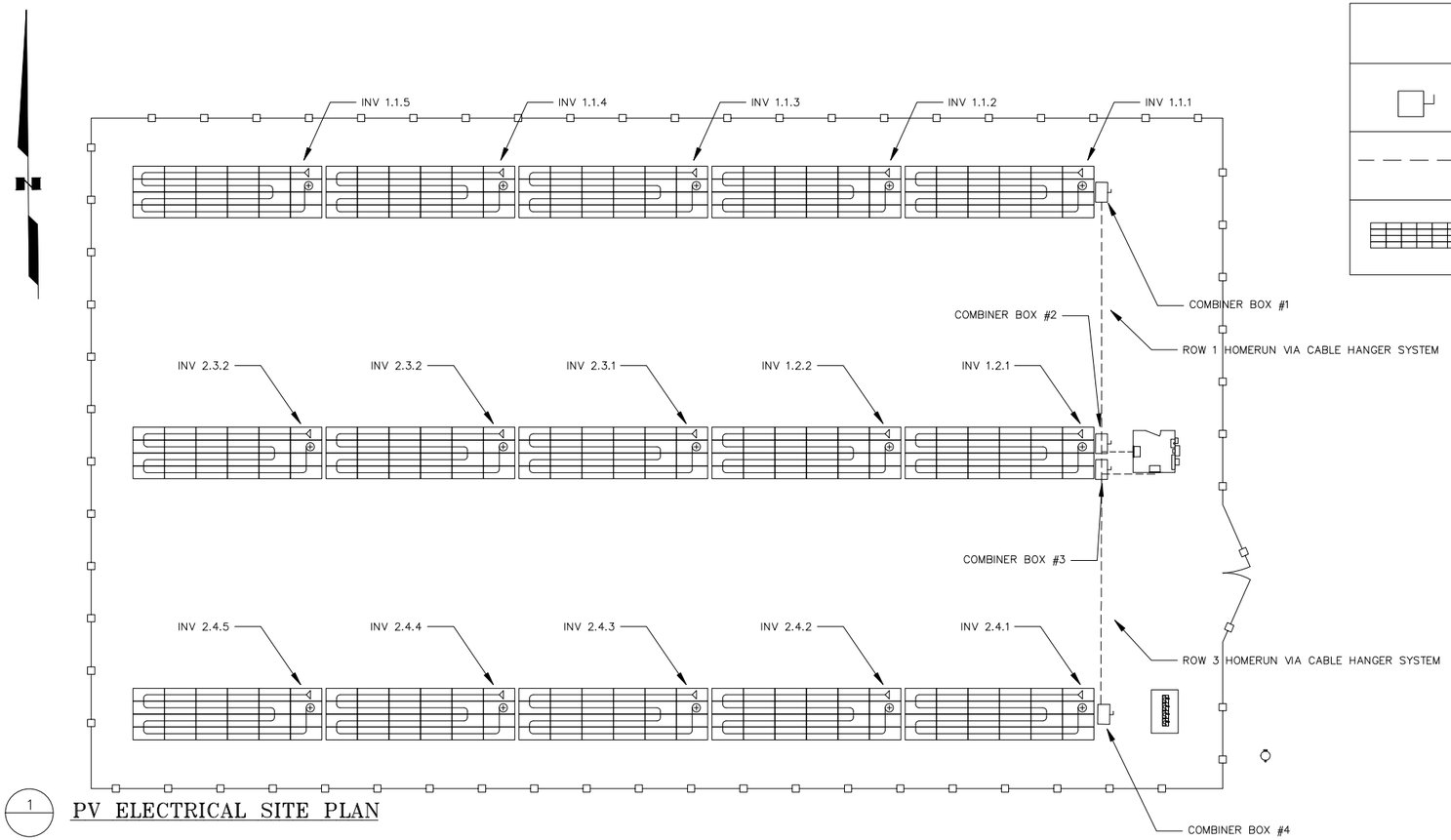
DRAWING NAME:
TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
PV ARRAY DC WIRING DIAGRAM

mnre-el-0011.dwg

REF DWG(S):

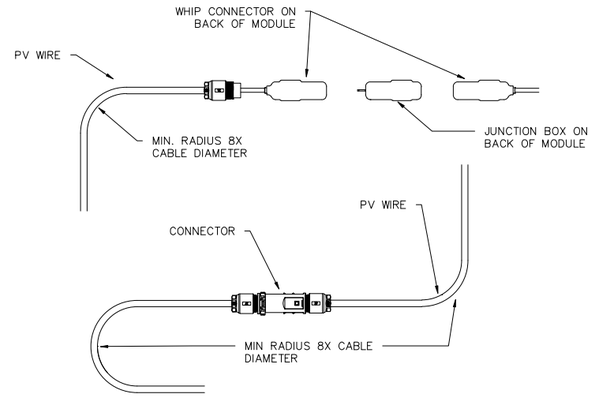
DRAWING NO.: MNRE-EL-0011

SHEET 1 OF 1



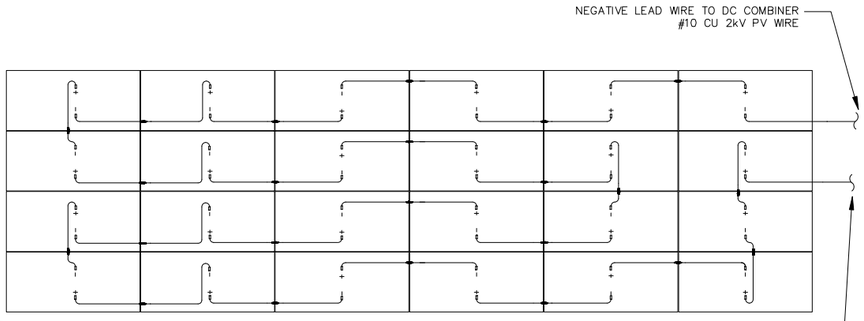
1 PV ELECTRICAL SITE PLAN

LEGEND	
	DC COMBINER BOXES (4)
	CABLE HANGER MESSENGER
	PV ARRAY



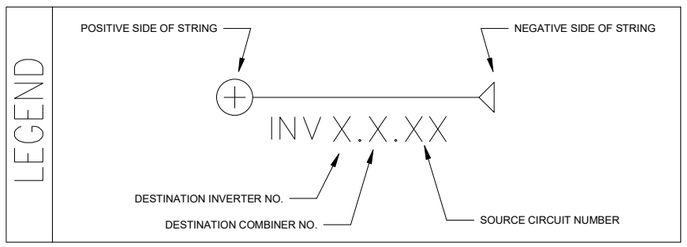
PV WIRE BENDING REQUIREMENTS NOTES:
1. OBSERVE MIN. BENDING RADIUS REQUIREMENTS WHEN BUILDING AND SECURING SOURCE CIRCUIT CONDUCTORS TO MODULES AND RACKING.
2. SEE MODULE SPEC SHEET OR CABLE SPECS FOR CABLE DIAMETER.

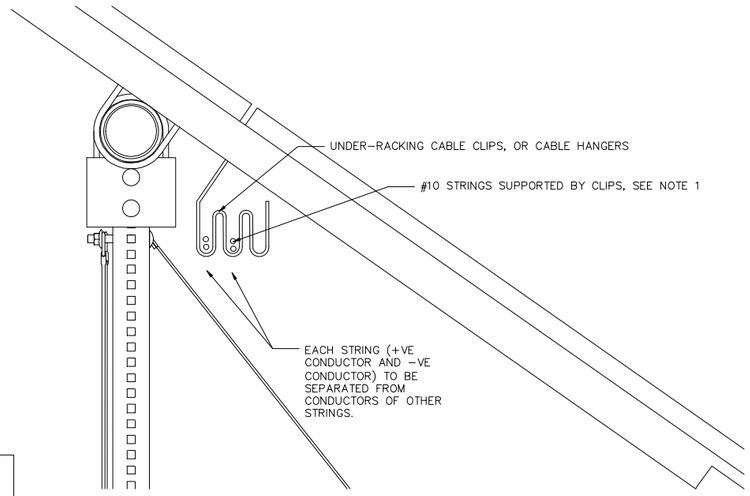
3 PV WIRE BENDING REQUIREMENTS
NTS



2 TYPICAL 24 MODULE SERIES WIRING

TYPICAL 24 MODULE SERIES WIRING NOTES:
1. WIRING FOR ILLUSTRATIVE PURPOSES ONLY. FINAL MODULE WIRING TO BE DETERMINED ON-SITE.





4 TYPICAL STRING SUPPORT CLIP DETAIL

TYPICAL 24 MODULE SERIES WIRING NOTES:
1. SUPPORT #10 STRINGS WITH CABLE CLIPS, OR OTHER TCC APPROVED UNDER-RACKING CABLE MANAGEMENT SYSTEM AT MOST EVERY 4' (48"). INSTALL PER MANUFACTURERS RECOMMENDATIONS. EXACT PLACEMENT AND CONNECTION METHOD TO BE DETERMINED BY CONTRACTOR ON-SITE

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

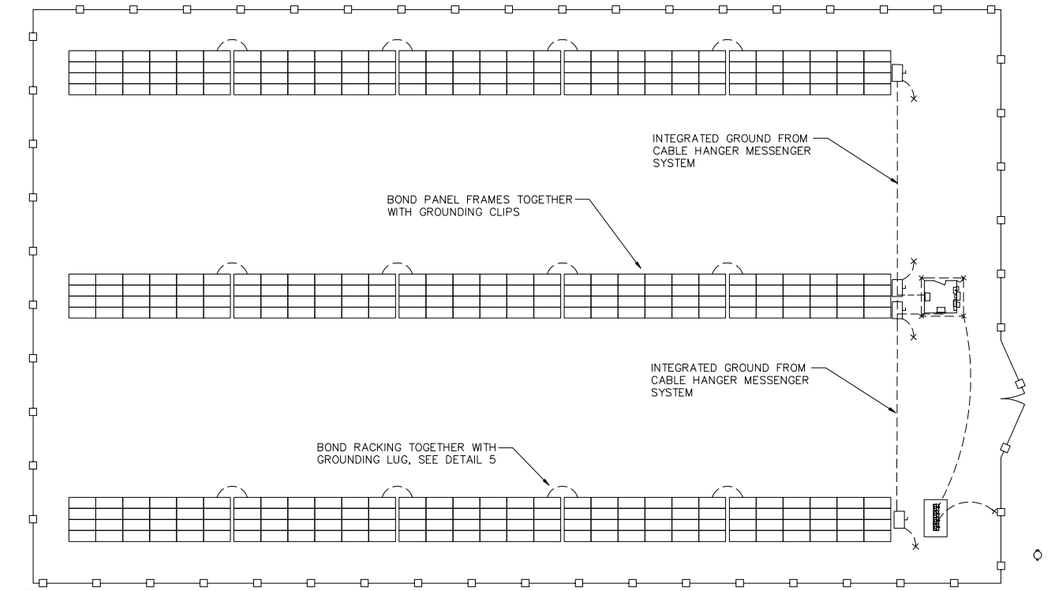
DRAWING NAME: TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
PV ELECTRICAL SITE PLAN

mnre-el-0020_1.dwg

REF DWG(S):

DRAWING NO.: MNRE-EL-0020

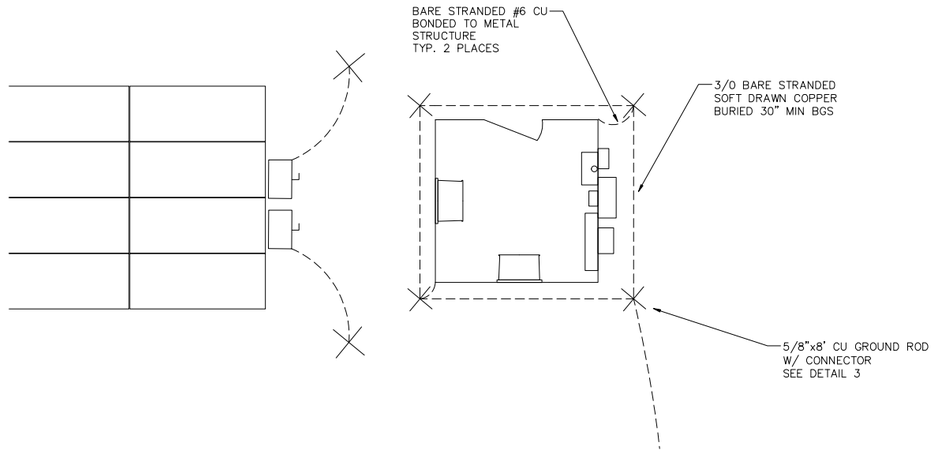
SHEET 1 OF 1



1 OVERALL ARRAY GROUNDING PLAN

20 0 20 40 FEET

SCALE: 1" = 20'-0"



2 HUT GROUNDING DETAIL

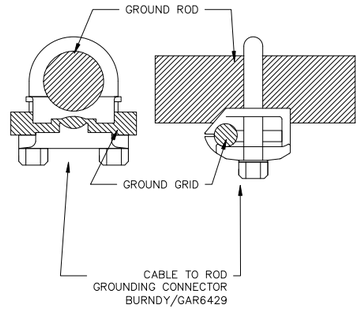
2 0 2 4 FEET

SCALE: 1" = 4'-0"

GROUNDING PLAN NOTES:

1. CONTRACTOR TO TEST EACH GROUNDING ELECTRODE USING THE FALL OF POTENTIAL TEST. GROUND RODS SPACED 6' MIN APART SHALL BE ADDED AS NECESSARY UNTIL A RESISTANCE TO GROUND VALUE OF 25 OHMS OR LESS IS ACHIEVED.
2. MIN. BARE COPPER GROUND WIRE SIZE SHALL BE #6.

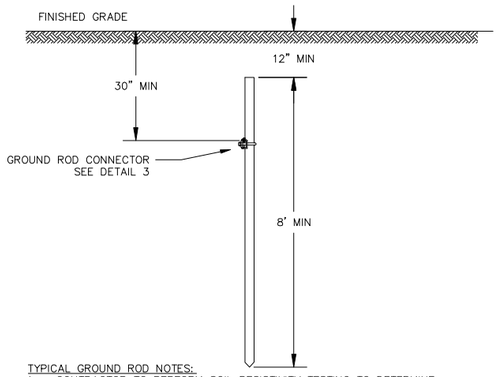
LEGEND	
×	GROUNDING RODS (5/8" x 10')
— — —	GROUNDING GRID



3 GROUND ROD CONNECTION

NTS

NOT FOR CONSTRUCTION

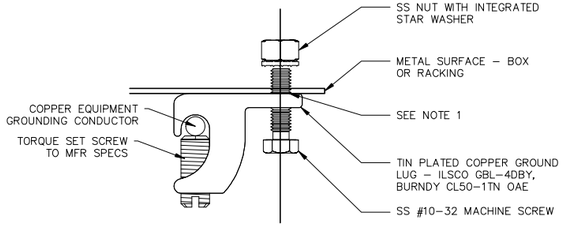


TYPICAL GROUND ROD NOTES:

1. CONTRACTOR TO PERFORM SOIL RESISTIVITY TESTING TO DETERMINE AMOUNT OF GROUND RODS NEEDED TO KEEP RESISTANCE BELOW 5 OHMS

4 TYPICAL GROUND ROD ×

NTS



TYPICAL METAL RACKING GROUNDING NOTES:

1. PRIOR TO MOUNTING LUGS ON ANODIZED ALUMINUM OR PAINTED METAL SURFACES, THE SURFACE MUST BE STRIPPED AND THEN COVERED WITH BURDNY PENETROX A-13 ANTI-OXIDANT COMPOUND BELOW THE LUG TO ENSURE CONDUCTIVITY
2. ON ANODIZED AL SURFACES, THE ANODIZATION SHALL BE GROUND OFF.
3. ON PAINTED SURFACES, THE PAINT LAYER SHALL BE GROUND OR SCRATCHED OFF.

5 TYPICAL METAL RACKING BONDING

NTS

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: MAX DONALDSON/JOHN VENABLES JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

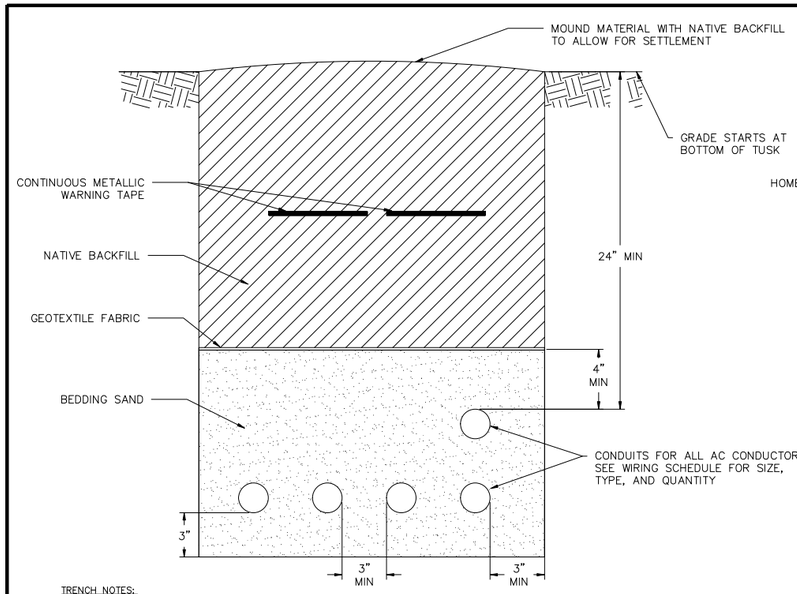
DRAWING NAME: TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
GROUNDING PLAN

mnre-ss-2000_1.dwg

REF DWG(S):

DRAWING NO.: MNRE-SS-2000

SHEET 1 OF 5



TRENCH NOTES:
1. BACKFILL THE TRENCH AREA WITH CLEAN SPOILS FREE OF AS MUCH ICE AS POSSIBLE.
2. CONSOLIDATION OF BACK FILL MATERIALS SHALL BE COMPLETED IN 12 INCH LIFTS MAXIMUM. INTENT OF THE CONSOLIDATION IS TO ENSURE ELIMINATION OF VOIDS.
3. FOR TRENCH IN GRAVEL, THE TRENCH CAP SHALL NOT EXCEED 4 INCHES. FOR TRENCH IN TUNDRA, THE TRENCH CAP SHOULD BE 35% – 40% OF THE TRENCH DEPTH (1.75' TO 2' FOR A 5' DEEP TRENCH), TO ALLOW FOR SETTLING AND ICE THAW. CONTRACTOR SHALL DISPOSE OF EXCESS EXCAVATED MATERIALS. FINAL CONTOURING OF THE TRENCH CAP IN TUNDRA SHOULD BE CONDUCTED BY HAND (MATCHING SURROUNDING DRAINAGE PATTERNS), TO ENSURE NO DIVERSION OF WATER OCCURS, RESULTING IN EROSION.
4. TRENCHES 1' WIDE SHOULD NOT NEED ANY SEEDING. FINAL REHABILITATION DETERMINATION TO BE MADE BY AGENCY REPRESENTATIVES.
5. COMPANY REPRESENTATIVE SHALL BE NOTIFIED AND PRESENT FOR ACCEPTANCE OF TRENCH PRIOR TO PLACEMENT OF CABLE AND BACKFILLING OF TRENCH (24–HOUR NOTICE REQUIRED). AGENCY REPRESENTATIVE SHALL ALSO PROVIDE ACCEPTANCE OF CABLE PRIOR TO BACKFILLING.
6. BEDDING SHALL BE 3/8" MINUS MATERIAL, NO CRUSHED OR SHARP ROCK. BEDDING MATERIAL SHALL NOT BE MACHINE COMPACTED WITHIN 6" OF CABLES. SLURRY OF A COMPOSITION THAT WILL NOT DAMAGE THE CABLE IS AN ACCEPTABLE BEDDING MATERIAL.
7. MAINTAIN 1" MIN. SEPARATION BETWEEN POWER CONDUCTORS AND COMMUNICATION CABLES

1 TYPICAL TRENCH
NTS

NOTES:

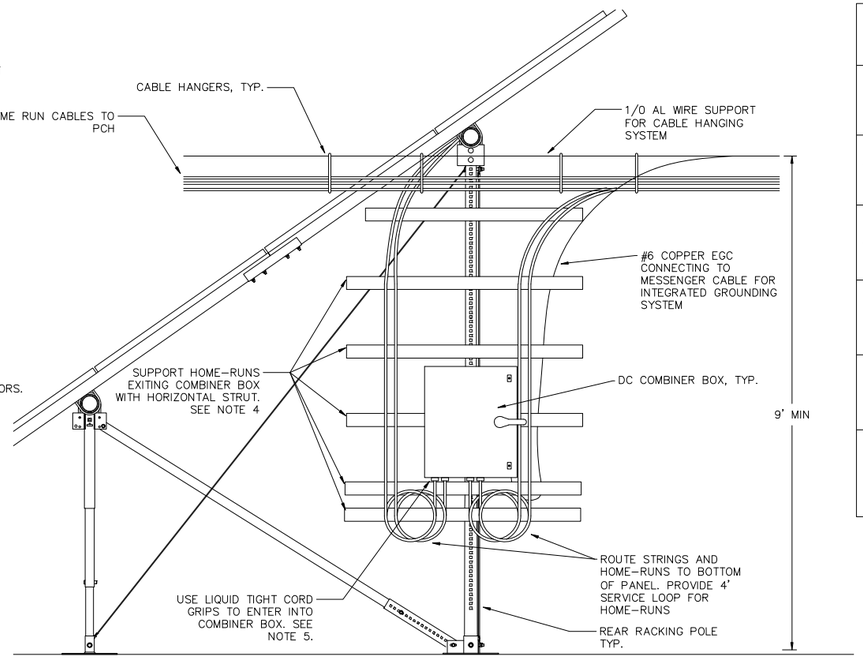
〈1〉 TRADE SIZE OF CONDUITS SHOWN IN CONDUIT SCHEDULE ARE MINIMUM SIZES BASED ON NEC CONDUIT FILL % (CHAPTER 9 TABLE 1). USE OF CONDUIT THAT IS LARGER IN TRADE SIZE THAN SPECIFIED IN CONDUIT SCHEDULE IS PERMITTED.

〈2〉 IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM PRODUCT DIMENSIONS AND ROUTE CONDUITS TO APPROPRIATE STUB–UP AREAS.

〈3〉 CONDUIT AND WIREWAY ROUTING SHOWN ON DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. EXACT WIREWAY ROUTING TO BE DETERMINED BY CONTRACTOR ON–SITE.

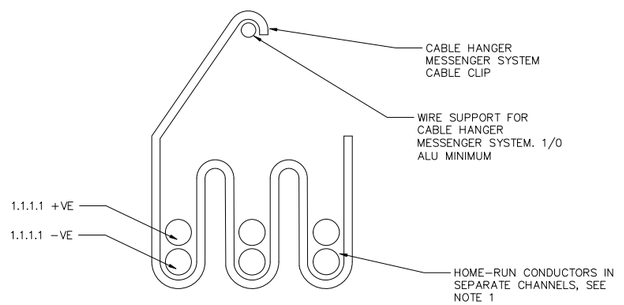
CONDUIT SCHEDULE 〈1〉

TAG	FUNCTION	CONDUIT TYPE	TRADE SIZE
C–0111	INV1 TO CB1	EMT	2"
C–0112	INV2 TO CB2	EMT	2"
C–11 – C13	MCB1 TO AC D.S.	PVC	3 X 3"
C–21 – C23	AC D.S. TO CT CAB.	PVC	3 X 3"
C–31 – C33	CT CAB. TO XFMR	PVC	3 X 3"
C–3	COMM PANEL TO POLE	HDPE	1"



2 TYPICAL COMBINER BOX DETAIL
NTS

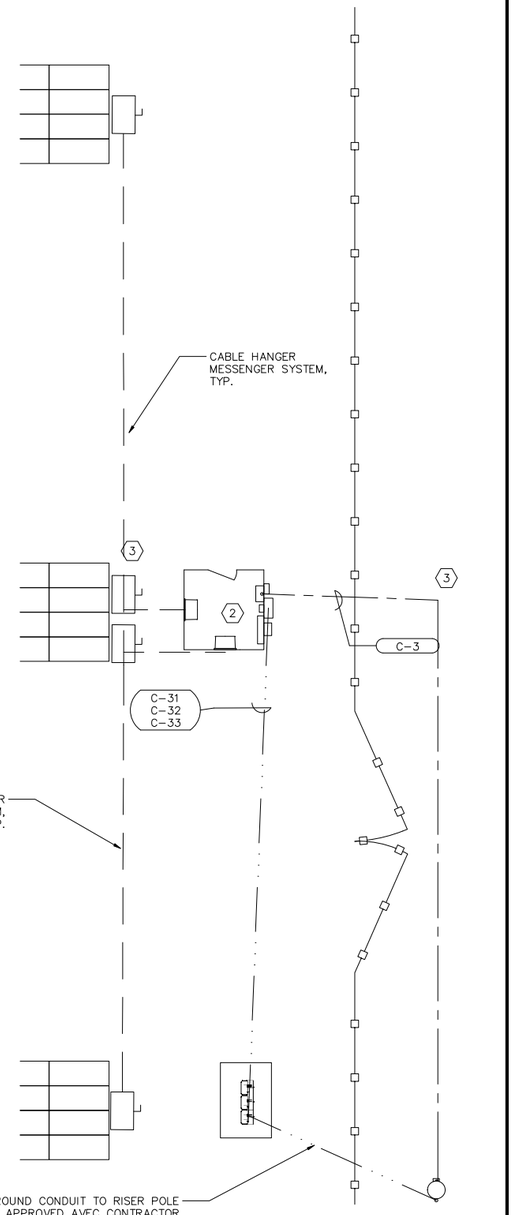
TYPICAL COMBINER BOX DETAIL NOTES:
1. ENSURE THAT CABLES ROUTED FROM HANGING SYSTEM TO COMBINER BOXES DO NOT EXCEED CONDUCTOR BENDING RADIUS
2. INSTALL CABLE HANGING SYSTEM ACCORDING TO MANUFACTURERS INSTALLATION INSTRUCTIONS
3. CONTRACTOR TO DETERMINE MOST SUITABLE MOUNTING SOLUTION FOR OVERHEAD CABLE MANAGEMENT SYSTEM
4. SUPPORT DC CABLES EXITING THE DC COMBINER BOX WITH A UV RESISTANT, OUTDOOR RATED CABLE TIE CONNECTED TO A HORIZONTAL STRUT. INSTALL CLOSEST CABLE SUPPORT A DISTANCE OF NO MORE THAN 12" AWAY FROM THE COMBINER BOX, AS MEASURED BY THE CABLE PATH. SUPPORT HOME–RUNS EVERY 12" UNTIL SUPPORTED BY CABLE HANGER MESSENGER SYSTEM. SUPPORT STRINGS EVERY 12" UNTIL SUPPORTED BY UNDER–RACKING CABLE MANAGEMENT SYSTEM.
5. USE A LIQUID TIGHT CORD GRIP OR CABLE GLAND FOR HOME–RUNS AND STRINGS WHEN ENTERING COMBINER BOX.



3 TYPICAL HOME–RUN CABLE HANGER DETAIL
NTS

TYPICAL HOME–RUN CABLE HANGER DETAIL NOTES:
1. HOME–RUN CONDUCTORS OF DIFFERENT CIRCUITS TO BE ROUTED IN SEPARATE CHANNELS IN CABLE HANGER MESSENGER SYSTEM. THE +VE AND –VE CONDUCTORS OF A SINGLE HOME–RUN CIRCUIT MAY BE ROUTED IN THE SAME CHANNEL.
2. INSTALL CABLE HANGERS IN REGULAR INTERVALS AS DIRECTED BY MANUFACTURERS INSTALLATION INSTRUCTIONS, OR, A DISTANCE OF NO MORE THAN 5' APART FROM EACH OTHER.
3. IF HOME–RUNS AND STRINGS ARE ROUTED IN THE SAME CABLE HANGER MESSENGER SYSTEM, SEPARATE HOME–RUNS AND STRINGS IN SEPARATE CHANNELS.

LEGEND	
	DC COMBINER BOXES (4)
— — — —	CABLE HANGER MESSENGER
— · · · —	UG POWER CABLE
— — — —	UG COMM CABLE
○	CONDUIT STUB–UP AREA
	PV ARRAY



4 TYPICAL HOME RUN CABLE LAYOUT DETAIL
NTS

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24–0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 95% REVIEW	MED/04–29–2025	JRV/04–29–2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10–11–2025	MED/10–11–2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE MINTO RENEWABLE ENERGY RACEWAY DETAILS

mnre–ss–2000_2.dwg

REF DWG(S):

DRAWING NO.: MNRE–SS–2000

SHEET 2 OF 5

4.5"

MANUAL DISCONNECT FOR PARALLEL GENERATION

3/8 MIN. TEXT

3" (RED BACKGROUND)

LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECT. LABEL TO BE ENGRAVED PLASTIC.
(1) TOTAL

NOTICE

PHOTOVOLTAIC SYSTEM GENERATION METER

LABEL TO BE LOCATED ON THE PV SYSTEM GENERATION METER.
(1) TOTAL

NEC 2023 690.13(B), 690.54

NOTICE

PHOTOVOLTAIC SYSTEM AC DISCONNECT AND POWER SOURCE

RATED OUTPUT CURRENT: 302A

NOMINAL OPERATING VOLTAGE: 480VAC

LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECT. (1) TOTAL

NEC 2023 705.12(B)(3)(3)

⚠ *WARNING*

THIS EQUIPMENT FED BY MULTIPLE SOURCES

TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR.

PERMANENT WARNING LABEL SHALL BE APPLIED TO DISTRIBUTION EQUIPMENT WHERE THE PV SYSTEM INTERCONNECTS. (1) TOTAL

NEC 2023 690.7(D)

MAXIMUM DC VOLTAGE OF PV SYSTEM

MAXIMUM VOLTAGE: 1069VDC

LABEL TO BE LOCATED ON COVER OF DC DISCONNECTING MEANS. (4) TOTAL

NEC 2023 690.31(D)(2)

WARNING: PHOTOVOLTAIC POWER SOURCE

3/8 MIN.

RED BACKGROUND

LABEL SHALL BE LOCATED ON ALL EXPOSED RACEWAYS, CABLE TRAYS, OTHER WIRING METHODS, COVERS OR ENCLOSURES OF PULL BOXES AND JUNCTION BOXES AND ON CONDUIT BODIES IN WHICH ANY OF THE AVAILABLE CONDUIT OPENINGS ARE UNUSED. LABEL SHALL BE REFLECTIVE, AND ALL LETTERS CAPITALIZED AND SHALL BE MINIMUM HEIGHT OF 3/8" IN WHITE ON A RED BACKGROUND. SPACING BETWEEN LABELS OR MARKINGS, OR BETWEEN A LABEL AND MARKING, SHALL NOT BE MORE THAN 10FT.

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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Consulting Engineers
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FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

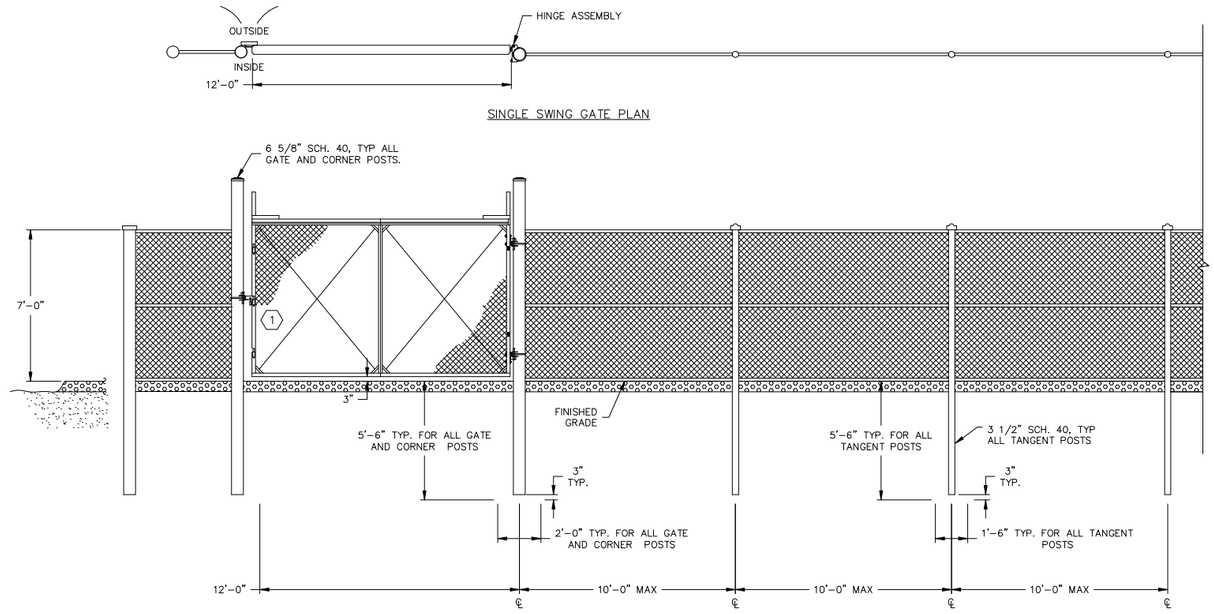
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
EQUIPMENT SAFETY LABEL SCHEDULE

mnre-ss-2000_3.dwg

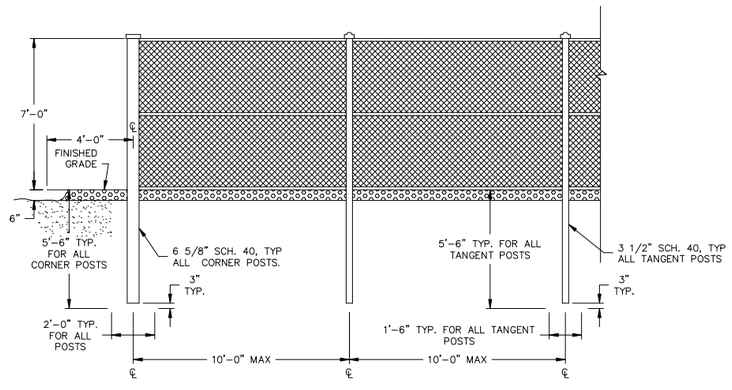
REF DWG(S):

DRAWING NO.: MNRE-SS-2000



SINGLE SWING GATE PLAN

1 FENCE DOUBLE GATE ELEVATION



2 CORNER/TERMINAL FENCE POST ELEVATION

NOTES:

1. PROVIDE DUAL CUSTODY PADLOCK ON ENTRY GATE TO ALLOW BOTH AVEC, AND LOCAL UTILITY TO ENTER INDEPENDANTLY

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
ISSUED FOR PV CONSTRUCTION BID		GGL/10-11-2025	MED/10-11-2025

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Consulting Engineers
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FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
SITE FENCING
DETAILS
mnre-ss-2000_4.dwg

REF DWG(S):

DRAWING NO.: MNRE-SS-2000

NAMEPLATE NUMBER	QTY	LINE 1 TEXT	LINE 2 TEXT	LINE 3 TEXT	NAMEPLATE SIZE HEIGHT x WIDTH (IN)	TEXT HEIGHT (IN)
N100	1	INVERTER 1			2 x 4	3/8
N101	1	INVERTER 2			2 x 4	3/8
N102	1	DC COMBINER	BOX 1		2 x 4	3/8
N103	1	DC COMBINER	BOX 2		2 x 4	3/8
N104	1	DC COMBINER	BOX 3		2 x 4	3/8
N105	1	DC COMBINER	BOX 4		2 x 4	3/8
N106	1	COMMUNICATIONS	PANEL		2 x 4	3/8
N107	1	200A	MAIN AC PANEL		2 x 4	3/8
N108	1	CB 1			1 x 3	1/8
N109	1	CB 2			1 x 3	1/8
N110	1	CB SS			1 x 3	1/8
N111	1	MCB			1 x 3	1/8
N112	1	120V STATION SERVICE PANEL			2 x 4	3/8
N113	1	DATA MANAGER			2 x 4	3/8
N114	1	METER PANEL			2 x 4	3/8
N115	1	POWER DISTRIBUTION	PANELBOARD		2 x 4	3/8
N116	1	CT ENCLOSURE			2 x 4	3/8
N117	1	METER ENCLOSURE			2 x 4	3/8

NOTES:

1) ALL NAMEPLATES SHALL BE 1/16" THICK MINIMUM PLASTIC.
2) ALL NAMEPLATES SHALL HAVE EXTERIOR RATED HIGH-TACK ADHESIVE.
3) ALL NAMEPLATES SHALL BE BLACK SURFACE WTH WHITE TEXT.
4) ALL TEXT SHALL BE "ARIAL BOLD" FONT.
5) EACH LINE OF TEXT SHALL BE CENTERED ON THE NAMEPLATE.
6) ALL TEXT SHALL BE UPPER CASE.
7) ALL DIMENSIONS SHOWN IN INCHES.

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
0	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

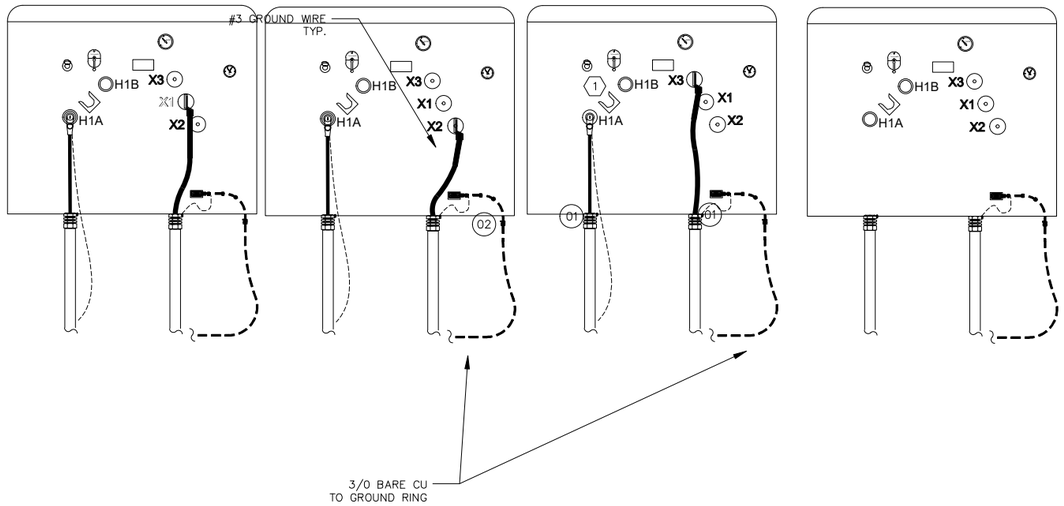
DRAWING NAME:
TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
EQUIPMENT NAMEPLATE SCHEDULE

mnre-ss-2000_5.dwg

REF DWG(S):

DRAWING NO.: MNRE-SS-2000

SHEET 5 OF 5



BILL OF MATERIAL

REF. NO.	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	–	CABLE LUG, NEMA 2–HOLE, 4/0 AWG CU	BURNDY/YA282N
02	–	CONNECTOR, COMPRESSION, 4/0 CU TO #6–#2 CU	BURNDY/YGHC29C26
03			
04			
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29			
30			

NOTES:

(1) LIFT X0 BUSHING BOND JUMPER AND ISOLATE ALL X0 CONNECTIONS FROM ANY GROUNDING AT THE UTILITY SERVICE POLE.

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
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ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
TRANSFORMER DETAILS

mnre-ss-2000_6.dwg

REF DWG(S):

DRAWING NO.: MNRE-SS-2000

SHEET 6 OF 6

Circuit Information																				
Destination Inverter No.	Destination Disconnect Switch No.	Source Circuit No.	Modules (#)	Open Circuit Voltage (VOC)	Maximum Power Voltage (Vmp)	Short Circuit Current (Isc)	Continuous Current (1.25*Isc)	Irradiance Current (1.25*CC)	Mininum Fuse Size (A)	Selected Fuse Size (A)	Minimum Wire Ampacity (A)	Selected String Wire Size (CU 2KV PV Wire, 90°C, <2% Voltage Drop) (AWG)	Maximum Wire Distance (FT)	Voltage Drop (V)	Voltage Drop (%)	Circuit Information from	to	Continuous Current (A)	Minimum Wire Ampacity From Selected Device (A)	Selected Wire Size (AL 2KV PV Wire, 75°C, <2% Voltage Drop)(AWG)
1	1	1	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	10	0.56	0.05	DS1	INV1	109.30	110.00	#2
1	1	2	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	60	3.38	0.32	DS2	INV1	43.72	44.00	#8
1	1	3	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	105	5.92	0.55	DS3	INV2	65.58	66.00	#6
1	1	4	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82	DS4	INV2	109.30	110.00	#2
1	1	5	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	200	11.28	1.06					
1	2	1	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	10	0.56	0.05					
1	2	2	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	60	3.38	0.32			PANEL CHARACTERISTICS		
2	3	1	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	105	5.92	0.55			Voc (V)	52.58	
2	3	2	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82			Voc Coef. (%/°C)	−0.25	
2	3	3	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	200	11.28	1.06			Vmp (V)	44.64	
2	4	1	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	10	0.56	0.05			Pmax Coef. (%/°C)	−0.3	
2	4	2	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	60	3.38	0.32			SITE CHARACTERISTICS		
2	4	3	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	105	5.92	0.55			T_Amb Min (°C)	−31.6	
2	4	4	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82			T_Amb Max (°C)	26	
2	4	5	24	1440	1068.1	13.99	17.49	21.86	21.86	25	25	10	200	11.28	1.06					

NOTES:

1) TEMPERATURE CORRECTED OPEN CIRCUIT VOLTAGE CALCULATIONS ARE AS FOLLOWS: VOC = ((Voc * # MODULES) * (1 + ((T_AMB MIN − T_AMB MAX) * (VOC COEF.))

NOT FOR CONSTRUCTION

PROJECT: MINTO RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 24-0560

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/03-07-2025	JRV/03-07-2025
B	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE
MINTO RENEWABLE ENERGY
PV STRING CALCULATIONS

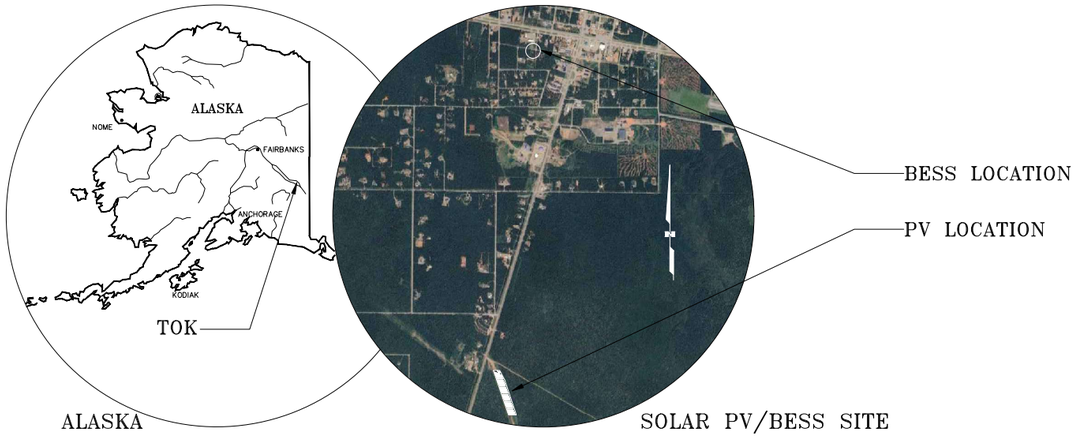
mnre-el-0700_1.dwg

REF DWG(S):

DRAWING NO.: MNRE-EL-0700

SHEET 1 OF 1

TANANA CHIEFS CONFERENCE
TOK PV/BESS DESIGN
EPS JOB NO. 25-0116 - ISSUED FOR PV CONSTRUCTION BID



ALASKA

SOLAR PV/BESS SITE

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182

DRAWING INDEX				
TITLE	DRAWING NUMBER	SHEET	REVISION	SCOPE OF WORK
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	TPBD-EL-0000	1	A	THE PROJECT SCOPE IS TO INSTALL A GRID-TIED SOLAR PHOTOVOLTAIC AND ~~BATTERY ENERGY STORAGE SYSTEM~~ IN TOK, AK. THE SYSTEM CONSISTS OF GROUND MOUNTED SOLAR ARRAYS AND 2 STRING INVERTERS MOUNTED INSIDE A CONTAINER. THE BATTERY MODULES AND INVERTER WILL BE HOUSED INSIDE A CONTAINER AND HAVE SELF-SERVING AUXILIARY LOADS. BOTH SYSTEMS WILL OPERATE IN PARALLEL WITH THE LOCAL UTILITY AND HAVE RELATED ELECTRICAL SAFETY AND METERING SYSTEMS. **SYSTEM SUMMARY** PV SYSTEM SIZE: 1.356MWdc, 999kWac ~~BESS SYSTEM SIZE: 1.5MW~~ INTERCONNECTION VOLTAGE:12.47kV, 3 PHASE, 4 WIRE
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	TPBD-EL-0000	2	A	
SITE LAYOUT - OVERALL	TPBD-EL-2500	1	C	
SITE LAYOUT - PV	TPBD-EL-2500	2	B	
~~SITE LAYOUT - BESS~~	~~TPBD-EL-2500~~	~~2~~	~~C~~	
SITE LAYOUT - POWER CONVERSION HUT	TPBD-EL-2500	4	A	
SITE LAYOUT - COMMUNICATIONS PANEL	TPBD-EL-2500	5	A	
ONE LINE DIAGRAM	TPBD-EL-0010	2	B	
THREE LINE DIAGRAM	TPBD-EL-0100	1	A	
PV ELECTRICAL SITE PLAN	TPBD-EL-3000	1	A	
PV ARRAY DC WIRING DIAGRAM	TPBD-EL-3000	2	A	
PV ARRAY DC WIRING DIAGRAM	TPBD-EL-3000	3	A	
PV ARRAY DC WIRING DIAGRAM	TPBD-EL-3000	4	A	
PV ARRAY DC WIRING DIAGRAM	TPBD-EL-3000	5	A	
EQUIPMENT/CABLE SCHEDULE	TPBD-EL-3000	6	A	
CONDUIT SCHEDULE	TPBD-EL-3000	7	A	
PV ARRAY GROUNDING PLAN	TPBD-SS-2000	1	A	
WIREWAY DETAILS	TPBD-SS-2000	2	A	
EQUIPMENT SAFETY LABEL SCHEDULE	TPBD-SS-2000	3	A	
FENCE DETAILS	TPBD-SS-2000	4	A	
EQUIPMENT NAMEPLATE SCHEDULE	TPBD-SS-2000	5	A	
TRANSFORMER DETAILS	TPBD-SS-2000	6	A	
PV STRING CALCULATIONS	TPBD-EL-0700	1	A	

BESS DRAWINGS NOT INCLUDED IN THIS DRAWING SET

GENERAL NOTES

ALL ELECTRICAL WORK TO BE INSTALLED BY A QUALIFIED AND LICENSED ELECTRICAL CONTRACTOR.

CONTRACTOR WILL FOLLOW IBC 2021 AND NFPA 70 NEC 2023 AS WELL AS ALL APPLICABLE LOCAL, STATE, MUNICIPAL AND CITY CODES, ORDINANCES AND REGULATIONS.

ALL MODULES AND INVERTERS SHALL BE UL LISTED 1703 & CEC APPROVED. ALL ELECTRICAL COMPONENTS AND MATERIALS SHALL BE LISTED FOR ITS PURPOSE AND INSTALLED IN A WORKMAN LIKE MANNER.

PRIOR TO INSTALLATION, THE CONTRACTOR SHALL UNDERSTAND ALL DRAWINGS AND PRODUCT MANUALS.

ALL DESIGN AND SPECIFICATIONS OF STRUCTURAL COMPONENTS ARE OUTSIDE THE SCOPE OF THESE PLANS.

PROJECT ENTITIES

OWNER: TANANA CHIEFS CONFERENCE

ENGINEER OF RECORD: ELECTRIC POWER SYSTEMS, INC.

ELECTRIC SERVICE PROVIDER: ALASKA VILLAGE ELECTRIC COOPERATIVE

NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE
TOK PV/BESS DESIGN
COVER SHEET AND INDEX

tpbd-pr-0001_1.dwg

REF DWG(S):

DRAWING NO.: TPBD-PR-0001

SHEET 1 OF 1

ELECTRICAL SPECIFICATIONS

GENERAL

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL A COMPLETE, TESTED, COMMISSIONED, AND SATISFACTORY ELECTRIC INSTALLATION IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS. THE INTENT OF THE DRAWINGS IS NOT TO SHOW OR LIST EVERY ITEM TO BE PROVIDED BY THE CONTRACTOR. IF AN ITEM IS NOT SHOWN OR LISTED THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE MISSING ITEMS TO ALLOW THE SYSTEM TO FUNCTION PROPERLY.

2. ALL DIMENSIONS AND LOCATIONS OF EXISTING CONDITIONS MUST BE VERIFIED PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES NOTED

3. ALL CONTRACTOR INITIATED CHANGES SHALL BE SUBMITTED IN WRITING TO THE ENGINEER OF RECORD FOR APPROVAL PRIOR TO ANY CHANGES IN THE FIELD.

4. EXACT LOCATION AND MOUNTING OF ALL EQUIPMENT SHALL BE VERIFIED IN THE FIELD.

5. THE CONTRACTOR SHALL READ AND UNDERSTAND ALL DRAWINGS AND EQUIPMENT MANUALS PRIOR TO INSTALLATION OR OPERATION OF EQUIPMENT. CONTRACTOR IS TO PROVIDE SKILLED LABOR FOR EACH TRADE WHOSE WORK RELATES TO THE DRAWINGS AND SPECIFICATIONS.

6. ALL OUTDOOR EQUIPMENT ENCLOSURES SHALL BE RATED NEMA 3R MINIMUM.

7. ALL THE EQUIPMENT SHOULD BE FREE FROM ANY DEBRIS, DAMAGED COMPONENTS AND ANY CONNECTION ISSUES.

8. THE CONTRACTOR SHALL KEEP ACCURATE RECORDS OF ALL DEVIATIONS IN WORK AS INSTALLED FROM WORK SPECIFIED ON THE DRAWINGS, OR IN THE SPECIFICATIONS, NOTING THE ORIGIN OF THE CHANGE.

9. SUFFICIENT ACCESS AND WORKING SPACE SHALL BE PROVIDED NEAR ELECTRICAL EQUIPMENT PER NEC ARTICLE 110.

10. CONTRACTOR SHALL PREPARE AN OPERATION AND MAINTENANCE MANUAL FOR ALL EQUIPMENT AND SYSTEMS INSTALLED.

11. CONDUIT JOINTS SHALL BE CUT SQUARE AND DE-BURRED UNTIL SMOOTH. BENDS SHALL BE MADE SO THAT THE CONDUIT IS NOT DAMAGED. THERE SHOULD NOT BE MORE THAN THE EQUIVALENT OF FOUR QUARTER-BENDS (360 DEGREES) BETWEEN PULL POINTS.

12. METALIC CONDUIT GROUNDS SHALL BE INSULATED AND SOLIDLY GROUNDED TO THE EGC SYSTEM. GROUNDS SHALL BE SIZED ACCORDING TO THE NEC.

13. CONDUCTORS SHALL BE COLOR-CODED, FACTORY OR FIELD APPLIED, WITH AN INDUSTRY STANDARD COLOR FOR EACH PHASE AND THE NEUTRAL.

RECORD DOCUMENTS

14. ON COMPLETION OF THE PROJECT, A COMPLETE SET OF MARKED-UP PRINTS SHOWING ANY DEVIATIONS SHALL BE DELIVERED TO THE ENGINEER OF RECORD. UNTIL THESE DRAWINGS ARE REVIEWED BY THE ENGINEER, THE CONTRACT SHALL REMAIN INCOMPLETE.

WIRING METHODS

15. EXPOSED PV WIRING SHALL BE PV WIRE TYPE, 90 DEGREE C, WET RATED AND UV RESISTANT.

16. PV SOURCE AND OUTPUT CIRCUIT CONDUCTORS SHALL BE RED FOR POSITIVE, BLACK FOR NEGATIVE, AND GREEN FOR GROUND. FIELD WIRING THAT IS NOT COLOR CODED SHALL BE MARKED AT BOTH ENDS SHOWING CIRCUIT POLARITY.

17. DC EQUIPMENT SHALL BE LISTED WITH A DC VOLTAGE GREATER THAN OR EQUAL TO THE MAXIMUM DC SYSTEM VOLTAGE.

18. INTERCONNECT WIRING AND POWER CONDUCTORS MUST BE IN ACCORDANCE WITH NEC NFPA 70. CONDUCTORS MUST CONFORM TO THE MINIMUM BEND RADIUS SPECIFIED IN THE SPECIFIC NEC ARTICLE. WIRE BUNDLES SHALL BE KEPT AWAY FROM SHARP EDGES TO AVOID DAMAGE TO WIRE INSULATION. CONDUCTORS SHALL BE COPPER RATED AT 90 DEGREES C UNLESS OTHERWISE NOTED IN THE DRAWINGS. FOR OUTDOOR INSTALLATIONS, CONDUITS AND FITTINGS SHALL BE PROPERLY NEMA RATED AS REQUIRED BY THE NEC.

19. CONNECTORS SHALL BE TORQUED PER DEVICE LISTING OR MANUFACTURER'S RECOMMENDATION.

20. AC WIRING SHALL BE COPPER RATED AT 90 DEGREES C, RATED 600VAC UNLESS OTHERWISE NOTED IN THE DRAWINGS.

21. PV SOURCE CIRCUITS IN FREE AIR SHALL BE PROPERLY SUPPORTED AND SEPARATED TO MAINTAIN AMPACITY RATINGS AND INSULATION INTEGRITY.

25. FIELD MADE CONNECTORS FOR PV QUICK CONNECTS SHALL BE THE SAME TYPE AND MANUFACTURER AS THE PV MODULES AND USE THE MANUFACTURER SPECIFIED CRIMPING TOOL.

GROUNDING

26. ONLY ONE CONNECTION TO DC CIRCUITS AND ONE CONNECTION TO AC CIRCUITS SHALL BE MADE FOR SYSTEM GROUNDING.

27. NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER EQUIPMENT GROUNDING TO ENSURE THE TERMINAL LUG IS PROPERTY BOLTED AND METAL-METAL CONTACT IS MADE. PAINT AND/OR FINISH AT THE POINT OF CONTACT IS TO BE REMOVED.

28. MODULES SHALL BE BONDED WITH EQUIPMENT GROUNDING CONDUCTORS BONDED TO A LOCATION APPROVED BY THE MANUFACTURER WITH A MEANS OF BONDING LISTED FOR THIS PURPOSE.

29. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, INCLUDING BUT NOT LIMITED TO GROUND RODS, GROUNDING LUGS, GROUNDING CLAMPS, ETC.

30. GROUNDING CONDUCTORS SHALL MEET THE FOLLOW SPECIFICATIONS:
 30.1. SOLID CONDUCTORS: ASTM B 3.
 30.2. STRANDED CONDUCTORS: ASTM B 8.
 30.3. TINNED CONDUCTORS: ASTM B 33.

31. GROUNDING BUS WHERE SPECIFIED SHALL BE RECTANGULAR BARS OF ANNEALED COPPER, CROSS SECTION SIZED FOR APPLICATION PER NEC, UNLESS OTHERWISE INDICATED; WITH INSULATORS.

32. GROUNDING CONDUCTORS SHALL BE ROUTED ALONG THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE. AVOID OBSTRUCTING ACCESS OR PLACING CONDUCTORS WHERE THEY MAY BE SUBJECTED TO STRAIN, IMPACT, OR DAMAGE.

33. INSTALL A GROUND CONDUCTOR LOOP AND GROUND RODS, ELECTRICALLY CONNECTED TO BUILDING STRUCTURE, GROUND RODS, AND EXTERIOR EQUIPMENT AS SHOWN ON DRAWINGS.

RACEWAYS

34. METAL CONDUIT AND TUBING SHALL MEET THE FOLLOWING STANDARDS:
 34.1. RIGID STEEL CONDUIT: ANSI C80.1.
 34.2. EMT: ANSI C80.3. (FOR INDOOR USE ONLY).
 34.3. LFMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.

35. FITTINGS FOR CONDUIT SHALL BE LISTED FOR TYPE AND SIZE RACEWAY WITH WHICH USED, AND FOR APPLICATION AND ENVIRONMENT IN WHICH INSTALLED.

36. COATED FITTINGS FOR PVC-COATED CONDUIT SHALL HAVE MINIMUM THICKNESS OF 0.040 INCHES WITH OVERLAPPING SLEEVES PROTECTING THREADED JOINTS.

37. NONMETALIC WIREWAY SHALL BE PROVIDED AS FIBERGLASS POLYESTER, EXTRUDED AND FABRICATED TO SIZE AND SHAPE INDICATED, WITH NO HOLES OR KNOCKOUTS. COVER IS GASKETED WITH OIL-RESISTANT GASKET MATERIAL AND FASTENED WITH CAPTIVE SCREWS TREATED FOR CORROSION RESISTANCE. CONNECTIONS ARE FLANGED, WITH STAINLESS-STEEL SCREWS AND OIL-RESISTANT GASKETS.

38. RACEWAYS FOR OPTICAL FIBER AND COMMUNICATIONS CIRCUITS SHALL BE INSTALLED AS FOLLOWS:
 38.1. 3/4-INCH TRADE SIZE AND SMALLER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 50 FEET.
 38.2. 1-INCH TRADE SIZE AND LARGER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 75 FEET.
 38.3. INSTALL WITH A MAXIMUM OF TWO 90-DEGREE BENDS OR EQUIVALENT FOR EACH LENGTH OF RACEWAY UNLESS DRAWINGS SHOW STRICTER REQUIREMENTS. SEPARATE LENGTHS WITH PULL OR JUNCTION BOXES OR TERMINATIONS AT DISTRIBUTION FRAMES OR CABINETS WHERE NECESSARY TO COMPLY WITH THESE REQUIREMENTS.

DISCONNECTING MEANS

39. MEANS SHALL BE PROVIDED TO DISCONNECT THE PV SYSTEM FROM WIRING SYSTEMS INCLUDING POWER SYSTEMS AND ENERGY STORAGE SYSTEMS.

40. PV DISCONNECTS SHALL NOT BE REQUIRED TO BE SUITABLE AS SERVICE EQUIPMENT AND SHALL BE RATED IN ACCORDANCE WITH ARTICLE 690 PART III: DISCONNECTING MEANS.

PANELBOARDS

41. CONTRACTOR SHALL PROVIDE THE FOLLOWING SUBMITTALS:

 41.1. EACH TYPE OF PANELBOARD, OVERCURRENT PROTECTIVE DEVICE, TRANSIENT VOLTAGE SUPPRESSION DEVICE, ACCESSORY, AND COMPONENT INDICATED. INCLUDE DIMENSIONS AND MANUFACTURERS' TECHNICAL DATA ON FEATURES, PERFORMANCE, ELECTRICAL CHARACTERISTICS, RATINGS, AND FINISHES.

 41.2. MANUFACTURER SEISMIC QUALIFICATION CERTIFICATION: SUBMIT CERTIFICATION THAT PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, ACCESSORIES, AND COMPONENTS WILL WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS" INCLUDE THE FOLLOWING:
  41.2.1. BASIS OF CERTIFICATION: INDICATE WHETHER WITHSTAND CERTIFICATION IS BASED ON ACTUAL TEST OF ASSEMBLED COMPONENTS OR ON CALCULATION.
  41.2.2. DIMENSIONED OUTLINE DRAWINGS OF EQUIPMENT UNIT: IDENTIFY CENTER OF GRAVITY AND LOCATE AND DESCRIBE MOUNTING AND ANCHORAGE PROVISIONS.
  41.2.3. DETAILED DESCRIPTION OF EQUIPMENT ANCHORAGE DEVICES ON WHICH THE CERTIFICATION IS BASED AND THEIR INSTALLATION REQUIREMENTS.

 41.3. FIELD QUALITY-CONTROL TEST REPORTS INCLUDING THE FOLLOWING:
  41.3.1. TEST PROCEDURES USED.
  41.3.2. TEST RESULTS THAT COMPLY WITH REQUIREMENTS.
  41.3.3. RESULTS OF FAILED TESTS AND CORRECTIVE ACTION TAKEN TO ACHIEVE TEST RESULTS THAT COMPLY WITH REQUIREMENTS.

 41.4. PANELBOARD SCHEDULES: FOR INSTALLATION IN PANELBOARDS. SUBMIT FINAL VERSIONS AFTER LOAD BALANCING.

 41.5. OPERATION AND MAINTENANCE DATA: FOR PANELBOARDS AND COMPONENTS TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS. IN ADDITION TO ITEMS SPECIFIED IN DIVISION 01 SECTION "OPERATION AND MAINTENANCE DATA," INCLUDE THE FOLLOWING:
  41.5.1. MANUFACTURER'S WRITTEN INSTRUCTIONS FOR TESTING AND ADJUSTING OVERCURRENT PROTECTIVE DEVICES.
  41.5.2. TIME-CURRENT CURVES, INCLUDING SELECTABLE RANGES FOR EACH TYPE OF OVERCURRENT PROTECTIVE DEVICE

42. CONTRACTOR SHALL MEET THE FOLLOWING QUALITY ASSURANCE STANDARDS:

 42.1. SOURCE LIMITATIONS: OBTAIN PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, COMPONENTS, AND ACCESSORIES THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER.
 42.2. PRODUCT OPTIONS: DRAWINGS INDICATE SIZE, PROFILES, AND DIMENSIONAL REQUIREMENTS OF PANELBOARDS AND ARE BASED ON THE SPECIFIC SYSTEM INDICATED. REFER TO DIVISION 01 SECTION "PRODUCT REQUIREMENTS."
 42.3. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
 42.4. COMPLY WITH NEMA PB 1.
 42.5. COMPLY WITH NFPA 70.

43. CONTRACTOR SHALL COORDINATE LAYOUT AND INSTALLATION OF PANELBOARDS AND COMPONENTS WITH OTHER CONSTRUCTION THAT PENETRATES WALLS OR IS SUPPORTED BY THEM, INCLUDING ELECTRICAL AND OTHER TYPES OF EQUIPMENT, RACEWAYS, PIPING, AND ENCUMBRANCES TO WORKSPACE CLEARANCE REQUIREMENTS.

44. CONTRACTOR SHALL PROVIDE PANELBOARD PRODUCTS THAT MEET THE FOLLOWING CRITERIA
 44.1. MANUFACTURER SHALL BE AS SHOWN ON DRAWINGS OR EQUAL.
 44.2. FABRICATE AND TEST PANELBOARDS ACCORDING TO IEEE 344 TO WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS."
 44.3. ENCLOSURES: SURFACE MOUNTED CABINETS. NEMA PB 1, TYPE 1.
  44.3.1. RATED FOR ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.
  44.3.2. OUTDOOR LOCATIONS: NEMA 250, TYPE 4X STAINLESS.
  44.3.3. OTHER WET OR DAMP INDOOR LOCATIONS: NEMA 250, TYPE 4X.
  44.3.4. FRONT: SECURED TO BOX WITH CONCEALED TRIM CLAMPS. FOR SURFACE-MOUNTED FRONTS, MATCH BOX DIMENSIONS; FOR FLUSH-MOUNTED FRONTS, OVERLAP BOX.
  44.3.5. FINISH: MANUFACTURER'S STANDARD ENAMEL FINISH OVER CORROSION-RESISTANT TREATMENT OR PRIMER COAT.
  44.3.6. DIRECTORY CARD: WITH TRANSPARENT PROTECTIVE COVER, MOUNTED IN METAL FRAME, INSIDE PANELBOARD DOOR

 44.4. PHASE AND GROUND BUSES:
  44.4.1. MATERIAL: HARD-DRAWN COPPER, 98 PERCENT CONDUCTIVITY.
  44.4.2. EQUIPMENT GROUND BUS: ADEQUATE FOR FEEDER AND BRANCH-CIRCUIT EQUIPMENT GROUND CONDUCTORS; BONDED TO BOX.

 44.5. CONDUCTOR CONNECTORS: SUITABLE FOR USE WITH CONDUCTOR MATERIAL.
  44.5.1. LUGS: MECHANICAL TYPE.

 44.6. SERVICE EQUIPMENT LABEL: UL LABELED FOR USE AS SERVICE EQUIPMENT FOR PANELBOARDS WITH MAIN SERVICE DISCONNECT SWITCHES.

 44.7. UL LABEL INDICATING SERIES-CONNECTED RATING WITH INTEGRAL OR REMOTE UPSTREAM OVERCURRENT PROTECTIVE DEVICES. INCLUDE SIZE AND TYPE OF UPSTREAM DEVICE ALLOWABLE, BRANCH DEVICES ALLOWABLE, AND UL SERIES-CONNECTED SHORT-CIRCUIT RATING.

45. CONTRACTOR SHALL PROVIDE OVERCURRENT PROTECTIVE DEVICES THAT MEET THE FOLLOWING CRITERIA:

 45.1. MOLDED-CASE CIRCUIT BREAKER: PROVIDE BREAKERS FROM PANELBOARD MANUFACTURER. UL 489, WITH SERIES-CONNECTED RATING TO MEET AVAILABLE FAULT CURRENTS

 45.2. THERMAL-MAGNETIC CIRCUIT BREAKERS: INVERSE TIME-CURRENT ELEMENT FOR LOW-LEVEL OVERLOADS, AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS. ADJUSTABLE MAGNETIC TRIP SETTING FOR CIRCUIT-BREAKER FRAME SIZES 250 A AND LARGER

 45.3. ADJUSTABLE INSTANTANEOUS-TRIP CIRCUIT BREAKERS: MAGNETIC TRIP ELEMENT WITH FRONT-MOUNTED, FIELD-ADJUSTABLE TRIP SETTING.

 45.4. ELECTRONIC TRIP-UNIT CIRCUIT BREAKERS SHALL HAVE RMS SENSING; FIELD-REPLACEABLE RATING PLUG; AND WITH THE FOLLOWING FIELD-ADJUSTABLE SETTINGS:
  45.4.1. INSTANTANEOUS TRIP.
  45.4.2. LONG- AND SHORT-TIME PICKUP LEVELS.
  45.4.3. LONG- AND SHORT-TIME TIME ADJUSTMENTS.
  45.4.4. GROUND-FAULT PICKUP LEVEL, TIME DELAY, AND I2/T RESPONSE.

 45.5. GFCI CIRCUIT BREAKERS: SINGLE- AND TWO-POLE CONFIGURATIONS WITH 5-MA WHERE INSTALLED PROTECTION OF GENERAL USE RECEPTACLES. WHERE REQUIRED, 30-MA TRIP SENSITIVITY FOR CIRCUITS INSTALLED TO SUPPLY SPECIFIC EQUIPMENT.

REQUIRED SAFETY SIGNS AND LABELS

1. THE MARKING SHALL ADEQUATELY WARN OF THE HAZARD USING EFFECTIVE WORDS AND/OR COLORS AND/OR SYMBOLS PER NEC 110.21.

2. THE LABEL SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN PER NEC 110.21.

3. THE LABEL SHALL BE OF SUFFICIENT DURABILITY ABLE TO WITHSTAND THE ENVIRONMENT INSTALLED IN PER NEC 110.21.

4. LABELS AND MARKINGS SHALL BE APPLIED TO THE APPROPRIATE COMPONENTS IN ACCORDANCE WITH THE NEC.

5. PV MODULES AND INVERTERS ARE TO BE SUPPLIED FROM THE MANUFACTURER WITH PRE-APPLIED MARKINGS TO MEET THE REQUIREMENTS OF NEC 690.51 & 690.41(B)(1).

6. UNLESS OTHERWISE SPECIFIED ON THE LABELING SHEET, OSHA 1910.145 AND ANSI Z535 RECOMMENDED SPECIFICATIONS ARE AS FOLLOWS:
 6.1. ROUNDED OR BLUNT CORNERS FREE OF SHARP EDGES.
 6.2. VISIBLE AT A MINIMUM DISTANCE OF 5FT. OR GREATER.
 6.3. "DANGER" HEADER; RED BACKGROUND WITH WHITE LETTERING.
 6.4. "WARNING" HEADER; ORANGE BACKGROUND WITH BLACK LETTERING.
 6.5. "CAUTION" HEADER; YELLOW BACKGROUND WITH BLACK LETTERING.
 6.6. "NOTICE" LABEL HEADER TO BE IN BLUE WITH WHITE LETTERING.
 6.7. OTHER TEXT TO BE BLACK ON A WHITE BACKGROUND.

7. ALL RELEVANT COMPONENTS OF THE PHOTOVOLTAIC SYSTEM SHALL BE CLEARLY MARKED AND LABELED IN ACCORDANCE WITH NEC ARTICLE 690.

NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

Electric Power Systems Inc
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS DESIGN
GENERAL INFORMATION AND SPECIFICATIONS
tpbd-el-0000_1.dwg

REF DWG(S):

DRAWING NO.: TPBD-EL-0000

STANDARD BLOCKS – ELECTRICAL

CABLE # → XX
EQUIPMENT → XX

CABLE TAG – WIRING DIAGRAMS & 3–LINES

STANDARD ABBREVIATIONS – ELECTRICAL

A	AMPERE
ACB	AIR CIRCUIT BREAKER
AB	AIR BREAK
ABV	ABOVE
AC	ALTERNATING CURRENT
ADJ	ADJUSTABLE
ADJT	ADJACENT
ALT	ALTERNATE
AL	ALUMINUM
APPRX	APPROXIMATE
B	BUS
BF	BREAKER FAIL
BFI	BREAKER FAIL INITIATE
BKR	BREAKER
BLDG	BUILDING
BLK	BLOCK
BOT	BOTTOM
BTU	BRITISH THERMAL UNIT
BTWN	BETWEEN
BU	BACKUP
C	COLOUMB
CAP	CAPACITOR OR CAPACITANCE
CAP	CORRUGATED ALUMINUM PIPE
CB	CENTER BREAK
CBL	CABLE
CEM	CEMENT
CF	CUBIC FOOT
CHK	CHECK
CI	CAST IRON
CIP	CAST IRON PIPE
CIPC	CAST–IN–PLACE CONCRETE
CIR	CIRCLE
CKT	CIRCUIT
CLK	CLOCK
CLS	CLOSE
CMIL	CIRCULAR MIL
CMP	CORRUGATED METAL PIPE
COS	COSINE
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CS	
CSP	CORRUGATED STEEL PIPE
CT	CURRENT TRANSFORMER
CTRL	CONTROLSWITCHER OR CONTROL SWITCH
CTS	CLEAR TO SEND
CU	COPPER
DC	DIRECT CURRENT
DCD	DATA CARRIER DETECT
DCE	DATA COMMUNICATIONS EQUIPMENT
DDE	DOUBLE DEAD END
DE	DEAD END
DEM	DEMOLISH, DEMOLITION
DEMOB	DEMOBILIZE
DET	DETAIL
DFR	DISTURBANCE FAULT RECORDER
DI	DIGITAL INPUT
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIST	DISTRIBUTION
DNP	DISTRIBUTED NETWORK PROTOCOL
DO	DIGITAL OUTPUT
DSSS	D STREET SUBSTATION
DTE	DATA TERMINAL EQUIPMENT
DWG	DRAWING
EA	EACH
EIA	ELECTRONICS INDUSTRY ASSOCIATION
EJ	EXPANSION JOINT
EL	ELECTRICAL
ELEV	ELEVATION
ENCL	ENCLOSURE
EQ	EQUAL
EQUIP	EQUIPMENT
EST	ESTIMATE
EXIST	EXISTING
F	FARAD
F	FUSE
FREQ	FREQUENCY
FT	FEET
FT	FEED THROUGH
FUT	FUTURE
G	CONDUCTANCE OR GROUND
GA	GAUGE
GALV	GALVANIZED
GB	GROUND BUS
GCB	GAS CIRCUIT BREAKER
GEN	GENERATOR
GI	GALVANIZED IRON
GND	GROUND
GOAB	GANG OPERATED AIR–BREAK SWITCH
GRC	GALVANIZED RIGID CONDUIT
GRD	GRADE, GRADING
GRSC	GALVANIZED RIGID STEEL CONDUIT
H	HENERY
HDPE	HIGH–DENSITY POLYETHYLENE
HLO	HOT LINE ORDER
HORIZ	HORIZONTAL
HP	HORSEPOWER
HZ	HERTZ
IA	PHASE A CURRENT
IB	PHASE B CURRENT
IC	PHASE C CURRENT
ID	INSIDE DIAMETER
IN	INPUT
IN	INCH
IN	NEUTRAL CURRENT
INCL	INCLUDE(D), INCLUDING
IND	INDUSTRY
INT	INTERSECTION
INV	INVERT
IP	POLARIZING CURRENT
j	COMPLEX NUMBER
J	JOULE
JB	JUNCTION BOX
KA	KILOAMPRERE
KV	KILOVOLT
KW	KILOWATT
L	INDUCTANCE
L	LINE
L	LOAD
LB	LOAD BREAK
LGPP	LANDFILL GAS POWER PLANT
LT	LIGHT
M	METER(S)
MAT	MATERIAL
MAX	MAXIMUM
MFG	MANUFACTURER
MI	MILE
MIN	MINIMUM
MISC	MISCELLANEOUS
MM	MILLIMETER(S)
MO	MOTOR OPERATED (OR)
MOB	MOBILIZE
MTR	METER
MW	MEGAWATT
N	NEUTRAL
N	NEWTON
N	NORTH
NC	NORMALLY CLOSED
NCC	NORMALLY CLOSED CONTACT
N/C	NO CONNECTION
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOC	NORMALLY OPEN CONTACT
NS	SYNCHRONIZING NEUTRAL
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
OUT	OUTPUT
P	REAL POWER OR PRIMARY
PB	PUSH BUTTON
PF	POWER FACTOR
PLC	PROGRAMMABLE LOGIC CONTROLLER
PM	PAD–MOUNT TRANSFORMER
PSSS	PROVIDER SWITCHYARD
PT	POINT
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER
Q	REACTIVE POWER
R	RESISTANCE OR RESISTOR
RCLS	RECLOSE
RAD	RADIUS
RAD	RADIAN
RD	ROAD
RE	REMOTE END
REF	REFERENCE
REQD	REQUIRED
RET	REMOTE END TRIP
RET	RETURN
REV	REVISION
RLY	RELAY
RR	RAILROAD
ROW	RIGHT OF WAY
RTS	READY TO SEND
RTU	REMOTE TERMINAL UNIT
RX	RECEIVE
S	APPARENT POWER
S	SOUTH
S	SOURCE
S–L	SOURCE–LOAD
SA	SURGE ARRESTOR
SC	SWITCH CABINET
SEC	SECTION
SEC	SECONDARY
SVC	SERVICE
SVC	STATIC VAR COMPENSATOR
SHT	SHEET
SIM	SIMILAR
SIN	SINE
SPEC	SPECIFICATION
SPECS	SPECIFICATIONS
SPSS	SPARTAN SUBSTATION
SS	SYNCHRONIZING SWITCH
STA	STATION
STD	STANDARD
SW	SWITCH
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
SYNCH	SYNCHRONIZE
T	TIME OR TRANSFORMER
TAN	TANGENT
TCM	TRIP COIL MONITOR
TEL	TELEPHONE
TERM	TERMINAL
TEMP	TEMPORARY
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
TRP	TRIP
TURB	TURBINE
TX	TRANSMIT
TYP	TYPICAL
UG	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
V	VOLT
VA	VOLTAMPERE
VA	PHASE A VOLTAGE
VAR	REACTIVE POWER
VB	PHASE B VOLTAGE
VAC	ALTERNATING CURRENT VOLTAGE
VC	PHASE C VOLTAGE
VCB	VACUUM CIRCUIT BREAKER
VDC	DIRECT CURRENT VOLTAGE
VERT	VERTICAL
VIF	VERIFY IN FIELD
VN	NEUTRAL VOLTAGE
VR	VOLTAGE REGULATOR
VREG	VOLTAGE REGULATOR
VS	SYNCHRONIZING VOLTAGE
VT	VOLTAGE TRANSFORMER
W	WEST
W	WATT
W/	WITH
W/O	WITHOUT
X	REACTANCE
XFMR	TRANSFORMER
XMSSN	TRANSMISSION
Y	ADMITTANCE
YL	YELLOW
Z	IMPEDANCE
2	TIME–DELAY
21	DISTANCE
25	SYNCHRONISM CHECK
27	UNDERVOLTAGE
30	ANNUNCIATOR
32	DIRECTIONAL POWER
37	UNDERCURRENT OR UNDERPOWER
38	BEARING
40	FIELD
43	MANUAL TRANSFER OR SELECTOR DEVICE
46	REVERSE–PHASE
47	PHASE–SEQUENCE VOLTAGE
49	MACHINE OR TRANSFORMER THERMAL RELAY
50	INSTANTANEOUS OVERCURRENT
51	AC TIME OVERCURRENT
52	AC CIRCUIT BREAKER
52a	NORMALLY OPEN BREAKER CONTACT
52b	NORMALLY CLOSED BREAKER CONTACT
59	OVERVOLTAGE
60	VOLTAGE BALANCE
63	PRESSURE SWITCH
64	APPARATUS GROUND
67	AC DIRECTIONAL OVERCURRENT
68	BLOCKING
69	PERMISSIVE
71	LEVEL SWITCH
74	ALARM
76	DC OVERCURRENT
78	OUT–OF–STEP
79	RECLOSING RELAY
81	FREQUENCY
85	CARRIER OR PILOT WIRE
86	LOCK OUT
87	DIFFERENTIAL
94	TRIPPING

NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25–0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10–13–2025	MED/10–13–2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS DESIGN
GENERAL INFORMATION AND SPECIFICATIONS

tpbd–el–0000_2.dwg

REF DWG(S):

DRAWING NO.: TPBD–EL–0000

SHEET 2 OF 2

1 OVERALL SITE LAYOUT
SCALE: 1"=932'

2 PV SITE LAYOUT
SCALE: 1"=100'

SEE REFERENCE 1 FOR FURTHER DETAILS

SEE REFERENCE 2 FOR FURTHER DETAILS

BESS DRAWINGS NOT INCLUDED IN THIS DRAWING SET

NOT FOR CONSTRUCTION

SHEET NOTES

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE LOCATIONS OF EXISTING PROPERTY LINES AND CORNERS PRIOR TO CONSTRUCTION.
2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE ALL UNDERGROUND UTILITIES MARKED PRIOR TO CONSTRUCTION.
3. ALL DIMENSIONS ARE FOR REFERENCE ONLY. PLEASE REFER TO MANUFACTURERS DRAWINGS TO CONFIRM ALL DIMENSIONS.

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	GGL/03-24-2025	MED/04-01-2025
B	RE-ISSUED FOR 35% REVIEW	GGL/08-22-2025	MED/08-22-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	TPBD-EL-2500/2	PV ARRAY LAYOUT DIAGRAM
2	TPBD-EL-2500/3	BESS LAYOUT DIAGRAM

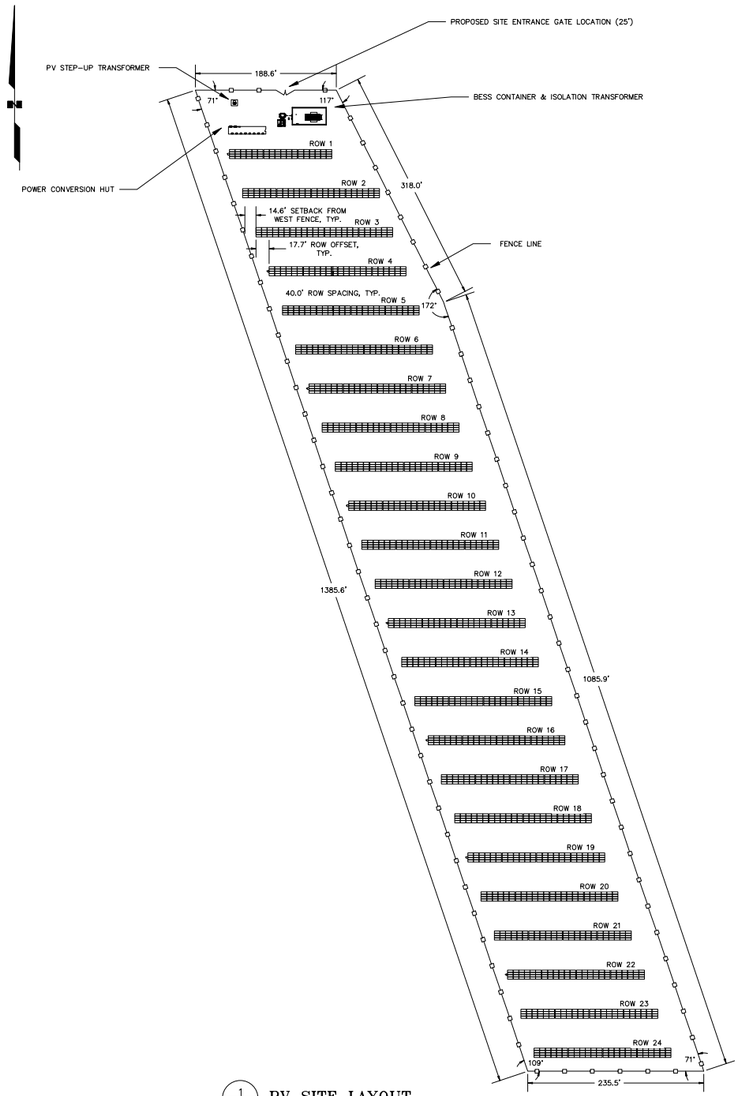
DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS DESIGN
SITE LAYOUT DIAGRAM

tpbd-el-2500_1.dwg

REF DWG(S):

DRAWING NO.: TPBD-EL-2500

SHEET 1 OF 5



1 PV SITE LAYOUT

SCALE: 1" = 64'-0"

LEGEND	
	FENCE LINE
	PV ARRAY
	SOLAR INVERTER

NOT FOR CONSTRUCTION

System Summary

Physical Arrangement	
Methodology	Fixed Tilt, Ground Mount
Tilt	35°
Azimuth	180°
Racking System / Model	Nuance Osprey PowerRACK
Electrical Arrangement	
Watts per Module	595W
Modules per String	24
Quantity of Strings	95
Quantity of Modules	2280
Total DC System Size	1,356,600W
Inverter Arrangement	
Manufacturer	SMA
Model	Sunny Highpower PEAK3 125-US
Inverter Size	125kW
Quantity of Inverters	8
PV Modules	
Manufacturer	SEG SOLAR
Model	SEG-595-BTA-BG
Peak Power	595W
Quantity of Modules	2280

PROJECT: **TOK PV/BESS DESIGN**

DESIGNER/PROJECT ENGINEER: **GRIFFIN LOGAN/MAX DONALDSON** JOB #: **25-0116**

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	GDL/03-24-2025	MBD/04-01-2025
B	ISSUED FOR PV CONSTRUCTION BID	GDL/09-30-2025	MBD/10-01-2025
C	ISSUED FOR PV CONSTRUCTION BID	GDL/10-13-2025	MBD/10-13-2025

ENG. STAMP

Electric Power Systems, Inc.
Consulting Engineers
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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

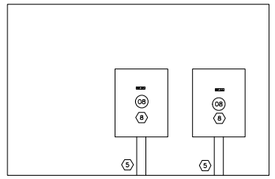
DRAWING TITLE:
TANANA CHIEFS CONFERENCE
TOK PV/BESS DESIGN
PV ARRAY SITE LAYOUT DIAGRAM

REF DWG(S):

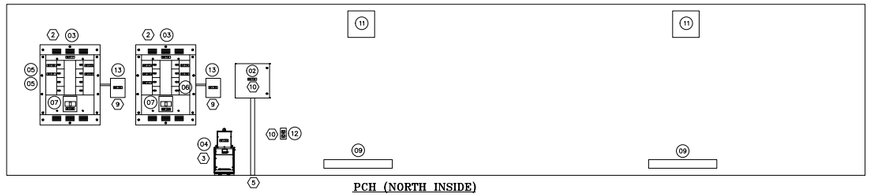
DRAWING NO.: TPBD-EL-2500

SHEET 2 OF 5

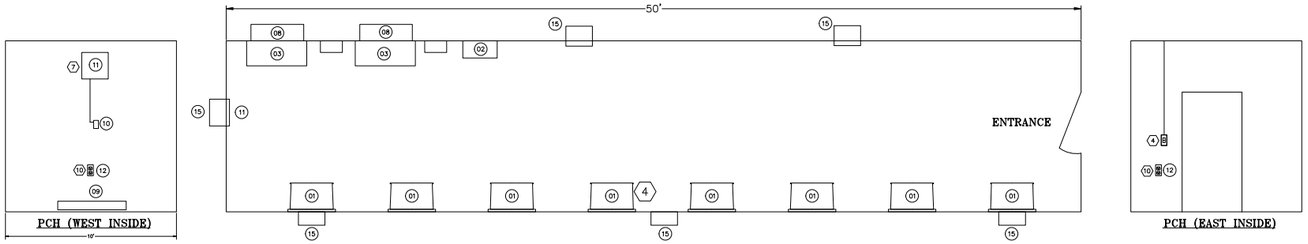
tpbd-el-2500_2.dwg

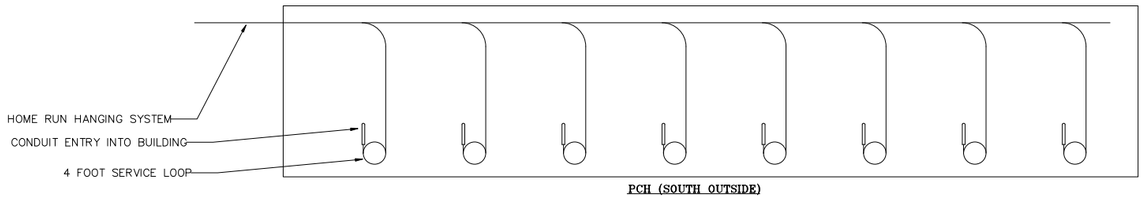


PCH (NORTH OUTSIDE)

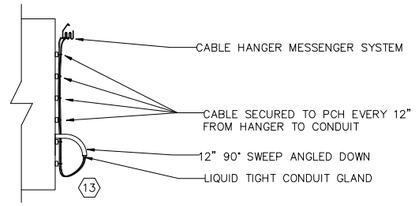


PCH (NORTH INSIDE)

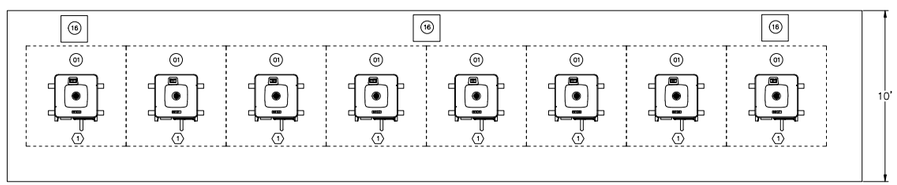




PCH (SOUTH OUTSIDE)



HOME-RUN ENTRY



PCH (SOUTH INSIDE)

BUILDING MANUFACTURER TO PROVIDE PRE-FABRICATED METAL BUILDING PER FOLLOWING SPECIFICATIONS:

STRUCTURAL:
- ROOF PITCH: 3:12
- ROOF DEAD LOAD 30PSF MINIMUM
- MAX WALL LOAD: 220LBS (INVERTER)
- MAX FLOOR LOAD: 210LBS (STATION SERVICE SUBSTATION)

INSULATION:
- WALL INSULATION: R22 MINIMUM
- CEILING INSULATION: R30 MINIMUM

ALL INTERIOR CONDUITS SHALL BE GALVANIZED RIGID CONDUIT (GRC) OR ELECTRICAL METALLIC TUBING (EMT). EXTERIOR CONDUIT SHALL BE RIGID GALVANIZED CONDUIT ONLY. EMT TYPE COUPLERS AND FITTINGS SHALL BE RAIN-TIGHT COMPRESSION TYPE. GROUNDING BUSHINGS SHALL BE INSTALLED AT THE SOURCE END OF THE EMT CONDUIT RUNS FROM THE AC PANEL.

1 POWER CONVERSION HUT LAYOUT

1:4 – 1" = 4'

4 0 4 8 FEET

NOT FOR CONSTRUCTION

BILL OF MATERIAL

REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	EA	8	SUNNY HIGHPOWER PEAK3-125KW	SMA/SHP 125-US-21
02	EA	1	COMMUNICATION PANEL	SEE REF. 1
03	EA	1	POWER DISTRIBUTION PANELBOARD W/ MAIN BREAKER, 800A, 600VAC, 10KAIC	SQUARED/HCP18688M
04	EA	1	STATION SERVICE SUBSTATION, 15kVA, 480VAC-120/240V	
05	EA	8	200A/3P CIRCUIT BREAKER	
06	EA	1	50A/2P CIRCUIT BREAKER	
07	EA	2	800A/3P MAIN CIRCUIT BREAKER	
08	EA	2	800A AC LOAD BREAK DISCONNECT W/ PROVISIONS FOR PADLOCK	
12 09	EA	3	ELECTRIC BASEBOARD HEATER, 1000W, 120VAC W/ BUILT-IN THERMOSTAT	
10	EA	1	ADJUSTABLE THERMOSTAT	
12 11	EA	3	WALL MOUNT SHUTTER FAN, >2500CFM, 120VAC W/ DAMPER MOTOR CONTROLLED BY THERMOSTAT	
12	EA	4	GFCI RECEPTACLE	
13	EA	2	SHARK 250 SELF-ENCLOSED METER ASSEMBLY	ELECTRO INDUSTRIES /ENCSHK250-277-60-10-V3-D2-INP100S-X
14	EA	1	LIGHT SWITCH	
7 15	EA	6	90° VENTILATION HOOD WITH INSECT SCREEN	
12 16	EA	3	10IN MOTORIZED INTAKE DAMPER	

NOTES:

1. MOUNT SMA SHP-125-US INVERTERS SUCH THAT THEY ARE 4" AWAY FROM THE WALL, AND 20" ON ALL OTHER SIDES FROM WALLS, FLOORS, CEILINGS, AND OTHER DEVICES. MAINTAIN 4' WORKING CLEARANCE ZONE IN FRONT OF INVERTERS, PER NEC. THE SUM OF CROSS-SECTIONAL AREAS OF ALL CONTAINED CONDUCTORS OR CABLES AT ANY CORSS SECTION OF THE NONMETALLIC WIREWAY SHALL NOT EXCEED 20 PERCENT OF THE INTERIOR CROSS-SECTIONAL ARE OR THE NONMETALLIC WIREWAY BETWEEN INVERTERS AND PANELBOARD
2. MOUNT POWER DISTRIBUTION PANELBOARDS SUCH THAT MANUFACTURER RECOMMENDED CLEARANCE DISTANCES BETWEEN THE PANELBOARDS AND WALLS, FLOORS, CEILINGS, AND OTHER DEVICES IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE IN FRONT OF THE PANELBOARD, PER NEC
3. MOUNT STATION SERVICE SUBSTATION SUCH THAT ALL MANUFACTURER RECOMMENDED CLEARANCE ZONES AWAY FROM EQUIPMENT IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE ZONE IN FRONT OF THE DEVICE, PER NEC
4. PROVIDE INTERIOR EMERGENCY BATTERY BACKUP LIGHTING, AS WELL AS NORMALLY SWITCHED MAIN LIGHTING, PER NFPA. PROVIDE CEILING MOUNTED LIGHTING SUCH THAT 30 FOOTCANDLES IS MAINTAINED. MOUNT LIGHT SWITCH NEXT TO DOOR AT LEAST 40" FROM FLOOR.
5. ROUTE CONDUITS SUCH THAT THE STUB-UP AREA IS DIRECTLY UNDER ALL DESTINATION DEVICES IN THE POWER CONVERSION HUT
6. ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN MAY BE CONTRACTOR DETERMINED, PROVIDED THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.
7. VENTILATION FOR THE ENCLOSURE SHALL BE PROVIDED BY WEATHERPROOF 120VAC EXHAUST FANS WITH A MINIMUM FLOW RATE OF 2500CFM EACH, CONTROLLED BY A SINGLE ADJUSTABLE THERMOSTAT, AND BY A 10" MOTORIZED INTAKE DAMPER. EXHAUST FAN AND INTAKE DAMPER SHALL BE PROVIDED WITH A 90° EXTERIOR HOOD WITH INSECT SCREENS TO PREVENT INTRUSIONS OF WIND DRIVEN RAIN/SNOW.
8. WHERE SINGLE CONDUCTOR CABLES COMPRISING EACH PHASE, NEUTRAL, OR GROUNDED CONDUCTOR OF AN AC CIRCUIT ARE CONNECTED IN PARALLEL AS PERMITTED IN NEC 310.10(H), THE CONDUCTORS SHALL BE INSTALLED IN GROUPS CONSISTING OF NOT MORE THAN ONE CONDUCTOR PER PHASE, NEUTRAL, OR GROUNDED CONDUCTOR IN WIREWAY OR CONDUIT. NEC 378.20
9. CONNECT SHARK 250 CURRENT TRANSFORMERS AND POTENTIAL TRANSFORMERS TO THE 800A OUTPUT BREAKER AT POWER DISTRIBUTION PANELBOARDS THROUGH A 1" CONDUIT.
10. MOUNT RECEPTACLES ON INSIDE WALLS OF PCH AT LEAST 18" FROM FLOOR. MOUNT ONE RECEPTACLE ON NORTH SIDE OF DOOR (EAST WALL), ONE RECEPTACLE NEXT TO THE COMMUNICATION PANEL (NORTH WALL), ONE RECEPTACLE ON WEST WALL, AND ONE RECEPTACLE INSIDE NEMA 1 COMMUNICATIONS PANEL (LINE ITEM 2, REF. NO. 1).
11. HEATING TO BE PROVIDED BY ELECTRIC BASEBOARD HEATERS WITH BUILT-IN THERMOSTATS. HEATERS TO TURN ON BELOW 10°F
12. PROVIDE HEATING AND COOLING SUCH THAT THE TEMPERATURE INSIDE THE PCH DOES NOT EXCEED 95°F, AND DOES NOT DROP BELOW 10°F. QUANTITIES AND DESCRIPTIONS OF LINE ITEMS 09, 11, AND 16 ARE FOR ILLUSTRATIVE PURPOSES ONLY. CONTRACTOR IS ABLE TO CHOOSE NEW PRODUCTS AND PRODUCT QUANTITIES FOR THESE LINE ITEMS, PROVIDED THAT THE MINIMUM SPECIFICATIONS AS NOTED IN THE 'DESCRIPTION' COLUMN IS MAINTAINED.
13. HOME-RUN CABLES TO ENTER INTO PCH VIA CONDUIT SWEEP ANGLED DOWN. MIN CONDUIT RADIUS TO BE 8 X THE DIAMETER OF THE LARGEST CABLE. SUPPORT CABLES EVERY 12"AS MEASURED BY THE CABLES PATH FROM HANGER, TO CONDUIT WITH UV RESISTANT, OUTDOOR RATED CABLE TIES. ADD IN A 4FT SERVICE LOOP BEFORE ENTERING INTO THE CONDUIT. EXACT HEIGHT AND PLACEMENT OF CONDUIT TO BE DETERMINED BY CONTRACTOR ON-SITE.

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

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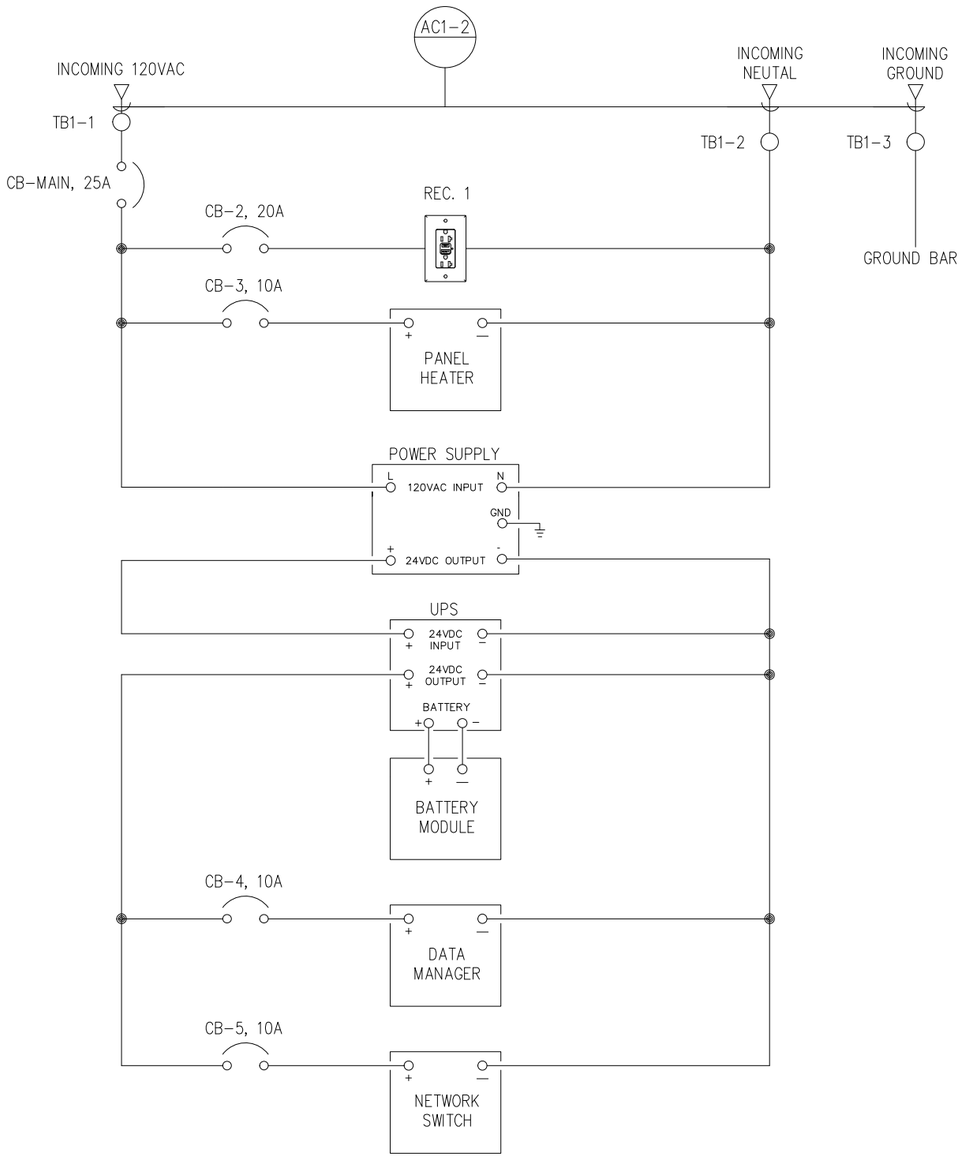
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	TPBD-EL-2500/5	COMMUNICATIONS PANEL ELEVATION DRAWING
2	TPBD-SS-2000/5	EQUIPMENT NAMEPLATE SCHEDULE

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
PCH LAYOUT
tpbd-el-2500_5.dwg

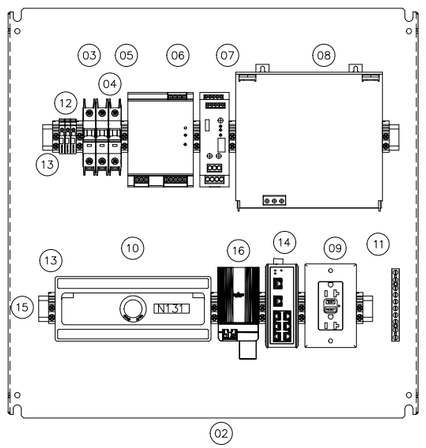
REF DWG(S):

DRAWING NO.: TPBD-EL-2500

SHEET 5 OF 8



1 ONE-LINE DIAGRAM



2 PANEL ELEVATION – INSIDE

1:4 – 1" = 4"

1

BILL OF MATERIAL

REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	EA	1	24" X 24" X 10" NEMA 1 MILD STEEL WALL MOUNTED ENCLOSURE	
02	EA	1	INNER PANEL FOR 24X24X10 ENCLOSURE	
03	EA	1	25A, 600V UL489 1-POLE BREAKER	
04	EA	1	20A, 600V UL489 1-POLE BREAKER	
05	EA	3	10A, 600V UL489 1-POLE BREAKER	
06	EA	1	PHOENIX CONTACT 120VAC/24VDC PS, 20 AMP	PHOENIX CONTACT/ 2866776
07	EA	1	PHOENIX CONTACT 20 AMP UPS	PHOENIX CONTACT/ 2320238
08	EA	1	PHOENIX CONTACT 12 Ah BATTERY	PHOENIX CONTACT/ 1274119
09	EA	1	RECEPTACLE, 125V, 20A, DUPLEX, GCI	
10	EA	1	DATA MANAGER	SMA/EDMM-20
11	EA	1	UL 467 GROUND BAR, 6 POLE MINIMUM	
12	EA	3	6MM DINRAIL MOUNTED TERMINAL BLOCK	
13	EA	9	6MM DINRAIL MOUNTED TERMINAL BLOCK END STOP	
14	EA	1	UNMANAGED ETHERNET SWITCH, 2 FIBER PORTS	MOXA/EDS-308-SS-SC-80
15	EA	1	35MM DIN MOUNTING RAIL	
16	EA	1	150W PANEL HEATER W/BUILT IN REGULATION ON: 41°F – OFF: 59°	STEGO/06021.0-00

NOTES:

1 ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN CAN BE CONTRACTOR DETERMINED, PROVIDED THAT THE CONTRACTOR DETERMINED PRODUCT MATCHES THE PRODUCT DESCRIPTION IN THE CENTER COLUMN, AND THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.

3 PANEL BOM

NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

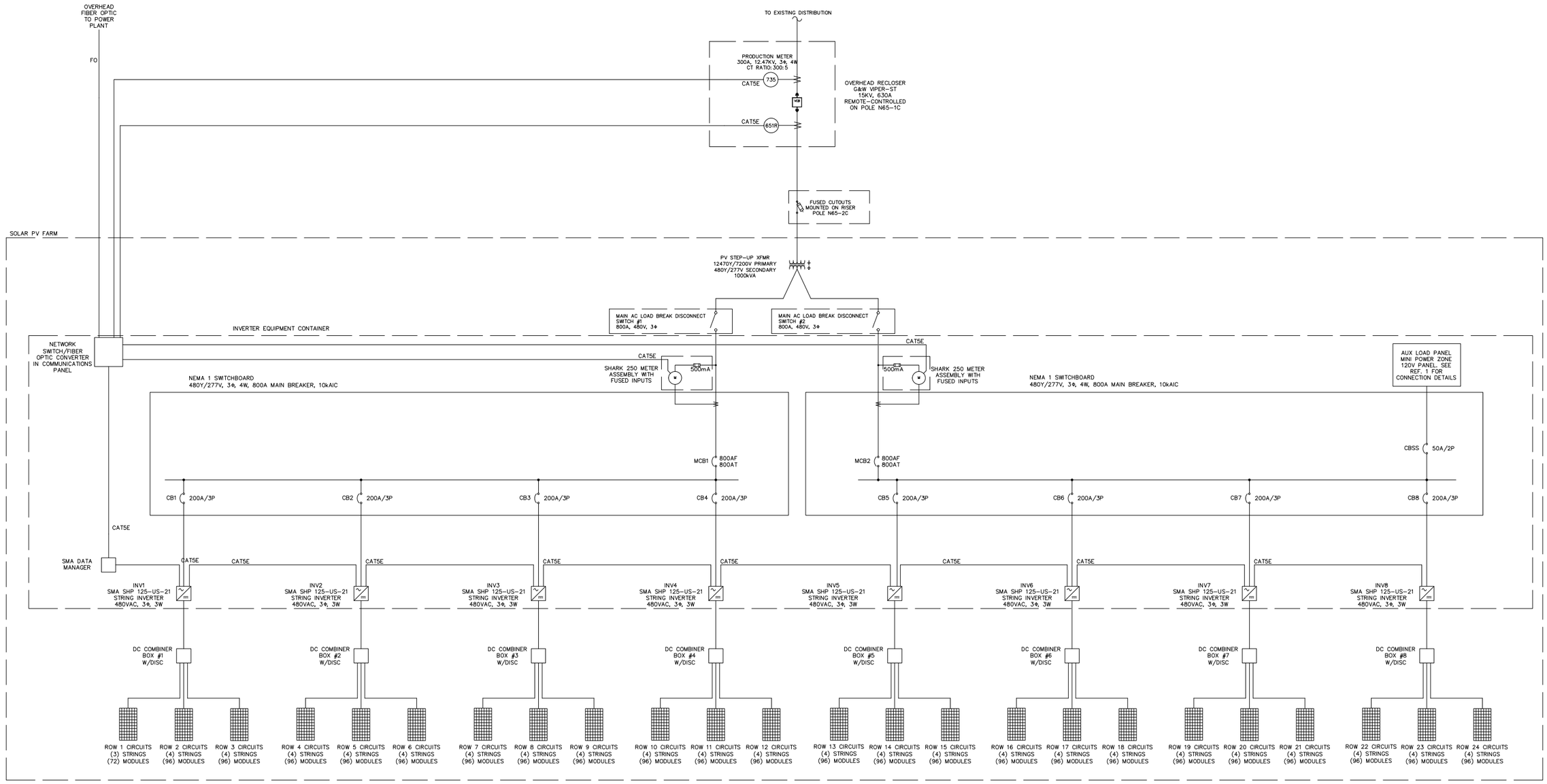
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	TPBD-SS-2000/5	EQUIPMENT NAMEPLATE SCHEDULE

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
COMMUNICATIONS PANEL
PANEL ELEVATION DRAWING
tpbd-el-2500_6.dwg

REF DWG(S):

DRAWING NO.: TPBD-EL-2500

SHEET 6 OF 8



NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	GGL/07-23-2025	MED/07-23-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

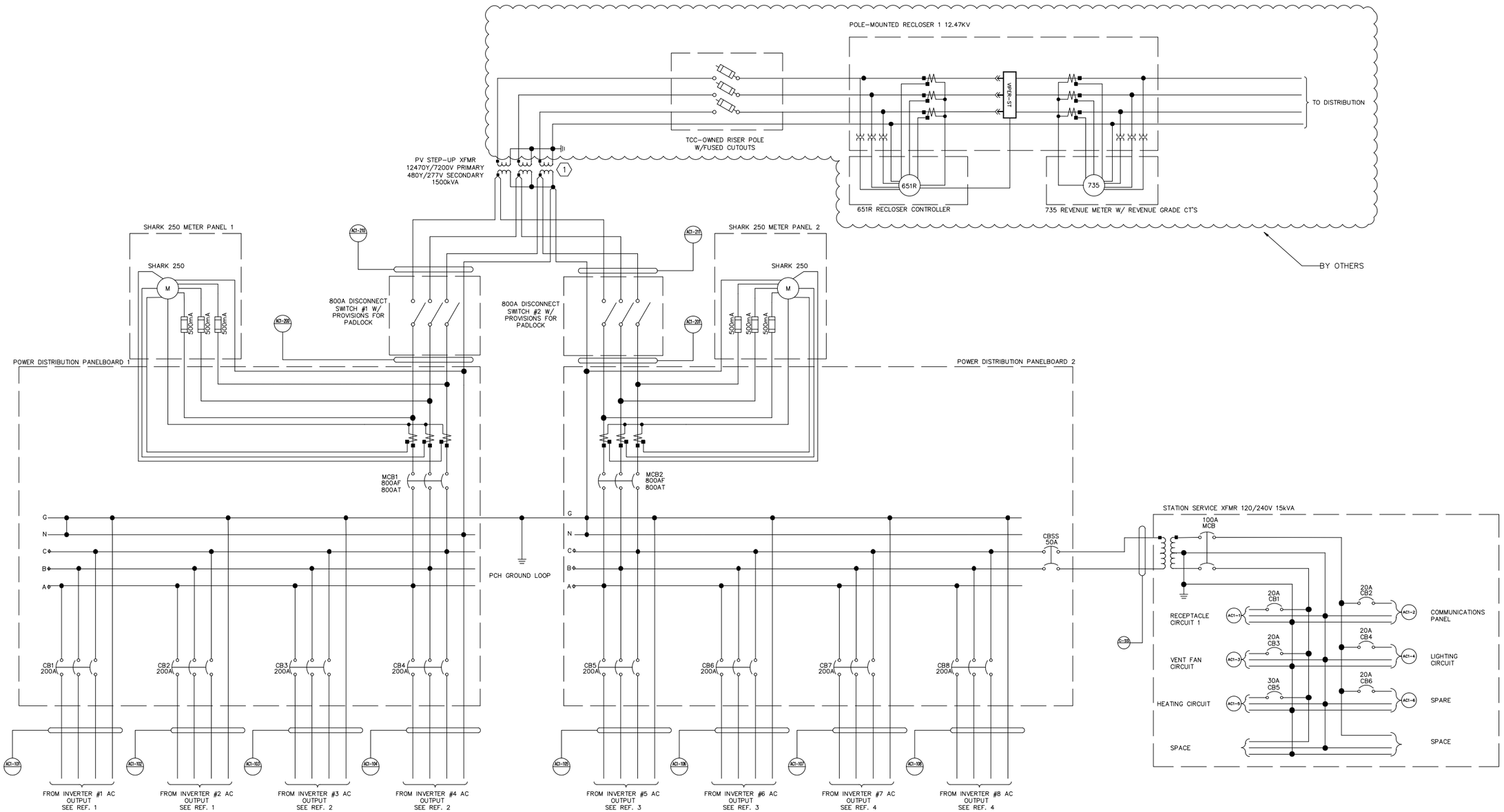
DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS DESIGN
1.4MW PV, 1.5MWH BESS SYSTEM
ONELINE DIAGRAM

tpbd-el-0010_1.dwg

REF DWG(S):

DRAWING NO.: TPBD-EL-0010

SHEET 1 OF 1



NOTES:

1. LIFT XO BUSHING BOND JUMPER AND ISOLATE ALL XO CONNECTIONS FROM ANY GROUNDING AT THE UTILITY SERVICE POLE. GROUND SECONDARY OF TRANSFORMER AT PCH GROUND LOOP

NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	FYRE-EL-3000/1	PV ARRAY 1-2 WIRING DIAGRAM
2	FYRE-EL-3000/1	PV ARRAY 3-4 WIRING DIAGRAM
3	FYRE-EL-3000/1	PV ARRAY 5-6 WIRING DIAGRAM
4	FYRE-EL-3000/1	PV ARRAY 7-8 WIRING DIAGRAM

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS DESIGN
1.4MW PV
THREELINE DIAGRAM

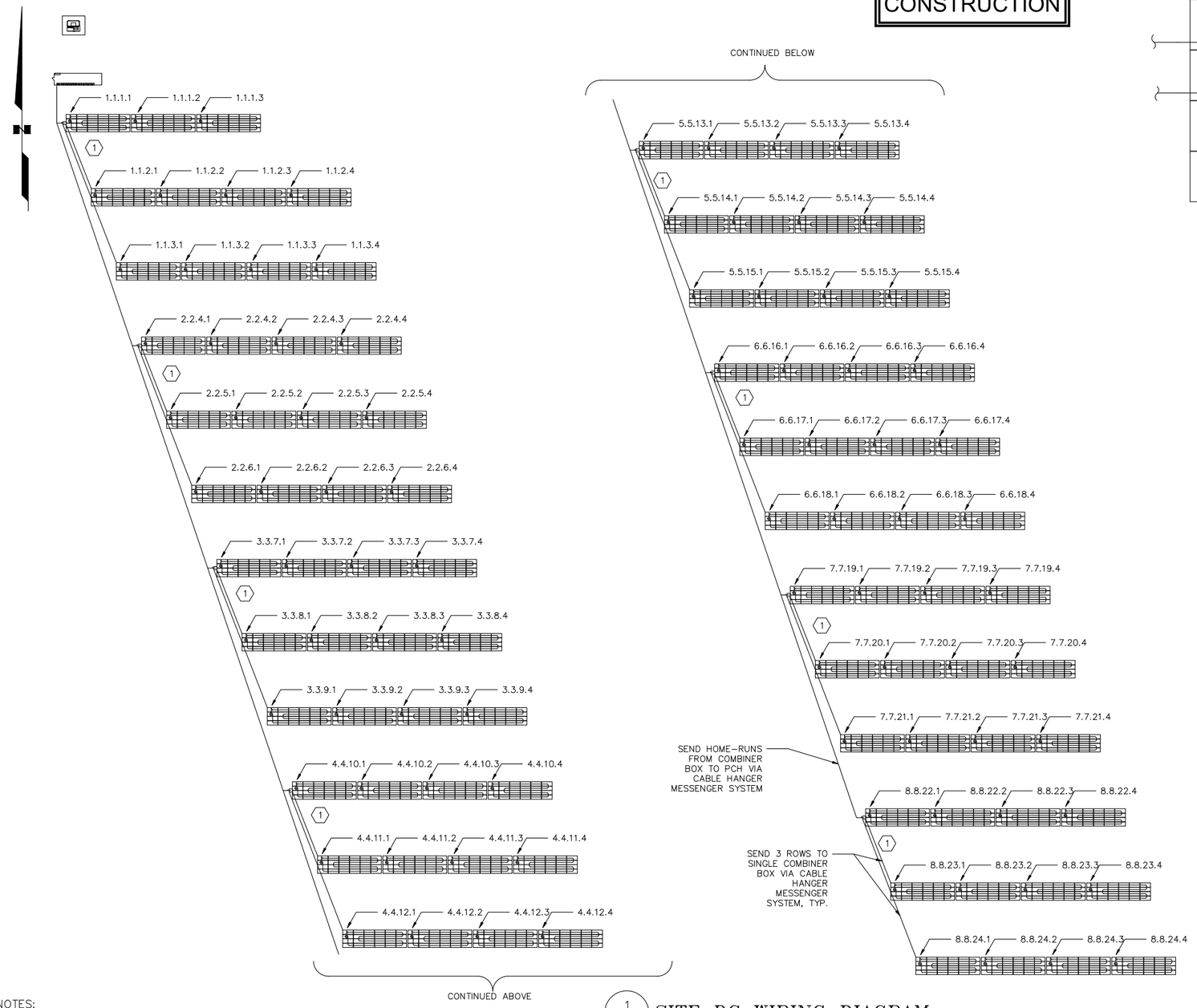
tpbd-el-0100_1.dwg

REF DWG(S):

DRAWING NO.: TPBD-EL-0100

SHEET 1 OF 1

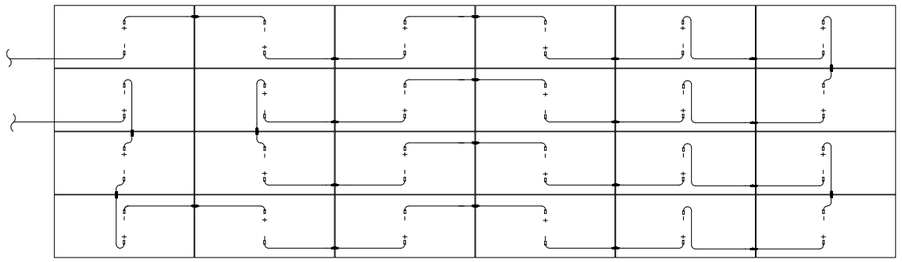
NOT FOR CONSTRUCTION



NOTES:

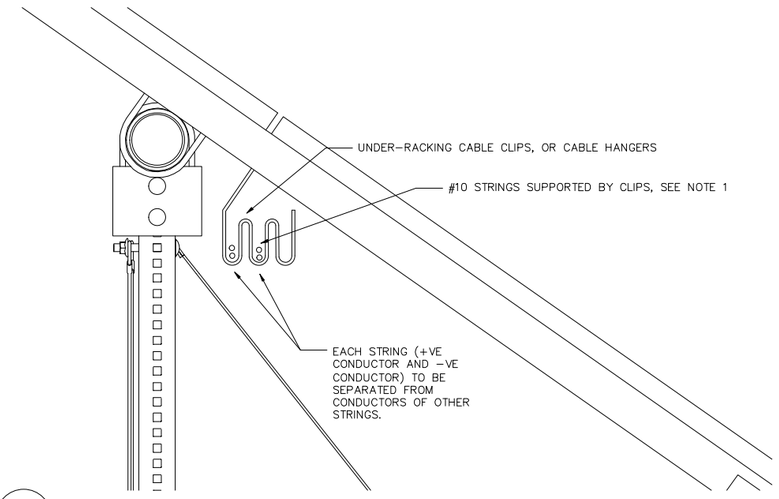
(1) STRINGS AND HOME-RUNS TO BE ROUTED IN SAME CABLE HANGER MESSENGER SYSTEM. ROUTING SHOWN ON SCREEN IS FOR ILLUSTRATIVE PURPOSES ONLY. EXACT ROUTING OF STRINGS AND HOME-RUNS VIA CABLE HANGER MESSENGER SYSTEM TO BE DETERMINED BY CONTRACTOR ON-SITE

(1) SITE DC WIRING DIAGRAM



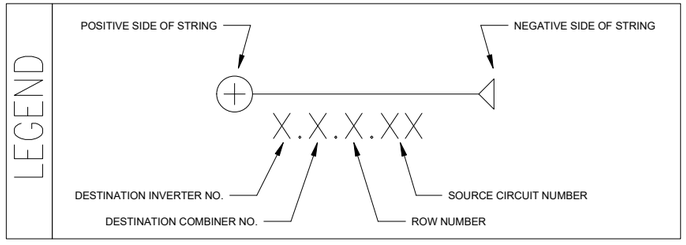
(2) TYPICAL 24 MODULE SERIES WIRING

TYPICAL 24 MODULE SERIES WIRING NOTES:
1. WIRING FOR ILLUSTRATIVE PURPOSES ONLY. FINAL MODULE WIRING TO BE DETERMINED BY CONTRACTOR ON-SITE.



(3) TYPICAL STRING SUPPORT CLIP DETAIL

TYPICAL 24 MODULE SERIES WIRING NOTES:
1. SUPPORT #10 STRINGS WITH CABLE CLIPS, OR OTHER TCC APPROVED UNDER-RACKING CABLE MANAGEMENT SYSTEM AT MOST EVERY 4' (48"). INSTALL PER MANUFACTURERS RECOMMENDATIONS. EXACT PLACEMENT AND CONNECTION METHOD TO BE DETERMINED BY CONTRACTOR ON-SITE



PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

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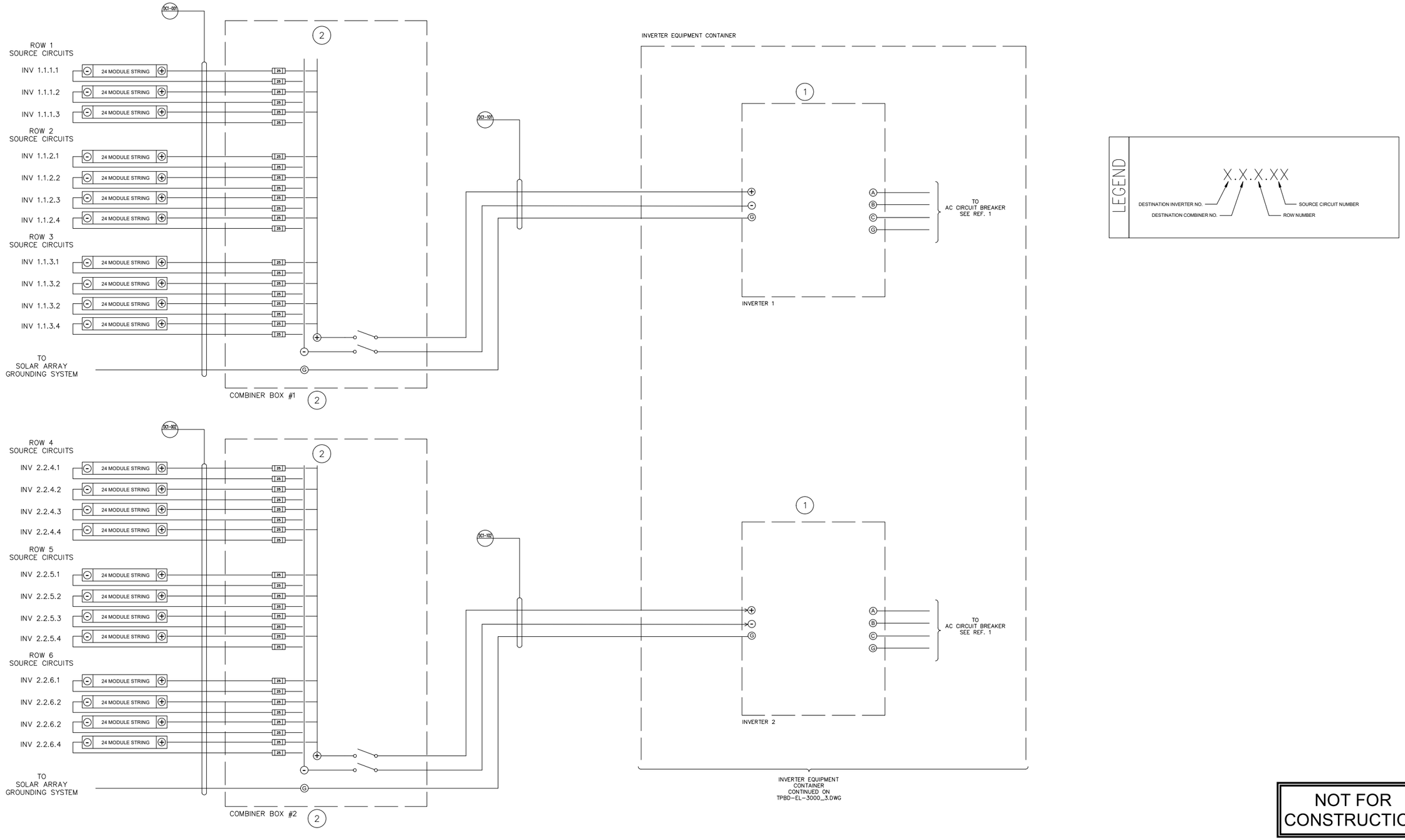
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS DESIGN
PV ARRAY WIRING DIAGRAM
tpbd-el-3000_1.dwg

REF DWG(S):

DRAWING NO.: TPBD-EL-3000

SHEET 1 OF 7



NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

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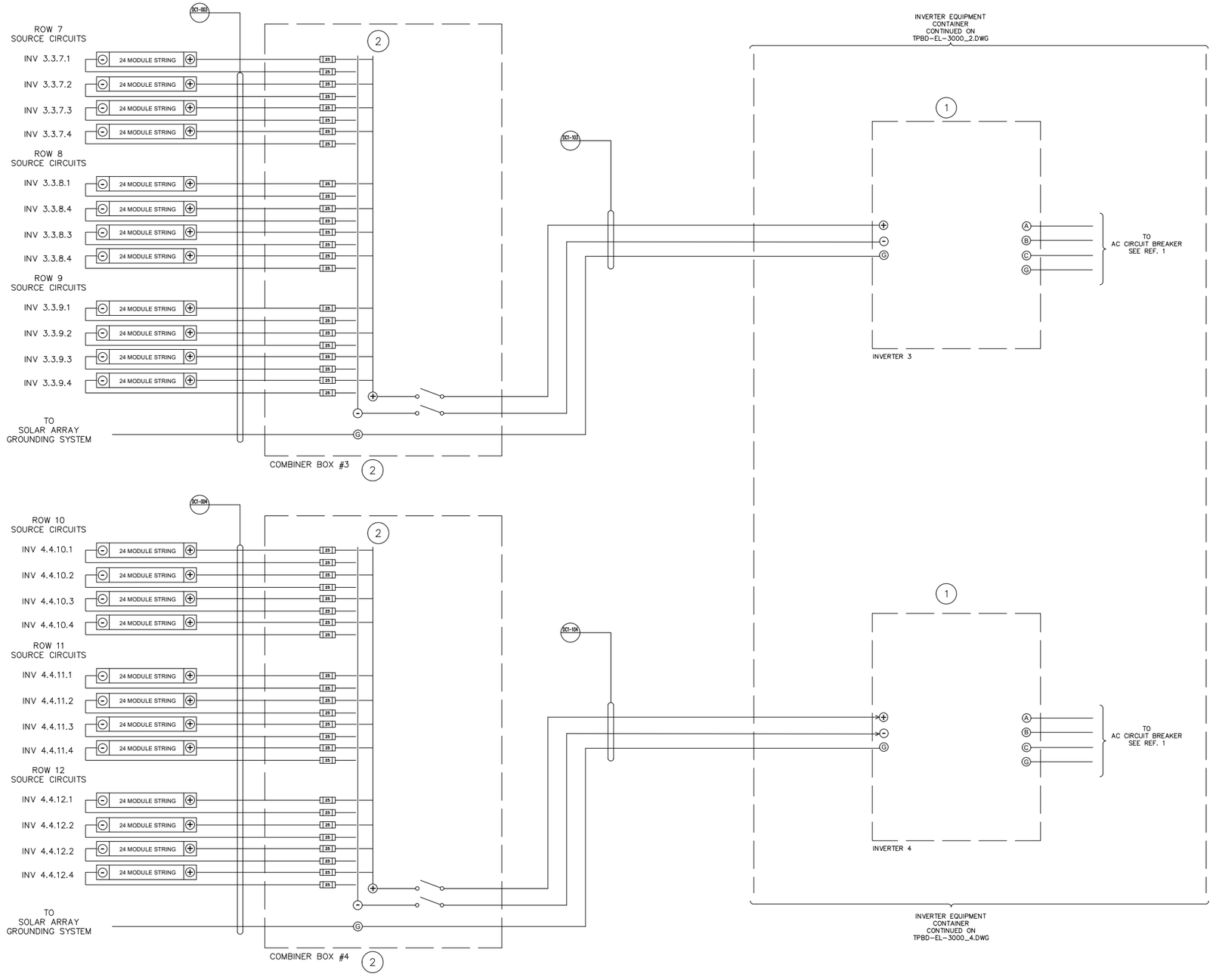
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	TPBD-EL-3000/3	ROW 7-12 DC WIRING DIAGRAM

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
ROW 1-6
DC WIRING DIAGRAM
tpbd-el-3000_2.dwg

REF DWG(S):

DRAWING NO.: TPBD-EL-3000



NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	TPBD-EL-3000/2	ROW 1-6 DC WIRING DIAGRAM
2	TPBD-EL-3000/4	ROW 13-18 DC WIRING DIAGRAM
3	TPBD-EL-0100/1	AC THREELINE DIAGRAM

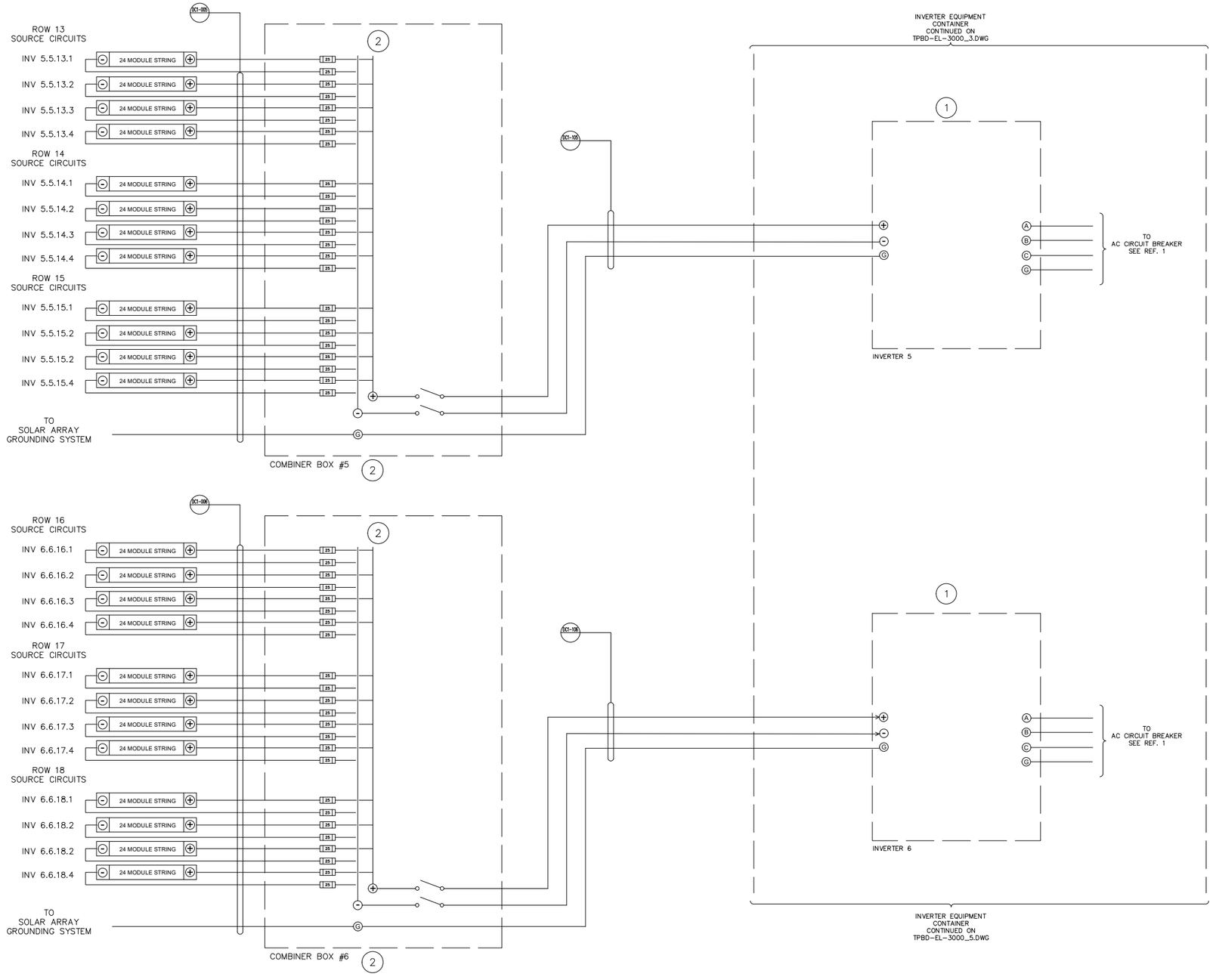
DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
ROW 7-12
DC WIRING DIAGRAM

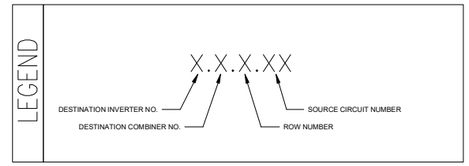
tpbd-el-3000_3.dwg

REF DWG(S):

DRAWING NO.: TPBD-EL-3000

SHEET 3 OF 7





NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	TPBD-EL-3000/3	ROW 7-12 DC WIRING DIAGRAM
2	TPBD-EL-3000/5	ROW 19-24 DC WIRING DIAGRAM
3	TPBD-EL-0100/1	AC THREELINE DIAGRAM

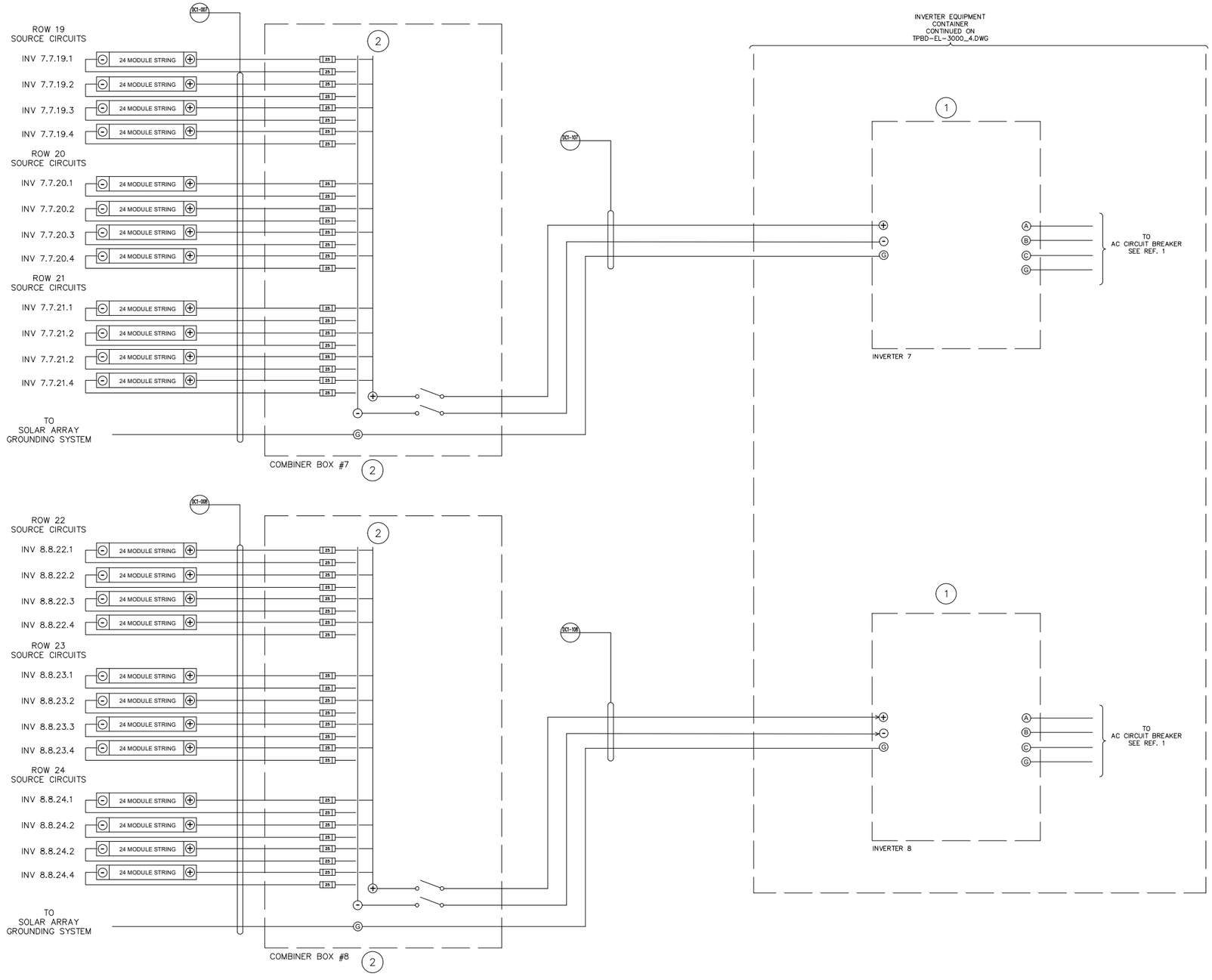
DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
ROW 13-18
DC WIRING DIAGRAM

tpbd-el-3000_4.dwg

REF DWG(S):

DRAWING NO.: TPBD-EL-3000

SHEET 4 OF 7



LEGEND

X.X.X.XX

DESTINATION INVERTER NO.
DESTINATION COMBINER NO.
SOURCE CIRCUIT NUMBER
ROW NUMBER

NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	TPBD-EL-3000/4	ROW 13-18 DC WIRING DIAGRAM
2	TPBD-EL-0100/1	AC THREELINE DIAGRAM

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
ROW 19-24
DC WIRING DIAGRAM
tpbd-el-3000_5.dwg

REF DWG(S):

DRAWING NO.: TPBD-EL-3000

SHEET 5 OF 7

EQUIPMENT SCHEDULE		
TAG	QUANTITY	DESCRIPTION
(1)	8	PV INVERTER; SMA SUNNY HIGHPOWER PEAK3 125-US
(2)	8	24 INPUT DC COMBINER;TERRASMART FSFT275-24-25-N4-CD OR EQUIVALENT

CABLE SCHEDULE

TAG	FUNCTION	DESCRIPTION	RACEWAY
DC1-001	ROW 1 STRING TO DS1	(22) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-002	ROW 2 STRING TO DS1	(24) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-003	ROW 3 STRING TO DS2	(24) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-004	ROW 4 STRING TO DS2	(24) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-005	ROW 5 STRING TO DS3	(24) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-006	ROW 6 STRING TO DS3	(24) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-007	ROW 7 STRING TO DS4	(24) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-008	ROW 8 STRING TO DS4	(24) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR

(2)

CABLE SCHEDULE

TAG	FUNCTION	DESCRIPTION	RACEWAY
DC1-101	DS1 TO INV1	(2) 4/0 AL 2kV PV WIRE, (1) #4 CU EGC	FREE AIR
DC1-102	DS2 TO INV1	(2) 4/0 AL 2kV PV WIRE, (1) #4 CU EGC	FREE AIR
DC1-103	DS3 TO INV2	(2) 4/0 AL 2kV PV WIRE, (1) #4 CU EGC	FREE AIR
DC1-104	DS4 TO INV2	(2) 4/0 AL 2kV PV WIRE, (1) #4 CU EGC	FREE AIR
DC1-105	DS5 TO INV3	(2) 350MCM AL 2kV PV WIRE, (1) #2 CU EGC	FREE AIR
DC1-106	DS6 TO INV3	(2) 350MCM AL 2kV PV WIRE, (1) #2 CU EGC	FREE AIR
DC1-107	DS7 TO INV4	(2) 350MCM AL 2kV PV WIRE, (1) #2 CU EGC	FREE AIR
DC1-108	DS8 TO INV4	(2) 350MCM AL 2kV PV WIRE, (1) #2 CU EGC	FREE AIR

(3)

CABLE SCHEDULE

TAG	FUNCTION	DESCRIPTION	RACEWAY
AC1-101	INV1 TO CB1	(3) 2/0 CU XHHW, #6 CU EGC	C-0111
AC1-102	INV2 TO CB2	(3) 2/0 CU XHHW, #6 CU EGC	C-0112
AC1-103	INV3 TO CB3	(3) 2/0 CU XHHW, #6 CU EGC	C-0113
AC1-104	INV4 TO CB4	(3) 2/0 CU XHHW, #6 CU EGC	C-0114
AC1-105	INV5 TO CB5	(3) 2/0 CU XHHW, #6 CU EGC	C-0115
AC1-106	INV6 TO CB6	(3) 2/0 CU XHHW, #6 CU EGC	C-0116
AC1-107	INV7 TO CB7	(3) 2/0 CU XHHW, #6 CU EGC	C-0117
AC1-108	INV8 TO CB8	(3) 2/0 CU XHHW, #6 CU EGC	C-0118
AC1-200	MCB1 TO DS1	3/PHASE 4/0 CU XHHW, (1) 3/0 CU XHHW NEUTRAL, (1) 3/0 CU EGC	C-0200
AC1-201	MCB2 TO DS2	3/PHASE 4/0 CU XHHW, (1) 3/0 CU XHHW NEUTRAL, (1) 3/0 CU EGC	C-0201
AC1-201	DS1 TO XFMR1	3/PHASE 4/0 CU XHHW, (1) 3/0 CU XHHW NEUTRAL, (1) 3/0 CU EGC	C-0210
AC1-211	DS2 TO XFMR1	3/PHASE 4/0 CU XHHW, (1) 3/0 CU XHHW NEUTRAL, (1) 3/0 CU EGC	C-0211
COM-500	COMM. PANEL TO POLE	MULTI-MODE FIBER OPTIC PATCH CABLE	C-0500
AC1-SS	STATION SERVICE	(2) #8 CU XHHW	1/2" EMT
AC1-1	RECEPTACLE CIRCUIT	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-2	COMMUNICATIONS PANEL	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-3	VENT FAN CIRCUIT	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-4	LIGHTING CIRCUIT	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-5	UNIT HEATER CIRCUIT	#10 CU XHHW, #10 CU XHHW NEUTRAL, #10 CU EGC	1/2" EMT

(1) (4)

NOTES:

(1) LOW VOLTAGE AC CABLE SIZING BASED ON CU XHHW WIRE AMPACITY WITH A TEMPERATURE RATING OF 75°C

(2) DC CABLE SIZING FOR STRINGS BASED ON CU UL4703 2KV PV WIRE AMPACITY WITH A TEMPERATURE RATING OF 90°C AND A VOLTAGE DROP OF LESS THAN 2%

(3) DC CABLE SIZING FOR HOME-RUNS BASED ON AL 2KV PV WIRE AMPACITY WITH A TEMPERATURE RATING OF 75°C IN FREE AIR (TABLE 310.15(B)(17)) AND A VOLTAGE DROP OF LESS THAN 2%. USE OF CABLE LARGER THAN SPECIFIED IN THE CABLE SCHEDULE IS ALLOWED, PROVIDED THAT THE CONDUCTOR DESCRIPTION IS MAINTAINED.

(4) SEE REF. 1 FOR CONDUIT SCHEDULE

NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	TPBD-EL-3000/6	PV ARRAY CONDUIT SCHEDULE

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
PV ARRAY
EQUIPMENT/CABLE SCHEDULE
tpbd-el-3000_6.dwg

REF DWG(S):

DRAWING NO.: TPBD-EL-3000

CONDUIT SCHEDULE

TAG	FUNCTION	CONDUIT TYPE	TRADE SIZE
C-0111	INV1 TO CB1	EMT	1.5"
C-0112	INV2 TO CB2	EMT	1.5"
C-0113	INV3 TO CB3	EMT	1.5"
C-0114	INV4 TO CB4	EMT	1.5"
C-0115	INV5 TO CB5	EMT	1.5"
C-0116	INV6 TO CB6	EMT	1.5"
C-0117	INV7 TO CB7	EMT	1.5"
C-0118	INV8 TO CB8	EMT	1.5"
C-0200	MCB1 TO DS1	PVC	3 X 2.5"
C-0201	MCB2 TO DS2	PVC	3 X 2.5"
C-0210	DS1 TO XFMR1	PVC	3 X 2.5"
C-0211	DS2 TO XFMR1	PVC	3 X 2.5"
C-0300	XFMR1 TO POLE	PVC	3"
C-0500	NEMA4 PANEL TO POLE	PVC	1"
⟨1⟩ C-0501	SPARE	PVC	1"

NOTES:

⟨1⟩ TRADE SIZE OF CONDUITS SHOWN IN CONDUIT SCHEDULE ARE MINIMUM SIZES BASED ON NEC CONDUIT FILL % (CHAPTER 9 TABLE 1). USE OF CONDUIT THAT IS LARGER IN TRADE SIZE THAN SPECIFIED IN CONDUIT SCHEDULE IS PERMITTED.

NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

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Consulting Engineers
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FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

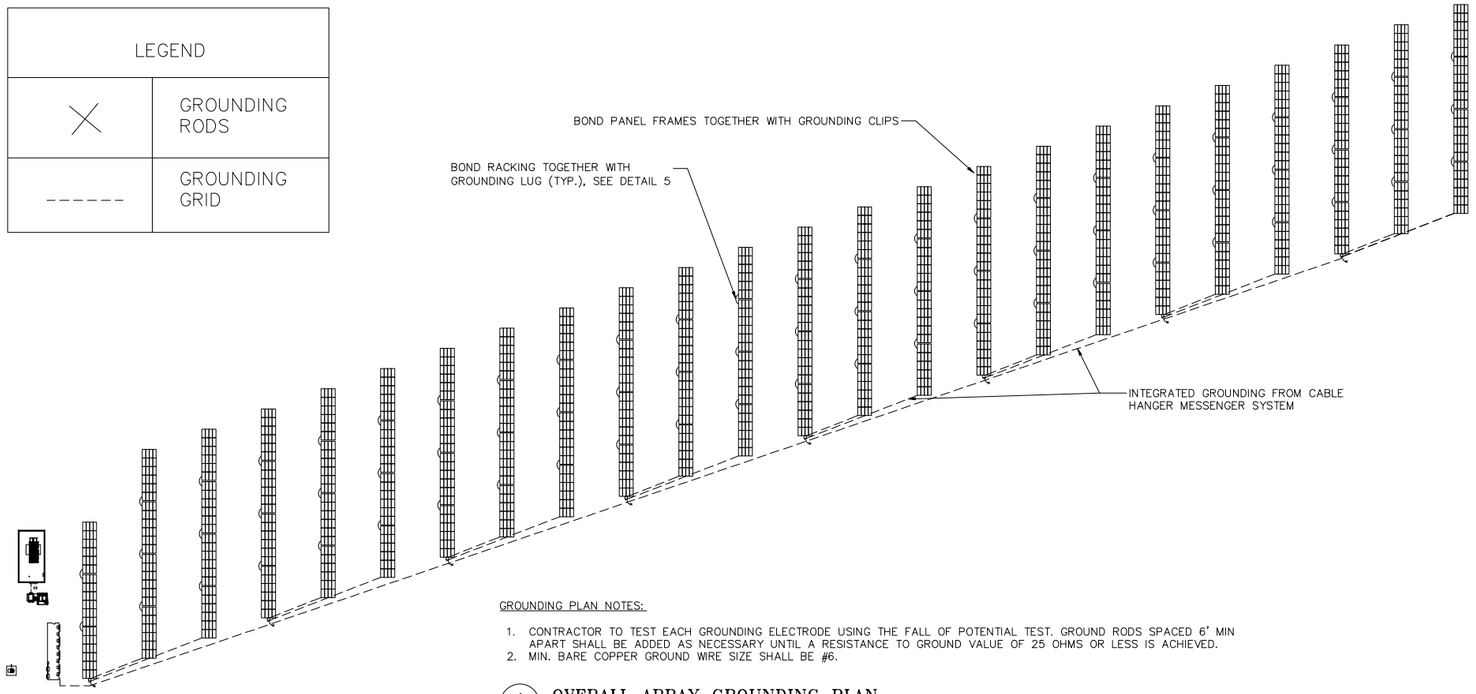
DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
PV ARRAY
CONDUIT SCHEDULE
tpbd-el-3000_7.dwg

REF DWG(S):

DRAWING NO.: TPBD-EL-3000

SHEET 7 OF 7

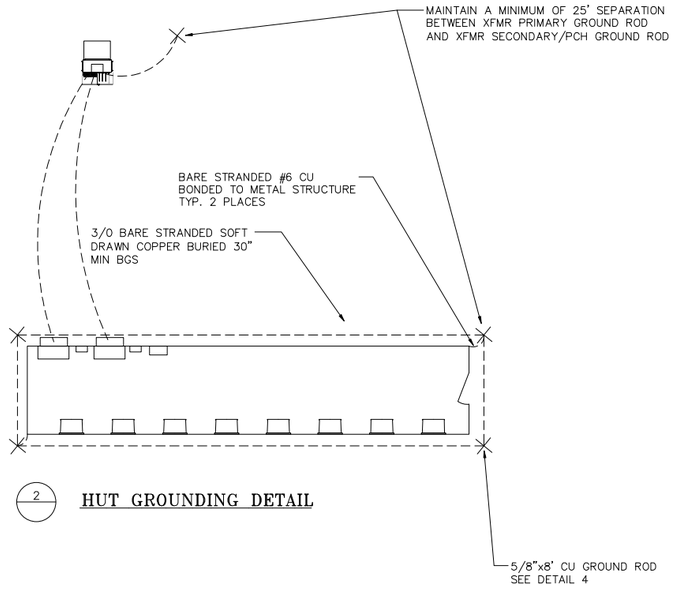
LEGEND	
×	GROUNDING RODS
-------	GROUNDING GRID



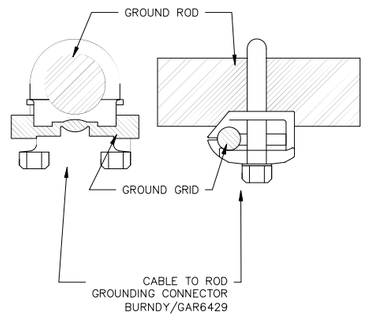
GROUNDING PLAN NOTES:

1. CONTRACTOR TO TEST EACH GROUNDING ELECTRODE USING THE FALL OF POTENTIAL TEST. GROUND RODS SPACED 6' MIN APART SHALL BE ADDED AS NECESSARY UNTIL A RESISTANCE TO GROUND VALUE OF 25 OHMS OR LESS IS ACHIEVED.
2. MIN. BARE COPPER GROUND WIRE SIZE SHALL BE #6.

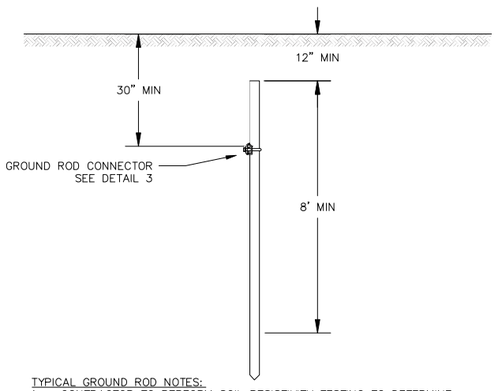
1 OVERALL ARRAY GROUNDING PLAN



2 HUT GROUNDING DETAIL



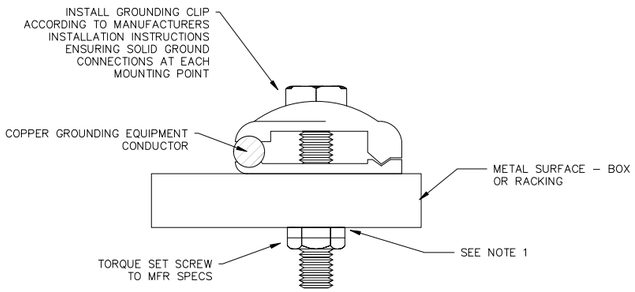
3 GROUND ROD CONNECTION
NTS



TYPICAL GROUND ROD NOTES:
1. CONTRACTOR TO PERFORM SOIL RESISTIVITY TESTING TO DETERMINE AMOUNT OF GROUND RODS NEEDED TO KEEP RESISTANCE BELOW 5 OHMS

4 TYPICAL GROUND ROD
NTS

NOT FOR CONSTRUCTION



TYPICAL METAL RACKING GROUNDING NOTES:
1. PRIOR TO MOUNTING LUGS ON ANODIZED ALUMINUM OR PAINTED METAL SURFACES, THE SURFACE MUST BE STRIPPED AND THEN COVERED WITH BURDNY PENETROX A-13 ANTI-OXIDANT COMPOUND BELOW THE LUG TO ENSURE CONDUCTIVITY
2. ON ANODIZED AL SURFACES, THE ANODIZATION SHALL BE GROUND OFF.
3. ON PAINTED SURFACES, THE PAINT LAYER SHALL BE GROUND OR SCRATCHED OFF.

5 TYPICAL METAL RACKING BONDING
NTS

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

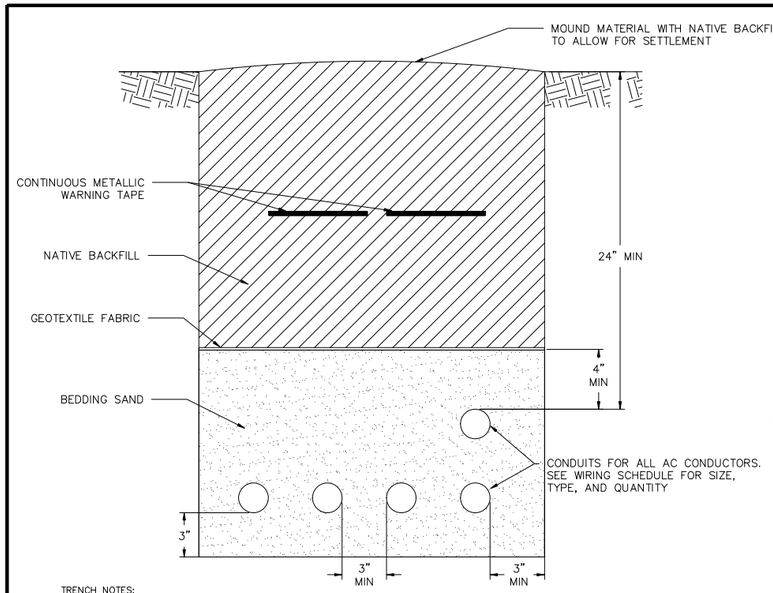
DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
GROUNDING PLAN

tpbd-ss-2000_1.dwg

REF DWG(S):

DRAWING NO.: TPBD-SS-2000

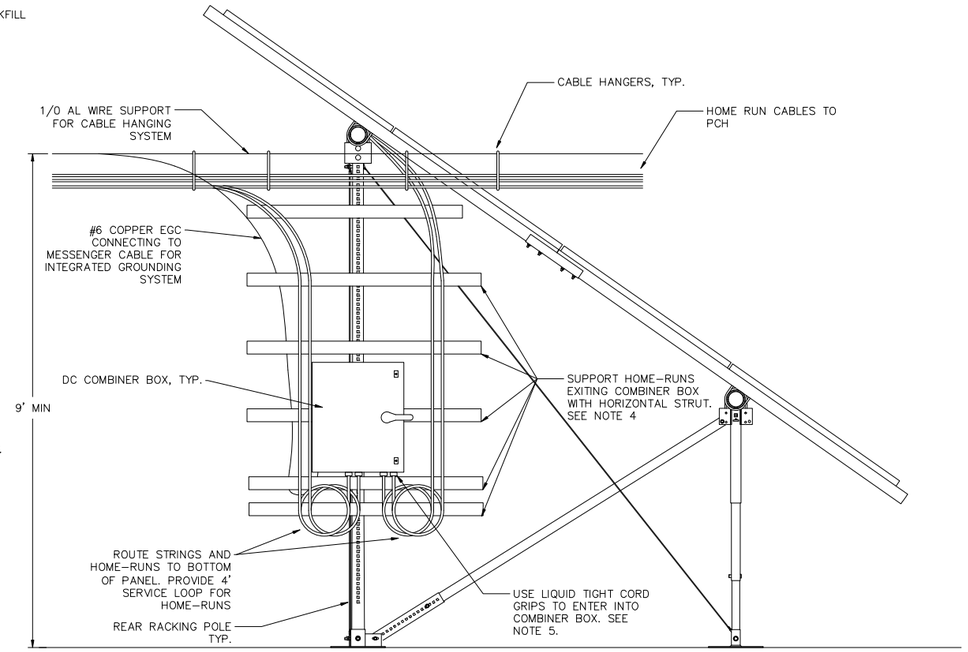
SHEET 1 OF 6



TRENCH NOTES:
1. BACKFILL THE TRENCH AREA WITH CLEAN SPOILS FREE OF AS MUCH ICE AS POSSIBLE.
2. CONSOLIDATION OF BACK FILL MATERIALS SHALL BE COMPLETED IN 12 INCH LIFTS MAXIMUM. INTENT OF THE CONSOLIDATION IS TO ENSURE ELIMINATION OF VOIDS.
3. FOR TRENCH IN GRAVEL, THE TRENCH CAP SHALL NOT EXCEED 4 INCHES. FOR TRENCH IN TUNDRA, THE TRENCH CAP SHOULD BE 35% – 40% OF THE TRENCH DEPTH (1.75' TO 2' FOR A 5' DEEP TRENCH), TO ALLOW FOR SETTLING AND ICE THAW. CONTRACTOR SHALL DISPOSE OF EXCESS EXCAVATED MATERIALS. FINAL CONTOURING OF THE TRENCH CAP IN TUNDRA SHOULD BE CONDUCTED BY HAND (MATCHING SURROUNDING DRAINAGE PATTERNS), TO ENSURE NO DIVERSION OF WATER OCCURS, RESULTING IN EROSION.
4. TRENCHES 1' WIDE SHOULD NOT NEED ANY SEEDING. FINAL REHABILITATION DETERMINATION TO BE MADE BY AGENCY REPRESENTATIVES.
5. COMPANY REPRESENTATIVE SHALL BE NOTIFIED AND PRESENT FOR ACCEPTANCE OF TRENCH PRIOR TO PLACEMENT OF CABLE AND BACKFILLING OF TRENCH (24–HOUR NOTICE REQUIRED). AGENCY REPRESENTATIVE SHALL ALSO PROVIDE ACCEPTANCE OF CABLE PRIOR TO BACKFILLING.
6. BEDDING SHALL BE 3/8" MINUS MATERIAL, NO CRUSHED OR SHARP ROCK. BEDDING MATERIAL SHALL NOT BE MACHINE COMPACTED WITHIN 6" OF CABLES. SLURRY OF A COMPOSITION THAT WILL NOT DAMAGE THE CABLE IS AN ACCEPTABLE BEDDING MATERIAL.
7. MAINTAIN 1" MIN. SEPARATION BETWEEN POWER CONDUCTORS AND COMMUNICATION CABLES

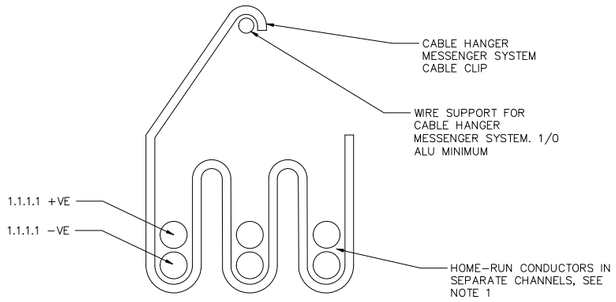
1 TYPICAL CONDUIT TRENCH
NTS

LEGEND	
— — — —	CABLE HANGER MESSENGER
—·—·—	UG POWER CABLE
—··—··—	UG COMM CABLE
○	CONDUIT STUB–UP AREA



2 TYPICAL COMBINER BOX DETAIL
NTS

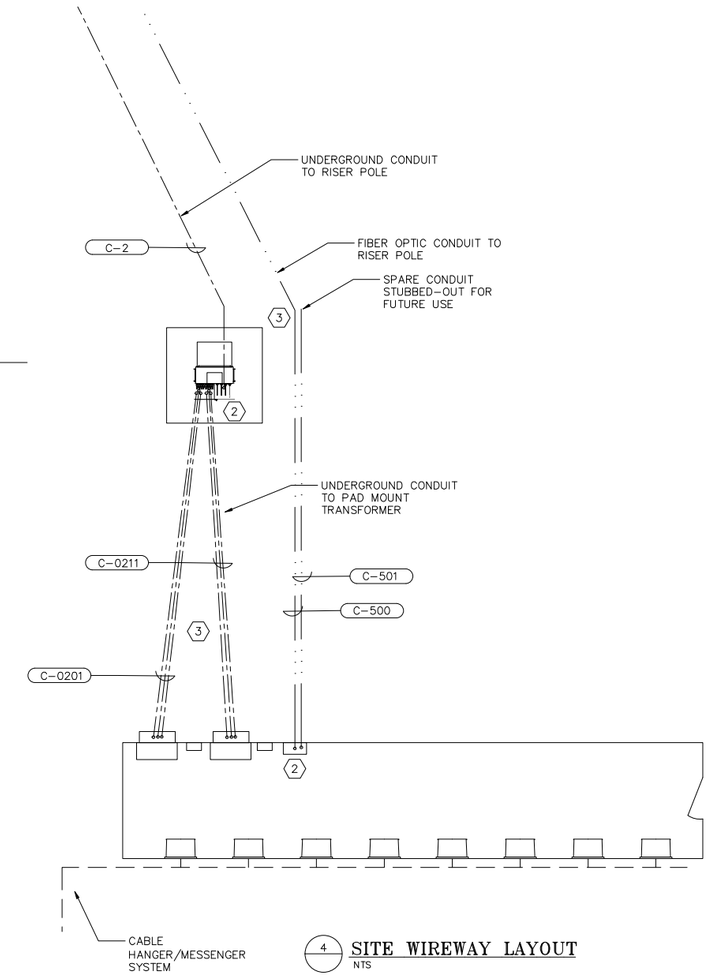
TYPICAL COMBINER BOX DETAIL NOTES:
1. ENSURE THAT CABLES ROUTED FROM HANGING SYSTEM TO COMBINER BOXES DO NOT EXCEED CONDUCTOR BENDING RADIUS
2. INSTALL CABLE HANGING SYSTEM ACCORDING TO MANUFACTURERS INSTALLATION INSTRUCTIONS
3. CONTRACTOR TO DETERMINE MOST SUITABLE MOUNTING SOLUTION FOR OVERHEAD CABLE MANAGEMENT SYSTEM
4. SUPPORT DC CABLES EXITING THE DC COMBINER BOX WITH A UV RESISTANT, OUTDOOR RATED CABLE TIE CONNECTED TO A HORIZONTAL STRUT. INSTALL CLOSEST CABLE SUPPORT A DISTANCE OF NO MORE THAN 12" AWAY FROM THE COMBINER BOX, AS MEASURED BY THE CABLE PATH. SUPPORT HOME–RUNS EVERY 12" UNTIL SUPPORTED BY CABLE HANGER MESSENGER SYSTEM. SUPPORT STRINGS EVERY 12" UNTIL SUPPORTED BY UNDER–RACKING CABLE MANAGEMENT SYSTEM.
5. USE A LIQUID TIGHT CORD GRIP OR CABLE GLAND FOR HOME–RUNS AND STRINGS WHEN ENTERING COMBINER BOX.



3 TYPICAL HOME–RUN CABLE HANGER DETAIL
NTS

TYPICAL HOME–RUN CABLE HANGER DETAIL NOTES:
1. HOME–RUN CONDUCTORS OF DIFFERENT CIRCUITS TO BE ROUTED IN SEPARATE CHANNELS IN CABLE HANGER MESSENGER SYSTEM. THE +VE AND –VE CONDUCTORS OF A SINGLE HOME–RUN CIRCUIT MAY BE ROUTED IN THE SAME CHANNEL.
2. INSTALL CABLE HANGERS IN REGULAR INTERVALS AS DIRECTED BY MANUFACTURERS INSTALLATION INSTRUCTIONS, OR, A DISTANCE OF NO MORE THAN 5' APART FROM EACH OTHER.
3. IF HOME–RUNS AND STRINGS ARE ROUTED IN THE SAME CABLE HANGER MESSENGER SYSTEM, SEPARATE HOME–RUNS AND STRINGS IN SEPARATE CHANNELS.

NOTES:
1. TRADE SIZE OF CONDUITS SHOWN IN CONDUIT SCHEDULE ARE MINIMUM SIZES BASED ON NEC CONDUIT FILL % (CHAPTER 9 TABLE 1). USE OF CONDUIT THAT IS LARGER IN TRADE SIZE THAN SPECIFIED IN CONDUIT SCHEDULE IS PERMITTED.
2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM PRODUCT DIMENSIONS, AND ROUTE CONDUITS TO APPROPRIATE STUB–UP AREAS.
3. CONDUIT AND WIREWAY ROUTING SHOWN ON DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. EXACT WIREWAY ROUTING TO BE DETERMINED BY CONTRACTOR ON–SITE.



4 SITE WIREWAY LAYOUT
NTS

SITE WIREWAY LAYOUT
1. SEE REF. 1 FOR CONDUIT SCHEDULE

NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25–0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10–13–2025	MED/10–13–2025

ENG. STAMP

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Consulting Engineers
TEL: (907) 522–1953
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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	TPBD–EL–3000/7	CONDUIT SCHEDULE

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
WIREWAY DETAILS
tpbd–ss–2000_2.dwg

REF DWG(S):

DRAWING NO.: TPBD–SS–2000

SHEET 2 OF 6

4.5"

3/8 MIN. TEXT

MANUAL DISCONNECT FOR PARALLEL GENERATION

3" (RED BACKGROUND)

LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECT. LABEL TO BE ENGRAVED PLASTIC. (2) TOTAL

NOTICE

PHOTOVOLTAIC SYSTEM GENERATION METER

LABEL TO BE LOCATED ON THE PV SYSTEM GENERATION METER. (1) TOTAL

NEC 2023 690.13(B), 690.54

NOTICE

PHOTOVOLTAIC SYSTEM AC DISCONNECT AND POWER SOURCE

RATED OUTPUT CURRENT: 604A

NOMINAL OPERATING VOLTAGE: 480VAC

LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECT. (2) TOTAL

NEC 2023 690.7(D)

MAXIMUM DC VOLTAGE OF PV SYSTEM

MAXIMUM VOLTAGE: 1072VDC

LABEL TO BE LOCATED ON COVER OF DC DISCONNECTING MEANS. (8) TOTAL

NEC 2023 705.12(B)(3)(3)

⚠ *WARNING*

THIS EQUIPMENT FED BY MULTIPLE SOURCES

TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR.

PERMANENT WARNING LABEL SHALL BE APPLIED TO DISTRIBUTION EQUIPMENT WHERE THE PV SYSTEM INTERCONNECTS. (2) TOTAL

NEC 2023 690.31(D)(2)

WARNING: PHOTOVOLTAIC POWER SOURCE

3/8 MIN.

RED BACKGROUND

LABEL SHALL BE LOCATED ON ALL EXPOSED RACEWAYS, CABLE TRAYS, OTHER WIRING METHODS, COVERS OR ENCLOSURES OF PULL BOXES AND JUNCTION BOXES AND ON CONDUIT BODIES IN WHICH ANY OF THE AVAILABLE CONDUIT OPENINGS ARE UNUSED. LABEL SHALL BE REFLECTIVE, AND ALL LETTERS CAPITALIZED AND SHALL BE MINIMUM HEIGHT OF 3/8" IN WHITE ON A RED BACKGROUND. SPACING BETWEEN LABELS OR MARKINGS, OR BETWEEN A LABEL AND MARKING, SHALL NOT BE MORE THAN 10FT.

NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN

DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

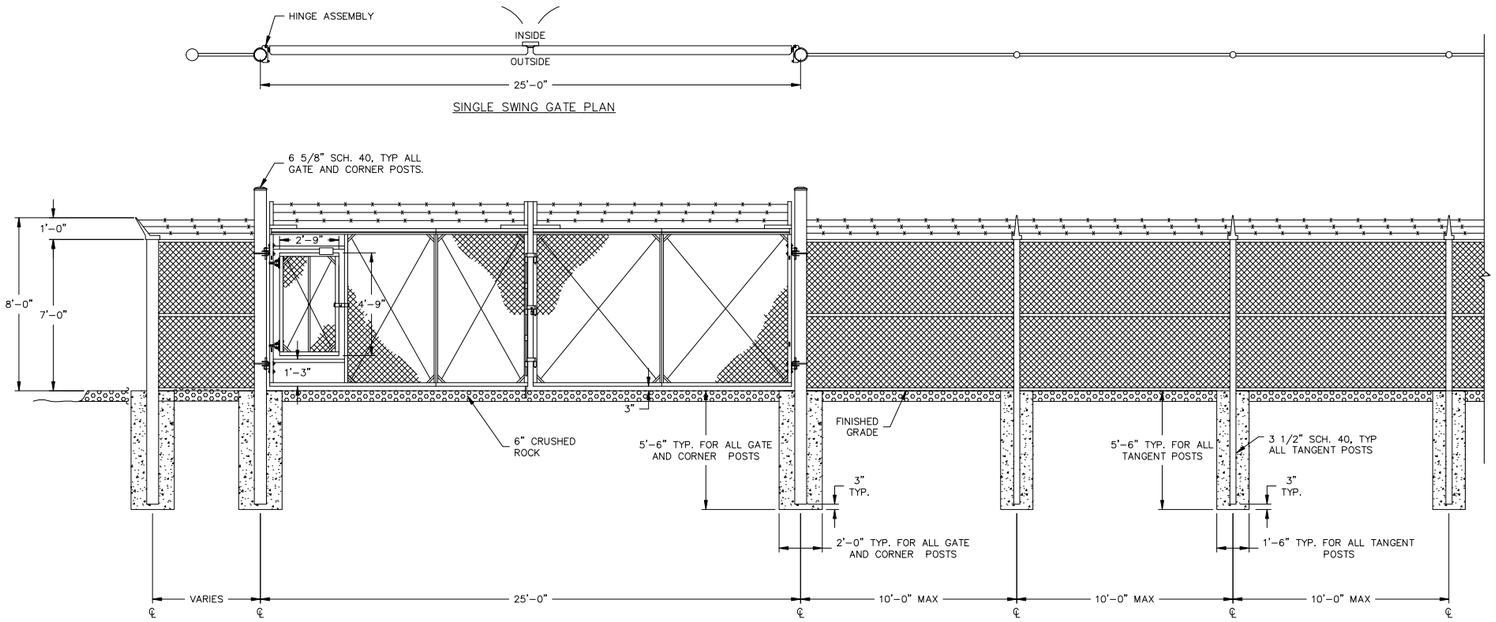
DRAWING NAME:

TANANA CHIEFS CONFERENCE
TOK PV/BESS
EQUIPMENT SAFETY LABEL SCHEDULE

tpbd-ss-2000_3.dwg

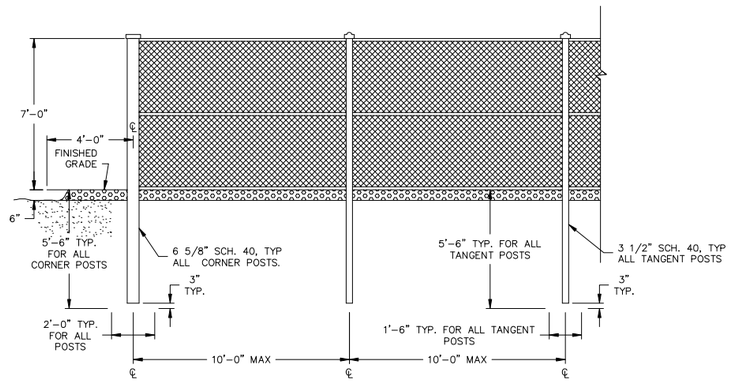
REF DWG(S):

DRAWING NO.: TPBD-SS-2000



SINGLE SWING GATE PLAN

1 FENCE DOUBLE GATE ELEVATION



2 CORNER/TERMINAL FENCE POST ELEVATION

NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN			
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116			
NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

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Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
SITE FENCING
DETAILS
tpbd-ss-2000_4.dwg

REF DWG(S):

DRAWING NO.: TPBD-SS-2000

NAMEPLATE NUMBER	QTY	LINE 1 TEXT	LINE 2 TEXT	NAMEPLATE SIZE HEIGHT x WIDTH (IN)	TEXT HEIGHT (IN)
N100	1	INVERTER 1		2 x 4	3/8
N101	1	INVERTER 2		2 x 4	3/8
N102	1	INVERTER 3		2 x 4	3/8
N103	1	INVERTER 4		2 x 4	3/8
N104	1	INVERTER 5		2 x 4	3/8
N105	1	INVERTER 6		2 x 4	3/8
N106	1	INVERTER 7		2 x 4	3/8
N107	1	INVERTER 8		2 x 4	3/8
N108	1	DC COMBINER	BOX 1	2 x 4	3/8
N109	1	DC COMBINER	BOX 2	2 x 4	3/8
N110	1	DC COMBINER	BOX 3	2 x 4	3/8
N111	1	DC COMBINER	BOX 4	2 x 4	3/8
N112	1	DC COMBINER	BOX 5	2 x 4	3/8
N113	1	DC COMBINER	BOX 6	2 x 4	3/8
N114	1	DC COMBINER	BOX 7	2 x 4	3/8
N115	1	DC COMBINER	BOX 8	2 x 4	3/8

NAMEPLATE NUMBER	QTY	LINE 1 TEXT	LINE 2 TEXT	NAMEPLATE SIZE HEIGHT x WIDTH (IN)	TEXT HEIGHT (IN)
N116	1	COMMUNICATIONS	PANEL	2 x 4	3/8
N117	1	POWER DISTRIBUTION	PANELBOARD 1	2 x 4	3/8
N118	1	POWER DISTRIBUTION	PANELBOARD 2	2 x 4	3/8
N119	1	CB 1		1 x 3	1/8
N120	1	CB 2		1 x 3	1/8
N121	1	CB 3		1 x 3	1/8
N122	1	CB 4		1 x 3	1/8
N123	1	CB 5		1 x 3	1/8
N124	1	CB 6		1 x 3	1/8
N125	1	CB 7		1 x 3	1/8
N126	1	CB 8		1 x 3	1/8
N127	1	CB SS		1 x 3	1/8
N128	1	MCB1		2 x 4	3/8
N129	1	MCB2		2 x 4	3/8
N130	1	120V STATION SERVICE PANEL		2 x 4	3/8
N131	1	DATA MANAGER		2 x 4	3/8
N132	1	METER PANEL 1		2 x 4	3/8
N133	1	METER PANEL 2		2 x 4	3/8
N134	1	MAIN AC	PANEL 1	2 x 4	3/8
N135	1	MAIN AC	PANEL 2	2 x 4	3/8

NOTES:

1) ALL NAMEPLATES SHALL BE 1/16" THICK MINIMUM PLASTIC.
2) ALL NAMEPLATES SHALL HAVE EXTERIOR RATED HIGH-TACK ADHESIVE.
3) ALL NAMEPLATES SHALL BE BLACK SURFACE WTH WHITE TEXT.
4) ALL TEXT SHALL BE "ARIAL BOLD" FONT.
5) EACH LINE OF TEXT SHALL BE CENTERED ON THE NAMEPLATE.
6) ALL TEXT SHALL BE UPPER CASE.
7) ALL DIMENSIONS SHOWN IN INCHES.

NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

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Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

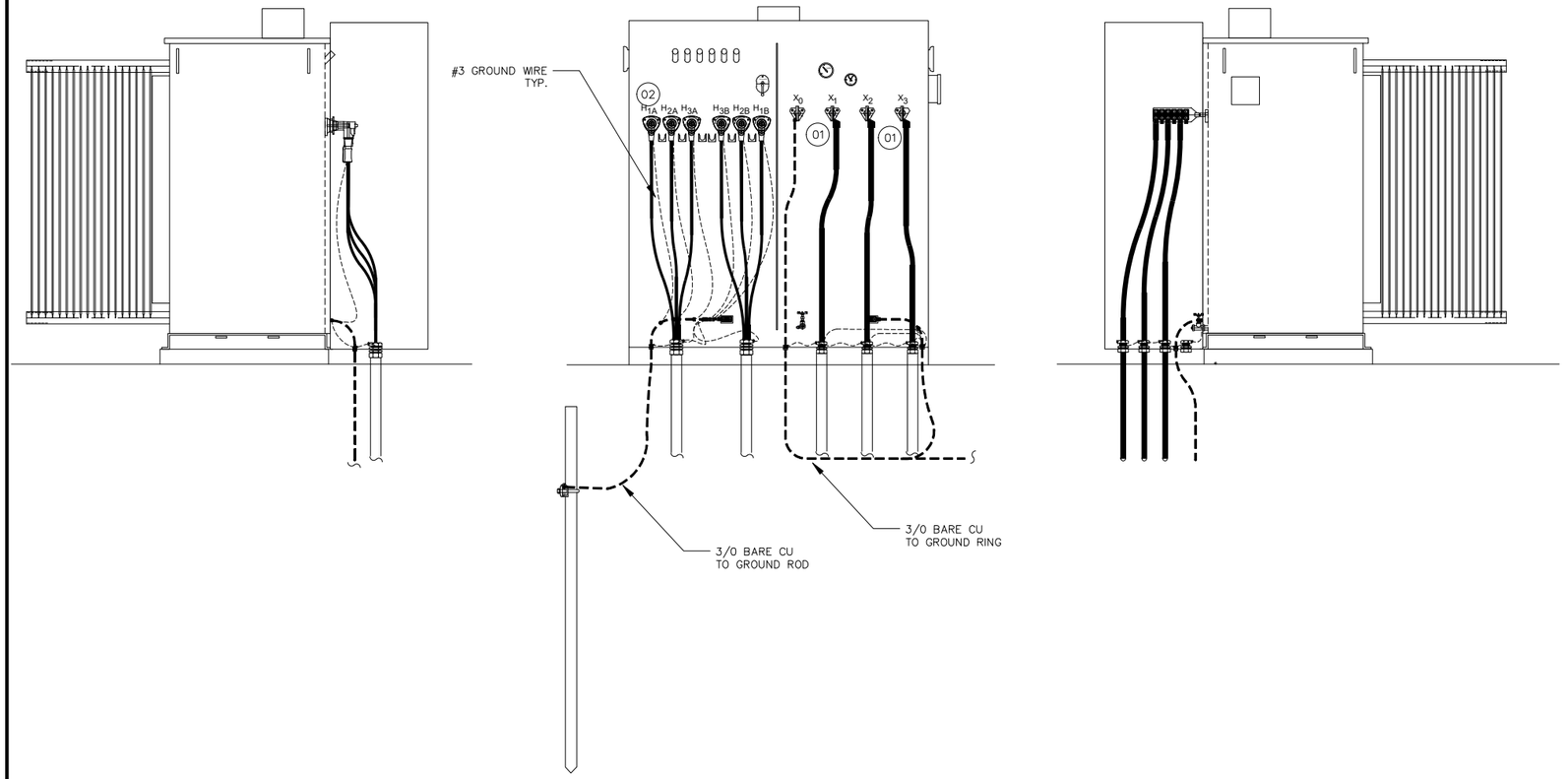
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
EQUIPMENT NAMEPLATE SCHEDULE

tpbd-ss-2000_5.dwg

REF DWG(S):

DRAWING NO.: TPBD-SS-2000



BILL OF MATERIAL

REF. NO.	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	–	CABLE LUG, NEMA 2–HOLE, 4/0 AWG CU	BURNDY/YA282N
02	–	CONNECTOR, COMPRESSION, 4/0 CU TO #6–#2 CU	BURNDY/YGHC29C26
03			
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NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

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Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
TRANSFORMER DETAILS

tpbd-ss-2000_6.dwg

REF DWG(S):

DRAWING NO.: TPBD-SS-2000

SHEET 6 OF 6

Circuit Information				ELECTRICAL CALCULATIONS												RESULTS							
Destination Inverter No.	Destination Disconnect Switch No.	Source Circuit No.	Modules (#)	Open Circuit Voltage (VOC)	Maximum Power Voltage (Vmp)	Short Circuit Current (Isc)	Continuous Current (1.25*Isc)	Irradiance Current (1.25*cc)	Mininum Fuse Size (A)	Selected Fuse Size (A)	Minimum Wire Ampacity (A)	Selected String Wire Size (CU 2KV PV Wire, 90°C, <2% Voltage Drop, AWG)	Maximum Wire Distance (FT)	Voltage Drop (V)	Voltage Drop (%)		Circuit Information FROM	TO	Distance (ft)	Continuous Current (A)	Minimum Wire Ampacity From Selected Device (A)	Selected Wire Size (AL 2KV PV Wire, 75°C, <2% Voltage Drop, AWG)	Voltage Drop (%)	Voltage Drop (V)
1	1	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	15	0.85	0.08		DS1	INV1	80	240.45	241	4/0	0.36	3.85
1	1	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	60	3.38	0.32		DS2	INV2	245	262.31	263	4/0	1.20	12.85
1	1	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	110	6.20	0.58		DS3	INV3	410	262.31	263	4/0	2.01	21.51
1	1	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	80	4.51	0.42		DS4	INV4	575	262.31	263	4/0	2.82	30.17
1	1	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	125	7.05	0.66		DS5	INV5	745	262.31	263	350	2.21	23.65
1	1	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	170	9.59	0.89		DS6	INV6	910	262.31	263	350	2.70	28.88
1	1	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	215	12.13	1.13		DS7	INV7	1075	262.31	263	350	3.18	34.12
1	1	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	135	7.61	0.71		DS8	INV8	1240	262.31	263	350	3.67	39.36
1	1	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	180	10.15	0.95									
1	1	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	225	12.69	1.18									
1	1	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	275	15.51	1.45									
2	2	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	15	0.85	0.08									
2	2	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	60	3.38	0.32									
2	2	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	110	6.20	0.58									
2	2	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82									
2	2	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	80	4.51	0.42									
2	2	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	125	7.05	0.66									
2	2	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	170	9.59	0.89									
2	2	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	215	12.13	1.13									
2	2	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	135	7.61	0.71									
2	2	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	180	10.15	0.95									
2	2	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	225	12.69	1.18									
2	2	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	275	15.51	1.45									
3	3	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	15	0.85	0.08									
3	3	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	60	3.38	0.32									
3	3	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	110	6.20	0.58									
3	3	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82		PV MODULE CHARACTERISTICS							
3	3	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	80	4.51	0.42		Voc (V)	52.58						
3	3	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	125	7.05	0.66		Voc Coef. (%/°C)	−0.25						
3	3	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	170	9.59	0.89		Vmp (V)	44.64						
3	3	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	215	12.13	1.13		Pmax Coef. (%/°C)	−0.3						
3	3	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	135	7.61	0.71									
3	3	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	180	10.15	0.95		SITE CHARACTERISTICS							
3	3	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	225	12.69	1.18		T_Amb Min (°C)	−40						
3	3	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	275	15.51	1.45		T_Amb Max (°C)	25						
4	4	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	15	0.85	0.08									
4	4	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	60	3.38	0.32									
4	4	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	110	6.20	0.58									
4	4	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82									
4	4	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	80	4.51	0.42									
4	4	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	125	7.05	0.66									
4	4	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	170	9.59	0.89									
4	4	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	215	12.13	1.13									
4	4	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	135	7.61	0.71									
4	4	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	180	10.15	0.95									
4	4	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	225	12.69	1.18									
4	4	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	275	15.51	1.45									
5	5	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	15	0.85	0.08									
5	5	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	60	3.38	0.32									
5	5	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	110	6.20	0.58									
5	5	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82									
5	5	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	80	4.51	0.42									
5	5	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	125	7.05	0.66									
5	5	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	170	9.59	0.89									
5	5	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	215	12.13	1.13									
5	5	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	135	7.61	0.71									
5	5	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	180	10.15	0.95									
5	5	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	225	12.69	1.18									
5	5	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	275	15.51	1.45									
6	6	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	15	0.85	0.08									
6	6	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	60	3.38	0.32									
6	6	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	110	6.20	0.58									
6	6	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82									
6	6	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	80	4.51	0.42									
6	6	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	125	7.05	0.66									
6	6	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	170	9.59	0.89									
6	6	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	215	12.13	1.13									
6	6	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	135	7.61	0.71									
6	6	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	180	10.15	0.95									
6	6	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	225	12.69	1.18									
6	6	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	275	15.51	1.45									
7	7	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	15	0.85	0.08									
7	7	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	60	3.38	0.32									
7	7	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	110	6.20	0.58									
7	7	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82									
7	7	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	80	4.51	0.42									
7	7	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	125	7.05	0.66									
7	7	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	170	9.59	0.89									
7	7	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	215	12.13	1.13									
7	7	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	135	7.61	0.71									
7	7	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	180	10.15	0.95									
7	7	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	225	12.69	1.18									
7	7	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	275	15.51	1.45									
8	8	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	15	0.85	0.08									
8	8	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	60	3.38	0.32									
8	8	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	110	6.20	0.58									
8	8	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	155	8.74	0.82									
8	8	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	80	4.51	0.42									
8	8	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	125	7.05	0.66									
8	8	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	170	9.59	0.89									
8	8	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	215	12.13	1.13									
8	8	1	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	135	7.61	0.71									
8	8	2	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	180	10.15	0.95									
8	8	3	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	225	12.69	1.18									
8	8	4	24	1467	1071.4	13.99	17.49	21.86	21.86	25	25	10	275	15.51	1.45									

NOTES:

1) TEMPERATURE CORRECTED OPEN CIRCUIT VOLTAGE CALCULATIONS ARE AS FOLLOWS: VOC = ((Voc * # MODULES) * (1 + ((T_AMB MIN − T_AMB MAX) * (VOC COEF.))

NOT FOR CONSTRUCTION

PROJECT: TOK PV/BESS DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0116

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-13-2025	MED/10-13-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
TOK PV/BESS
PV STRING CALCULATIONS

tpbd-el-0700_1.dwg

REF DWG(S):

DRAWING NO.: TPBD-EL-0700

SHEET 1 OF 1

TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY DESIGN
ISSUED FOR PV CONSTRUCTION BID

ALASKA

SOLAR PV SITE

FT YUKON VILLAGE OVERVIEW

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182

DRAWING INDEX

TITLE	DRAWING NUMBER	SHEET	REVISION
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	FYRE-EL-0000	1	C
GENERAL INFORMATION AND ELECTRICAL SPECIFICATIONS	FYRE-EL-0000	2	C
~~SITE LAYOUT - OVERALL~~	~~FYRE-EL-2500~~	~~1~~	~~C~~
SITE LAYOUT - PV	FYRE-EL-2500	2	C
~~SITE LAYOUT - BESS~~	~~FYRE-EL-2500~~	~~2~~	~~C~~
SITE LAYOUT - INTERCONNECTION	FYRE-EL-2500	4	C
SITE LAYOUT - POWER CONVERSION HUT	FYRE-EL-2500	5	C
SITE LAYOUT - COMMUNICATIONS PANEL	FYRE-EL-2500	6	A
~~RETIREMENT PLAN~~	~~FYRE-EL-2500~~	~~7~~	~~A~~
~~PV TAKE-OFF PLAN SHEET~~	~~FYRE-EL-2500~~	~~8~~	~~A~~
ONE LINE DIAGRAM	FYRE-EL-0010	2	D
THREE LINE DIAGRAM	FYRE-EL-0100	1	C
PV ELECTRICAL SITE PLAN	FYRE-EL-0020	1	C
PV ARRAY DC WIRING DIAGRAM	FYRE-EL-3000	1	C
PV ARRAY DC WIRING DIAGRAM	FYRE-EL-3000	2	C
PV ARRAY DC WIRING DIAGRAM	FYRE-EL-3000	3	C
PV ARRAY DC WIRING DIAGRAM	FYRE-EL-3000	4	C
EQUIPMENT/CABLE SCHEDULE	FYRE-EL-3000	5	C
CONDUIT SCHEDULE	FYRE-EL-3000	6	C
PV ARRAY GROUNDING PLAN	FYRE-SS-2000	1	C
SITE CONDUIT PLAN	FYRE-SS-2000	2	B
GROUNDING AND CONDUIT DETAILS	FYRE-SS-2000	3	C
FENCE DETAILS	FYRE-SS-2000	4	B
EQUIPMENT SAFETY LABEL SCHEDULE	FYRE-SS-2000	5	B
TRANSFORMER DETAILS	FYRE-SS-2000	6	A
EQUIPMENT NAMEPLATE SCHEDULE	FYRE-SS-2000	7	A
~~STAKING SHEETS~~	~~FYRE-SS-2001~~	~~1~~	~~A~~
~~DETAILS~~	~~FYRE-SS-2001~~	~~2~~	~~A~~
~~DETAILS~~	~~FYRE-SS-2001~~	~~3~~	~~A~~
PV STRING CALCULATIONS	FYRE-EL-0700	1	B

BESS DRAWINGS NOT INCLUDED IN THIS DRAWING SET

UTILITY INTERCONNECTION DRAWINGS NOT INCLUDED IN THIS DRAWING SET

SCOPE OF WORK

THE PROJECT SCOPE IS TO INSTALL A GRID-TIED SOLAR PHOTOVOLTAIC ~~AND BATTERY ENERGY STORAGE SYSTEM~~ IN FORT YUKON, AK.

THE SYSTEM CONSISTS OF GROUND MOUNTED SOLAR ARRAYS AND 8 STRING INVERTERS MOUNTED INSIDE A CONTAINER. THE PV SYSTEM WILL OPERATE IN PARALLEL WITH THE LOCAL UTILITY AND HAVE RELATED ELECTRICAL SAFETY AND METERING SYSTEMS.

SYSTEM SUMMARY

PV SYSTEM SIZE: 1,370.88kWdc / 999kWac
INTERCONNECTION VOLTAGE: 4.16kV, 3 PHASE, 4 WIRE

GENERAL NOTES

ALL ELECTRICAL WORK TO BE INSTALLED BY A QUALIFIED AND LICENSED ELECTRICAL CONTRACTOR.

CONTRACTOR WILL FOLLOW IBC 2021 AND NFPA 70 NEC 2023 AS WELL AS ALL APPLICABLE LOCAL, STATE, MUNICIPAL AND CITY CODES, ORDINANCES AND REGULATIONS.

ALL MODULES AND INVERTERS SHALL BE UL LISTED 1703 & CEC APPROVED. ALL ELECTRICAL COMPONENTS AND MATERIALS SHALL BE LISTED FOR ITS PURPOSE AND INSTALLED IN A WORKMAN LIKE MANNER.

PRIOR TO INSTALLATION, THE CONTRACTOR SHALL UNDERSTAND ALL DRAWINGS AND PRODUCT MANUALS.

ALL DESIGN AND SPECIFICATIONS OF STRUCTURAL COMPONENTS ARE OUTSIDE THE SCOPE OF THESE PLANS.

PROJECT ENTITIES

OWNER: TANANA CHIEFS CONFERENCE

ENGINEER OF RECORD: ELECTRIC POWER SYSTEMS, INC.

ELECTRIC SERVICE PROVIDER: GWITCHYAA ZHEE CORPORATION.

NOT FOR CONSTRUCTION

PROJECT: FT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/04-23-2025	JRV/04-23-2025
B	ISSUED FOR 95% REVIEW	MED/05-02-2025	JRV/05-02-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE FT YUKON RENEWABLE ENERGY COVER SHEET AND INDEX

fyre-pr-0001_1.dwg

REF DWG(S):

DRAWING NO.: FYRE-PR-0001

SHEET 1 OF 1

ELECTRICAL SPECIFICATIONS

GENERAL

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL A COMPLETE, TESTED, COMMISSIONED, AND SATISFACTORY ELECTRIC INSTALLATION IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS. THE INTENT OF THE DRAWINGS IS NOT TO SHOW OR LIST EVERY ITEM TO BE PROVIDED BY THE CONTRACTOR. IF AN ITEM IS NOT SHOWN OR LISTED THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE MISSING ITEMS TO ALLOW THE SYSTEM TO FUNCTION PROPERLY.

2. ALL DIMENSIONS AND LOCATIONS OF EXISTING CONDITIONS MUST BE VERIFIED PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES NOTED

3. ALL CONTRACTOR INITIATED CHANGES SHALL BE SUBMITTED IN WRITING TO THE ENGINEER OF RECORD FOR APPROVAL PRIOR TO ANY CHANGES IN THE FIELD.

4. EXACT LOCATION AND MOUNTING OF ALL EQUIPMENT SHALL BE VERIFIED IN THE FIELD.

5. THE CONTRACTOR SHALL READ AND UNDERSTAND ALL DRAWINGS AND EQUIPMENT MANUALS PRIOR TO INSTALLATION OR OPERATION OF EQUIPMENT. CONTRACTOR IS TO PROVIDE SKILLED LABOR FOR EACH TRADE WHOSE WORK RELATES TO THE DRAWINGS AND SPECIFICATIONS.

6. ALL OUTDOOR EQUIPMENT ENCLOSURES SHALL BE RATED NEMA 3R MINIMUM.

7. ALL THE EQUIPMENT SHOULD BE FREE FROM ANY DEBRIS, DAMAGED COMPONENTS AND ANY CONNECTION ISSUES.

8. THE CONTRACTOR SHALL KEEP ACCURATE RECORDS OF ALL DEVIATIONS IN WORK AS INSTALLED FROM WORK SPECIFIED ON THE DRAWINGS, OR IN THE SPECIFICATIONS, NOTING THE ORIGIN OF THE CHANGE.

9. SUFFICIENT ACCESS AND WORKING SPACE SHALL BE PROVIDED NEAR ELECTRICAL EQUIPMENT PER NEC ARTICLE 110.

10. CONTRACTOR SHALL PREPARE AN OPERATION AND MAINTENANCE MANUAL FOR ALL EQUIPMENT AND SYSTEMS INSTALLED.

11. CONDUIT JOINTS SHALL BE CUT SQUARE AND DE-BURRED UNTIL SMOOTH. BENDS SHALL BE MADE SO THAT THE CONDUIT IS NOT DAMAGED. THERE SHOULD NOT BE MORE THAN THE EQUIVALENT OF FOUR QUARTER-BENDS (360 DEGREES) BETWEEN PULL POINTS.

12. METALIC CONDUIT GROUNDS SHALL BE INSULATED AND SOLIDLY GROUNDED TO THE EGC SYSTEM. GROUNDS SHALL BE SIZED ACCORDING TO THE NEC.

13. CONDUCTORS SHALL BE COLOR-CODED, FACTORY OR FIELD APPLIED, WITH AN INDUSTRY STANDARD COLOR FOR EACH PHASE AND THE NEUTRAL.

RECORD DOCUMENTS

14. ON COMPLETION OF THE PROJECT, A COMPLETE SET OF MARKED-UP PRINTS SHOWING ANY DEVIATIONS SHALL BE DELIVERED TO THE ENGINEER OF RECORD. UNTIL THESE DRAWINGS ARE REVIEWED BY THE ENGINEER, THE CONTRACT SHALL REMAIN INCOMPLETE.

WIRING METHODS

15. EXPOSED PV WIRING SHALL BE PV WIRE TYPE, 90 DEGREE C, WET RATED AND UV RESISTANT.

16. PV SOURCE AND OUTPUT CIRCUIT CONDUCTORS SHALL BE RED FOR POSITIVE, BLACK FOR NEGATIVE, AND GREEN FOR GROUND. FIELD WIRING THAT IS NOT COLOR CODED SHALL BE MARKED AT BOTH ENDS SHOWING CIRCUIT POLARITY.

17. DC EQUIPMENT SHALL BE LISTED WITH A DC VOLTAGE GREATER THAN OR EQUAL TO THE MAXIMUM DC SYSTEM VOLTAGE.

18. INTERCONNECT WIRING AND POWER CONDUCTORS MUST BE IN ACCORDANCE WITH NEC NFPA 70. CONDUCTORS MUST CONFORM TO THE MINIMUM BEND RADIUS SPECIFIED IN THE SPECIFIC NEC ARTICLE. WIRE BUNDLES SHALL BE KEPT AWAY FROM SHARP EDGES TO AVOID DAMAGE TO WIRE INSULATION. CONDUCTORS SHALL BE COPPER RATED AT 90 DEGREES C UNLESS OTHERWISE NOTED IN THE DRAWINGS. FOR OUTDOOR INSTALLATIONS, CONDUITS AND FITTINGS SHALL BE PROPERLY NEMA RATED AS REQUIRED BY THE NEC.

19. CONNECTORS SHALL BE TORQUED PER DEVICE LISTING OR MANUFACTURER'S RECOMMENDATION.

20. AC WIRING SHALL BE COPPER RATED AT 90 DEGREES C, RATED 600VAC UNLESS OTHERWISE NOTED IN THE DRAWINGS.

21. PV SOURCE CIRCUITS IN FREE AIR SHALL BE PROPERLY SUPPORTED AND SEPARATED TO MAINTAIN AMPACITY RATINGS AND INSULATION INTEGRITY.

25. FIELD MADE CONNECTORS FOR PV QUICK CONNECTS SHALL BE THE SAME TYPE AND MANUFACTURER AS THE PV MODULES AND USE THE MANUFACTURER SPECIFIED CRIMPING TOOL.

GROUNDING

26. ONLY ONE CONNECTION TO DC CIRCUITS AND ONE CONNECTION TO AC CIRCUITS SHALL BE MADE FOR SYSTEM GROUNDING.

27. NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER EQUIPMENT GROUNDING TO ENSURE THE TERMINAL LUG IS PROPERTY BOLTED AND METAL-METAL CONTACT IS MADE. PAINT AND/OR FINISH AT THE POINT OF CONTACT IS TO BE REMOVED.

28. MODULES SHALL BE BONDED WITH EQUIPMENT GROUNDING CONDUCTORS BONDED TO A LOCATION APPROVED BY THE MANUFACTURER WITH A MEANS OF BONDING LISTED FOR THIS PURPOSE.

29. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, INCLUDING BUT NOT LIMITED TO GROUND RODS, GROUNDING LUGS, GROUNDING CLAMPS, ETC.

30. GROUNDING CONDUCTORS SHALL MEET THE FOLLOW SPECIFICATIONS:
 30.1. SOLID CONDUCTORS: ASTM B 3.
 30.2. STRANDED CONDUCTORS: ASTM B 8.
 30.3. TINNED CONDUCTORS: ASTM B 33.

31. GROUNDING BUS WHERE SPECIFIED SHALL BE RECTANGULAR BARS OF ANNEALED COPPER, CROSS SECTION SIZED FOR APPLICATION PER NEC, UNLESS OTHERWISE INDICATED; WITH INSULATORS.

32. GROUNDING CONDUCTORS SHALL BE ROUTED ALONG THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE. AVOID OBSTRUCTING ACCESS OR PLACING CONDUCTORS WHERE THEY MAY BE SUBJECTED TO STRAIN, IMPACT, OR DAMAGE.

33. INSTALL A GROUND CONDUCTOR LOOP AND GROUND RODS, ELECTRICALLY CONNECTED TO BUILDING STRUCTURE, GROUND RODS, AND EXTERIOR EQUIPMENT AS SHOWN ON DRAWINGS.

RACEWAYS

34. METAL CONDUIT AND TUBING SHALL MEET THE FOLLOWING STANDARDS:
 34.1. RIGID STEEL CONDUIT: ANSI C80.1.
 34.2. EMT: ANSI C80.3.
 34.3. LFMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.

35. FITTINGS FOR CONDUIT SHALL BE LISTED FOR TYPE AND SIZE RACEWAY WITH WHICH USED, AND FOR APPLICATION AND ENVIRONMENT IN WHICH INSTALLED.

36. COATED FITTINGS FOR PVC-COATED CONDUIT SHALL HAVE MINIMUM THICKNESS OF 0.040 INCHES WITH OVERLAPPING SLEEVES PROTECTING THREADED JOINTS.

37. NONMETALIC WIREWAY SHALL BE PROVIDED AS FIBERGLASS POLYESTER, EXTRUDED AND FABRICATED TO SIZE AND SHAPE INDICATED, WITH NO HOLES OR KNOCKOUTS. COVER IS GASKETED WITH OIL-RESISTANT GASKET MATERIAL AND FASTENED WITH CAPTIVE SCREWS TREATED FOR CORROSION RESISTANCE. CONNECTIONS ARE FLANGED, WITH STAINLESS-STEEL SCREWS AND OIL-RESISTANT GASKETS.

38. RACEWAYS FOR OPTICAL FIBER AND COMMUNICATIONS CIRCUITS SHALL BE INSTALLED AS FOLLOWS:
 38.1. 3/4-INCH TRADE SIZE AND SMALLER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 50 FEET.
 38.2. 1-INCH TRADE SIZE AND LARGER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 75 FEET.
 38.3. INSTALL WITH A MAXIMUM OF TWO 90-DEGREE BENDS OR EQUIVALENT FOR EACH LENGTH OF RACEWAY UNLESS DRAWINGS SHOW STRICTER REQUIREMENTS. SEPARATE LENGTHS WITH PULL OR JUNCTION BOXES OR TERMINATIONS AT DISTRIBUTION FRAMES OR CABINETS WHERE NECESSARY TO COMPLY WITH THESE REQUIREMENTS.

DISCONNECTING MEANS

39. MEANS SHALL BE PROVIDED TO DISCONNECT THE PV SYSTEM FROM WIRING SYSTEMS INCLUDING POWER SYSTEMS AND ENERGY STORAGE SYSTEMS.

40. PV DISCONNECTS SHALL NOT BE REQUIRED TO BE SUITABLE AS SERVICE EQUIPMENT AND SHALL BE RATED IN ACCORDANCE WITH ARTICLE 690 PART III: DISCONNECTING MEANS.

PANELBOARDS

41. CONTRACTOR SHALL PROVIDE THE FOLLOWING SUBMITTALS:

 41.1. EACH TYPE OF PANELBOARD, OVERCURRENT PROTECTIVE DEVICE, TRANSIENT VOLTAGE SUPPRESSION DEVICE, ACCESSORY, AND COMPONENT INDICATED. INCLUDE DIMENSIONS AND MANUFACTURERS' TECHNICAL DATA ON FEATURES, PERFORMANCE, ELECTRICAL CHARACTERISTICS, RATINGS, AND FINISHES.

 41.2. MANUFACTURER SEISMIC QUALIFICATION CERTIFICATION: SUBMIT CERTIFICATION THAT PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, ACCESSORIES, AND COMPONENTS WILL WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS" INCLUDE THE FOLLOWING:
  41.2.1. BASIS OF CERTIFICATION: INDICATE WHETHER WITHSTAND CERTIFICATION IS BASED ON ACTUAL TEST OF ASSEMBLED COMPONENTS OR ON CALCULATION.
  41.2.2. DIMENSIONED OUTLINE DRAWINGS OF EQUIPMENT UNIT: IDENTIFY CENTER OF GRAVITY AND LOCATE AND DESCRIBE MOUNTING AND ANCHORAGE PROVISIONS.
  41.2.3. DETAILED DESCRIPTION OF EQUIPMENT ANCHORAGE DEVICES ON WHICH THE CERTIFICATION IS BASED AND THEIR INSTALLATION REQUIREMENTS.

 41.3. FIELD QUALITY-CONTROL TEST REPORTS INCLUDING THE FOLLOWING:
  41.3.1. TEST PROCEDURES USED.
  41.3.2. TEST RESULTS THAT COMPLY WITH REQUIREMENTS.
  41.3.3. RESULTS OF FAILED TESTS AND CORRECTIVE ACTION TAKEN TO ACHIEVE TEST RESULTS THAT COMPLY WITH REQUIREMENTS.

 41.4. PANELBOARD SCHEDULES: FOR INSTALLATION IN PANELBOARDS. SUBMIT FINAL VERSIONS AFTER LOAD BALANCING.

 41.5. OPERATION AND MAINTENANCE DATA: FOR PANELBOARDS AND COMPONENTS TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS. IN ADDITION TO ITEMS SPECIFIED IN DIVISION 01 SECTION "OPERATION AND MAINTENANCE DATA," INCLUDE THE FOLLOWING:
  41.5.1. MANUFACTURER'S WRITTEN INSTRUCTIONS FOR TESTING AND ADJUSTING OVERCURRENT PROTECTIVE DEVICES.
  41.5.2. TIME-CURRENT CURVES, INCLUDING SELECTABLE RANGES FOR EACH TYPE OF OVERCURRENT PROTECTIVE DEVICE

42. CONTRACTOR SHALL MEET THE FOLLOWING QUALITY ASSURANCE STANDARDS:

 42.1. SOURCE LIMITATIONS: OBTAIN PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, COMPONENTS, AND ACCESSORIES THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER.
 42.2. PRODUCT OPTIONS: DRAWINGS INDICATE SIZE, PROFILES, AND DIMENSIONAL REQUIREMENTS OF PANELBOARDS AND ARE BASED ON THE SPECIFIC SYSTEM INDICATED. REFER TO DIVISION 01 SECTION "PRODUCT REQUIREMENTS."
 42.3. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
 42.4. COMPLY WITH NEMA PB 1.
 42.5. COMPLY WITH NFPA 70.

43. CONTRACTOR SHALL COORDINATE LAYOUT AND INSTALLATION OF PANELBOARDS AND COMPONENTS WITH OTHER CONSTRUCTION THAT PENETRATES WALLS OR IS SUPPORTED BY THEM, INCLUDING ELECTRICAL AND OTHER TYPES OF EQUIPMENT, RACEWAYS, PIPING, AND ENCUMBRANCES TO WORKSPACE CLEARANCE REQUIREMENTS.

44. CONTRACTOR SHALL PROVIDE PANELBOARD PRODUCTS THAT MEET THE FOLLOWING CRITERIA
 44.1. MANUFACTURER SHALL BE AS SHOWN ON DRAWINGS OR EQUAL.
 44.2. FABRICATE AND TEST PANELBOARDS ACCORDING TO IEEE 344 TO WITHSTAND SEISMIC FORCES DEFINED IN DIVISION 26 SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS."
 44.3. ENCLOSURES: SURFACE MOUNTED CABINETS. NEMA PB 1, TYPE 1.
  44.3.1. RATED FOR ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.
  44.3.2. OUTDOOR LOCATIONS: NEMA 250, TYPE 4X STAINLESS.
  44.3.3. OTHER WET OR DAMP INDOOR LOCATIONS: NEMA 250, TYPE 4X.
  44.3.4. FRONT: SECURED TO BOX WITH CONCEALED TRIM CLAMPS. FOR SURFACE-MOUNTED FRONTS, MATCH BOX DIMENSIONS; FOR FLUSH-MOUNTED FRONTS, OVERLAP BOX.
  44.3.5. FINISH: MANUFACTURER'S STANDARD ENAMEL FINISH OVER CORROSION-RESISTANT TREATMENT OR PRIMER COAT.
  44.3.6. DIRECTORY CARD: WITH TRANSPARENT PROTECTIVE COVER, MOUNTED IN METAL FRAME, INSIDE PANELBOARD DOOR

 44.4. PHASE AND GROUND BUSES:
  44.4.1. MATERIAL: HARD-DRAWN COPPER, 98 PERCENT CONDUCTIVITY.
  44.4.2. EQUIPMENT GROUND BUS: ADEQUATE FOR FEEDER AND BRANCH-CIRCUIT EQUIPMENT GROUND CONDUCTORS; BONDED TO BOX.

 44.5. CONDUCTOR CONNECTORS: SUITABLE FOR USE WITH CONDUCTOR MATERIAL.
  44.5.1. LUGS: MECHANICAL TYPE.

 44.6. SERVICE EQUIPMENT LABEL: UL LABELED FOR USE AS SERVICE EQUIPMENT FOR PANELBOARDS WITH MAIN SERVICE DISCONNECT SWITCHES.

 44.7. UL LABEL INDICATING SERIES-CONNECTED RATING WITH INTEGRAL OR REMOTE UPSTREAM OVERCURRENT PROTECTIVE DEVICES. INCLUDE SIZE AND TYPE OF UPSTREAM DEVICE ALLOWABLE, BRANCH DEVICES ALLOWABLE, AND UL SERIES-CONNECTED SHORT-CIRCUIT RATING.

45. CONTRACTOR SHALL PROVIDE OVERCURRENT PROTECTIVE DEVICES THAT MEET THE FOLLOWING CRITERIA:

 45.1. MOLDED-CASE CIRCUIT BREAKER: PROVIDE BREAKERS FROM PANELBOARD MANUFACTURER. UL 489, WITH SERIES-CONNECTED RATING TO MEET AVAILABLE FAULT CURRENTS

 45.2. THERMAL-MAGNETIC CIRCUIT BREAKERS: INVERSE TIME-CURRENT ELEMENT FOR LOW-LEVEL OVERLOADS, AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS. ADJUSTABLE MAGNETIC TRIP SETTING FOR CIRCUIT-BREAKER FRAME SIZES 250 A AND LARGER

 45.3. ADJUSTABLE INSTANTANEOUS-TRIP CIRCUIT BREAKERS: MAGNETIC TRIP ELEMENT WITH FRONT-MOUNTED, FIELD-ADJUSTABLE TRIP SETTING.

 45.4. ELECTRONIC TRIP-UNIT CIRCUIT BREAKERS SHALL HAVE RMS SENSING; FIELD-REPLACEABLE RATING PLUG; AND WITH THE FOLLOWING FIELD-ADJUSTABLE SETTINGS:
  45.4.1. INSTANTANEOUS TRIP.
  45.4.2. LONG- AND SHORT-TIME PICKUP LEVELS.
  45.4.3. LONG- AND SHORT-TIME TIME ADJUSTMENTS.
  45.4.4. GROUND-FAULT PICKUP LEVEL, TIME DELAY, AND I2/T RESPONSE.

 45.5. GFCI CIRCUIT BREAKERS: SINGLE- AND TWO-POLE CONFIGURATIONS WITH 5-MA WHERE INSTALLED PROTECTION OF GENERAL USE RECEPTACLES. WHERE REQUIRED, 30-MA TRIP SENSITIVITY FOR CIRCUITS INSTALLED TO SUPPLY SPECIFIC EQUIPMENT.

REQUIRED SAFETY SIGNS AND LABELS

1. THE MARKING SHALL ADEQUATELY WARN OF THE HAZARD USING EFFECTIVE WORDS AND/OR COLORS AND/OR SYMBOLS PER NEC 110.21.

2. THE LABEL SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN PER NEC 110.21.

3. THE LABEL SHALL BE OF SUFFICIENT DURABILITY ABLE TO WITHSTAND THE ENVIRONMENT INSTALLED IN PER NEC 110.21.

4. LABELS AND MARKINGS SHALL BE APPLIED TO THE APPROPRIATE COMPONENTS IN ACCORDANCE WITH THE NEC.

5. PV MODULES AND INVERTERS ARE TO BE SUPPLIED FROM THE MANUFACTURER WITH PRE-APPLIED MARKINGS TO MEET THE REQUIREMENTS OF NEC 690.51 & 690.41(B)(1).

6. UNLESS OTHERWISE SPECIFIED ON THE LABELING SHEET, OSHA 1910.145 AND ANSI Z535 RECOMMENDED SPECIFICATIONS ARE AS FOLLOWS:
 6.1. ROUNDED OR BLUNT CORNERS FREE OF SHARP EDGES.
 6.2. VISIBLE AT A MINIMUM DISTANCE OF 5FT. OR GREATER.
 6.3. "DANGER" HEADER; RED BACKGROUND WITH WHITE LETTERING.
 6.4. "WARNING" HEADER; ORANGE BACKGROUND WITH BLACK LETTERING.
 6.5. "CAUTION" HEADER; YELLOW BACKGROUND WITH BLACK LETTERING.
 6.6. "NOTICE" LABEL HEADER TO BE IN BLUE WITH WHITE LETTERING.
 6.7. OTHER TEXT TO BE BLACK ON A WHITE BACKGROUND.

7. ALL RELEVANT COMPONENTS OF THE PHOTOVOLTAIC SYSTEM SHALL BE CLEARLY MARKED AND LABELED IN ACCORDANCE WITH NEC ARTICLE 690.

NOT FOR CONSTRUCTION

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DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

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fyre-el-0000_1.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-0000

SHEET 1 OF 3

STANDARD BLOCKS – ELECTRICAL

STANDARD ABBREVIATIONS – ELECTRICAL

A	AMPERE
ACB	AIR CIRCUIT BREAKER
AB	AIR BREAK
ABV	ABOVE
AC	ALTERNATING CURRENT
ADJ	ADJUSTABLE
ADJT	ADJACENT
ALT	ALTERNATE
AL	ALUMINUM
APPRX	APPROXIMATE
B	BUS
BF	BREAKER FAIL
BFI	BREAKER FAIL INITIATE
BKR	BREAKER
BLDG	BUILDING
BLK	BLOCK
BOT	BOTTOM
BTU	BRITISH THERMAL UNIT
BTWN	BETWEEN
BU	BACKUP
C	COLOUMB
CAP	CAPACITOR OR CAPACITANCE
CAP	CORRUGATED ALUMINUM PIPE
CB	CENTER BREAK
CBL	CABLE
CEM	CEMENT
CF	CUBIC FOOT
CHK	CHECK
CI	CAST IRON
CIP	CAST IRON PIPE
CIPC	CAST–IN–PLACE CONCRETE
CIR	CIRCLE
CKT	CIRCUIT
CLK	CLOCK
CLS	CLOSE
CMIL	CIRCULAR MIL
CMP	CORRUGATED METAL PIPE
COS	COSINE
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CS	
CSP	CORRUGATED STEEL PIPE
CT	CURRENT TRANSFORMER
CTRL	CONTROLSWITCHER OR CONTROL SWITCH
CTS	CLEAR TO SEND
CU	COPPER
DC	DIRECT CURRENT
DCD	DATA CARRIER DETECT
DCE	DATA COMMUNICATIONS EQUIPMENT
DDE	DOUBLE DEAD END
DE	DEAD END
DEM	DEMOLISH, DEMOLITION
DEMOB	DEMOBILIZE
DET	DETAIL
DFR	DISTURBANCE FAULT RECORDER
DI	DIGITAL INPUT
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIST	DISTRIBUTION
DNP	DISTRIBUTED NETWORK PROTOCOL
DO	DIGITAL OUTPUT
DSSS	D STREET SUBSTATION
DTE	DATA TERMINAL EQUIPMENT
DWG	DRAWING
EA	EACH
EIA	ELECTRONICS INDUSTRY ASSOCIATION
EJ	EXPANSION JOINT
EL	ELECTRICAL
ELEV	ELEVATION
ENCL	ENCLOSURE
EQ	EQUAL
EQUIP	EQUIPMENT
EST	ESTIMATE
EXIST	EXISTING
F	FARAD
F	FUSE
FREQ	FREQUENCY
FT	FEET
FT	FEED THROUGH
FUT	FUTURE
G	CONDUCTANCE OR GROUND
GA	GAUGE
GALV	GALVANIZED
GB	GROUND BUS
GCB	GAS CIRCUIT BREAKER
GEN	GENERATOR
GI	GALVANIZED IRON
GND	GROUND
GOAB	GANG OPERATED AIR–BREAK SWITCH
GRC	GALVANIZED RIGID CONDUIT
GRD	GRADE, GRADING
GRSC	GALVANIZED RIGID STEEL CONDUIT
H	HENERY
HDPE	HIGH–DENSITY POLYETHYLENE
HLO	HOT LINE ORDER
HORIZ	HORIZONTAL
HP	HORSEPOWER
HZ	HERTZ
IA	PHASE A CURRENT
IB	PHASE B CURRENT
IC	PHASE C CURRENT
ID	INSIDE DIAMETER
IN	INPUT
IN	INCH
IN	NEUTRAL CURRENT
INCL	INCLUDE(D), INCLUDING
IND	INDUSTRY
INT	INTERSECTION
INV	INVERT
IP	POLARIZING CURRENT
j	COMPLEX NUMBER
J	JOULE
JB	JUNCTION BOX
KA	KILOAMPRERE
KV	KILOVOLT
KW	KILOWATT
L	INDUCTANCE
L	LINE
L	LOAD
LB	LOAD BREAK
LGPP	LANDFILL GAS POWER PLANT
LT	LIGHT
M	METER(S)
MAT	MATERIAL
MAX	MAXIMUM
MFG	MANUFACTURER
MI	MILE
MIN	MINIMUM
MISC	MISCELLANEOUS
MM	MILLIMETER(S)
MO	MOTOR OPERATED (OR)
MOB	MOBILIZE
MTR	METER
MW	MEGAWATT
N	NEUTRAL
N	NEWTON
N	NORTH
NC	NORMALLY CLOSED
NCC	NORMALLY CLOSED CONTACT
N/C	NO CONNECTION
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOC	NORMALLY OPEN CONTACT
NS	SYNCHRONIZING NEUTRAL
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
OUT	OUTPUT
P	REAL POWER OR PRIMARY
PB	PUSH BUTTON
PCH	POWER CONVERSION HUT
PF	POWER FACTOR
PLC	PROGRAMMABLE LOGIC CONTROLLER
PM	PAD–MOUNT TRANSFORMER
PSSS	PROVIDER SWITCHYARD
PT	POINT
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER
Q	REACTIVE POWER
R	RESISTANCE OR RESISTOR
RCLS	RECLOSE
RAD	RADIUS
RAD	RADIAN
RD	ROAD
RE	REMOTE END
REF	REFERENCE
REQD	REQUIRED
RET	REMOTE END TRIP
RET	RETURN
REV	REVISION
RLY	RELAY
RR	RAILROAD
ROW	RIGHT OF WAY
RTS	READY TO SEND
RTU	REMOTE TERMINAL UNIT
RX	RECEIVE
S	APPARENT POWER
S	SOUTH
S	SOURCE
S–L	SOURCE–LOAD
SA	SURGE ARRESTOR
SC	SWITCH CABINET
SEC	SECTION
SEC	SECONDARY
SVC	SERVICE
SVC	STATIC VAR COMPENSATOR
SHT	SHEET
SIM	SIMILAR
SIN	SINE
SPEC	SPECIFICATION
SPECS	SPECIFICATIONS
SPSS	SPARTAN SUBSTATION
SS	SYNCHRONIZING SWITCH
STA	STATION
STD	STANDARD
SW	SWITCH
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
SYNCH	SYNCHRONIZE
T	TIME OR TRANSFORMER
TAN	TANGENT
TCM	TRIP COIL MONITOR
TEL	TELEPHONE
TERM	TERMINAL
TEMP	TEMPORARY
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
TRP	TRIP
TURB	TURBINE
TX	TRANSMIT
TYP	TYPICAL
UG	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
V	VOLT
VA	VOLTAMPERE
VA	PHASE A VOLTAGE
VAR	REACTIVE POWER
VB	PHASE B VOLTAGE
VAC	ALTERNATING CURRENT VOLTAGE
VC	PHASE C VOLTAGE
VCB	VACUUM CIRCUIT BREAKER
VDC	DIRECT CURRENT VOLTAGE
VERT	VERTICAL
VIF	VERIFY IN FIELD
VN	NEUTRAL VOLTAGE
VR	VOLTAGE REGULATOR
VREG	VOLTAGE REGULATOR
VS	SYNCHRONIZING VOLTAGE
VT	VOLTAGE TRANSFORMER
W	WEST
W	WATT
W/	WITH
W/O	WITHOUT
X	REACTANCE
XFMR	TRANSFORMER
XMSSN	TRANSMISSION
Y	ADMITTANCE
YL	YELLOW
Z	IMPEDANCE
2	TIME–DELAY
21	DISTANCE
25	SYNCHRONISM CHECK
27	UNDERVOLTAGE
30	ANNUNCIATOR
32	DIRECTIONAL POWER
37	UNDERCURRENT OR UNDERPOWER
38	BEARING
40	FIELD
43	MANUAL TRANSFER OR SELECTOR DEVICE
46	REVERSE–PHASE
47	PHASE–SEQUENCE VOLTAGE
49	MACHINE OR TRANSFORMER THERMAL RELAY
50	INSTANTANEOUS OVERCURRENT
51	AC TIME OVERCURRENT
52	AC CIRCUIT BREAKER
52a	NORMALLY OPEN BREAKER CONTACT
52b	NORMALLY CLOSED BREAKER CONTACT
59	OVERVOLTAGE
60	VOLTAGE BALANCE
63	PRESSURE SWITCH
64	APPARATUS GROUND
67	AC DIRECTIONAL OVERCURRENT
68	BLOCKING
69	PERMISSIVE
71	LEVEL SWITCH
74	ALARM
76	DC OVERCURRENT
78	OUT–OF–STEP
79	RECLOSING RELAY
81	FREQUENCY
85	CARRIER OR PILOT WIRE
86	LOCK OUT
87	DIFFERENTIAL
94	TRIPPING

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fyre–el–0000_2.dwg

REF DWG(S):

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SHEET 2 OF 3

1 PV ARRAY SITE OVERVIEW

1:40 – 1" = 40'

40 0 40 80 FEET

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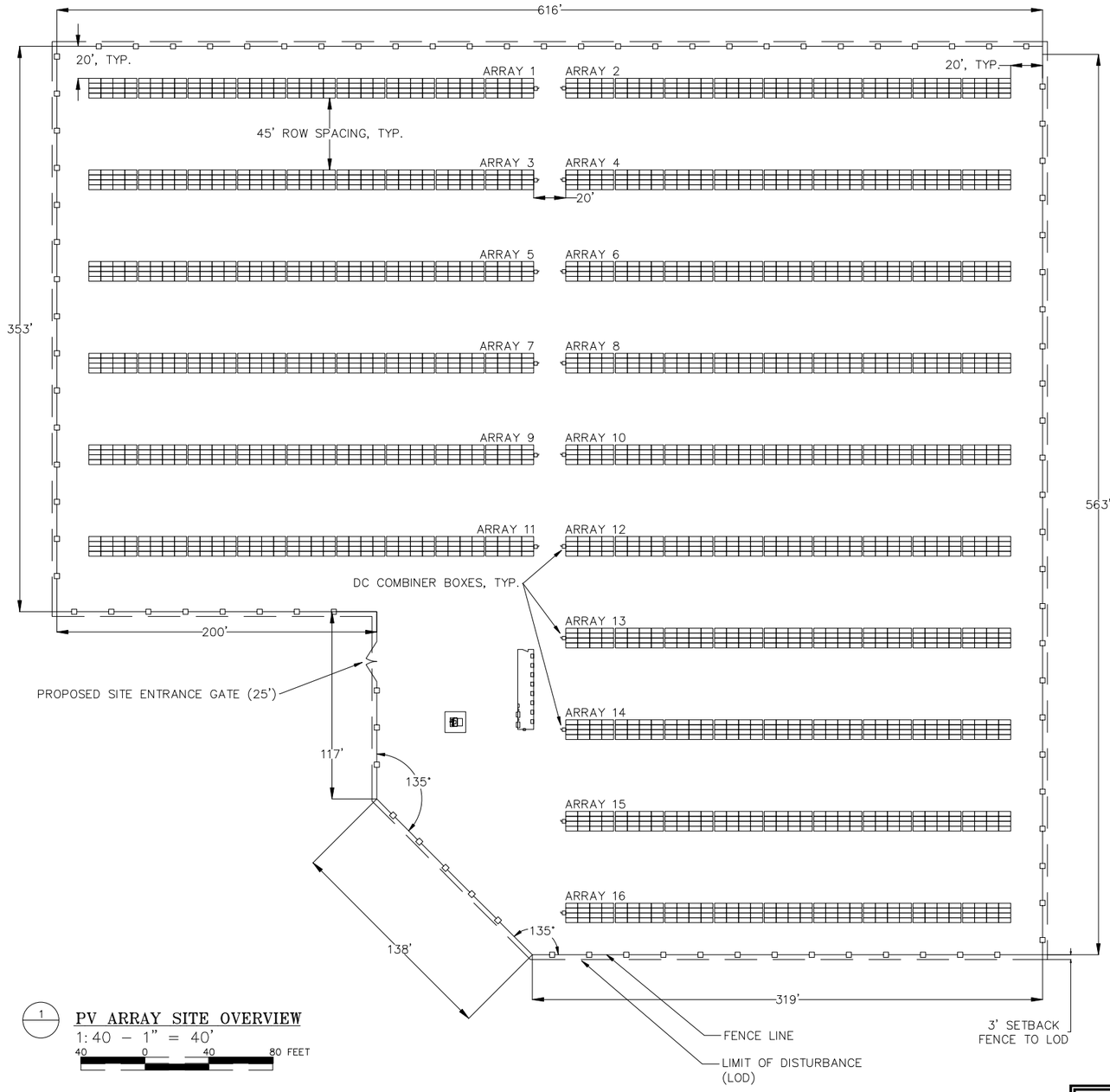
PV ARRAY SITE LAYOUT DIAGRAM

fyre-el-2500_2.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-2500

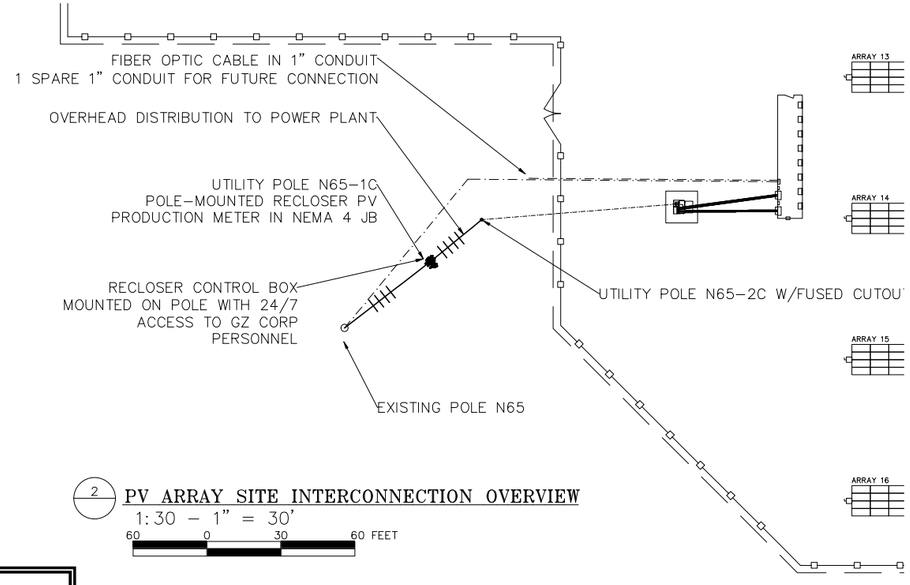


1 PV ARRAY SITE OVERVIEW
1:40 – 1" = 40'
40 0 40 80 FEET

LEGEND	
	DC COMBINER BOXES (16)
	LIMIT OF DISTURBANCE (LOD)
	FENCE LINE
	UNDERGROUND CONDUIT
	OVERHEAD DISTRIBUTION
	PV ARRAY
	SOLAR INVERTER (8)

System Summary

Physical Arrangement	
Methodology	Fixed Tilt, Ground Mount
Tilt	35°
Azimuth	180°
Racking System / Model	Nuance Osprey/PowerRACK
Electrical Arrangement	
Watts per Module	595W
Modules per String	24
Quantity of Strings	96
Quantity of Modules	2304
Total DC System Size	1,370,880W
Inverter Arrangement	
Manufacturer	SMA
Model	Sunny Highpower PEAK3 125-US
Inverter Size	125kW
Quantity of Inverters	8
Strings per Inverter	12
PV Modules	
Manufacturer	SEG Solar
Model	SEG-595-BTA-BG
Peak Power	595W
Quantity of Modules	2304



2 PV ARRAY SITE INTERCONNECTION OVERVIEW
1:30 – 1" = 30'
60 0 30 60 FEET

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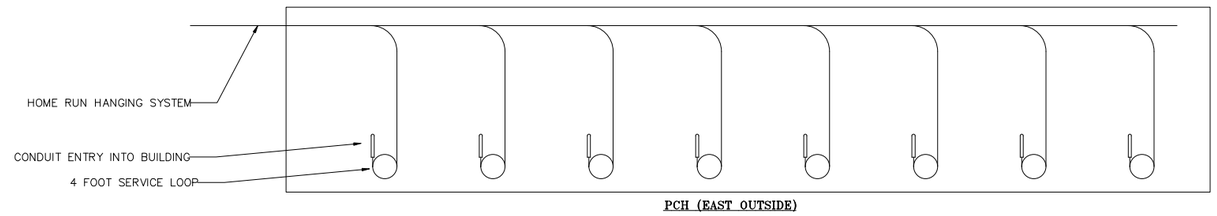
fyre-el-2500_4.dwg

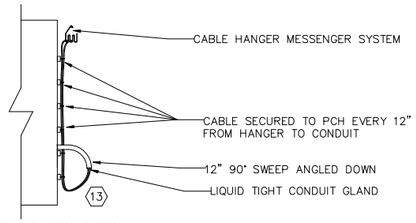
REF DWG(S):

DRAWING NO.: FYRE-EL-2500

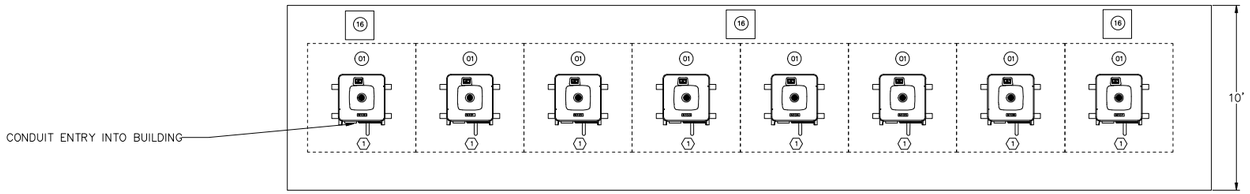
SHEET 4 OF 8



PCH (EAST OUTSIDE)



HOME-RUN ENTRY



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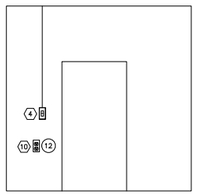
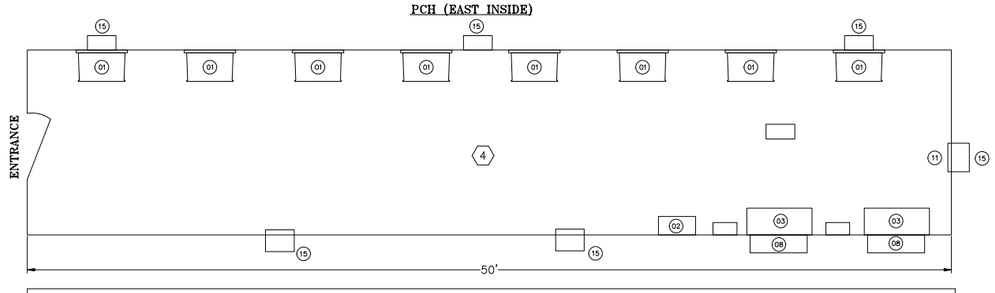
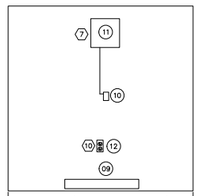
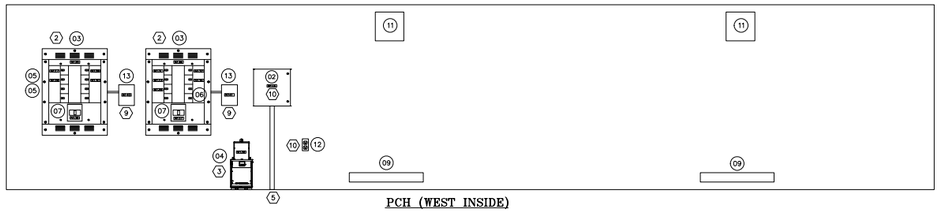


PCH (NORTH INSIDE)

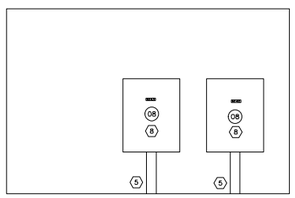




PCH (SOUTH INSIDE)



PCH (WEST INSIDE)



PCH (WEST OUTSIDE)

1 POWER CONVERSION HUT LAYOUT

1:4 – 1" = 4'

4 0 4 8 FEET

BUILDING MANUFACTURER TO PROVIDE PRE-FABRICATED METAL BUILDING PER FOLLOWING SPECIFICATIONS:

STRUCTURAL:
- -ROOF PITCH: 3:12
- -ROOF DEAD LOAD 30PSF MINIMUM
- -MAX WALL LOAD: 220LBS (INVERTER)
- -MAX FLOOR LOAD: 210LBS (STATION SERVICE SUBSTATION)

INSULATION:
- -WALL INSULATION: R22 MINIMUM
- -CEILING INSULATION: R30 MINIMUM

ALL INTERIOR CONDUITS SHALL BE GALVANIZED RIGID CONDUIT (GRC) OR ELECTRICAL METALLIC TUBING (EMT). EXTERIOR CONDUIT SHALL BE RIGID GALVANIZED CONDUIT ONLY. EMT TYPE COUPLERS AND FITTINGS SHALL BE RAIN-TIGHT COMPRESSION TYPE. GROUNDING BUSHINGS SHALL BE INSTALLED AT THE SOURCE END OF THE EMT CONDUIT RUNS FROM THE AC PANEL.

BILL OF MATERIAL

	REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
	01	EA	8	SUNNY HIGHPOWER PEAK3-125KW	SMA/SHP 125-US-21
	02	EA	1	COMMUNICATION PANEL	SEE REF. 1
	03	EA	1	POWER DISTRIBUTION PANELBOARD W/ MAIN BREAKER, 800A, 600VAC, 10KAIC	SQUARED/HCP18688M
	04	EA	1	STATION SERVICE SUBSTATION, 15kVA, 480VAC-120/240V	
	05	EA	8	200A/3P CIRCUIT BREAKER	
	06	EA	1	50A/2P CIRCUIT BREAKER	
	07	EA	2	800A/3P MAIN CIRCUIT BREAKER	
	08	EA	2	800A AC LOAD BREAK DISCONNECT W/ PROVISIONS FOR PADLOCK	
12	09	EA	3	ELECTRIC BASEBOARD HEATER, 1000W, 120VAC W/ BUILT-IN THERMOSTAT	
	10	EA	1	ADJUSTABLE THERMOSTAT	
12	11	EA	3	WALL MOUNT SHUTTER FAN, >2500CFM, 120VAC W/ DAMPER MOTOR CONTROLLED BY THERMOSTAT	
	12	EA	4	GFCI RECEPTACLE	
	13	EA	2	SHARK 250 SELF-ENCLOSED METER ASSEMBLY	ELECTRO INDUSTRIES /ENCSHK250-277-60-10-V3-D2-INP100S-X
	14	EA	1	LIGHT SWITCH	
7	15	EA	6	90° VENTILATION HOOD WITH INSECT SCREEN	
12	16	EA	3	10IN MOTORIZED INTAKE DAMPER	

NOTES:

1. MOUNT SMA SHP-125-US INVERTERS SUCH THAT THEY ARE 4" AWAY FROM THE WALL, AND 20" ON ALL OTHER SIDES FROM WALLS, FLOORS, CEILINGS, AND OTHER DEVICES. MAINTAIN 4' WORKING CLEARANCE ZONE IN FRONT OF INVERTERS, PER NEC. THE SUM OF CROSS-SECTIONAL AREAS OF ALL CONTAINED CONDUCTORS OR CABLES AT ANY CORSS SECTION OF THE NONMETALLIC WIREWAY SHALL NOT EXCEED 20 PERCENT OF THE INTERIOR CROSS-SECTIONAL ARE OR THE NONMETALLIC WIREWAY BETWEEN INVERTERS AND PANELBOARD
2. MOUNT POWER DISTRIBUTION PANELBOARDS SUCH THAT MANUFACTURER RECOMMENDED CLEARANCE DISTANCES BETWEEN THE PANELBOARDS AND WALLS, FLOORS, CEILINGS, AND OTHER DEVICES IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE IN FRONT OF THE PANELBOARD, PER NEC
3. MOUNT STATION SERVICE SUBSTATION SUCH THAT ALL MANUFACTURER RECOMMENDED CLEARANCE ZONES AWAY FROM EQUIPMENT IS MAINTAINED, AS WELL AS A 4' WORKING CLEARANCE ZONE IN FRONT OF THE DEVICE, PER NEC
4. PROVIDE INTERIOR EMERGENCY BATTERY BACKUP LIGHTING, AS WELL AS NORMALLY SWITCHED MAIN LIGHTING, PER NFPA. PROVIDE CEILING MOUNTED LIGHTING SUCH THAT 30 FOOTCANDLES IS MAINTAINED. MOUNT LIGHT SWITCH NEXT TO DOOR AT LEAST 40" FROM FLOOR.
5. ROUTE CONDUITS SUCH THAT THE STUB-UP AREA IS DIRECTLY UNDER ALL DESTINATION DEVICES IN THE POWER CONVERSION HUT
6. ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN MAY BE CONTRACTOR DETERMINED, PROVIDED THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.
7. VENTILATION FOR THE ENCLOSURE SHALL BE PROVIDED BY WEATHERPROOF 120VAC EXHAUST FANS WITH A MINIMUM FLOW RATE OF 2500CFM EACH, CONTROLLED BY A SINGLE ADJUSTABLE THERMOSTAT, AND BY A 10" MOTORIZED INTAKE DAMPER. EXHAUST FAN AND INTAKE DAMPER SHALL BE PROVIDED WITH A 90° EXTERIOR HOOD WITH INSECT SCREENS TO PREVENT INTRUSIONS OF WIND DRIVEN RAIN/SNOW.
8. WHERE SINGLE CONDUCTOR CABLES COMPRISING EACH PHASE, NEUTRAL, OR GROUNDED CONDUCTOR OF AN AC CIRCUIT ARE CONNECTED IN PARALLEL AS PERMITTED IN NEC 310.10(H), THE CONDUCTORS SHALL BE INSTALLED IN GROUPS CONSISTING OF NOT MORE THAN ONE CONDUCTOR PER PHASE, NEUTRAL, OR GROUNDED CONDUCTOR IN WIREWAY OR CONDUIT. NEC 378.20
9. CONNECT SHARK 250 CURRENT TRANSFORMERS AND POTENTIAL TRANSFORMERS TO THE 800A OUTPUT BREAKER AT POWER DISTRIBUTION PANELBOARDS THROUGH A 1" CONDUIT.
10. MOUNT RECEPTACLES ON INSIDE WALLS OF PCH AT LEAST 18" FROM FLOOR. MOUNT ONE RECEPTACLE ON WEST SIDE OF DOOR (NORTH WALL), ONE RECEPTACLE NEXT TO THE COMMUNICATION PANEL (SOUTH WALL), AND ONE RECEPTACLE INSIDE NEMA 1 COMMUNICATIONS PANEL (LINE ITEM 2, REF. NO. 1).
11. HEATING TO BE PROVIDED BY ELECTRIC BASEBOARD HEATERS WITH BUILT-IN THERMOSTATS. HEATERS TO TURN ON BELOW 10°F
12. PROVIDE HEATING AND COOLING SUCH THAT THE TEMPERATURE INSIDE THE PCH DOES NOT EXCEED 95°F, AND DOES NOT DROP BELOW 10°F. QUANTITIES AND DESCRIPTIONS OF LINE ITEMS 09, 11, AND 16 ARE FOR ILLUSTRATIVE PURPOSES ONLY. CONTRACTOR IS ABLE TO CHOOSE NEW PRODUCTS AND PRODUCT QUANTITIES FOR THESE LINE ITEMS, PROVIDED THAT THE MINIMUM SPECIFICATIONS AS NOTED IN THE 'DESCRIPTION' COLUMN IS MAINTAINED.
13. HOME-RUN CABLES TO ENTER INTO PCH VIA CONDUIT SWEEP ANGLED DOWN. MIN CONDUIT RADIUS TO BE 8 X THE DIAMETER OF THE LARGEST CABLE. SUPPORT CABLES EVERY 12"AS MEASURED BY THE CABLES PATH FROM HANGER, TO CONDUIT WITH UV RESISTANT, OUTDOOR RATED CABLE TIES. ADD IN A 4FT SERVICE LOOP BEFORE ENTERING INTO THE CONDUIT. EXACT HEIGHT AND PLACEMENT OF CONDUIT TO BE DETERMINED BY CONTRACTOR ON-SITE.

NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/04-23-2025	JRV/4-23-2025
B	ISSUED FOR 95% REVIEW	MED/05-02-2025	JRV/05-02-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

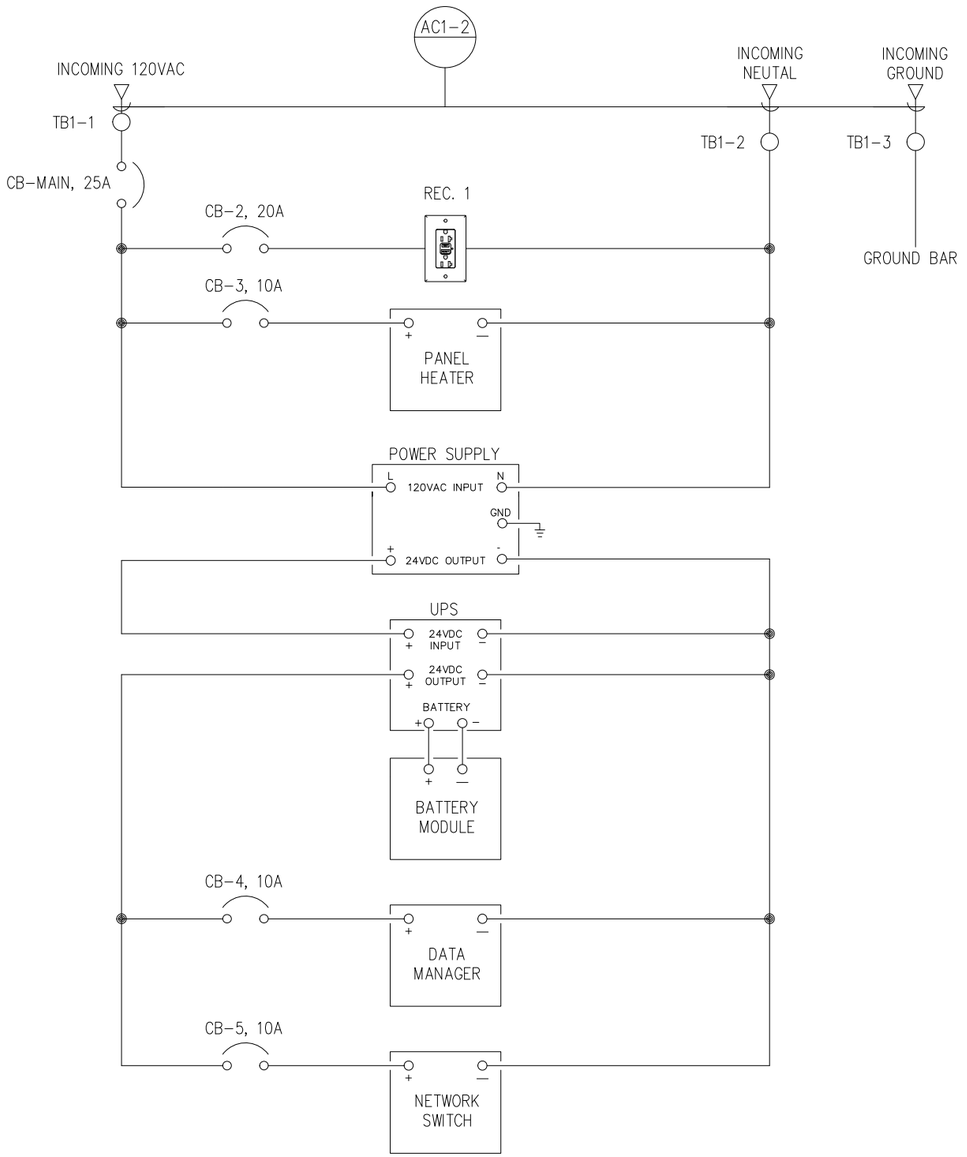
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	FYRE-EL-2000/6	COMMUNICATIONS PANEL ELEVATION DRAWING

DRAWING NAME:
TANANA CHIEFS CONFERENCE FORT YUKON RENEWABLE ENERGY PCH LAYOUT

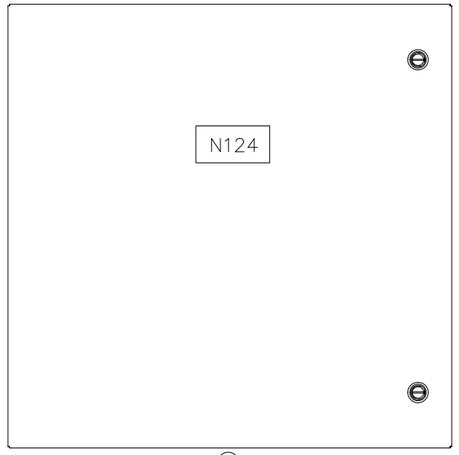
fyre-el-2500_5.dwg

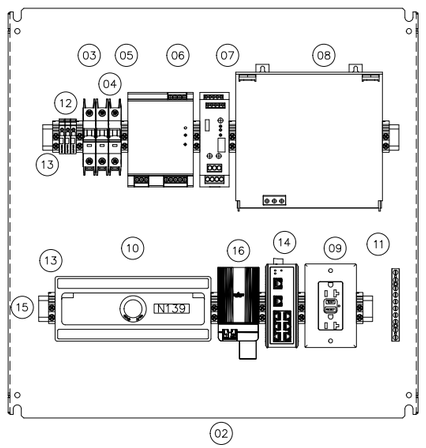
REF DWG(S):

DRAWING NO.: FYRE-EL-2500



1 ONE-LINE DIAGRAM





2 PANEL ELEVATION – INSIDE

1:4 – 1" = 4"

1

BILL OF MATERIAL

REF. NO.	UNIT	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	EA	1	24" X 24" X 10" NEMA 1 MILD STEEL WALL MOUNTED ENCLOSURE	
02	EA	1	INNER PANEL FOR 24X24X10 ENCLOSURE	
03	EA	1	25A, 600V UL489 1-POLE BREAKER	
04	EA	1	20A, 600V UL489 1-POLE BREAKER	
05	EA	3	10A, 600V UL489 1-POLE BREAKER	
06	EA	1	PHOENIX CONTACT 120VAC/24VDC PS, 20 AMP	PHOENIX CONTACT/ 2866776
07	EA	1	PHOENIX CONTACT 20 AMP UPS	PHOENIX CONTACT/ 2320238
08	EA	1	PHOENIX CONTACT 12 Ah BATTERY	PHOENIX CONTACT/ 1274119
09	EA	1	RECEPTACLE, 125V, 20A, DUPLEX, GCI	
10	EA	1	DATA MANAGER	SMA/EDMM-20
11	EA	1	UL 467 GROUND BAR, 6 POLE MINIMUM	
12	EA	3	6MM DINRAIL MOUNTED TERMINAL BLOCK	
13	EA	9	6MM DINRAIL MOUNTED TERMINAL BLOCK END STOP	
14	EA	1	UNMANAGED ETHERNET SWITCH, 2 FIBER PORTS	MOXA/EDS-308-SS-SC-80
15	EA	1	35MM DIN MOUNTING RAIL	
16	EA	1	150W PANEL HEATER W/BUILT IN REGULATION ON: 41F – OFF: 59'	STEGO/06021.0-00

NOTES:

1 ANY LINE ITEM ON THE BILL OF MATERIAL THAT DOES NOT HAVE A SPECIFIED MFGR./CATALOG NO. IN THE RIGHT-HAND COLUMN CAN BE CONTRACTOR DETERMINED, PROVIDED THAT THE CONTRACTOR DETERMINED PRODUCT MATCHES THE PRODUCT DESCRIPTION IN THE CENTER COLUMN, AND THAT ALL CONDITIONS SPECIFIED IN THE GENERAL PROJECT NOTES ARE MET.

3 PANEL BOM

NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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Consulting Engineers
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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
COMMUNICATIONS PANEL
PANEL ELEVATION DRAWING
fyre-el-2500_6.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-2500

SHEET 6 OF 8

NOT FOR CONSTRUCTION

OVERHEAD FIBER OPTIC TO POWER PLANT

FO

TO EXISTING DISTRIBUTION

INSTALLED UNDER SEPARATE CONTRACT

PRODUCTION METER
300A, 4.16KV, 3φ, 4W
CT RATIO: 300:5

CAT5E — 735

VCR

OVERHEAD RECLOSER
G&W VIPER-ST
15KV, 630A
REMOTE-CONTROLLED
ON POLE N65-1C

CAT5E — 651R

FUSED CUTOUTS
MOUNTED ON RISER
POLE N65-2C

SOLAR PV FARM

PV STEP-UP XFMR
4160Y/2400V PRIMARY
480Y/277V SECONDARY
1500kVA

MAIN AC LOAD BREAK DISCONNECT
SWITCH #1
800A, 480V, 3φ

MAIN AC LOAD BREAK DISCONNECT
SWITCH #2
800A, 480V, 3φ

INVERTER EQUIPMENT CONTAINER

NETWORK SWITCH/FIBER OPTIC CONVERTER IN COMMUNICATIONS PANEL

CAT5E

SHARK 250 METER ASSEMBLY WITH FUSED INPUTS — 500mA

NEMA 1 SWITCHBOARD
480Y/277V, 3φ, 4W, 800A MAIN BREAKER, 10kAIC

MCB1 800AF 800AT

CB1 200A/3P — CB2 200A/3P — CB3 200A/3P — CB4 200A/3P

SHARK 250 METER ASSEMBLY WITH FUSED INPUTS — 500mA

NEMA 1 SWITCHBOARD
480Y/277V, 3φ, 4W, 800A MAIN BREAKER, 10kAIC

MCB2 800AF 800AT

CB5 200A/3P — CB6 200A/3P — CB7 200A/3P — CB8 200A/3P

AUX LOAD PANEL
MINI POWER ZONE
120V PANEL. SEE
REF. 1 FOR
CONNECTION DETAILS

CBSS 50A/2P

SMA DATA MANAGER

CAT5E

INV1 SMA SHP 125-US-21 STRING INVERTER 480VAC, 3φ, 3W	INV2 SMA SHP 125-US-21 STRING INVERTER 480VAC, 3φ, 3W	INV3 SMA SHP 125-US-21 STRING INVERTER 480VAC, 3φ, 3W	INV4 SMA SHP 125-US-21 STRING INVERTER 480VAC, 3φ, 3W	INV5 SMA SHP 125-US-21 STRING INVERTER 480VAC, 3φ, 3W	INV6 SMA SHP 125-US-21 STRING INVERTER 480VAC, 3φ, 3W	INV7 SMA SHP 125-US-21 STRING INVERTER 480VAC, 3φ, 3W	INV8 SMA SHP 125-US-21 STRING INVERTER 480VAC, 3φ, 3W
DC COMBINER BOX #1 W/DISC	DC COMBINER BOX #2 W/DISC	DC COMBINER BOX #3 W/DISC	DC COMBINER BOX #4 W/DISC	DC COMBINER BOX #5 W/DISC	DC COMBINER BOX #6 W/DISC	DC COMBINER BOX #7 W/DISC	DC COMBINER BOX #8 W/DISC
PV ARRAY 1 (144) MODULES	PV ARRAY 2 (144) MODULES	PV ARRAY 3 (144) MODULES	PV ARRAY 4 (144) MODULES	PV ARRAY 5 (144) MODULES	PV ARRAY 6 (144) MODULES	PV ARRAY 7 (144) MODULES	PV ARRAY 8 (144) MODULES

DC COMBINER BOX #9 W/DISC	DC COMBINER BOX #10 W/DISC	DC COMBINER BOX #11 W/DISC	DC COMBINER BOX #12 W/DISC
PV ARRAY 9 (144) MODULES	PV ARRAY 10 (144) MODULES	PV ARRAY 11 (144) MODULES	PV ARRAY 12 (144) MODULES

DC COMBINER BOX #13 W/DISC	DC COMBINER BOX #14 W/DISC	DC COMBINER BOX #15 W/DISC	DC COMBINER BOX #16 W/DISC
PV ARRAY 13 (144) MODULES	PV ARRAY 14 (144) MODULES	PV ARRAY 15 (144) MODULES	PV ARRAY 16 (144) MODULES

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 35% REVIEW	MED/04-04-2025	JRV/04-04-2025
B	ISSUED FOR 65% REVIEW	MED/04-23-2025	JRV/04-23-2025
C	ISSUED FOR 95% REVIEW	MED/05-02-2025	JRV/05-02-2025
D	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	FYRE-EL-0100/1	AC THREE LINE DIAGRAM

DRAWING NAME:

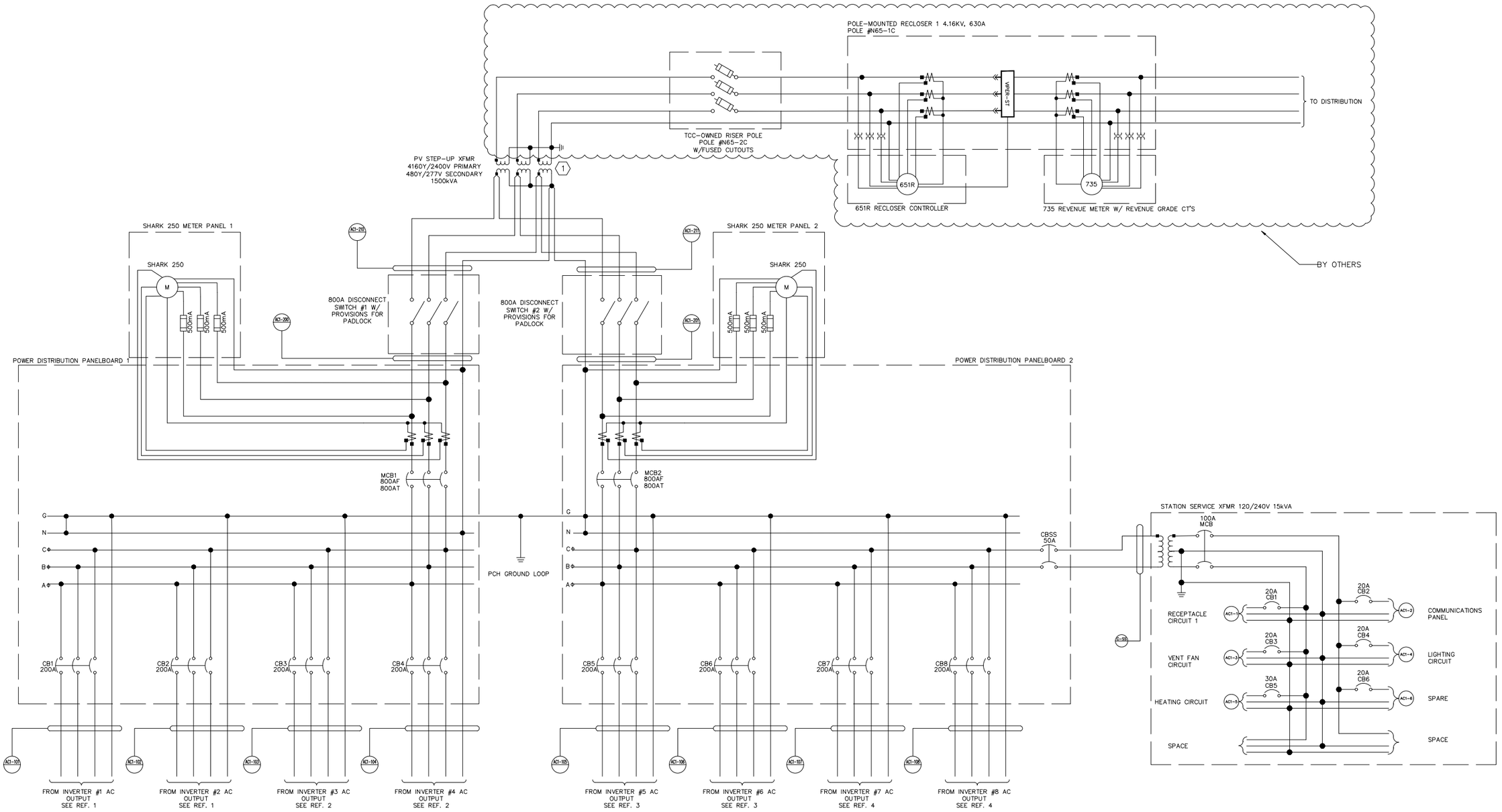
TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
1.5MWdc PV SYSTEM
ONELINE DIAGRAM

fyre-el-0010_2.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-0010

SHEET 2 OF 2



NOTES:

(1) LIFT X0 BUSHING BOND JUMPER AND ISOLATE ALL X0 CONNECTIONS FROM ANY GROUNDING AT THE UTILITY SERVICE POLE. GROUND SECONDARY OF TRANSFORMER AT PCH GROUND LOOP

NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN

DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/04-23-2025	JRV/04-23-2025
B	ISSUED FOR 65% REVIEW	MED/05-02-2025	JRV/05-02-2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	FYRE-EL-3000/1	PV ARRAY 1-2 WIRING DIAGRAM
2	FYRE-EL-3000/1	PV ARRAY 3-4 WIRING DIAGRAM
3	FYRE-EL-3000/1	PV ARRAY 5-6 WIRING DIAGRAM
4	FYRE-EL-3000/1	PV ARRAY 7-8 WIRING DIAGRAM

DRAWING NAME:

TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
AC THREELINE

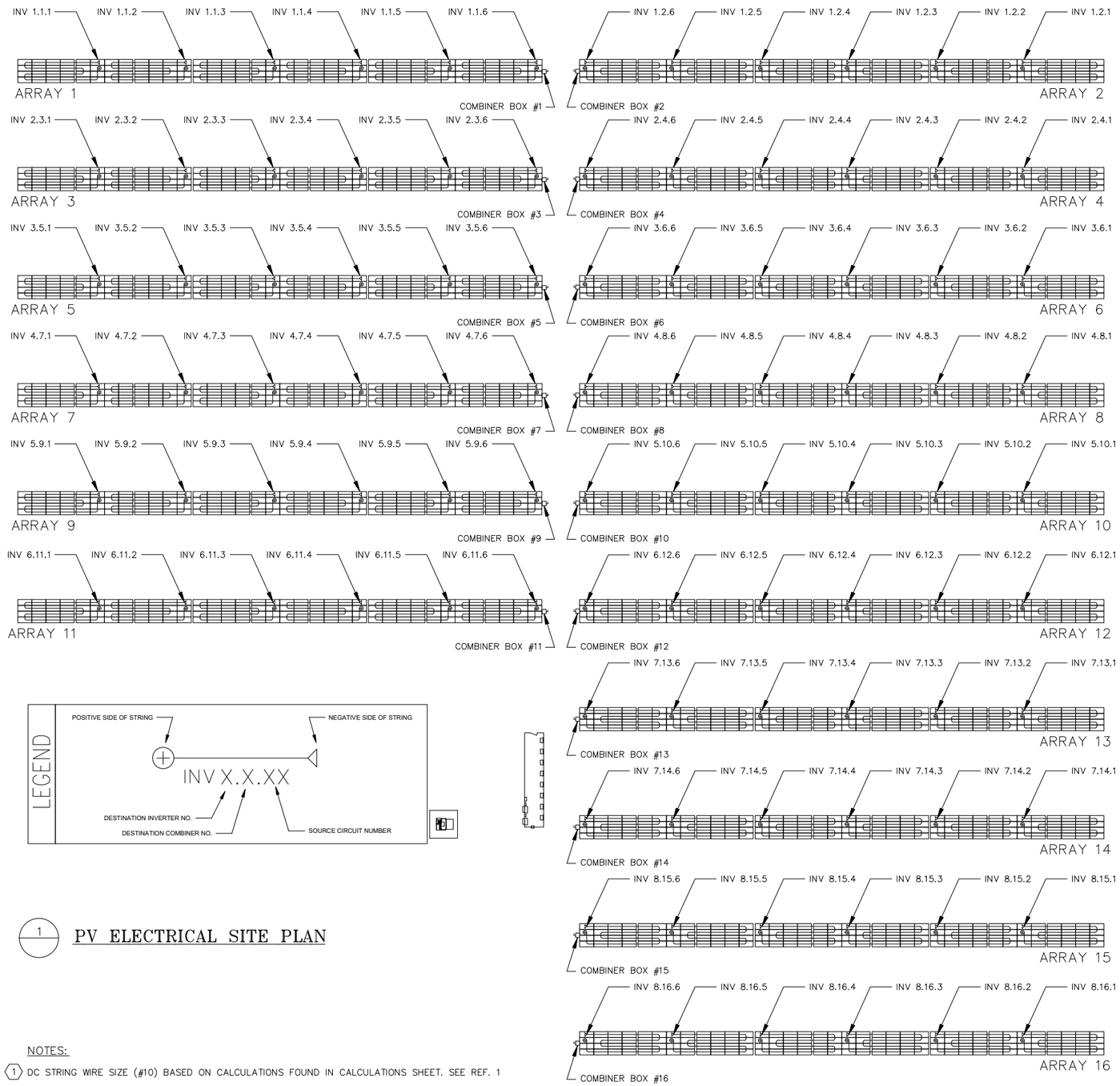
fyre-el-0100_1.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-0100

SHEET 1 OF 1

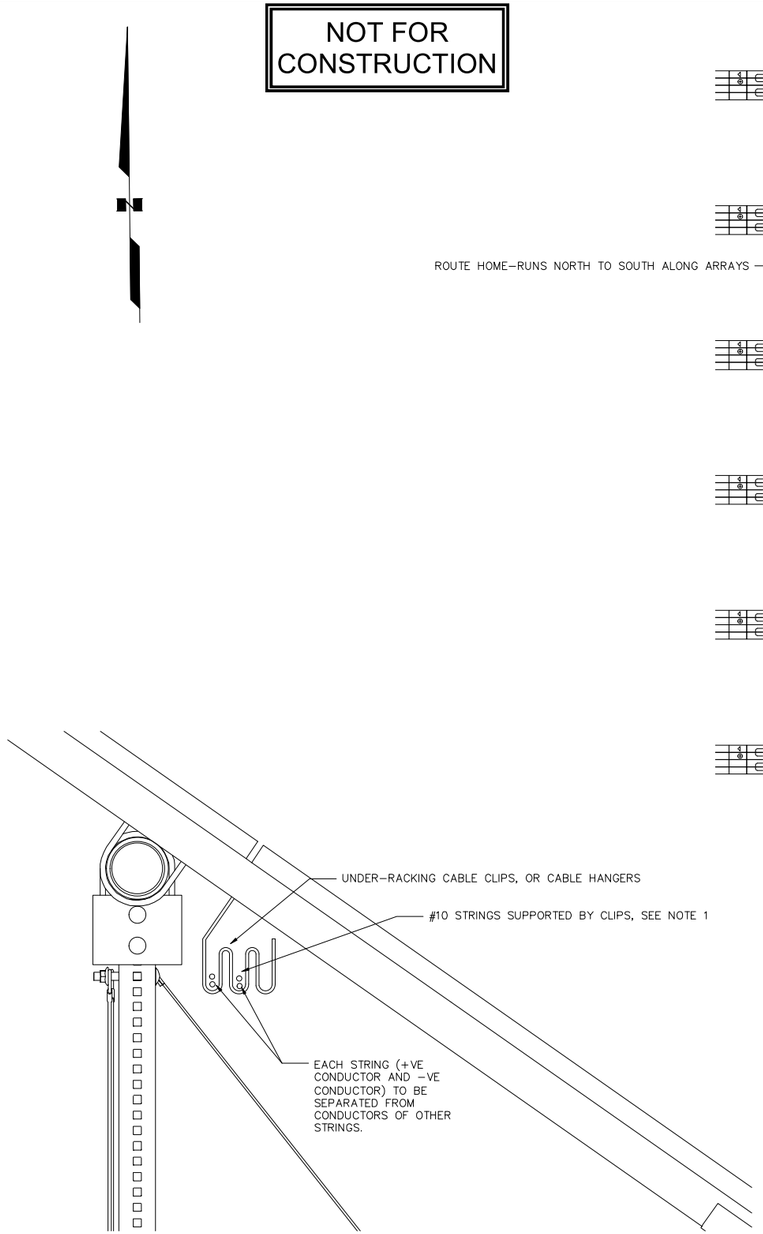
NOT FOR CONSTRUCTION



1 PV ELECTRICAL SITE PLAN

NOTES:

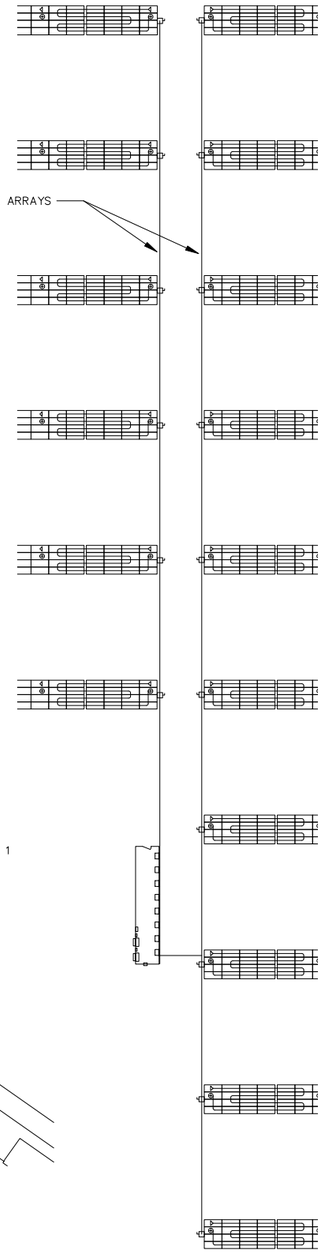
(1) DC STRING WIRE SIZE (#10) BASED ON CALCULATIONS FOUND IN CALCULATIONS SHEET. SEE REF. 1



2 TYPICAL STRING SUPPORT CLIP DETAIL

TYPICAL 24 MODULE SERIES WIRING NOTES:

1. SUPPORT #10 STRINGS WITH CABLE CLIPS, OR OTHER TCC APPROVED UNDER-RACKING CABLE MANAGEMENT SYSTEM AT MOST EVERY 4' (48"). INSTALL PER MANUFACTURERS RECOMMENDATIONS. EXACT PLACEMENT AND CONNECTION METHOD TO BE DETERMINED BY CONTRACTOR ON-SITE



3 DC HOMERUN SITE PLAN

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/04-23-2025	JRV/04-23-2025
B	ISSUED FOR 95% REVIEW	MED/05-02-2025	JRV/05-02-2025
C	ISSUED FOR BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	FYRE-EL-0700/1	CALCULATION SHEET

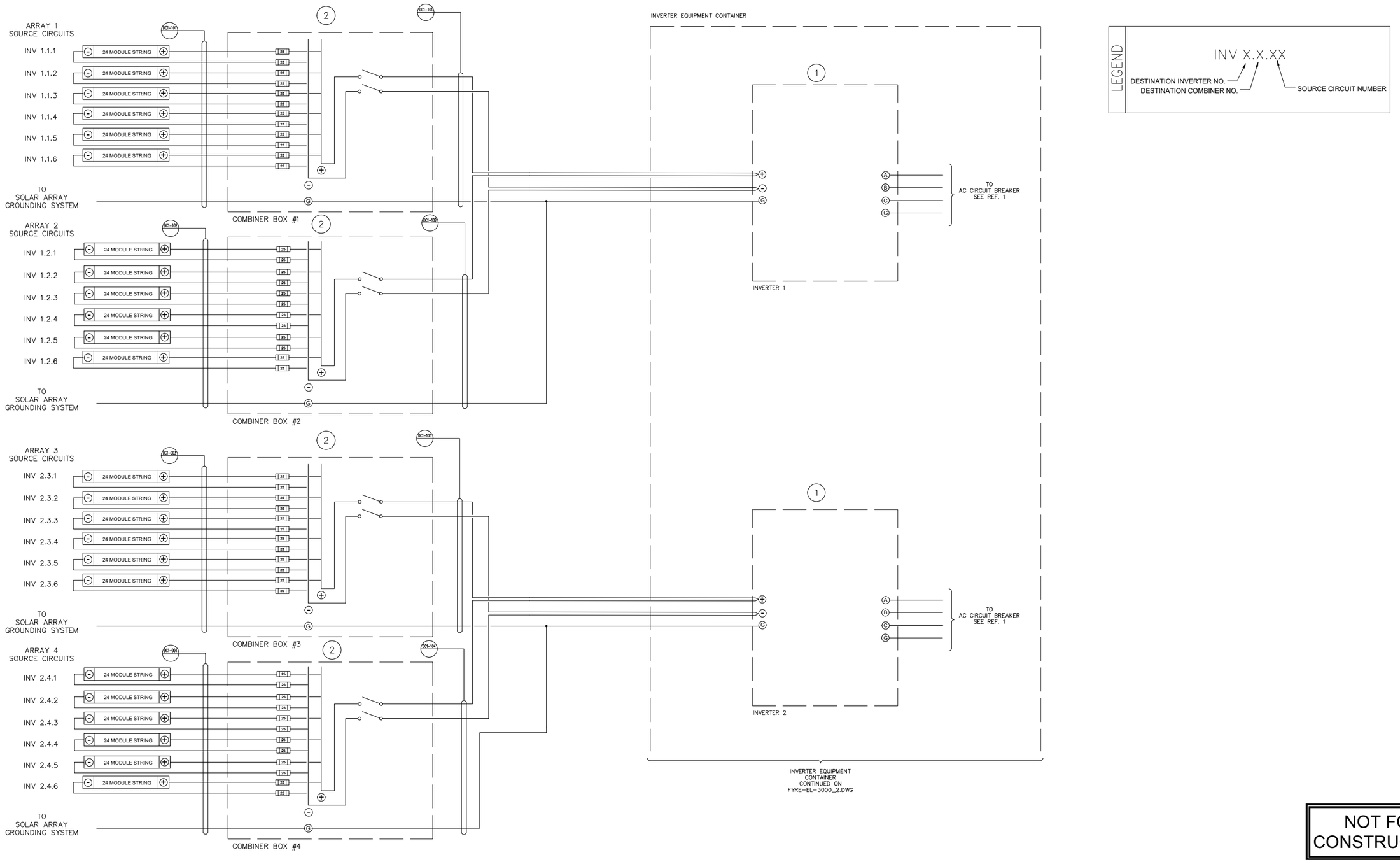
DRAWING NAME:
TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
PV ELECTRICAL PLAN

fyre-el-0020_1.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-0020

SHEET 1 OF 1



NOT FOR CONSTRUCTION

PROJECT:	FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER:	MAX DONALDSON/JOHN VENABLES
JOB #:	25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/04-23-2025	JRV/04-23-2025
B	ISSUED FOR 95% REVIEW	MED/05-02-2025	JRV/05-02-2025
C	ISSUED FOR BID	GGL/09-26-2025	JRV/09-26-2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	FYRE-EL-3000/2	PV ARRAY 5-8 DC WIRING DIAGRAM

DRAWING NAME:

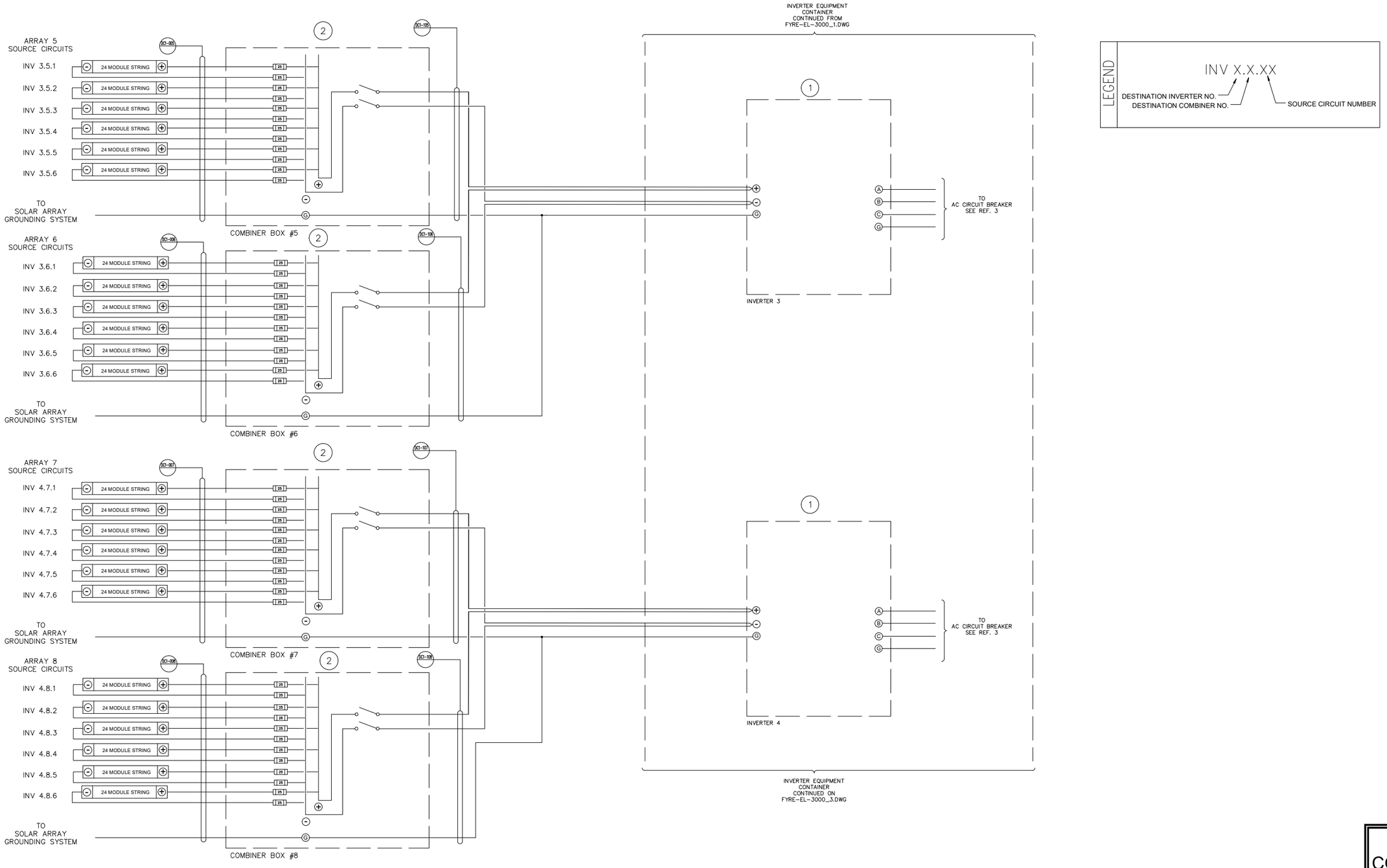
TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
PV ARRAY 1-4
DC WIRING DIAGRAM

fyre-el-3000_1.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-3000

SHEET 1 OF 6



NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/04-23-2025	JRV/04-23-2025
B	ISSUED FOR 95% REVIEW	MED/05-02-2025	JRV/05-02-2025
C	ISSUED FOR BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	FYRE-EL-3000/1	PV ARRAY 1-4 DC WIRING DIAGRAM
2	FYRE-EL-3000/3	PV ARRAY 9-12 DC WIRING DIAGRAM
3	FYRE-EL-0100/1	AC THREELINE DIAGRAM

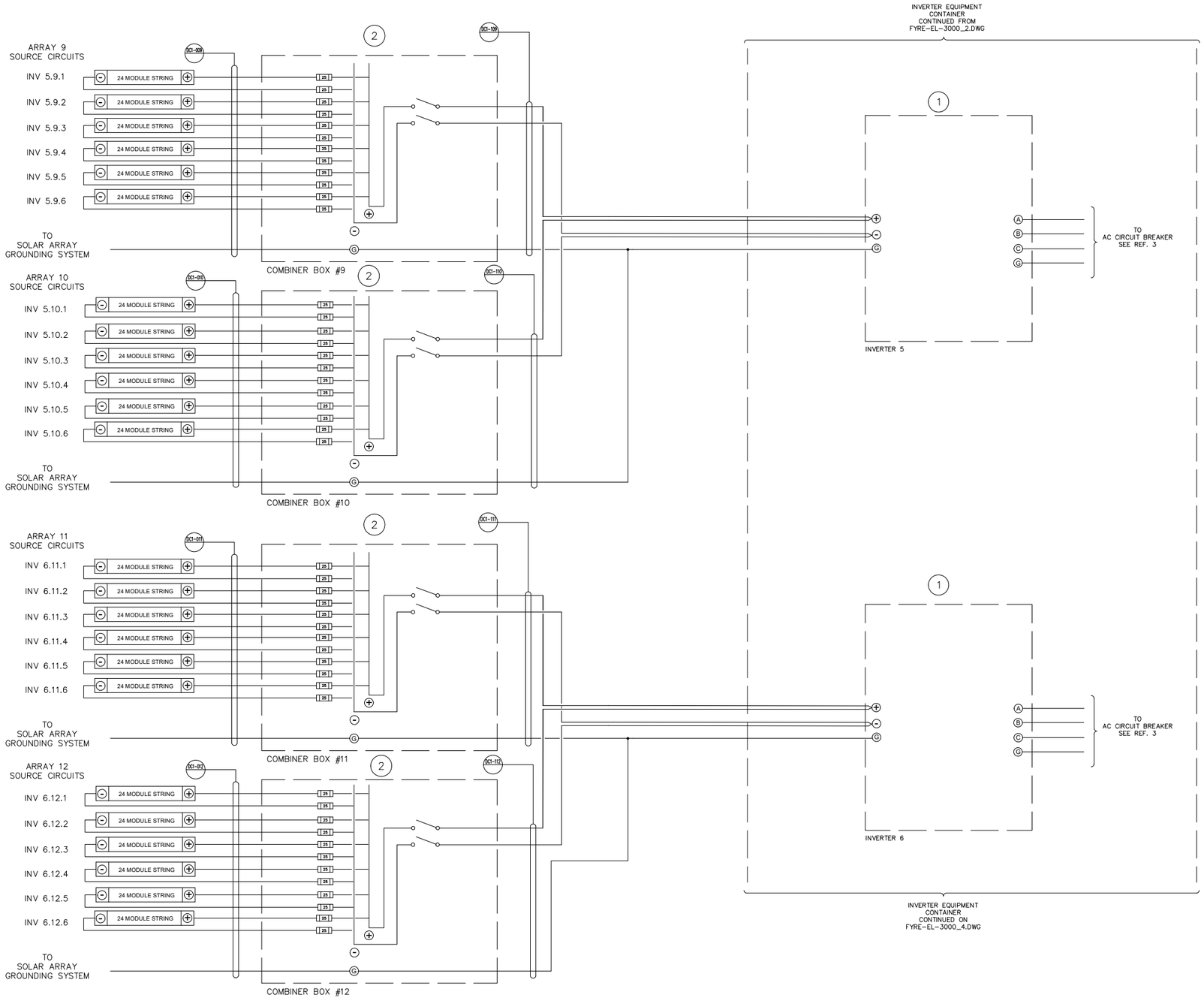
DRAWING NAME:
TANANA CHIEFS CONFERENCE FORT YUKON RENEWABLE ENERGY PV ARRAY 5-8 DC WIRING DIAGRAM

fyre-el-3000_2.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-3000

SHEET 2 OF 6



LEGEND

INV X.X.XX

DESTINATION INVERTER NO.
DESTINATION COMBINER NO.
SOURCE CIRCUIT NUMBER

NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/04-23-2025	JRV/04-23-2025
B	ISSUED FOR 95% REVIEW	MED/05-02-2025	JRV/05-02-2025
C	ISSUED FOR BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

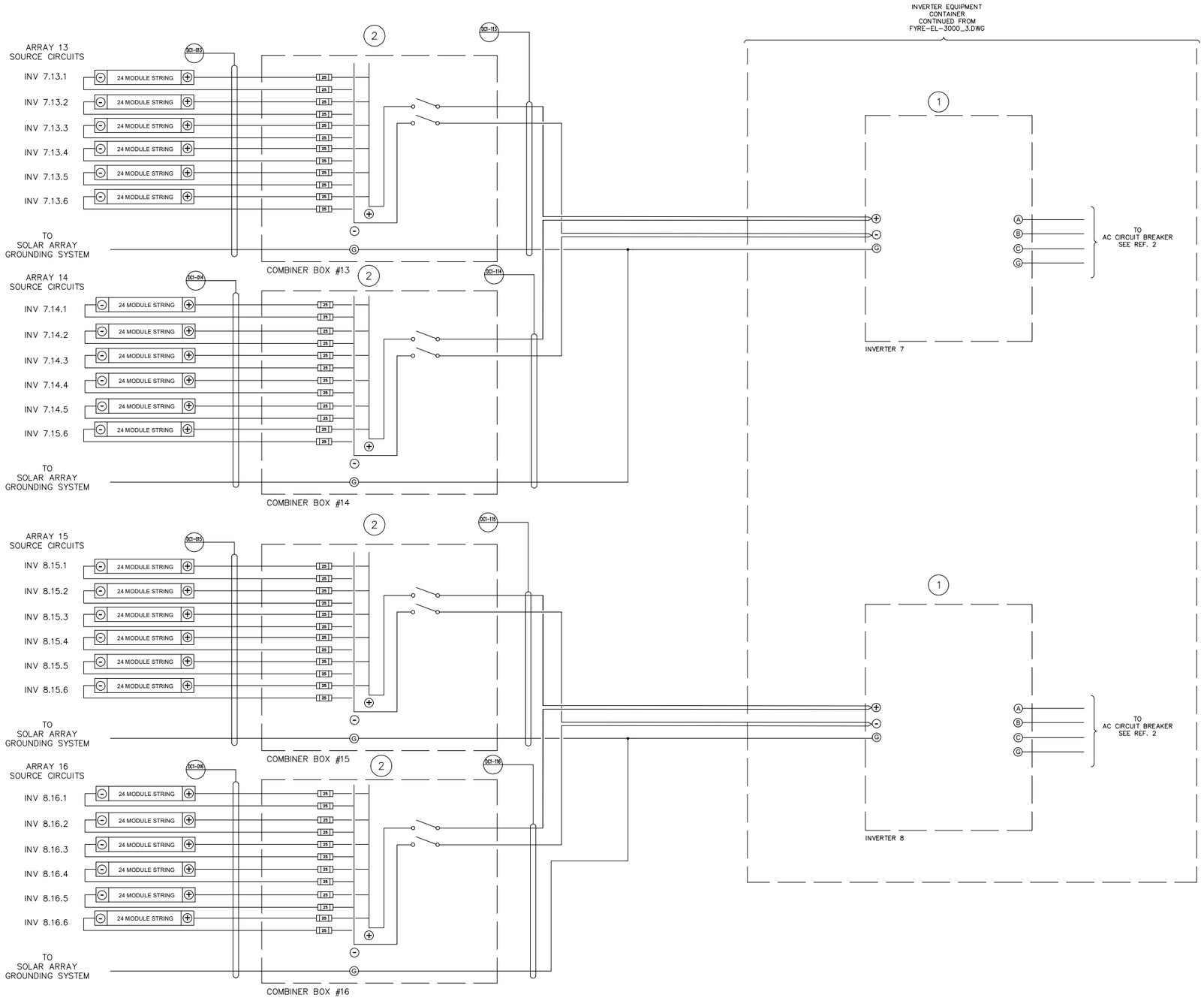
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	FYRE-EL-3000/2	PV ARRAY 5-8 DC WIRING DIAGRAM
2	FYRE-EL-3000/4	PV ARRAY 13-16 DC WIRING DIAGRAM
3	FYRE-EL-0100/1	AC THREELINE DIAGRAM

DRAWING NAME:
TANANA CHIEFS CONFERENCE FORT YUKON RENEWABLE ENERGY PV ARRAY 9-12 DC WIRING DIAGRAM

fyre-el-3000_3.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-3000



NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/04-23-2025	JRV/04-23-2025
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C	ISSUED FOR BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	FYRE-EL-3000/3	PV ARRAY 9-12 DC WIRING DIAGRAM
2	FYRE-EL-0100/1	AC THREELINE DIAGRAM

DRAWING NAME:
TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
PV ARRAY 13-16
DC WIRING DIAGRAM

fyre-el-3000_4.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-3000

SHEET 4 OF 6

EQUIPMENT SCHEDULE		
TAG	QUANTITY	DESCRIPTION
1	8	PV INVERTER; SMA SUNNY HIGHPOWER PEAK3 125-US
2	16	12 INPUT DC COMBINER;TERRASMART FSFT275-12-25-N4-CD OR EQUIVALENT

CABLE SCHEDULE

TAG	FUNCTION	DESCRIPTION	RACEWAY
DC1-001	ROW 1 STRING TO DS1	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-002	ROW 2 STRING TO DS1	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-003	ROW 3 STRING TO DS2	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-004	ROW 4 STRING TO DS2	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-005	ROW 5 STRING TO DS3	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-006	ROW 6 STRING TO DS3	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-007	ROW 7 STRING TO DS4	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-008	ROW 8 STRING TO DS4	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-009	ROW 9 STRING TO DS5	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-010	ROW 10 STRING TO DS5	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-011	ROW 11 STRING TO DS6	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-012	ROW 12 STRING TO DS6	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-013	ROW 13 STRING TO DS7	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-014	ROW 14 STRING TO DS7	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-015	ROW 15 STRING TO DS8	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR
DC1-016	ROW 16 STRING TO DS8	(12) #10 CU UL4703 2kV PV WIRE, (1) #10 CU EGC	FREE AIR

〈2〉

CABLE SCHEDULE

TAG	FUNCTION	DESCRIPTION	RACEWAY
DC1-101	DS1 TO INV1	(2) 1/0 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-102	DS2 TO INV1	(2) 1/0 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-103	DS3 TO INV2	(2) 1/0 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-104	DS4 TO INV2	(2) 1/0 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-105	DS5 TO INV3	(2) 1/0 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-106	DS6 TO INV3	(2) 1/0 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-107	DS7 TO INV4	(2) #2 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-108	DS8 TO INV4	(2) #2 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-109	DS9 TO INV5	(2) #2 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-110	DS10 TO INV5	(2) #2 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-111	DS11 TO INV6	(2) #2 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-112	DS12 TO INV6	(2) #2 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-113	DS13 TO INV7	(2) #2 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-114	DS14 TO INV7	(2) #2 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-115	DS15 TO INV8	(2) #2 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR
DC1-116	DS16 TO INV8	(2) #2 AL 2kV PV WIRE, (1) #8 CU EGC	FREE AIR

〈3〉

CABLE SCHEDULE

TAG	FUNCTION	DESCRIPTION	RACEWAY
AC1-101	INV1 TO CB1	(3) 2/0 CU XHHW, #6 CU EGC	C-0111
AC1-102	INV2 TO CB2	(3) 2/0 CU XHHW, #6 CU EGC	C-0112
AC1-103	INV3 TO CB3	(3) 2/0 CU XHHW, #6 CU EGC	C-0113
AC1-104	INV4 TO CB4	(3) 2/0 CU XHHW, #6 CU EGC	C-0114
AC1-105	INV5 TO CB5	(3) 2/0 CU XHHW, #6 CU EGC	C-0115
AC1-106	INV6 TO CB6	(3) 2/0 CU XHHW, #6 CU EGC	C-0116
AC1-107	INV7 TO CB7	(3) 2/0 CU XHHW, #6 CU EGC	C-0117
AC1-108	INV8 TO CB8	(3) 2/0 CU XHHW, #6 CU EGC	C-0118
AC1-200	MCB1 TO DS1	3/PHASE 4/0 CU XHHW, (1) 3/0 CU XHHW NEUTRAL, (1) 3/0 CU EGC	C-0200
AC1-201	MCB2 TO DS2	3/PHASE 4/0 CU XHHW, (1) 3/0 CU XHHW NEUTRAL, (1) 3/0 CU EGC	C-0201
AC1-201	DS1 TO XFMR1	3/PHASE 4/0 CU XHHW, (1) 3/0 CU XHHW NEUTRAL, (1) 3/0 CU EGC	C-0210
AC1-211	DS2 TO XFMR1	3/PHASE 4/0 CU XHHW, (1) 3/0 CU XHHW NEUTRAL, (1) 3/0 CU EGC	C-0211
COM-500	COMM. PANEL TO POLE	MULTI-MODE FIBER OPTIC PATCH CABLE	C-0500
AC1-SS	STATION SERVICE	(2) #8 CU XHHW	1/2" EMT
AC1-1	RECEPTACLE CIRCUIT	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-2	COMMUNICATIONS PANEL	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-3	VENT FAN CIRCUIT	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-4	LIGHTING CIRCUIT	#12 CU XHHW, #12 CU XHHW NEUTRAL, #12 CU EGC	1/2" EMT
AC1-5	UNIT HEATER CIRCUIT	#10 CU XHHW, #10 CU XHHW NEUTRAL, #10 CU EGC	1/2" EMT

〈1〉〈4〉

NOTES:

〈1〉 LOW VOLTAGE AC CABLE SIZING BASED ON CU XHHW WIRE AMPACITY WITH A TEMPERATURE RATING OF 75°C

〈2〉 DC CABLE SIZING FOR STRINGS BASED ON CU UL4703 2KV PV WIRE AMPACITY WITH A TEMPERATURE RATING OF 90°C AND A VOLTAGE DROP OF LESS THAN 2%

〈3〉 DC CABLE SIZING FOR HOME-RUNS BASED ON AL 2KV PV WIRE AMPACITY WITH A TEMPERATURE RATING OF 75°C IN FREE AIR (TABLE 310.15(B)(17)) AND A VOLTAGE DROP OF LESS THAN 2%. USE OF CABLE LARGER THAN SPECIFIED IN THE CABLE SCHEDULE IS ALLOWED, PROVIDED THAT THE CONDUCTOR DESCRIPTION IS MAINTAINED.

〈4〉 SEE REF. 1 FOR CONDUIT SCHEDULE

NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/04-23-2025	JRV/04-23-2025
B	ISSUED FOR 95% REVIEW	MED/05-02-2025	JRV/05-02-2025
C	ISSUED FOR BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	FYRE-EL-3000/6	PV ARRAY CONDUIT SCHEDULE

DRAWING NAME:
TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
PV ARRAY
EQUIPMENT/CABLE SCHEDULE
fyre-el-3000_5.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-3000

SHEET 5 OF 6

CONDUIT SCHEDULE

TAG	FUNCTION	CONDUIT TYPE	TRADE SIZE
C-0111	INV1 TO CB1	EMT	1.5"
C-0112	INV2 TO CB2	EMT	1.5"
C-0113	INV3 TO CB3	EMT	1.5"
C-0114	INV4 TO CB4	EMT	1.5"
C-0115	INV5 TO CB5	EMT	1.5"
C-0116	INV6 TO CB6	EMT	1.5"
C-0117	INV7 TO CB7	EMT	1.5"
C-0118	INV8 TO CB8	EMT	1.5"
C-0200	MCB1 TO DS1	PVC	3 X 2.5"
C-0201	MCB2 TO DS2	PVC	3 X 2.5"
C-0210	DS1 TO XFMR1	PVC	3 X 2.5"
C-0211	DS2 TO XFMR1	PVC	3 X 2.5"
C-0300	XFMR1 TO POLE	PVC	3"
C-0500	NEMA4 PANEL TO POLE	PVC	1"
⟨1⟩ C-0501	SPARE	PVC	1"

NOTES:

⟨1⟩ TRADE SIZE OF CONDUITS SHOWN IN CONDUIT SCHEDULE ARE MINIMUM SIZES BASED ON NEC CONDUIT FILL % (CHAPTER 9 TABLE 1). USE OF CONDUIT THAT IS LARGER IN TRADE SIZE THAN SPECIFIED IN CONDUIT SCHEDULE IS PERMITTED.

NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
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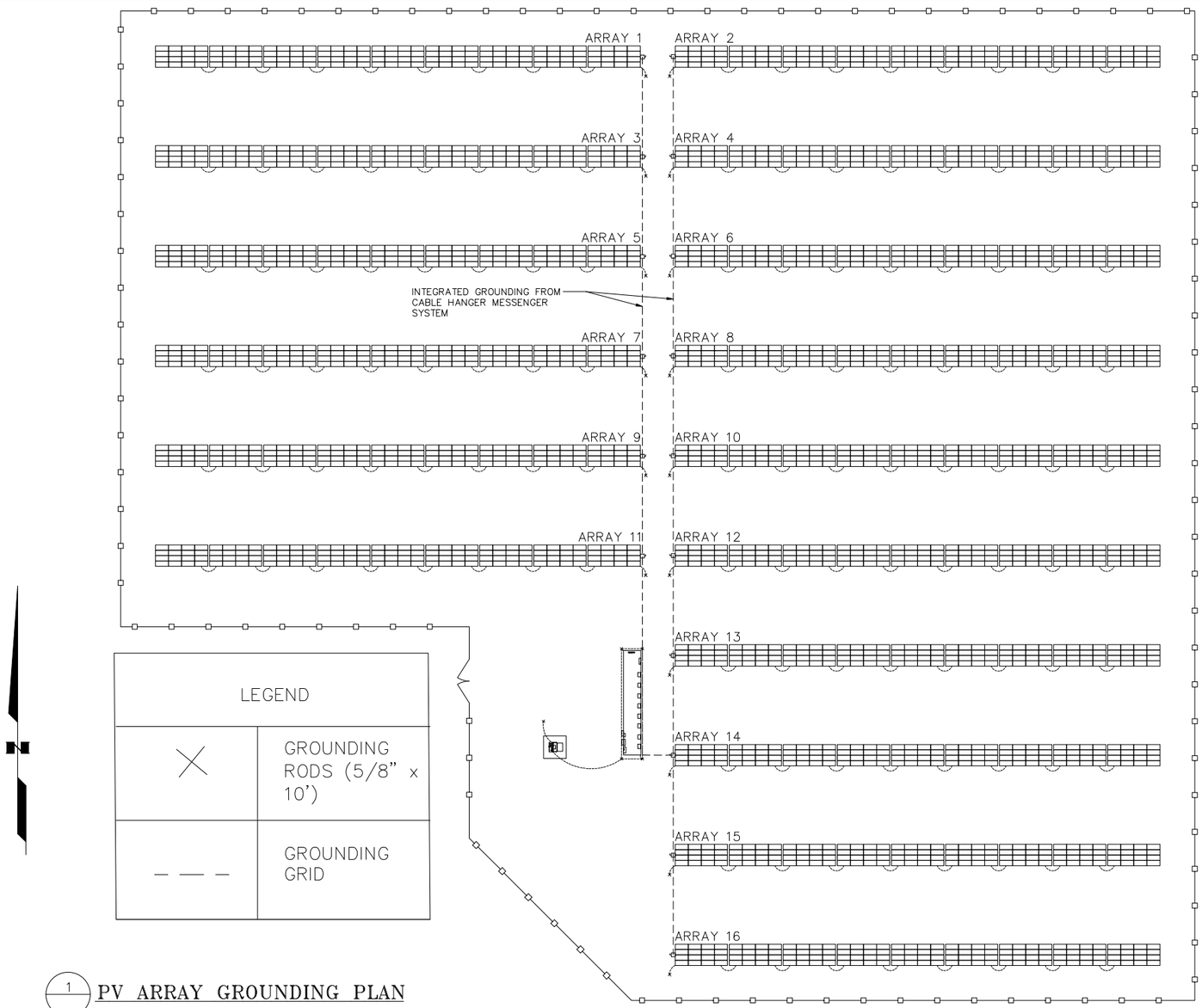
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
PV ARRAY
CONDUIT SCHEDULE
fyre-el-3000_6.dwg

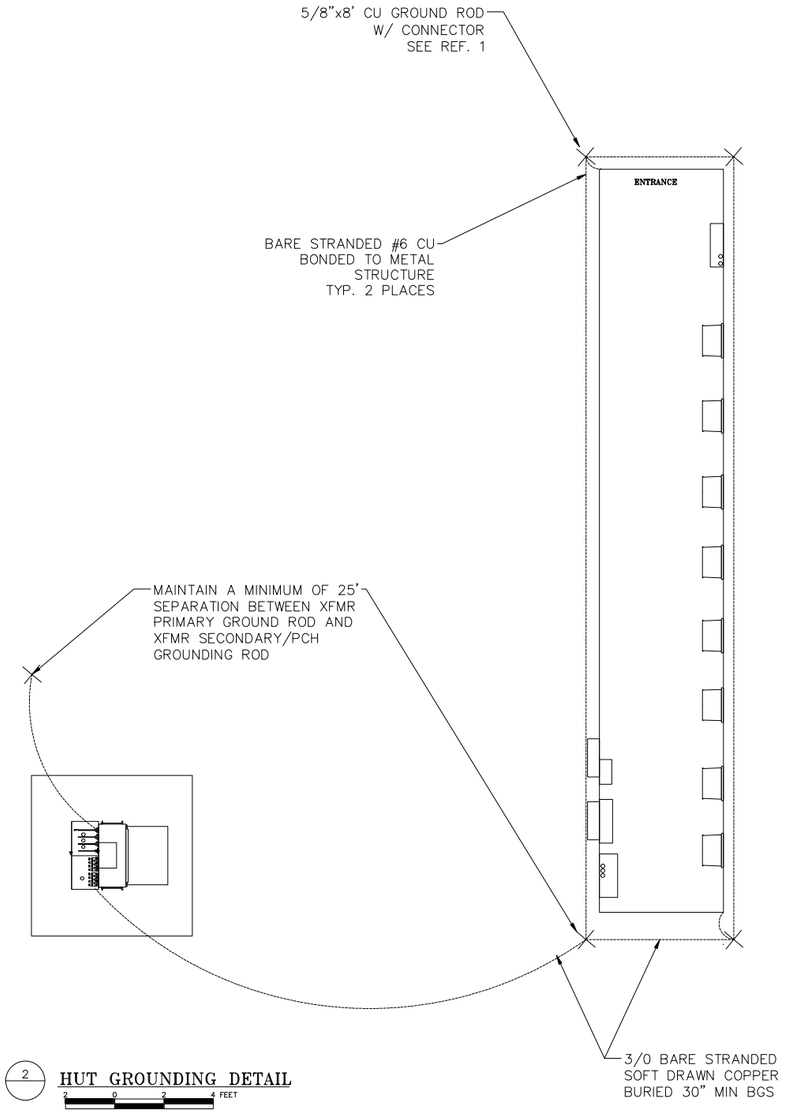
REF DWG(S):

DRAWING NO.: FYRE-EL-3000



1 PV ARRAY GROUNDING PLAN

20 0 20 40 FEET



2 HUT GROUNDING DETAIL

2 0 2 4 FEET

GROUNDING PLAN NOTES:

1. CONTRACTOR TO TEST EACH GROUNDING ELECTRODE USING THE FALL OF POTENTIAL TEST. GROUND RODS SPACED 6' MIN APART SHALL BE ADDED AS NECESSARY UNTIL A RESISTANCE TO GROUND VALUE OF 25 OHMS OR LESS IS ACHIEVED.

NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

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C	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION
1	FYRE-SS-3000/3	GROUNDING AND CONDUIT DETAILS

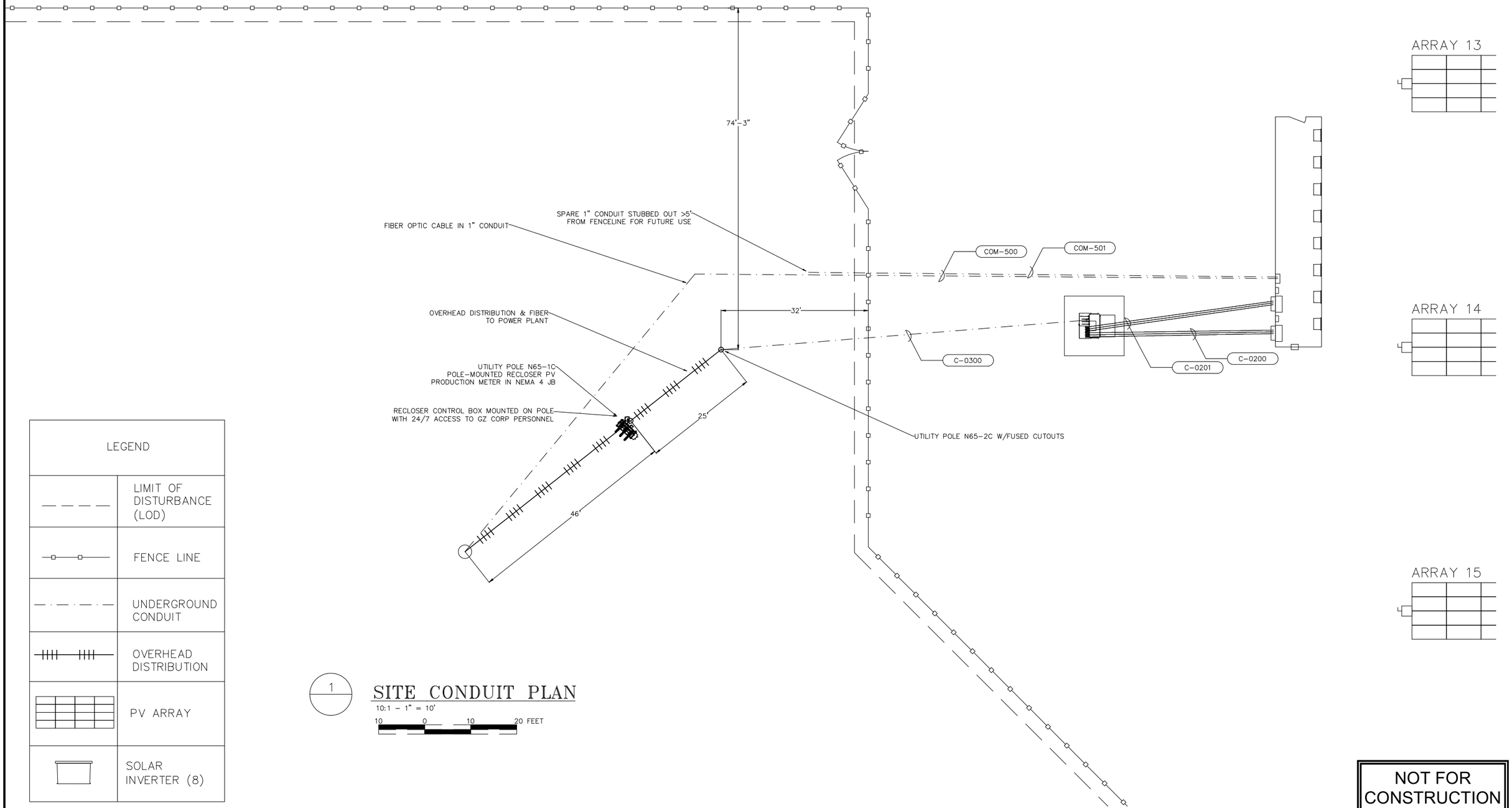
DRAWING NAME:
TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
PV ARRAY GROUNDING PLAN

fyre-el-2000_1.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-2000

SHEET 1 OF 7



LEGEND	
— — — —	LIMIT OF DISTURBANCE (LOD)
—□—□—	FENCE LINE
— · — · — · —	UNDERGROUND CONDUIT
⊣⊢⊣⊢	OVERHEAD DISTRIBUTION
▦	PV ARRAY
▭	SOLAR INVERTER (8)

1 SITE CONDUIT PLAN

10:1 – 1" = 10'

10 0 10 20 FEET

NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN

DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 95% REVIEW	MED/05-05-2025	JRV/05-05-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
PV ARRAY CONDUIT PLAN

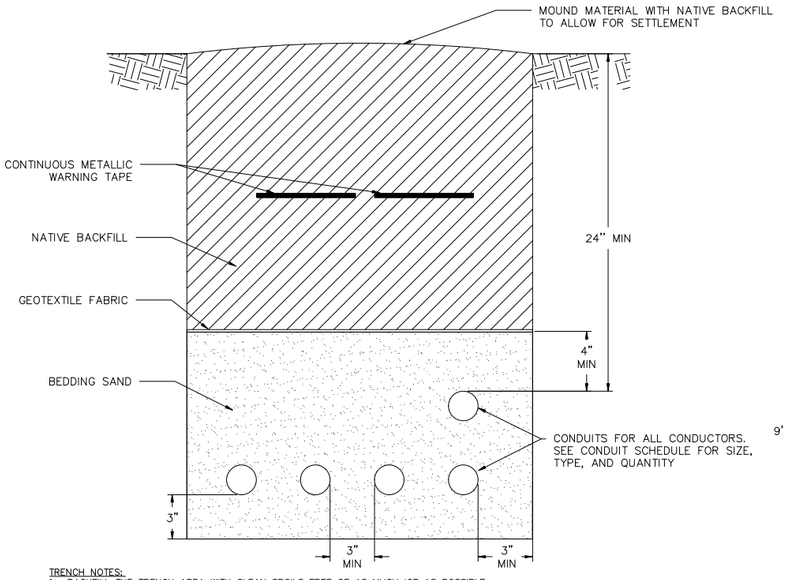
fyre-el-2000_2.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-2000

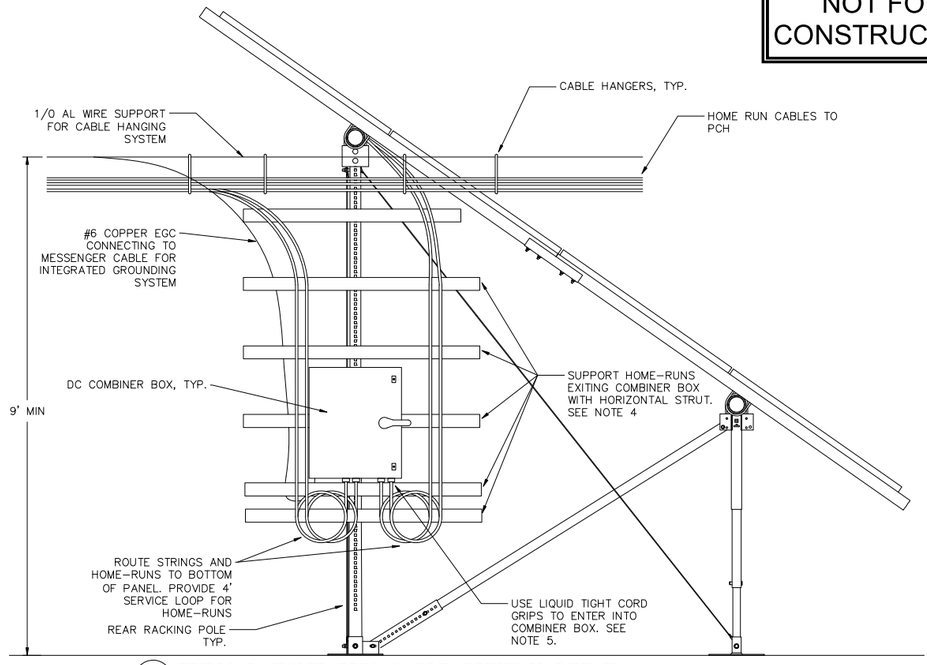
SHEET 2 OF 7

NOT FOR CONSTRUCTION



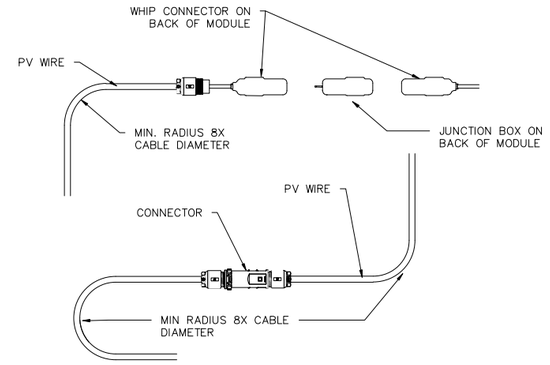
TRENCH NOTES:
1. BACKFILL THE TRENCH AREA WITH CLEAN SPOILS FREE OF AS MUCH ICE AS POSSIBLE.
2. CONSOLIDATION OF BACK FILL MATERIALS SHALL BE COMPLETED IN 12 INCH LIFTS MAXIMUM. INTENT OF THE CONSOLIDATION IS TO ENSURE ELIMINATION OF VOIDS.
3. FOR TRENCH IN GRAVEL, THE TRENCH CAP SHALL NOT EXCEED 4 INCHES. FOR TRENCH IN TUNDRA, THE TRENCH CAP SHOULD BE 35% – 40% OF THE TRENCH DEPTH (1.75' TO 2' FOR A 5' DEEP TRENCH), TO ALLOW FOR SETTLING AND ICE THAW. CONTRACTOR SHALL DISPOSE OF EXCESS EXCAVATED MATERIALS. FINAL CONTOURING OF THE TRENCH CAP IN TUNDRA SHOULD BE CONDUCTED BY HAND (MATCHING SURROUNDING DRAINAGE PATTERNS), TO ENSURE NO DIVERSION OF WATER OCCURS, RESULTING IN EROSION.
4. TRENCHES 1' WIDE SHOULD NOT NEED ANY SEEDING. FINAL REHABILITATION DETERMINATION TO BE MADE BY AGENCY REPRESENTATIVES.
5. COMPANY REPRESENTATIVE SHALL BE NOTIFIED AND PRESENT FOR ACCEPTANCE OF TRENCH PRIOR TO PLACEMENT OF CABLE AND BACKFILLING OF TRENCH (24–HOUR NOTICE REQUIRED). AGENCY REPRESENTATIVE SHALL ALSO PROVIDE ACCEPTANCE OF CABLE PRIOR TO BACKFILLING.
6. BEDDING SHALL BE 3/8" MINUS MATERIAL, NO CRUSHED OR SHARP ROCK. BEDDING MATERIAL SHALL NOT BE MACHINE COMPACTED WITHIN 6" OF CABLES. SLURRY OF A COMPOSITION THAT WILL NOT DAMAGE THE CABLE IS AN ACCEPTABLE BEDDING MATERIAL.
7. MAINTAIN 1' MIN. SEPARATION BETWEEN POWER CONDUCTORS AND COMMUNICATION CABLES

1 TYPICAL TRENCH
NTS



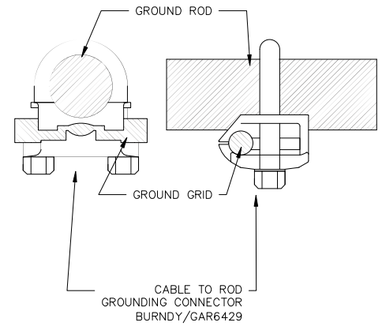
2 TYPICAL HOME RUN CABLE RUNWAY DETAIL
NTS

TYPICAL COMBINER BOX DETAIL NOTES:
1. ENSURE THAT CABLES ROUTED FROM HANGING SYSTEM TO COMBINER BOXES DO NOT EXCEED CONDUCTOR BENDING RADIUS
2. INSTALL CABLE HANGING SYSTEM ACCORDING TO MANUFACTURERS INSTALLATION INSTRUCTIONS
3. CONTRACTOR TO DETERMINE MOST SUITABLE MOUNTING SOLUTION FOR OVERHEAD CABLE MANAGEMENT SYSTEM
4. SUPPORT DC CABLES EXITING THE DC COMBINER BOX WITH A UV RESISTANT, OUTDOOR RATED CABLE TIE CONNECTED TO A HORIZONTAL STRUT. INSTALL CLOSEST CABLE SUPPORT A DISTANCE OF NO MORE THAN 12" AWAY FROM THE COMBINER BOX, AS MEASURED BY THE CABLE PATH. SUPPORT HOME–RUNS EVERY 12" UNTIL SUPPORTED BY CABLE HANGER MESSENGER SYSTEM. SUPPORT STRINGS EVERY 12" UNTIL SUPPORTED BY UNDER–RACKING CABLE MANAGEMENT SYSTEM.
5. USE A LIQUID TIGHT CORD GRIP OR CABLE GLAND FOR HOME–RUNS AND STRINGS WHEN ENTERING COMBINER BOX.

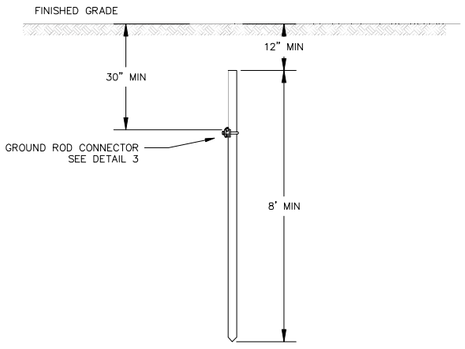


PV WIRE BENDING REQUIREMENTS NOTES:
1. OBSERVE MIN. BENDING RADIUS REQUIREMENTS WHEN BUILDING AND SECURING SOURCE CIRCUIT CONDUCTORS TO MODULES AND RACKING.
2. SEE MODULE SPEC SHEET OR CABLE SPECS FOR CABLE DIAMETER.

3 PV WIRE BENDING REQUIREMENTS
NTS

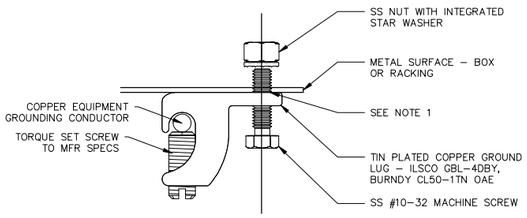


4 GROUND ROD CONNECTION
NTS



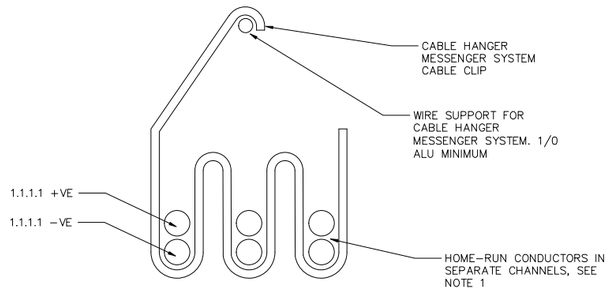
TYPICAL GROUND ROD NOTES:
1. CONTRACTOR TO PERFORM SOIL RESISTIVITY TESTING TO DETERMINE AMOUNT OF GROUND RODS NEEDED TO KEEP RESISTANCE BELOW 5 OHMS

5 TYPICAL GROUND ROD
NTS



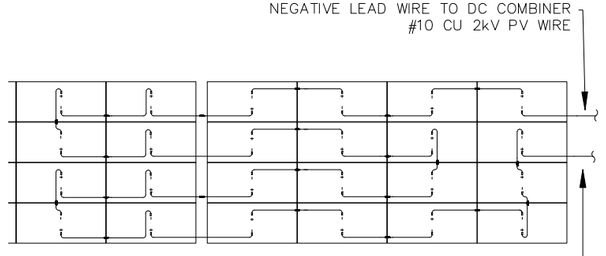
TYPICAL METAL RACKING GROUNDING NOTES:
1. PRIOR TO MOUNTING LUGS ON ANODIZED ALUMINUM OR PAINTED METAL SURFACES, THE SURFACE MUST BE STRIPPED AND THEN COVERED WITH BURDNY PENETROX A–13 ANTI–OXIDANT COMPOUND BELOW THE LUG TO ENSURE CONDUCTIVITY
2. ON ANODIZED AL SURFACES, THE ANODIZATION SHALL BE GROUND OFF.
3. ON PAINTED SURFACES, THE PAINT LAYER SHALL BE GROUND OR SCRATCHED OFF.

6 TYPICAL METAL RACKING BONDING
NTS



7 TYPICAL HOME–RUN CABLE HANGER DETAIL
NTS

TYPICAL HOME–RUN CABLE HANGER DETAIL NOTES:
1. HOME–RUN CONDUCTORS OF DIFFERENT CIRCUITS TO BE ROUTED IN SEPARATE CHANNELS IN CABLE HANGER MESSENGER SYSTEM. THE +VE AND –VE CONDUCTORS OF A SINGLE HOME–RUN CIRCUIT MAY BE ROUTED IN THE SAME CHANNEL.
2. INSTALL CABLE HANGERS IN REGULAR INTERVALS AS DIRECTED BY MANUFACTURERS INSTALLATION INSTRUCTIONS, OR, A DISTANCE OF NO MORE THAN 5' APART FROM EACH OTHER.
3. IF HOME–RUNS AND STRINGS ARE ROUTED IN THE SAME CABLE HANGER MESSENGER SYSTEM, SEPARATE HOME–RUNS AND STRINGS IN SEPARATE CHANNELS.



TYPICAL 24 MODULE SERIES WIRING NOTES:
1. WIRING FOR ILLUSTRATIVE PURPOSES ONLY. FINAL MODULE WIRING TO BE DETERMINED IN FIELD

8 TYPICAL 24 MODULE SERIES WIRING
NTS

PROJECT: FT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25–0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 65% REVIEW	MED/04–23–2025	JRV/04–23–2025
B	ISSUED FOR 95% REVIEW	MED/05–02–2025	JRV/05–02–2025
C	ISSUED FOR PV CONSTRUCTION BID	GGL/10–11–2025	MED/10–11–2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522–1953
FAX: (907) 522–1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

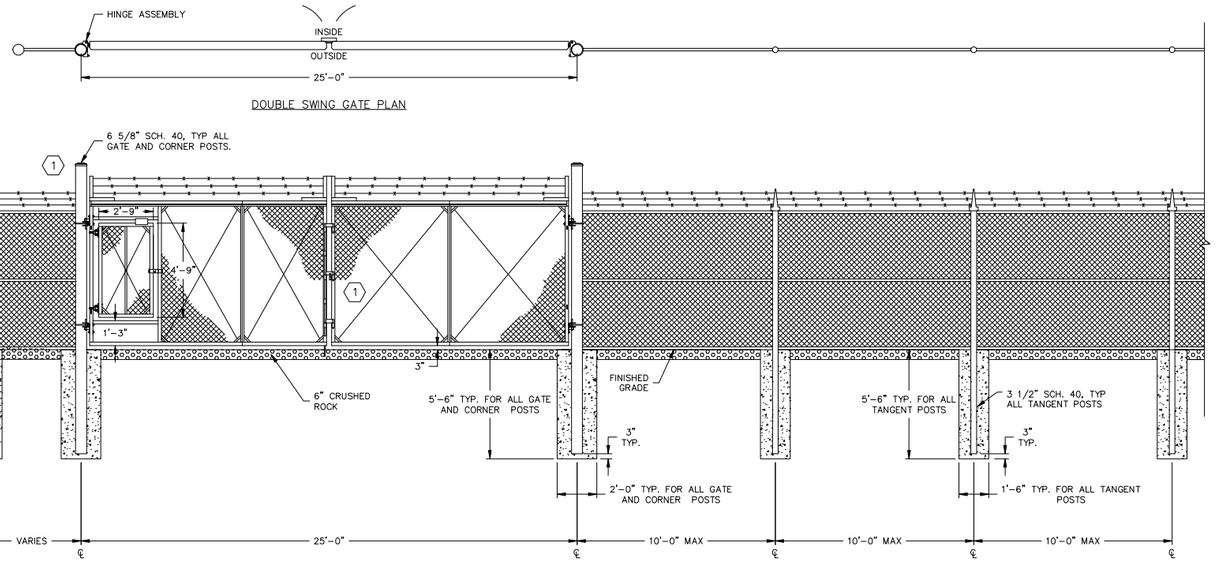
DRAWING NAME:
TANANA CHIEFS CONFERENCE FT YUKON RENEWABLE ENERGY GROUNDING AND CONDUIT DETAILS

fyre–el–2000_3.dwg

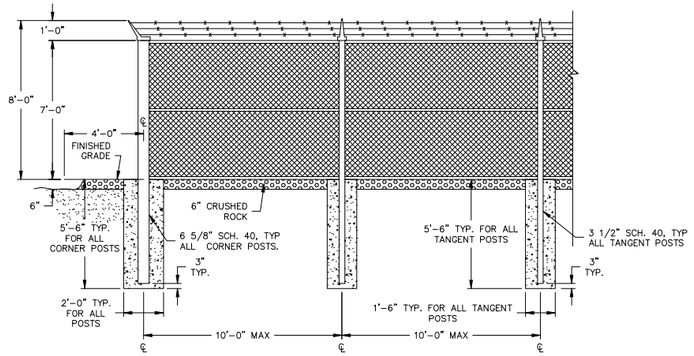
REF DWG(S):

DRAWING NO.: FYRE–EL–2000

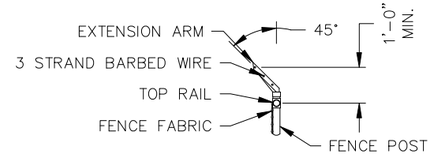
SHEET 3 OF 7



1 FENCE/GATE ELEVATION

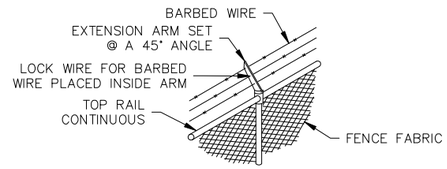


2 CORNER/TERMINAL FENCE POST ELEVATION



3 "V" TYPE EXTENSION ARM

N.T.S.



4 POST EXTENSION WITH BARBED WIRE

N.T.S.

NOTES:

1 PROVIDE DUAL CUSTODY PADLOCK ON ENTRY GATE TO ALLOW BOTH AVEC, AND LOCAL UTILITY TO ENTER INDEPENDANTLY

NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME: TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
FENCE DETAILS

fyre-ss-2000_4.dwg

REF DWG(S):

DRAWING NO.: FYRE-SS-2000

4.5"

MANUAL DISCONNECT FOR PARALLEL GENERATION

3/8 MIN. TEXT

3" (RED BACKGROUND)

LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECTS. LABEL TO BE ENGRAVED PLASTIC
(2) TOTAL

NOTICE

PHOTOVOLTAIC SYSTEM GENERATION METER

LABEL TO BE LOCATED ON THE PV SYSTEM GENERATION METER.
(1) TOTAL

NEC 2023 690.13(B), 690.54

NOTICE

PHOTOVOLTAIC SYSTEM AC DISCONNECT AND POWER SOURCE

RATED OUTPUT CURRENT: 604A

NOMINAL OPERATING VOLTAGE: 480VAC

LABEL TO BE LOCATED ON THE PV SYSTEM AC DISCONNECTS (2) TOTAL

NEC 2023 705.12(B)(3)(3)

⚠ *WARNING*

THIS EQUIPMENT FED BY MULTIPLE SOURCES

TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR.

PERMANENT WARNING LABEL SHALL BE APPLIED TO DISTRIBUTION EQUIPMENT WHERE THE PV SYSTEM INTERCONNECTS. (2) TOTAL

NEC 2023 690.7(D)

MAXIMUM DC VOLTAGE OF PV SYSTEM

MAXIMUM VOLTAGE: 1065VDC

LABEL TO BE LOCATED ON COVER OF DC DISCONNECTING MEANS. (16) TOTAL

NEC 2023 690.31(D)(2)

WARNING: PHOTOVOLTAIC POWER SOURCE

3/8 MIN.

RED BACKGROUND

LABEL SHALL BE LOCATED ON ALL EXPOSED RACEWAYS, CABLE TRAYS, OTHER WIRING METHODS, COVERS OR ENCLOSURES OF PULL BOXES AND JUNCTION BOXES AND ON CONDUIT BODIES IN WHICH ANY OF THE AVAILABLE CONDUIT OPENINGS ARE UNUSED. LABEL SHALL BE REFLECTIVE, AND ALL LETTERS CAPITALIZED AND SHALL BE MINIMUM HEIGHT OF 3/8" IN WHITE ON A RED BACKGROUND. SPACING BETWEEN LABELS OR MARKINGS, OR BETWEEN A LABEL AND MARKING, SHALL NOT BE MORE THAN 10FT.

NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 95% REVIEW	MED/04-29-2025	JRV/04-29-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

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WEB: WWW.EPSINC.COM

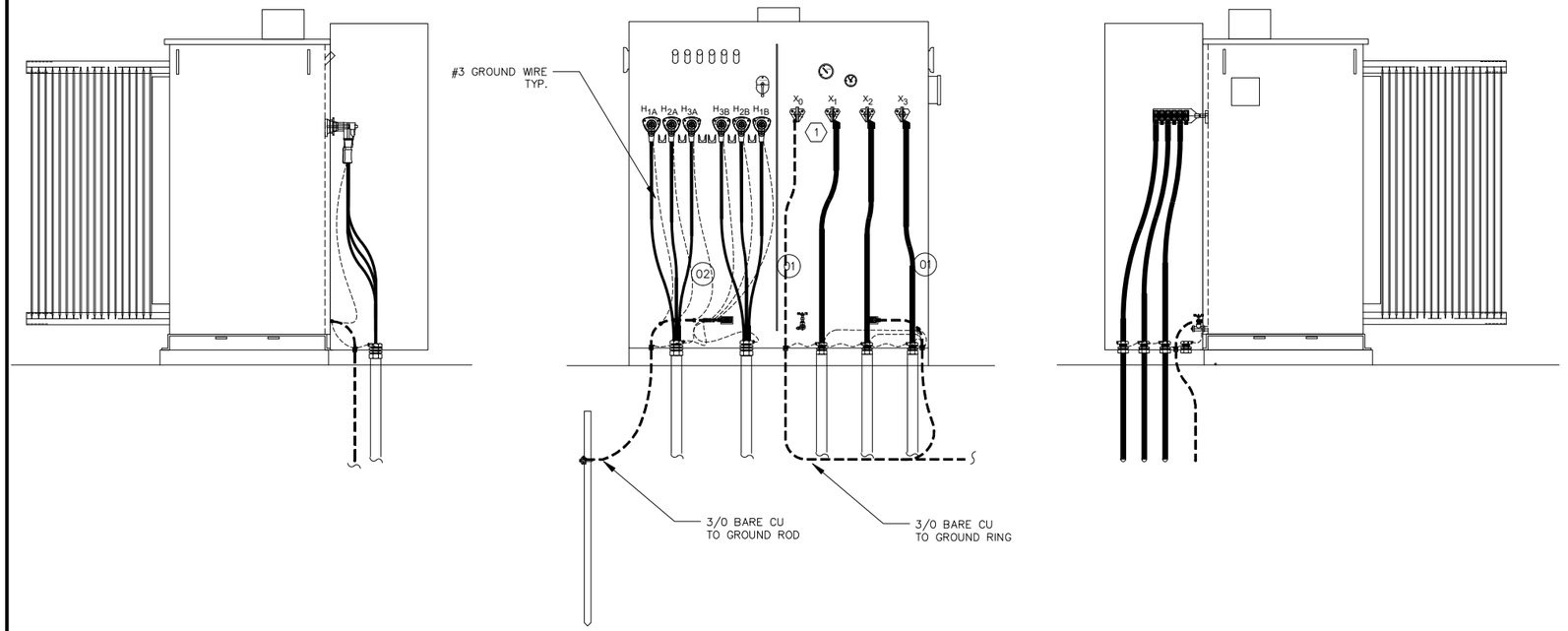
NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
EQUIPMENT SAFETY LABEL SCHEDULE

fyre-ss-2000_5.dwg

REF DWG(S):

DRAWING NO.: FYRE-SS-2000



BILL OF MATERIAL

REF. NO.	EST. QTY.	DESCRIPTION	MFGR./CATALOG NO.
01	–	CABLE LUG, NEMA 2–HOLE, 4/0 AWG CU	BURNDY/YA282N
02	–	CONNECTOR, COMPRESSION, 4/0 CU TO #6–#2 CU	BURNDY/YGHC29C26
03			
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NOTES:

(1) LIFT X0 BUSHING BOND JUMPER AND ISOLATE ALL X0 CONNECTIONS FROM ANY GROUNDING AT THE UTILITY SERVICE POLE.

NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
TRANSFORMER DETAILS

fyre-ss-2000_6.dwg

REF DWG(S):

DRAWING NO.: FYRE-SS-2000

NAMEPLATE NUMBER	QTY	LINE 1 TEXT	LINE 2 TEXT	NAMEPLATE SIZE HEIGHT x WIDTH (IN)	TEXT HEIGHT (IN)
N100	1	INVERTER 1		2 x 4	3/8
N101	1	INVERTER 2		2 x 4	3/8
N102	1	INVERTER 3		2 x 4	3/8
N103	1	INVERTER 4		2 x 4	3/8
N104	1	INVERTER 5		2 x 4	3/8
N105	1	INVERTER 6		2 x 4	3/8
N106	1	INVERTER 7		2 x 4	3/8
N107	1	INVERTER 8		2 x 4	3/8
N108	1	DC COMBINER	BOX 1	2 x 4	3/8
N109	1	DC COMBINER	BOX 2	2 x 4	3/8
N110	1	DC COMBINER	BOX 3	2 x 4	3/8
N111	1	DC COMBINER	BOX 4	2 x 4	3/8
N112	1	DC COMBINER	BOX 5	2 x 4	3/8
N113	1	DC COMBINER	BOX 6	2 x 4	3/8
N114	1	DC COMBINER	BOX 7	2 x 4	3/8
N115	1	DC COMBINER	BOX 8	2 x 4	3/8
N116	1	DC COMBINER	BOX 9	2 x 4	3/8
N117	1	DC COMBINER	BOX 10	2 x 4	3/8
N118	1	DC COMBINER	BOX 11	2 x 4	3/8
N119	1	DC COMBINER	BOX 12	2 x 4	3/8
N120	1	DC COMBINER	BOX 13	2 x 4	3/8
N121	1	DC COMBINER	BOX 14	2 x 4	3/8
N122	1	DC COMBINER	BOX 15	2 x 4	3/8
N123	1	DC COMBINER	BOX 16	2 x 4	3/8

NAMEPLATE NUMBER	QTY	LINE 1 TEXT	LINE 2 TEXT	NAMEPLATE SIZE HEIGHT x WIDTH (IN)	TEXT HEIGHT (IN)
N124	1	COMMUNICATIONS	PANEL	2 x 4	3/8
N125	1	POWER DISTRIBUTION	PANELBOARD 1	2 x 4	3/8
N126	1	POWER DISTRIBUTION	PANELBOARD 2	2 x 4	3/8
N127	1	CB 1		1 x 3	1/8
N128	1	CB 2		1 x 3	1/8
N129	1	CB 3		1 x 3	1/8
N130	1	CB 4		1 x 3	1/8
N131	1	CB 5		1 x 3	1/8
N132	1	CB 6		1 x 3	1/8
N133	1	CB 7		1 x 3	1/8
N134	1	CB 8		1 x 3	1/8
N135	1	CB SS		1 x 3	1/8
N136	1	MCB1		2 x 4	3/8
N137	1	MCB2		2 x 4	3/8
N138	1	120V STATION SERVICE PANEL		2 x 4	3/8
N139	1	DATA MANAGER		2 x 4	3/8
N140	1	METER PANEL 1		2 x 4	3/8
N141	1	METER PANEL 2		2 x 4	3/8
N142	1	MAIN AC	PANEL 1	2 x 4	3/8
N143	1	MAIN AC	PANEL 2	2 x 4	3/8

NOTES:

1) ALL NAMEPLATES SHALL BE 1/16" THICK MINIMUM PLASTIC.
2) ALL NAMEPLATES SHALL HAVE EXTERIOR RATED HIGH-TACK ADHESIVE.
3) ALL NAMEPLATES SHALL BE BLACK SURFACE WTH WHITE TEXT.
4) ALL TEXT SHALL BE "ARIAL BOLD" FONT.
5) EACH LINE OF TEXT SHALL BE CENTERED ON THE NAMEPLATE.
6) ALL TEXT SHALL BE UPPER CASE.
7) ALL DIMENSIONS SHOWN IN INCHES.

NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

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NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
EQUIPMENT NAMEPLATE SCHEDULE

fyre-ss-2000_7.dwg

REF DWG(S):

DRAWING NO.: FYRE-SS-2000

Circuit Information				ELECTRICAL CALCULATIONS													RESULTS							
Destination Inverter No.	Destination Disconnect Switch No.	Source Circuit No.	Modules (#)	Open Circuit Voltage (VOC)	Maximum Power Voltage (Vmp)	Short Circuit Current (Isc)	Continuous Current (1.25*Isc)	Irradiance Current (1.25*cc)	Minimum Fuse Size (A)	Selected Fuse Size (A)	Minimum Wire Ampacity (A)	Selected String Wire Size (CU 2KV PV Wire, 90°C, <2% Voltage Drop, AWG)	Maximum Wire Distance (FT)	Voltage Drop (V)	Voltage Drop (%)		Circuit Information FROM	TO	Distance (ft)	Continuous Current (A)	Minimum Wire Ampacity From Selected Device (A)	Selected Wire Size (AL 2KV PV Wire, 75°C, <2% Voltage Drop, AWG)	Voltage Drop (%)	Voltage Drop (V)
1	1	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27		DS1	INV1	380	1.31.16	132	1/0	1.88	20.04
1	1	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03		DS2	INV1	410	1.31.16	132	1/0	2.03	21.62
1	1	3	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.79		DS3	INV2	320	1.31.16	132	1/0	1.58	16.87
1	1	4	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.53		DS4	INV2	335	1.31.16	132	1/0	1.66	17.66
1	1	5	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29		DS5	INV3	265	1.31.16	132	1/0	1.31	13.97
1	1	6	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03		DS6	INV3	280	1.31.16	132	1/0	1.39	14.76
1	2	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27		DS7	INV4	205	1.31.16	132	#2	1.61	17.15
1	2	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03		DS8	INV4	220	1.31.16	132	#2	1.73	18.41
1	2	3	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.79		DS9	INV5	150	1.31.16	132	#2	1.18	12.55
1	2	4	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.53		DS10	INV5	165	1.31.16	132	#2	1.30	13.81
1	2	5	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29		DS11	INV6	90	1.31.16	132	#2	0.71	7.53
1	2	6	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03		DS12	INV6	110	1.31.16	132	#2	0.86	9.20
2	3	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27		DS13	INV7	50	1.31.16	132	#2	0.39	4.18
2	3	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03		DS14	INV7	90	1.31.16	132	#2	0.71	7.53
2	3	3	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.79		DS15	INV8	150	1.31.16	132	#2	1.18	12.55
2	3	4	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.53		DS16	INV8	205	1.31.16	132	#2	1.61	17.15
2	3	5	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29									
2	3	6	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03									
2	4	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27									
2	4	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
2	4	3	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.79									
2	4	4	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.53									
2	4	5	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29									
2	4	6	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03									
3	5	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27									
3	5	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
3	5	3	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.79		PV MODULE CHARACTERISTICS							
3	5	4	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.53		Voc (V)	52.58						
3	5	5	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29		Voc Coef. (%/°C)	−0.25						
3	5	6	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03		Vmp (V)	44.64						
3	6	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27		Pmax Coef. (%/°C)	−0.3						
3	6	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
3	6	3	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.79		SITE CHARACTERISTICS							
3	6	4	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.53		T_Amb Min (°C)	−40						
3	6	5	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29		T_Amb Max (°C)	27						
3	6	6	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03									
4	7	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27									
4	7	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
4	7	3	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.79									
4	7	4	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.53									
4	7	5	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29									
4	7	6	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03									
4	8	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27									
4	8	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
4	8	3	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.79									
4	8	4	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.53									
4	8	5	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29									
4	8	6	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03									
5	9	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27									
5	9	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
5	9	3	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.79									
5	9	4	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.53									
5	9	5	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29									
5	9	6	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03									
5	10	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27									
5	10	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
5	10	3	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.79									
5	10	4	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.53									
5	10	5	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29									
5	10	6	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03									
6	11	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27									
6	11	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
6	11	3	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.79									
6	11	4	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.53									
6	11	5	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29									
6	11	6	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03									
6	12	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27									
6	12	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
6	12	3	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.79									
6	12	4	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.53									
6	12	5	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29									
6	12	6	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03									
7	13	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27									
7	13	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
7	13	3	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.79									
7	13	4	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.53									
7	13	5	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.29									
7	13	6	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.03									
7	14	1	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.27									
7	14	2	24	1467	1064.9	13.99	17.49	21.86	21.86	25	25	10	195	11.00	1.03									
7	14	3	25	1528	1109.3	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.76									
7	14	4	26	1589	1153.7	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.49									
7	14	5	27	1650	1198.0	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.26									
7	14	6	28	1711	1242.4	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.02									
8	15	1	29	1773	1286.8	13.99	17.49	21.86	21.86	25	25	10	240	13.54	1.05									
8	15	2	30	1834	1331.2	13.99	17.49	21.86	21.86	25	25	10	195	11.00	0.83									
8	15	3	31	1895	1375.5	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.62									
8	15	4	32	1956	1419.9	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.40									
8	15	5	33	2017	1464.3	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.21									
8	15	6	34	2078	1508.7	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.02									
8	16	1	35	2139	1553.0	13.99	17.49	21.86	21.86	25	25	10	240	13.54	0.87									
8	16	2	36	2200	1597.4	13.99	17.49	21.86	21.86	25	25	10	195	11.00	0.69									
8	16	3	37	2262	1641.8	13.99	17.49	21.86	21.86	25	25	10	150	8.46	0.52									
8	16	4	38	2323	1686.1	13.99	17.49	21.86	21.86	25	25	10	100	5.64	0.33									
8	16	5	39	2384	1730.5	13.99	17.49	21.86	21.86	25	25	10	55	3.10	0.18									
8	16	6	40	2445	1774.9	13.99	17.49	21.86	21.86	25	25	10	5	0.28	0.02									

NOTES:

1) TEMPERATURE CORRECTED OPEN CIRCUIT VOLTAGE CALCULATIONS ARE AS FOLLOWS: VOC = ((Voc * # MODULES) * (1 + ((T_AMB MIN − T_AMB MAX) * (VOC COEF.))

NOT FOR CONSTRUCTION

PROJECT: FORT YUKON RENEWABLE ENERGY DESIGN
DESIGNER/PROJECT ENGINEER: GRIFFIN LOGAN/MAX DONALDSON JOB #: 25-0053

NO.	DESIGN/CONSTRUCTION/ASBUILT REVISION	DWN BY/DATE	REVIEWED BY/DATE
A	ISSUED FOR 95% REVIEW	MED/05-02-2025	JRV/05-02-2025
B	ISSUED FOR PV CONSTRUCTION BID	GGL/10-11-2025	MED/10-11-2025

ENG. STAMP

Electric Power Systems Inc.
Consulting Engineers
TEL: (907) 522-1953
FAX: (907) 522-1182
WEB: WWW.EPSINC.COM

NO.	DRAWING NO./SHEET	REFERENCE DRAWING DESCRIPTION

DRAWING NAME:
TANANA CHIEFS CONFERENCE
FORT YUKON RENEWABLE ENERGY
PV STRING CALCULATIONS

fyre-el-0700_1.dwg

REF DWG(S):

DRAWING NO.: FYRE-EL-0700

SHEET 1 OF 1