COM-41720 ESTES ROCKETS
480.15 kW (DC) / 360 kW (AC) SOLAR ELECTRIC SYSTEM
1295 H ST. PENROSE, CO 81240

SCOPE OF WORK

INSTALL NEW SYSTEM CONSISTING OF 990 MODULES, 3 INVERTERS AND 495 OPTIMIZERS

SYSTEM DESCRIPTION:
480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEERING SCOPE OF WORK:
FREEDOM SOLAR POWER HAS PROVIDED BOTH DESIGN AND ENGINEERING SERVICES ON THIS PROJECT.

APPLICABLE CODES

2020 NATIONAL ELECTRICAL CODE
2018 INTERNATIONAL BUILDING CODE
2018 INTERNATIONAL FIRE CODE
ADDITIONALLY, CONFORM TO ALL LOCAL ORDINANCES AND REQUIREMENTS.

GENERAL NOTES

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

ALL SOLAR MODULES SHALL BE UL LISTED 1703 & CEC APPROVED. ALL INVERTERS SHALL BE UL LISTED 1741 CERTIFIED & CEC APPROVED. ALL ELECTRICAL COMPONENTS AND MATERIALS SHALL BE LISTED FOR IT'S PURPOSE AND INSTALLED IN THE CORRECT MANNER. ALL OUTDOOR EQUIPMENT SHALL MEET APPROPRIATE NEMA STANDARDS.

THE ELECTRICAL CONTRACTOR IS ADVISED THAT ALL DRAWINGS AND COMPONENT MANUALS ARE TO BE UNDERSTOOD PRIOR TO INSTALLATION, THE CONTRACTOR IS ADVISED TO HAVE ALL SWITCHES IN THE "OFF" POSITION AND FUSES REMOVED PRIOR TO INSTALLATION OF FUSE-BEARING COMPONENTS.

THIS SYSTEM IS INTENDED TO BE OPERATED IN PARALLEL WITH THE UTILITY SERVICE PROVIDER. ANTI-ISLANDING PROTECTION IS A REQUIREMENT OF UL 1741 AND IS INTENDED TO PREVENT THE OPERATION OF THE PV SYSTEM WHEN THE UTILITY GRID IS NOT OPERATIONAL.

PERMISSION TO OPERATE THE SYSTEM IS NOT AUTHORIZED UNTIL FINAL INSPECTIONS AND APPROVALS ARE OBTAINED FROM THE LOCAL AUTHORITY HAVING JURISDICTION AND THE LOCAL UTILITY SERVICE PROVIDER.

THE METHOD OF ATTACHMENT CREATES A UNIFIED STRUCTURE TO MEET DEAD LOAD, WIND LOAD, AND SEISMIC REQUIREMENTS. SOLAR MODULES WILL BE SECURED TO THE EXISTING ROOF AS SPECIFIED ON THE STRUCTURAL SHEETS. EXISTING ROOF EQUIPMENT WILL NOT BE AFFECTED BY THE PV SYSTEM. ALL STRUCTURAL DESIGN AND INSTALLATION COMPONENTS ARE THE RESPONSIBILITY OF OTHERS AND OUTSIDE THE SCOPE OF THIS DOCUMENT.

ALL FASTENERS SHALL BE CORROSION RESISTANT APPROPRIATE FOR SITE CONDITIONS, CONNECTORS SHALL BE TORQUED PER DEVICE LISTING OR ENGINEERING RECOMMENDATIONS.

ALL ROOFING REPAIR MUST MAINTAIN EXISTING CLASS AND TYPE OF ROOF AND ALL WORK SHALL BE IN ACCORDANCE WITH THE ROOFING MANUFACTURER'S INSTALLATION REQUIREMENTS.

VICINITY MAP

AERIAL IMAGE

GENERAL ABBREVIATIONS

AC	- ALTERNATING CURRENT
AHJ	- AUTHORITY HAVING JURISDICTION
AL	- ALUMINUM
APP	- APPROXIMATE
AWG	- AMERICAN WIRE GAUGE
BLDG	- BUILDING
CL	- CENTERLINE
CU	- COPPER
DAS	- DATA ACQUISITION SYSTEM
DC	- DIRECT CURRENT
DIA	- DIAMETER
DO	- DITTO
(E)	- EXISTING
EMT	- ELECTRICAL METALLIC TUBING
EW	- EAST-WEST
FBO	- FURNISHED BY OTHERS
GALV	- GALVANIZED
HVAC	- HEATING VENTILATION AND AIR COND.
IBC	- INTERNATIONAL BUILDING CODE
MOD	- SOLAR MODULE
NEC	- NATIONAL ELECTRICAL CODE
NS	- NORTH - SOUTH
NTS	- NOT TO SCALE
PVC	- POLYVINYLCHLORIDE CONDUIT
TYP	- TYPICAL
(N)	- NEW
IFC	- INTERNATIONAL FIRE CODE

PROJECT DIRECTORY

OWNER
ESTES ROCKETS

CONTRACTOR
FIRM: FREEDOM SOLAR POWER
CONTACT: COMMERCIAL DEPARTMENT
PHONE: (512) 759-8313

SYSTEM DESIGNER
FIRM: FREEDOM SOLAR POWER
CONTACT: COMMERCIAL DEPARTMENT
PHONE: (512) 759-8313

SYSTEM ENGINEER
FIRM:
FIRM#:
CONTACT:
PHONE:

AUTHORITY HAVING JURISDICTION
FREMONT COUNTY
615 MACON AVENUE
CAÑON CITY CO 81212

APPROVALS

SHEET INDEX

SHEET NUMBER	SHEET TITLE
A-001	COVER SHEET
A-101	SITE PLAN
A-102	ENLARGED SITE PLAN
A-103	ENLARGED SITE PLAN
A-201	PLOT PLAN A
E-101	SYSTEM PLANVIEW
E-102	ENLARGED SYSTEM PLANVIEW
E-103	ENLARGED SYSTEM PLANVIEW
E-201	EQUIPMENT ELEVATION VIEW
E-505	ELECTRICAL PLACARD
E-601	ELECTRICAL LINE DIAGRAM
E-602	ELECTRICAL CALCULATIONS
O-001	BOM/BOS
O-501	SPECIFICATION SHEETS
Z-101	FIELD ARRAY WIRE DIAGRAM
Z-102	FIELD ARRAY WIRE DIAGRAM
Z-103	FIELD ARRAY WIRE DIAGRAM
Z-104	FIELD ARRAY WIRE DIAGRAM
Z-105	FIELD ARRAY WIRE DIAGRAM
Z-106	FIELD ARRAY WIRE DIAGRAM
Z-107	FIELD ARRAY WIRE DIAGRAM
Z-108	FIELD ARRAY WIRE DIAGRAM
Z-109	FIELD ARRAY WIRE DIAGRAM
Z-110	FIELD ARRAY WIRE DIAGRAM
Z-111	FIELD ARRAY WIRE DIAGRAM
Z-112	FIELD ARRAY WIRE DIAGRAM
Z-113	FIELD ARRAY WIRE DIAGRAM
Z-114	FIELD ARRAY WIRE DIAGRAM
Z-115	FIELD ARRAY WIRE DIAGRAM
X-101	SAFETY PLAN
OMCO SOLAR STRUCTURAL DRAWINGS	
OS1.0	COVER SHEET
OS1.1	GENERAL STRUCTURAL NOTES
OS1.2	FOUNDATIONS
OS2.0	GENERAL LAYOUT
OS2.1	TYPICAL SECTIONS
OS2.2	FRAMING PLANS
OS3.0	DETAILS AND SECTIONS
OS3.1	STRUCTURAL DETAILS

PROJECT PROVIDED BY:
FREEDOM SOLAR POWER
FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR
FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION
480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD
COLORADO LICENSED PROFESSIONAL ENGINEER
Signed 5/02/2024

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST. PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
A-001
COVER SHEET

CONSTRUCTION SUMMARY

(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485

(3) SOLAREDGE SE120K-US [480/277] PV INVERTER

SE120KUS OUTPUT = 120kW AC

(3) 3PH-200A BREAKERS

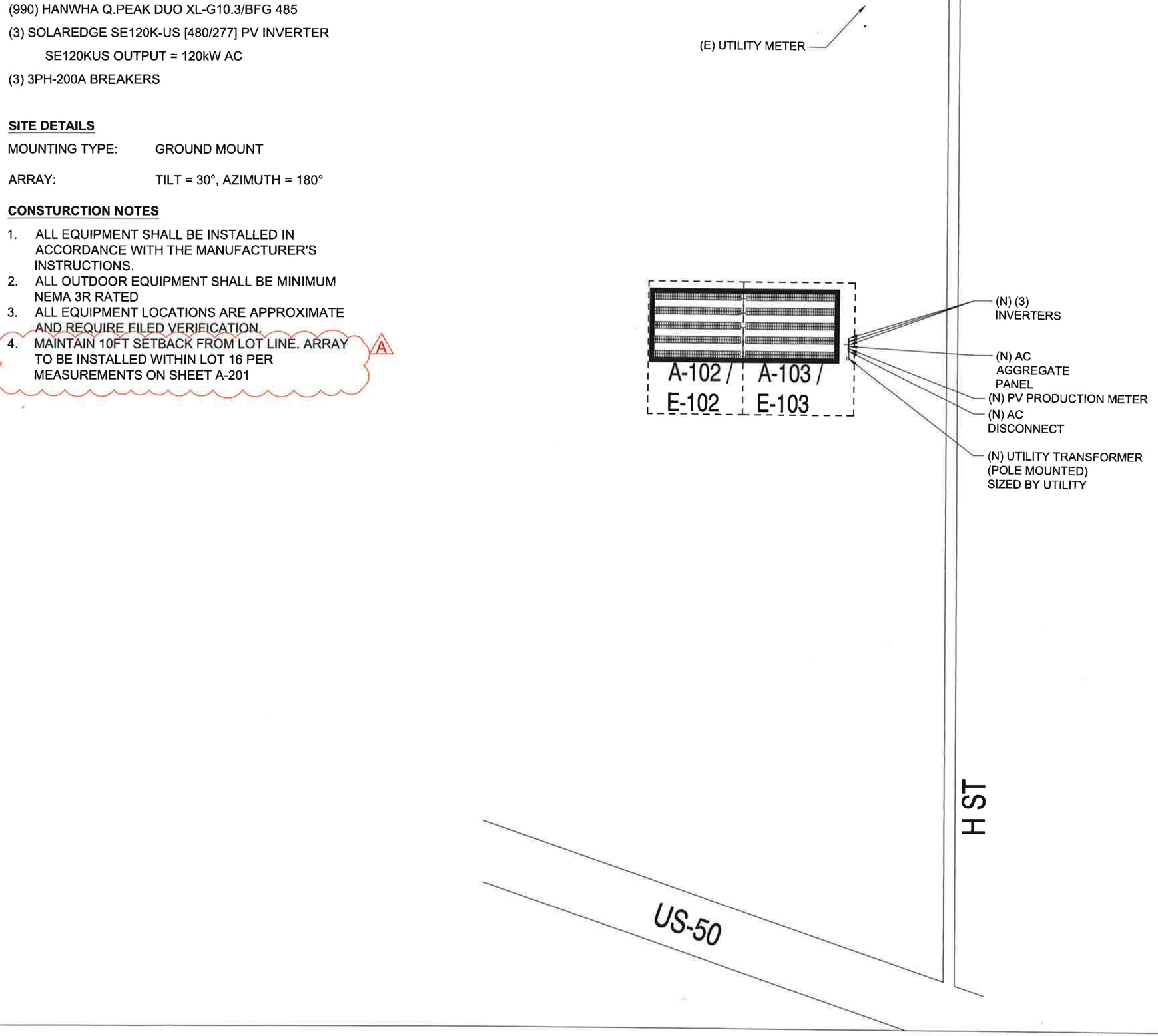
SITE DETAILS

MOUNTING TYPE: GROUND MOUNT

ARRAY: TILT = 30°, AZIMUTH = 180°

CONSTURCTION NOTES

1. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
2. ALL OUTDOOR EQUIPMENT SHALL BE MINIMUM NEMA 3R RATED
3. ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND REQUIRE FILED VERIFICATION.
4. MAINTAIN 10FT SETBACK FROM LOT LINE. ARRAY TO BE INSTALLED WITHIN LOT 16 PER MEASUREMENTS ON SHEET A-201 A



PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COLORADO LICENSED PROFESSIONAL ENGINEER PE.0053037

Signed 5/02/2024

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

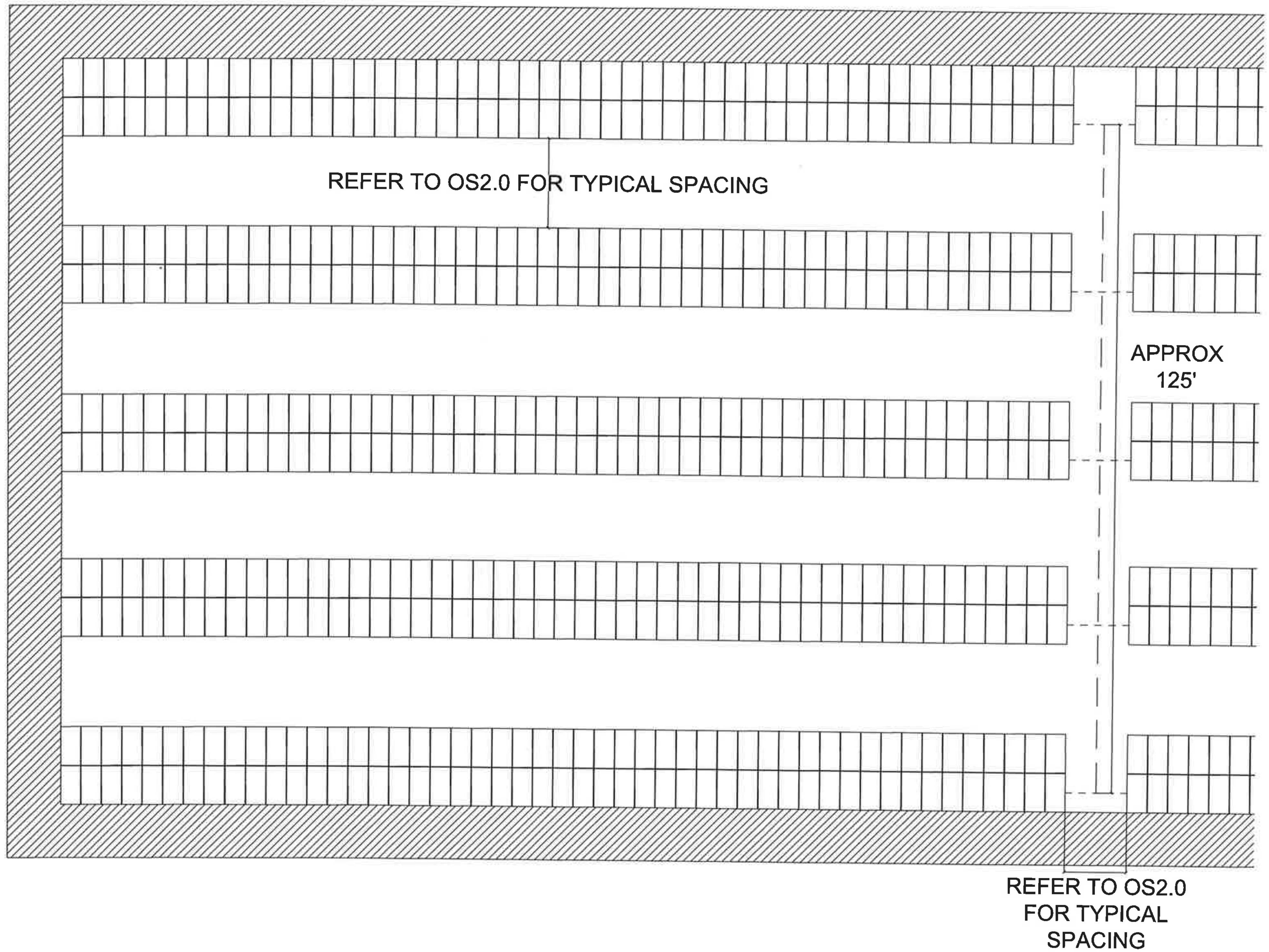
PROJECT NUMBER:
COM-41720

DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
NTS
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
A-101
SITE PLAN



PROJECT PROVIDED BY:

FREEDOM SOLAR POWER
FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 KW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

Signed 5/02/2024

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST. PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

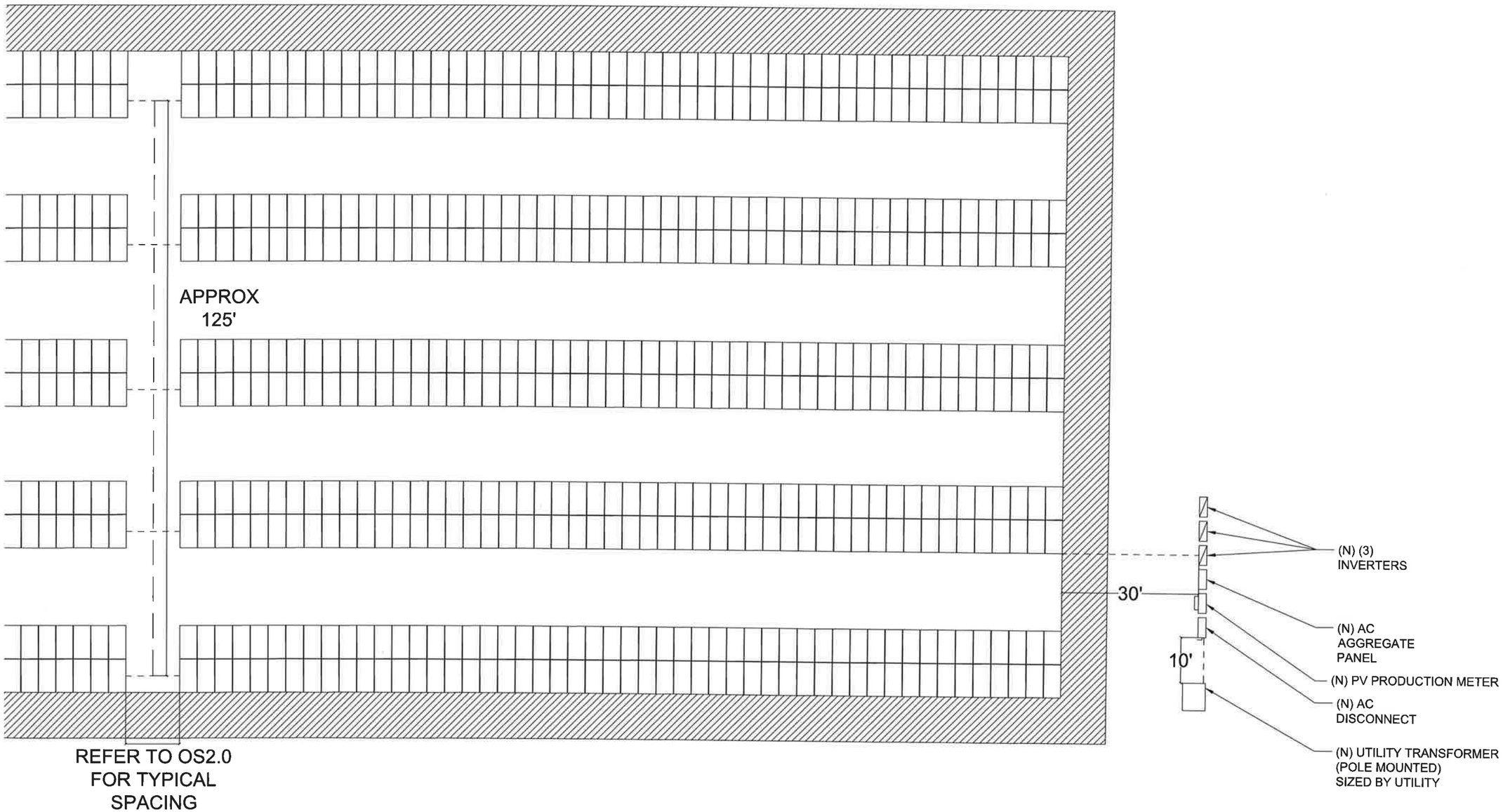
PROJECT NUMBER:
COM-41720

DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
3/32" = 1'-0"
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
A-102
ENLARGED SITE PLAN



PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN. STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN. STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
300 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(1) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COLORADO LICENSED PROFESSIONAL ENGINEER
PE.0055014

Signed 5/02/2024

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

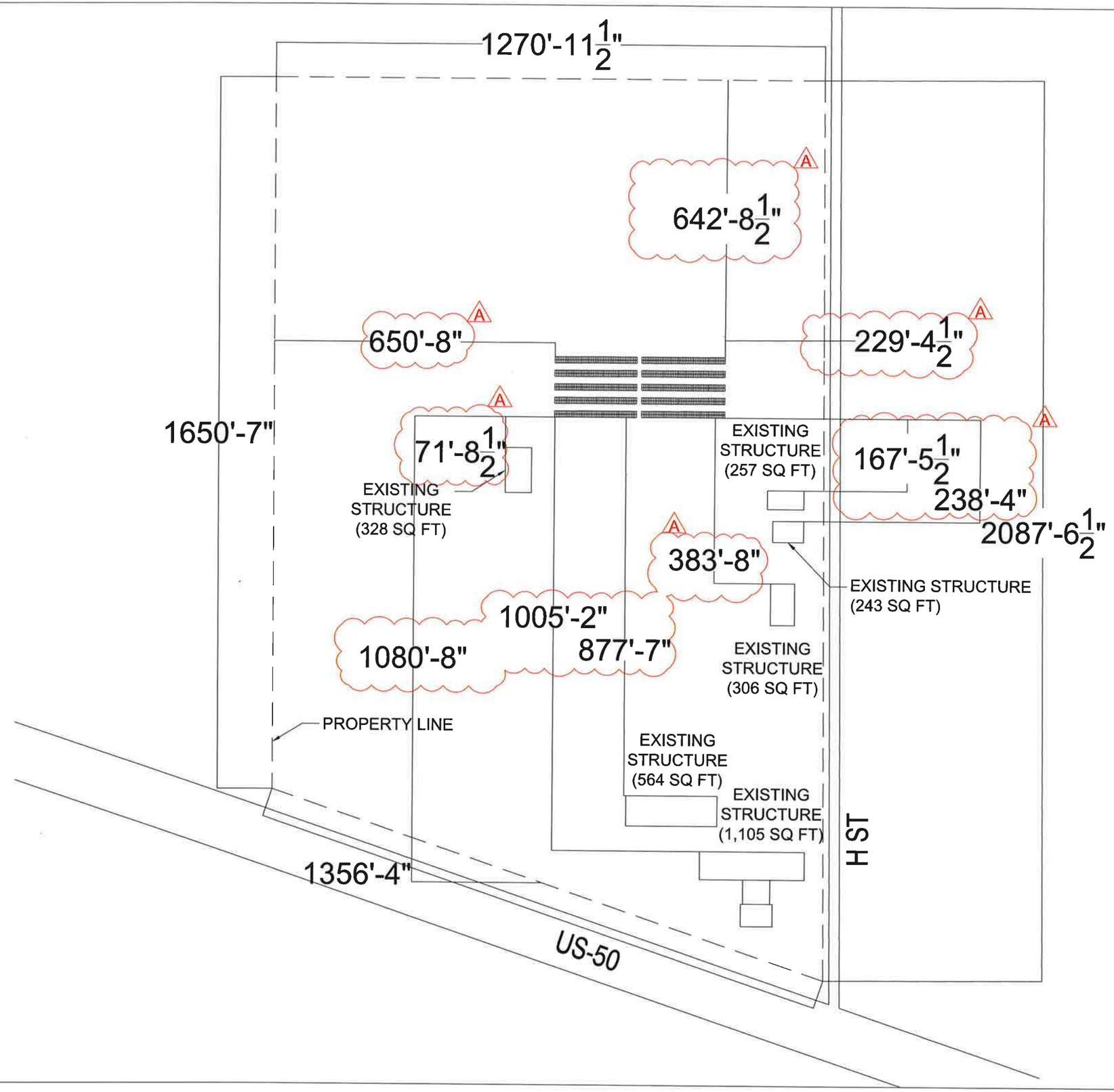
DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
3/32" = 1'-0"
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
A-103
ENLARGED SITE PLAN

USE/TYPE: SOLAR
SIZE: 27,532.03 SQ. FT
AVERAGE HEIGHT: 9 FT - 6 IN
HABITABLE AREA: 0 SQ. FT



PROJECT PROVIDED BY:

FREEDOM SOLAR POWER
FREEDOM SOLAR LLC
4801 FREIDRICH LN. STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 799-8313

SYSTEM INFORMATION
480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COLORADO LICENSED PROFESSIONAL ENGINEER
PE.0055331

Signed 5/02/2024

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

DESIGNED BY:
DAVID GUTIERREZ

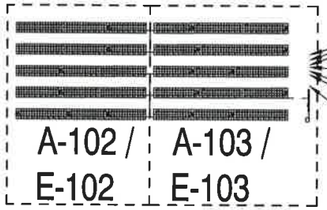
REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE
NTS
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" x 36"

SHEET NO: & NAME:
A-201
PLOT PLAN

A

(E) UTILITY METER



(N) (3) INVERTERS

(N) AC AGGREGATE PANEL

(N) PV PRODUCTION METER

(N) AC DISCONNECT

(N) UTILITY TRANSFORMER (POLE MOUNTED) SIZED BY UTILITY

H ST

US-50

1 SE120KUS

Center:
- 16 P1100 / 32 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES

Left:
- 17 P1100 / 34 MODULES
- 18 P1100 / 36 MODULES
- 17 P1100 / 34 MODULES

Right:
- 18 P1100 / 36 MODULES
- 16 P1100 / 32 MODULES
- 18 P1100 / 36 MODULES

2 SE120KUS

Center:
- 16 P1100 / 32 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES

Left:
- 18 P1100 / 36 MODULES
- 16 P1100 / 32 MODULES
- 17 P1100 / 34 MODULES

Right:
- 20 P1100 / 40 MODULES
- 17 P1100 / 34 MODULES
- 16 P1100 / 32 MODULES

3 SE120KUS

Center:
- 16 P1100 / 32 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES

Left:
- 17 P1100 / 34 MODULES
- 18 P1100 / 36 MODULES
- 19 P1100 / 38 MODULES

Right:
- 20 P1100 / 40 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES

PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COLORADO LICENSED PROFESSIONAL ENGINEER PE.0036301

Signed 5/02/2024

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

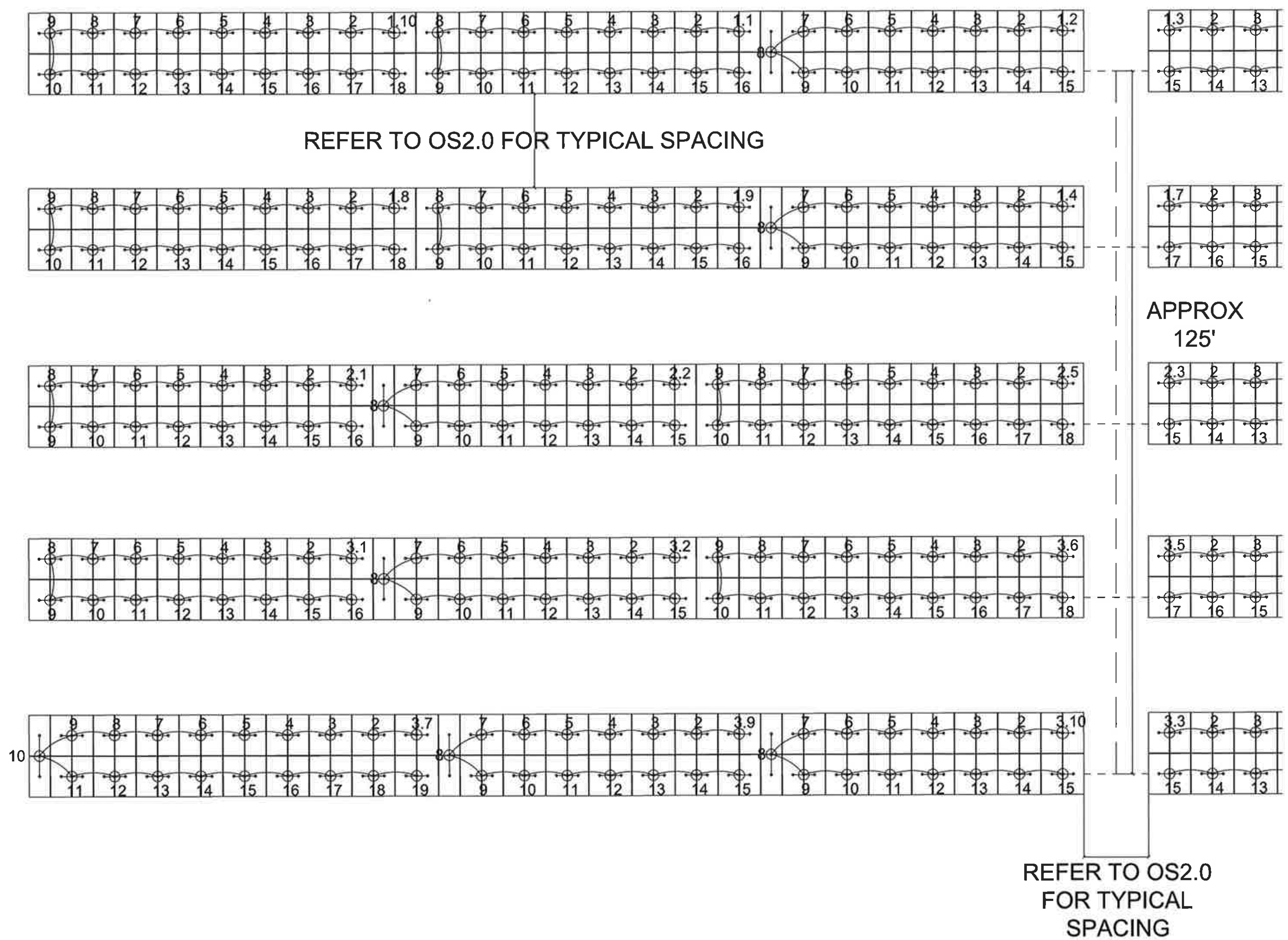
PROJECT NUMBER:
COM-41720

DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
NTS
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
E-101
SYSTEM PLANVIEW



1 SE120KUS

Center:

- 16 P1100 / 32 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES

Left:

- 17 P1100 / 34 MODULES
- 18 P1100 / 36 MODULES
- 17 P1100 / 34 MODULES

Right:

- 18 P1100 / 36 MODULES
- 16 P1100 / 32 MODULES
- 18 P1100 / 36 MODULES

2 SE120KUS

Center:

- 16 P1100 / 32 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES

Left:

- 18 P1100 / 36 MODULES
- 16 P1100 / 32 MODULES
- 17 P1100 / 34 MODULES

Right:

- 20 P1100 / 40 MODULES
- 17 P1100 / 34 MODULES
- 16 P1100 / 32 MODULES

3 SE120KUS

Center:

- 16 P1100 / 32 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES

Left:

- 17 P1100 / 34 MODULES
- 18 P1100 / 36 MODULES
- 19 P1100 / 38 MODULES

Right:

- 20 P1100 / 40 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES

PROJECT PROVIDED BY:

FREEDOM SOLAR POWER
FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COLORADO LICENSED PROFESSIONAL ENGINEER
Signed 5/02/2024

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST. PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

DESIGNED BY:
DAVID GUTIERREZ

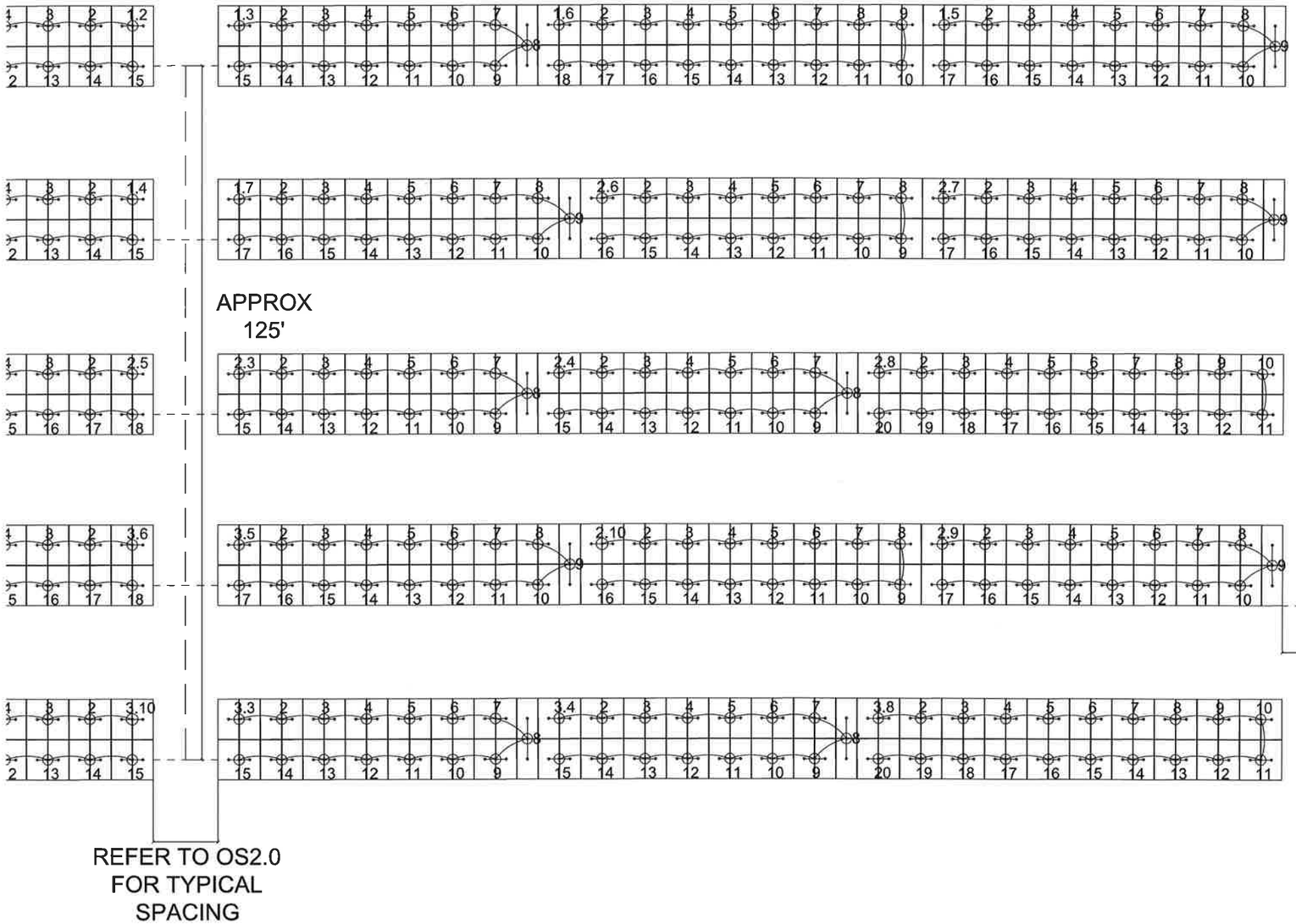
REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
3/32" = 1'-0"
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:

E-102

ENLARGED SYSTEM PLANVIEW



1 SE120KUS

Center:

- 16 P1100 / 32 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES

Left:

- 17 P1100 / 34 MODULES
- 18 P1100 / 36 MODULES
- 17 P1100 / 34 MODULES

Right:

- 18 P1100 / 36 MODULES
- 16 P1100 / 32 MODULES
- 18 P1100 / 36 MODULES

2 SE120KUS

Center:

- 16 P1100 / 32 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES

Left:

- 18 P1100 / 36 MODULES
- 16 P1100 / 32 MODULES
- 17 P1100 / 34 MODULES

Right:

- 20 P1100 / 40 MODULES
- 17 P1100 / 34 MODULES
- 16 P1100 / 32 MODULES

3 SE120KUS

Center:

- 16 P1100 / 32 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES

Left:

- 17 P1100 / 34 MODULES
- 18 P1100 / 36 MODULES
- 19 P1100 / 38 MODULES

Right:

- 20 P1100 / 40 MODULES
- 15 P1100 / 30 MODULES
- 15 P1100 / 30 MODULES

PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.0 kW DC SYSTEM
300 kW AC SYSTEM
(600) HANWHA Q.PEAK DUO XL-G10.3/BFG 465
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COLORADO LICENSED PROFESSIONAL ENGINEER
PE.0038321
Signed 5/02/2024

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

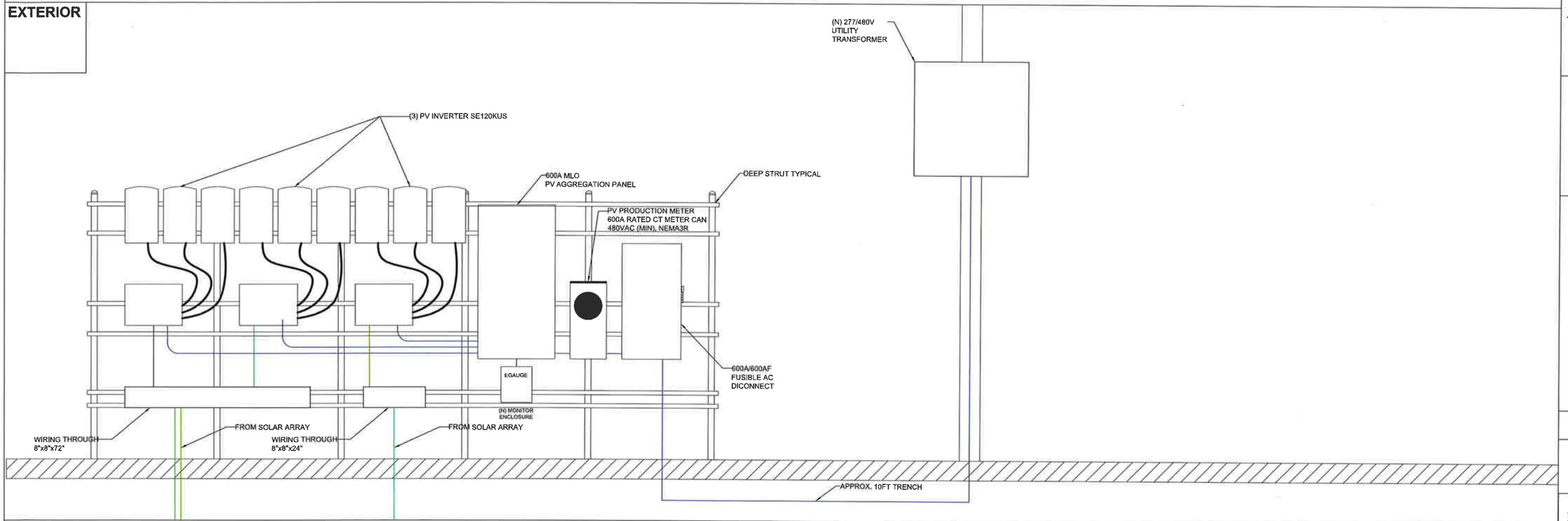
SCALE:
3/32" = 1'-0"
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:

E-103

ENLARGED SYSTEM PLANVIEW

EXTERIOR



PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
300 kW AC SYSTEM
(390) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COLORADO LICENSED PROFESSIONAL ENGINEER
PE.0053531

Signed 5/02/2024

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
E-201
EQUIPMENT
ELEVATION VIEW

PLACARDS

⚠ WARNING

ELECTRIC SHOCK HAZARD

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

DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

LABEL LOCATION
AC DISCONNECT,POINT OF INTERCONNECTION
[PER CODE: NEC 690.13(B)]

**WARNING-ELECTRIC SHOCK HAZARD
NO USER SERVICEABLE PARTS INSIDE
CONTACT AUTHORIZED SERVICE
PROVIDE FOR ASSISTANCE**

LABEL LOCATION
INVERTER, JUNCTION BOXES (ROOF),
AC DISCONNECT
[PER CODE: NEC 690.13]

WARNING:PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION
CONDUIT, COMBINER BOX
[PER CODE: NEC690.31(G)(3)]

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION
INVERTER
[PER CODE: NEC 690.56(C)(3)]

INVERTER 1

MAXIMUM RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER(IF INSTALLED)		A
MAXIMUM SYSTEM VOLTAGE	1000	V
MAXIMUM OUTPUT CURRENT	144.3	A

LABEL LOCATION
DC DISCONNECT
[PER CODE: NEC 690.53]

PHOTOVOLTAIC SYSTEM AC DISCONNECT SWITCH
RATED AC OPERATING CURRENT 144.75 AMPS
AC NOMINAL OPERATING VOLTAGE 480 VAC

LABEL LOCATION
AC DISCONNECT , POINT OF INTERCONNECTION
[PER CODE: NEC 690.54]

CAUTION: SOLAR CIRCUIT

LABEL LOCATION
MARKINGS PLACED ON ALL INTERIOR AND EXTERIOR DC CONDUIT, RACEWAYS, ENCLOSURES AND CABLE ASSEMBLES AT LEAST EVERY 10 FT, AT TURNS AND ABOVE/BELOW PENETRATIONS AND ALL COMBINER/JUNCTION BOXES. (PER CODE: IFC605.11.1.4)

SOLAR DISCONNECT

LABEL LOCATION
DISCONNECT, POINT OF INTERCONNECTION
[PER CODE: NEC690.13(B)]

⚠ WARNING
DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

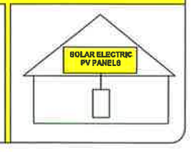
LABEL LOCATION
POINT OF INTERCONNECTION
[PER CODE: NEC705.12(D)(4)]

CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED

LABEL LOCATION
WEATHER RESISTANT MATERIAL, DURABLE ADHESDIVE, UL 969 AS STANDARD TO WEATHER RATING (UL LISTING OF MARKINGS NOT REQUIRED), MIN 3/8" LETTER HEIGHT ARIAL OR SIMILAR FONT NON-BOLD, PLACED WITHIN THE MAIN SERVICE DISCONNECT, PLACED ON THE OUTSIDE OF THE COVER WHEN DISCONNECT IS OPERATED WITH THE SERVICE PANEL CLOSED.
(PER CODE: NEC 690.15 ,690.13(B))

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



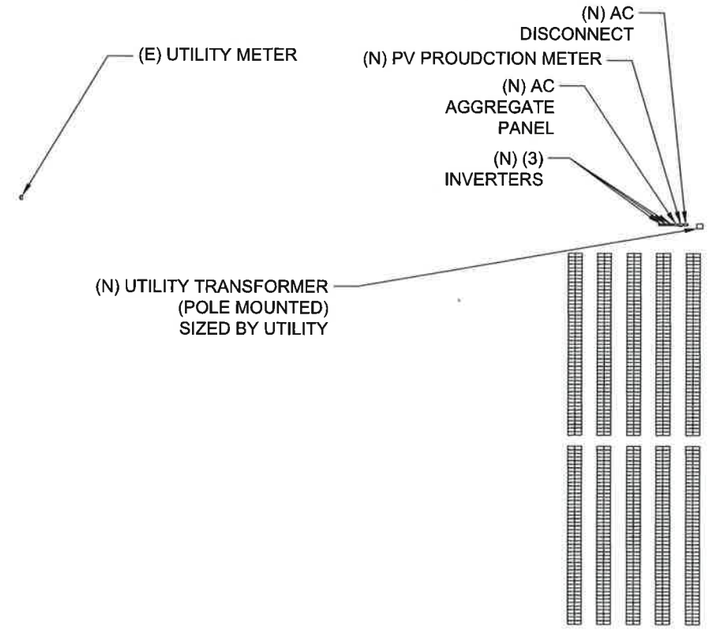
LABEL LOCATION
AC DISCONNECT , DC DISCONNECT,
POINT OF INTERCONNECTION
(PER CODE: NEC690.56(C)(1)(A))

SYSTEM LABELING REQUIREMENTS:

1. LABELS MUST BE OF REFLECTIVE PHENOLIC MATERIAL WITH WHITE LETTERS AND RED BACKGROUND.
2. LABELS TO BE MECHANICALLY FASTENED AND PLACED AS REQUIRED PER NEC 690.
3. LABELS TO BE IN A CAPITALIZED ARIAL FONT WITH A MINIMUM OF 3/8" IN HEIGHT.
4. DC CONDUIT LABEL MADE OF DURABLE ADHESIVE MATERIALS PLACED EVERY 10 FEET AND NEAR ALL JUNCTIONS AND PENETRATIONS.
5. LABELS SHOWN FOR REFERENCE ONLY, CONTRACTOR RESPONSIBLE TO MEET LOCAL AUTHORITY AND UTILITY REQUIREMENTS.

CAUTION

MULTIPLE SOURCES OF POWER DISCONNECTS ARE LOCATED AS SHOWN



QUESTIONS, CALL:
800-504-2337
www.freedomsolarpower.com

FREEDOM SOLAR POWER
ESTES ROCKETS
COM-41758

ESTES ROCKETS - SITE MAP PLACARD

1 COPIE NEEDED OF PLACARD:

1 TO BE MOUNTED AT MAIN SERVICE DISCONNECT

PROJECT PROVIDED BY:
FREEDOM SOLAR POWER
FREEDOM SOLAR LLC
4601 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR
FREEDOM SOLAR LLC
4601 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION
480.15 KW DC SYSTEM
360 KW AC SYSTEM
(600) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD
COLORADO LICENSED PROFESSIONAL ENGINEER
PE.0039331
Signed 5/02/2024

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

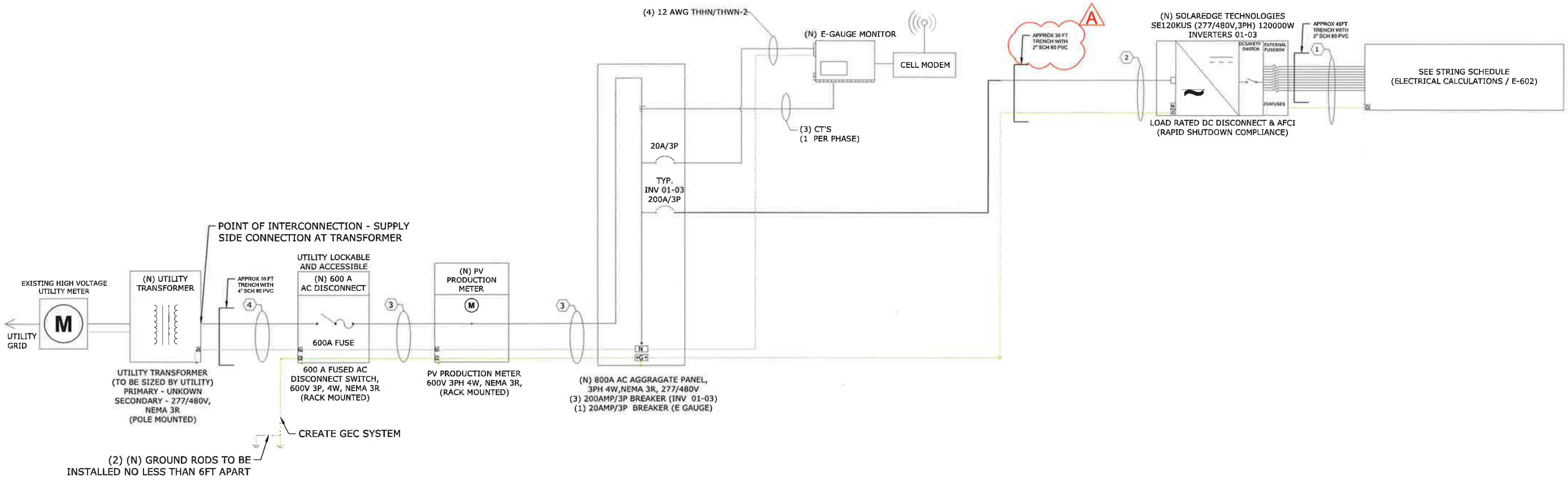
PROJECT NUMBER:
COM-41720

DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
E-505
ELECTRICAL PLACARDS



NOTE:

1. THIS INSTALLATION IS TO BE CONSIDERED SUPERVISED.ALL NEW ADDITIONS AND ALTERATIONS TO ANY EQUIPMENT IDENTIFIED IN THIS DOCUMENT MUST BE MADE WITH ENGINEERING SUPERVISION AND ALL WORK MUST BE COMPLETED BY QUALIFIED PERSONNEL.
2. ALL EQUIPMENT AND TERMINALS MUST BE MINIMUM 75°C RATED.
3. ALL CONDUCTORS ARE COPPER, UNLESS OTHERWISE SPECIFIED.
4. ALL TERMINATIONS OF ALUMINUM CONDUCTORS SHALL BE PROPERLY INSTALLED WITH BEST PRACTIC PROCEDURES THAT INCLUDE BUT NOT LIMITED TO: USE OF TERMINATION EQUIPMENT RATED FOR ALUMINUM AT THE CONDUCTOR TEMPERATURE, CURRENT, AND VOLTAGE; ALLOWANCE FOR MOVEMENT DUE TO THERMAL EXPANSION/CONTRACTION; EXPOSED ALUMINUM SHALL BE PROPERLY COATED WITH ANTI-OXIDATION COMPOUND; TERMINALS ARE TORQUE AND MARKED TO REQUIRED SETTINGS WITH CALIBRATED DEVICE.
5. TAP DISCONNECTS ARE WITHIN THE 10 FOOT PER TAP RULE.
6. TAPS ARE MADE USING LISTED DEVICES.
7. EACH SOLAREDGE P1101 POWER OPTIMIZER IS CONNECTED TO TWO MODULES
8. ALL DC FUSES SHOWN ARE CONNECTED EXTERNALLY TO THE INVERTER

CONDUIT SCHEDULE

CONDUIT TAG #	CONDUIT SIZE	PARALLEL FEEDERS	CONDUCTOR	NEUTRAL	GROUND
1	2" EMT/PVC	1	(20) 10 AWG PV WIRE 2K	-	(1) 6 AWG THHN/THWN-2
2	2" EMT/PVC	1	(3) 3/0 AWG THHN/THWN-2	-	(1) 6 AWG THHN/THWN-2
3	3" EMT/PVC	2	(3) 350 kcmil THHN/THWN-2	(1) 1 AWG THHN/THWN-2	(1) 1 AWG THHN/THWN-2
4	3" EMT/PVC	2	(3) 350 kcmil THHN/THWN-2	(1) 350 AWG THHN/THWN-2	-

GENERAL CONDUCTOR INSULATION COLOR KEY

DC CONDUCTORS	
POSITIVE	RED
NEGATIVE	BLACK
277V/480V AC CONDUCTORS	
PHASE A	BROWN
PHASE B	ORANGE
PHASE C	YELLOW
NEUTRAL	WHITE OR GREY
GROUND	GREEN OR BARE Cu

OPTIMIZER SPECIFICATIONS

MODEL	SOLAREDGE P1101
MODULE POWER @ STC	485 W
OPEN CIRCUIT VOLTAGE: Voc	53.63 V
MAX POWER VOLTAGE: Vmp	45.63 V
SHORT CIRCUIT CURRENT: Isc	11.16 A

INVERTER SPECIFICATIONS

MODEL	SOLAREDGE SE120KUS (277/480V/ 3PH)
POWER RATING	120000 W
MAX OUTPUT CURRENT	144.3 A
CEC WEIGHTED EFFICIENCY	98.50%
MAX INPUT CURRENT	144.75 A
MAX DC VOLTAGE	1000 V

MODULE SPECIFICATION

MODEL	HANWHA Q.PEAK DUO XL-G10.3/BFG 485W
MODULE POWER @ STC	485 W
OPEN CIRCUIT VOLTAGE: Voc	53.63 V
MAX POWER VOLTAGE: Vmp	45.63 V
SHORT CIRCUIT CURRENT: Isc	11.16 A
MAX POWER CURRENT: Imp	10.63 A

PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COLORADO LICENSED PROFESSIONAL ENGINEER

Signed 5/02/2024

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST. PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER: COM-41720

DESIGNED BY: DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE: AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:

E-601

ELECTRICAL LINE DIAGRAM

3 PHASE AC VOLTAGE DROP CALCULATION

Source	Termination	120k 480v	# of inverters	Continuous Use (AMPS)	Disco Size (AMPS)	Interconnection	OCPD Size (AMPS)	# of Wire Sets	AMPS Per Set of Wire	Full System Min. Wire Size	Wire Length (FT)	Resistance (OHMS/ 1000FT)	Voltage Drop % of Min Wire Size
AC AGGREGATE	POI	3	3	541.13	600	XFMR	600	2	270.56	350 KCMIL	10	0.0390	0.0380

STRING SCHEDULE:

INVERTER 1	SE120K	
STRING	MODULES	OPTIMIZERS
1.1	32	16
1.2	30	15
1.3	30	15
1.4	30	15
1.5	34	17
1.6	36	18
1.7	34	17
1.8	36	18
1.9	32	16
1.10	36	18
TOTAL	330	165

INVERTER 2	SE120K	
STRING	MODULES	OPTIMIZERS
2.1	32	16
2.2	30	15
2.3	30	15
2.4	30	15
2.5	36	18
2.6	32	16
2.7	34	17
2.8	40	20
2.9	34	17
2.10	32	16
TOTAL	330	165

INVERTER 3	SE120K	
STRING	MODULES	OPTIMIZERS
3.1	32	16
3.2	30	15
3.3	30	15
3.4	30	15
3.5	34	17
3.6	36	18
3.7	38	19
3.8	40	20
3.9	30	15
3.10	30	15
TOTAL	330	165

SYSTEM INFO:
480.15 kW DC SYSTEM SIZE
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485W MODULES
(3) SOLAREDGE SE120KUS (277/480V,3PH)
(495) SOLAREDGE P1101 POWER OPTIMIZER

ELECTRICAL CALCULATIONS:

OCPD CALCULATIONS:
INVERTER OVERCURRENT PROTECTION =
INVERTER MAX CONTINUOUS OUTPUT CURRENT x 1.25
(144.3 x 3) x 1.25 = 541.13 A => PV BREAKER/FUSE RATING = 600 A
TOTAL REQUIRED PV BREAKER/FUSE SIZE=> 600 A BREAKER/FUSE

SYSTEM CHARACTERISTICS - INV 01 - 03:
VMP - INVERTER FIXED STRING VOLTAGE = 850V
VOC - MAX INVERTER SYSTEM VOLTAGE = 1000V
MAX OPERATING CURRENT = DC SYSTEM SIZE/VMP= 188.29 A
MAX SHORT CIRCUIT CURRENT =
(OPTIMIZER MAX CURRENT) X NO OF STRING = 18A x 10 = 180 A

DC WIRE SIZING (TAG 1):
MAX CIRCUIT CURRENT =
(OPTIMIZER OUTPUT) X (HIGH IRRADIANCE)[690.8(A)(1)] X (CONTINUOUS LOAD)[690.53] = 18A X 1.25=22.5A
ADJUSTED CONDUCTOR AMPACITY = (HIGH TEMP) [PER TABLE 310.15(B)(1)]X (CONDUIT FILL) [PER TABLE 310.15(C)(1)] X (CONDUCTOR AMPACITY) [PER TABLE 310.16] = 0.91 X 0.5 X 40A = 18.2A
TERMINAL RATING, [PER NEC 110.14(C)] - 10 AWG, 75°C RATED = 35A
35A > 22.5A, SO THE TERMINAL RATING GOVERNS THE CONDUCTOR SIZING
ALSO, 18.2A > 18A, AND 10 AWG IS SUFFICIENT.

AC WIRE SIZING (TAG 2):
MAX AC OUTPUT CURRENT = (MAX INVERTER OUTPUT) X (CONTINUOUS LOAD) [PER NEC 690.52] = 144.3 A X 1.25 = 180.38 A
ADJUSTED CONDUCTOR AMPACITY = (HIGH TEMP) [PER TABLE 310.15(B)(1)]X (CONDUIT FILL) [PER TABLE 310.15(C)(1)] X (CONDUCTOR AMPACITY) [PER TABLE 310.16] = 0.91 X 1 X 225 A = 204.75 A
TERMINAL RATING, [PER NEC 110.14(C)] - 3/0 AWG , 75°C RATED = 200 A
200 A ≥ 180.38 A, SO THE ADJUSTED CONDUCTOR AMPACITY GOVERNS THE CONDUCTOR SIZING
ALSO, 204.75 A >144.3 A, AND 3/0 AWG IS SUFFICIENT
INVERTER OVER CURRENT PROTECTION (INVERTER MAX CURRENT) X (CONTINUOUS LOAD) =
144.3 A X 1.25 = 180.38 A -->200 A OVERCURRENT PROTECTION

AC ACCUMULATION PANEL TO POINT INTERCONNECTION (TAG 5): NO. OF PARALLEL FEEDERS: 2
MAX AC OUTPUT CURRENT = (MAX INVERTER OUTPUT) X (CONTINUOUS LOAD) [PER NEC 690.52] = (144.3A x 3) x 1.25 = 541.13 A / 2 = 270.56 A
ADJUSTED CONDUCTOR AMPACITY = (HIGH TEMP) [PER TABLE 310.15(B)(1)] X (CONDUIT FILL) [PER TABLE 310.15(C)(1)] X (CONDUCTOR AMPACITY) [PER TABLE 310.16] = 0.91 X 1 X 350 A = 318.5 A
TERMINAL RATING, [PER NEC 110.14(C)] - 350 kcmil , 75°C RATED = 310 A
310 A > 270.56 A, SO THE ADJUSTED CONDUCTOR AMPACITY GOVERNS THE CONDUCTOR SIZING ALSO, 318.5 > 216.45 A, AND 350 kcmil IS SUFFICIENT

INVERTER OVER CURRENT PROTECTION:
(INVERTER MAX CURRENT) X (CONTINUOUS LOAD) = ((144.3 x 3)) x 1.25 = 541.13 A --> 600A OVERCURRENT PROTECTION

PROJECT PROVIDED BY:
FREEDOM SOLAR POWER
FREEDOM SOLAR LLC
4601 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR
FREEDOM SOLAR LLC
4601 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-6313

SYSTEM INFORMATION
480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD
COLORADO LICENSED PROFESSIONAL ENGINEER PE.0053031
Signed 5/02/2024

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
E-602
ELECTRICAL CALCULATIONS

Bill of Materials

Project Name:	**COM-41720 ESTES ROCKETS**
Address:	1295 H ST. PENROSE, CO 81240
System Size:	**480.15 kWdc**
Date Created:	2/16/2024
Utility Shutdown:	YES

Part # or Catalog #	Part Description	Qty	Unit
MODULES			
Q.PEAK DUO XL-G10.2 485W	HANWHA Q.CELLS Q.PEAK DUO XL-G10.2 485W	990	ea
INVERTERS			
SE120K-US08IBNZ4	SE120K Inverter, 3-P For the 277/480V Grid	3	ea
P1101	SOLAREDGE P1101 POWER OPTIMIZER	495	ea
RACKING	TBD (OMCO SOLAR)		
Switchgear			
TNIA64	Neutral Kit, 400A, 1 x 350 - 800MCM, Cu/Al	4	ea
58950TNG3	Ground Kit, Equipment, 3 x 10AWG -1/0AWG, 400A to 600A, Cu/Al	4	ea
THN3365R	CH 600A 600V HD FUSIBLE DISCONNECT	2	ea
FLSR600	600A 600V FUSE	2	ea
AGGPB-480V-3-200A	AGG PANEL 600A WITH (3) 3P 200 A AND (1) 3P 20 A BREAKERS	1	ea
A8824RT	Gutter Box, NEMA 3R, Screw Cover, 8" x 8" x 24", Gray, No KOs	1	ea
A8872RT	Gutter Box, NEMA 3R, Screw Cover, 8" x 8" x 72", Gray, No KOs	1	ea
Monitoring			
PEK-277-XL	Egauge Powered Enclosure Kit (277/480VAC) (Extra Large Enclosure)	1	ea
RCT-106mm	Rogowski Coils (Flexible Rope CTs) with CTid	3	ea
Labeling			
WARNING STICKERS	WARNING STICKERS	2	ea
SITE PLACARD	SITE PLACARD	2	ea

Balance of System

Project Name:	**COM-41758 ESTES ROCKETS**
Address:	1295 H ST. PENROSE, CO 81240
System Size:	**480.15 kWdc**
Date Created:	2/16/2024
Utility Shutdown:	YES

Part # or Catalog #	Part Description	Qty	Unit
300.0000	EMT Conduit, 3", Steel, 10'	15	ea
EMT30090	3" EMT 90° Elbow	4	ea
	Condulet Box Type LB, Conduit Body, 3"	2	ea
2952RT	EMT Compression Coupling, 3", Raintight, Steel	15	ea
2942RT	EMT Compression Connector, 3 inch, Insulated, Raintight, Steel	6	ea
447.0000	3" Plastic Bushing, Insulating	6	ea
PS-1300-AS-2-EG	2" Strap Pipe unit strut Clamp	8	ea
1712.0000	Conduit Hub, 3", Insulated, Raintight, Zinc Die Cast	2	ea
THHN350STRBLK-CUT	350 MCM THHN/THWN-2 Stranded Copper, Black, Cut to Length	150	ft
THHN2STRBLK-CUT	1 AWG THHN/THWN-2, Stranded, Copper, Black, Cut to Length	100	ft
THHN3/0STRBLK-CUT	3/0 AWG THHN/THWN-2 Stranded Copper, Black, Cut to Length	70	ft
THHN6STRGRN-CUT	6 AWG THHN/THWN-2 Stranded Copper, Green, Cut to Length	30	ft
200.0000	EMT Conduit, 2", Steel, 10'	8	ea
6200S	EMT Compression Coupling, 2", Steel, Concrete Tight	8	ea
825RT	EMT Compression Connector, 2 inch, Raintight/Concrete Tight, Steel	8	ea
36130.0000	2" Plastic Bushing, Insulating	8	ea
EMT20090	2" EMT 90° Elbow	2	ea
PS-1300-AS-2-EG	2" Strap Pipe unit strut Clamp	10	ea
PS-500-EH-10-PG	Shallow Strut - Elongated Holes, Steel, Pre-Galvanized, 1-5/8" x 13/16" x 10'	6	ea
PS-200-EH-10-PG	Unit Strut - Elongated Holes, Steel, Pre-Galvanized, 1-5/8" x 1-5/8" x 10'	4	ea
165BR4A	General Use Vinyl Electrical Tape, Multi-Purpose, Brown, 3/4" x 60'	1	ea
165OR4A	General Use Vinyl Electrical Tape, Multi-Purpose, Orange, 3/4" x 60	1	ea
165YL4A	General Use Vinyl Electrical Tape, Multi-Purpose, Yellow, 3/4" x 60'	1	ea
165GY4A	General Use Vinyl Electrical Tape, Multi-Purpose, Gray, 3/4" x 60'.	1	ea
1708010.0000	General Use Vinyl Electrical Tape, Multi-Purpose, Green, 3/4" x 60'	1	ea

PROJECT PROVIDED BY:

FREEDOM SOLAR POWER
FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
300 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
*	1/12/2024	DG	JM	ISSUE FOR REVIEW
*	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	*	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
O-001
BOM / BOS

Three Phase Inverter with Synergy Technology

For the 277/480V Grid for North America

SE80KUS / SE100KUS / SE110KUS / SE120KUS

INVERTER

Powered by unique pre-commissioning process for rapid system installation

- Pre-commissioning feature for automated validation of system components and wiring during the site installation process and prior to grid connection
- Easy 2-person installation with lightweight, modular design (each inverter consists of 2 or 3 Synergy units and 1 Synergy Manager)
- Independent operation of each Synergy unit enables higher uptime and easy serviceability
- Built-in thermal sensors detect faulty wiring, ensuring enhanced protection and safety
- Built-in arc fault protection and rapid shutdown
- Built-in PID mitigation for maximized system performance
- Monitored* and field-replaceable surge protection devices, to better withstand surges caused by lightning or other events
- Built-in module-level monitoring with Ethernet or cellular communication for full system visibility

solaredge.com

solaredge

/ Three Phase Inverter with Synergy Technology

For the 277/480V Grid for North America

SE80KUS / SE100KUS / SE110KUS / SE120KUS

MODEL NUMBER	SE80KUS	SE100KUS	SE110KUS	SE120KUS	
APPLICABLE TO INVERTERS WITH PART NUMBER	SExxK-USx8xxxx				UNITS
OUTPUT					
Rated AC Active Output Power	80000	100000	110000	120000	W
Maximum AC Apparent Output Power	80000	100000	120000	120000	VA
AC Output Line Connections	3W + PE, 4W + PE				
Supported Grids	WYE: TN-C, TN-S, TN-C-S, TT, IT; Delta: IT				
AC Output Voltage Minimum-Nominal-Maximum(1) (L-N)	244 - 277 - 305				Vac
AC Output Voltage Minimum-Nominal-Maximum(1) (L-L)	422.5 - 480 - 529				Vac
AC Frequency Min-Nom-Max(1)	59.5 - 60 - 60.5				Hz
Maximum Continuous Output Current (per Phase, PF=1)	96.5	120	144.3		Aac
GFDI Threshold	1				A
Utility Monitoring, Islanding Protection, Configurable Power Factor, Country Configurable Thresholds	Yes				
Total Harmonic Distortion	≤ 3				%
Power Factor Range	+/- 0.2 to 1				
INPUT					
Maximum DC Power (Module STC) Inverter / Synergy Unit	140000 / 70000	175000 / 58300	210000 / 70000		W
Transformer-less, Ungrounded	Yes				
Maximum Input Voltage DC+ to DC-	1000				Vdc
Operating Voltage Range	850 - 1000				Vdc
Maximum Input Current	2 x 48.25	3 x 40	3 x 48.25		Adc
Reverse-Polarity Protection	Yes				
Ground-Fault Isolation Detection	167kΩ sensitivity per Synergy Unit(2)				
CEC Weighted Efficiency	98.5				%
Nighttime Power Consumption	< 8	< 12			W
ADDITIONAL FEATURES					
Supported Communication Interfaces(3)	2 x RS485, Ethernet, Wi-Fi (optional), Cellular (optional)				
Smart Energy Management	Export Limitation				
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi access point for local connection				
Arc Fault Protection	Built-in, User Configurable (According to UL1699B)				
Photovoltaic Rapid Shutdown System	NEC 2014, 2017 and 2020, Built-in				
PID Rectifier	Nighttime, built-in				
RS485 Surge Protection (ports 1+2)	Type II, field replaceable, integrated				
AC, DC Surge Protection	Type II, field replaceable, integrated				
DC Fuses (Single Pole)	25A, integrated				
DC SAFETY SWITCH					
DC Disconnect	Built-in				
STANDARD COMPLIANCE					
Safety	UL1699B, UL1741, UL1741 SA, UL1741 SB, UL1998, CSA C22.2#107.1, Canadian AFCI according to T.I.L. M-07				
Grid Connection Standards	IEEE 1547-2018, Rule 21, Rule 14 (HI)				
Emissions	FCC part 15 class A				

(1) For other regional settings please contact SolarEdge support.
(2) Where permitted by local regulations.
(3) For specifications of the optional communication options, visit the Communication product page or the Resource Library to download the relevant product datasheet.

/ Three Phase Inverter with Synergy Technology

For the 277/480V Grid for North America

SE80KUS / SE100KUS / SE110KUS / SE120KUS

MODEL NUMBER	SE80KUS	SE100KUS	SE110KUS	SE120KUS	
APPLICABLE TO INVERTERS WITH PART NUMBER	SExxK-USx8xxxx				UNITS
INSTALLATION SPECIFICATIONS					
Number of Synergy Units per Inverter	2	3			
AC Max Conduit Size	2 1/2"				in
Max AWG Line / PE	4/0 / 1/0				
DC Max Conduit Size	1 x 3", 2 x 2"				in
DC Input Inverter / Synergy Unit	8 / 4 pairs 6-12 AWG	12 / 4 pairs 6-12 AWG			
	2 pairs / 1 pair, Max 2 AWG copper or aluminum	3 pairs / 1 pair, Max 2 AWG copper or aluminum			
Dimensions (H x W x D)	Synergy Unit: 22 x 12.9 x 10.75 / 558 x 328 x 273; Synergy Manager: 14.17 x 22.4 x 11.6 / 360 x 580 x 295				in / mm
Weight	Synergy Unit: 70.4 / 32; Synergy Manager: 39.6 / 18				lb / kg
Operating Temperature Range	-40 to +140 / -40 to +60(4)				°F / °C
Cooling	Fan (user replaceable)				
Noise	< 67				dBA
Protection Rating	NEMA 3R				
Mounting	Brackets provided				

(4) For power de-rating information refer to the Temperature De-rating - Technical Note (North America)

Power Optimizer

For North America

P1101

POWER OPTIMIZER

PV power optimization at the module level

The most cost-effective solution for commercial and large field installations

- Specifically designed to work with SolarEdge inverters
- High efficiency with module-level MPPT, for maximized system energy production and revenue, and fast project ROI
- Superior efficiency (99.5%)
- Balance of System cost reduction; 50% less cables, fuses, and combiner boxes; over 2x longer string lengths possible
- Fast installation with a single bolt
- Advanced maintenance with module-level monitoring
- Module-level voltage shutdown for installer and firefighter safety
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)

solaredge.com

solaredge

/ Power Optimizer

For North America

P1101

Power Optimizer Model (Typical Module Compatibility)	P1101 (for up to 2 x high power or bi-facial modules)	Units
INPUT		
Rated Input DC Power(1)	1100	W
Connection Method	Single input for series connected modules	
Absolute Maximum Input Voltage (Voc at lowest temperature)	125	Vdc
MPPT Operating Range	12.5 - 105	Vdc
Maximum Short Circuit Current (Isc)	14.1	Adc
Maximum Short Circuit Current per Input (Isc)	-	Adc
Maximum Efficiency	99.5	%
Weighted Efficiency	98.6	%
Overvoltage Category	II	
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)		
Maximum Output Current	18	Adc
Maximum Output Voltage	80	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)		
Safety Output Voltage per Power Optimizer	1 ± 0.1	Vdc
STANDARD COMPLIANCE		
Photovoltaic Rapid Shutdown System	Compliant with NEC 2014, 2017, 2020	
EMC	FCC Part 15 Class A, IEC61000-6-2, IEC61000-6-3	
Safety	IEC62109-1 (class II safety), UL1741, UL3741, CSA C22.2#107.1	
Material	UL94 V-0, UV resistant	
RoHS	Yes	
INSTALLATION SPECIFICATIONS		
Compatible SolarEdge Inverters	All commercial three phase inverters	
Maximum Allowed System Voltage	1000	Vdc
Dimensions (W x L x H)	129 x 162 x 59 / 5.1 x 6.4 x 2.32	mm / in
Weight	1064 / 2.34	gr / lb
Input Connector	MC4(2)	
Input Wire Length Options (1 / 2 / 3)	1.6 / 5.2	m / ft
Output Wire Type / Connector	Double insulated; MC4	
Output Wire Length	2.4 / 7.8	m / ft
Operating Temperature Range(3)	-40 to +85 / -40 to +185	°C / °F
Protection Rating	IP68 / NEMA6P	
Relative Humidity	0 - 100	%

(1) Rated power of the module at STC will not exceed the Power Optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed.
(2) For other connector types please refer to the Power Optimizer Input Connector Compatibility Technical Note.
(3) For ambient temperatures above +70°C / +158°F power de-rating is applied. Refer to Power Optimizers De-Rating Application Note for more details.

PV System Design Using a SolarEdge Inverter(4)(5)		208V Grid	208V Grid	277/480V Grid	277/480V Grid	
Compatible Power Optimizers		P1101				
Minimum String Length	Power Optimizers	8	10	14	14	
	PV Modules	15	19	27	27	
Maximum String Length	Power Optimizers	30	30	30	30	
	PV Modules	60	60	60	60	
Maximum Continuous Power per String		7200	8820	15300	15300	W
Maximum Allowed Connected Power per String(6)		1 string - 8400; 2 strings or more - 9800	1 string - 10020; 2 strings or more - 12020	1 string - 17550; 2 strings or more - 20300	2 strings or less - 17550; 3 strings or more - 20300	W
Parallel Strings of Different Lengths or Orientations		Yes				
Maximum Difference in Number of Power Optimizers Allowed Between the Shortest and Longest String Connected to the Same Inverter Unit		5 Power Optimizers				

* The same rules apply for Synergy units of equivalent power ratings that are part of the modular Synergy Technology inverter.
(4) For each string, a Power Optimizer may be connected to a single PV module if 1) each Power Optimizer is connected to a single PV module or 2) it is the only Power Optimizer connected to a single PV module in the string.
(5) Design with three phase 208V inverters is limited. Use the SolarEdge Designer for verification.
(6) To connect more STC power per string, design your project using SolarEdge Designer.

RoHS

Q.PEAK DUO XL-G10.3 / BFG

475-490

BIFACIAL DOUBLE GLASS MODULE WITH EXCELLENT RELIABILITY AND ADDITIONAL YIELD

TÜVRheinland CERTIFIED — Quality Controlled PV

EUPD RESEARCH TOP BRAND PV 2021

Q CELLS Yield Security

BIFACIAL ENERGY YIELD GAIN OF UP TO 20%
Bifacial Q.ANTUM solar cells with zero gap cell layout make efficient use of light shining on the module rear-side for radically improved LCOE.

LOW ELECTRICITY GENERATION COSTS
Q.ANTUM DUO Z combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology for higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 21.4%.

INNOVATIVE ALL-WEATHER TECHNOLOGY
Optimal yields, whatever the weather with excellent low-light and temperature behavior.

ENDURING HIGH PERFORMANCE
Long-term yield security with Anti LID and Anti PID Technology[1], Hot-Spot Protect and Traceable Quality Tra.Q™.

FRAME FOR VERSATILE MOUNTING OPTIONS
High-tech aluminum alloy frame protects from damage, enables use of a wide range of mounting structures and is certified regarding IEC for high snow (5400 Pa) and wind loads (2400 Pa).

A RELIABLE INVESTMENT
Double glass module design enables extended lifetime with 12-year product warranty and improved 30-year performance warranty[2].

[1] APT test conditions according to IEC/TS 62804-1:2015 method B (−1500V, 168h) including post treatment according to IEC 61215-1-1 Ed. 2.0 (CD)
[2] See data sheet on rear for further information.

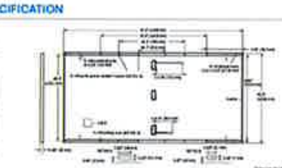
THE IDEAL SOLUTION FOR: Ground-mounted solar power plants

Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	87.2 in × 41.1 in × 1.38 in (including frame) (2216 mm × 1045 mm × 35 mm)
Weight	64.2 lbs (29.1 kg)
Front Cover	0.08 in (2.0 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	0.08 in (2.0 mm) semi-tempered glass
Frame	Anodized aluminum
Cell	6 × 26 monocrystalline Q.ANTUM solar half cells
Junction Box	2.09-3.98 in × 1.26-2.36 in × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥27.6 in (700 mm), (−) ≥13.8 in (350 mm)
Connector	Stäubli MC4, Stäubli MC4-Evo2, Hanwha Q CELLS HQC4, IP68



ELECTRICAL CHARACTERISTICS

POWER CLASS			475		480		485		490	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC AND BSTC (POWER TOLERANCE +5W / −0W)				BSTC*		BSTC*		BSTC*		BSTC*
Power at MPP	P_{MPP}	[W]	475	518.6	480	525.0	485	530.5	490	536.0
Short Circuit Current	I_{SC}	[A]	11.08	12.12	11.12	12.17	11.16	12.21	11.20	12.26
Open Circuit Voltage	V_{OC}	[V]	53.15	53.34	53.39	53.58	53.63	53.82	53.86	54.06
Current at MPP	I_{MPP}	[A]	10.55	11.54	10.59	11.58	10.63	11.63	10.67	11.67
Voltage at MPP	V_{MPP}	[V]	45.03	45.07	45.33	45.32	45.63	45.62	45.93	45.92
Efficiency	η	[%]	≥20.5	≥22.4	≥20.7	≥22.7	≥20.9	≥22.9	≥21.2	≥23.1

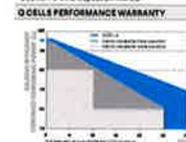
Bifaciality of P_{MPP} and I_{SC} 70% ±5% • Bifaciality given for rear side irradiation on top of STC (front side) • According to IEC 60904-1-2

*Measurement tolerances P_{MPP} ±3%; I_{SC}, V_{OC} ±5% at STC: 1000 W/m²; *at BSTC: 1000 W/m² + φ × 135 W/m², φ = 70% ±5%, 25±2°C, AM 1.5 according to IEC 60904-3

MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT*			475	480	485	490
Power at MPP	P_{MPP}	[W]	357.6	361.4	365.1	368.9
Short Circuit Current	I_{SC}	[A]	8.92	8.96	8.99	9.02
Open Circuit Voltage	V_{OC}	[V]	50.37	50.49	50.72	50.95
Current at MPP	I_{MPP}	[A]	8.30	8.34	8.37	8.40
Voltage at MPP	V_{MPP}	[V]	43.08	43.35	43.63	43.92

*800 W/m², NMOT, spectrum AM 1.5

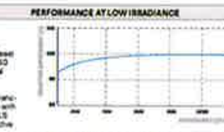
Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.45% degradation per year. At least 93.95% of nominal power up to 10 years. At least 84.95% of nominal power up to 30 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25°C, 1000 W/m²)

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	−0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	−0.34	Nominal Module Operating Temperature	NMOT	[°F]	108 ± 5.4 (42 ± 3°C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V_{SYS}	[V]	1500	PV module classification	Class II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating based on ANSI/UL 61730	TYPE 29*
Max. Design Load, Push / Pull*	[lbs/ft²]	75 (3600 Pa) / 33 (1600 Pa)	Permitted Module Temperature on Continuous Duty	−40°F up to +185°F (−40°C up to +85°C)
Max. Test Load, Push / Pull*	[lbs/ft²]	113 (5400 Pa) / 50 (2400 Pa)		

*See Installation Manual — *New Type is similar to Type 3 but with metallic frame

QUALIFICATIONS AND CERTIFICATES

Quality Controlled PV - TÜV Rheinland; UL 61730, CE-compliant, IEC 61215:2016, IEC 61730:2016, U.S. Patent No. 9,893,215 (solar cells)

PACKAGING INFORMATION

Horizontal packaging	89.4 in 2270 mm	43.1 in 1095 mm	47.6 in 1210 mm	1975 lbs 896 kg	20 pallets	20 pallets	29 modules
Vertical packaging	90.8 in 2306 mm	45.3 in 1150 mm	47.4 in 1205 mm	2013 lbs 913 kg	20 pallets	20 pallets	30 modules

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS America Inc.
400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us.q-cells.com | WEB www.q-cells.us

PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST. PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

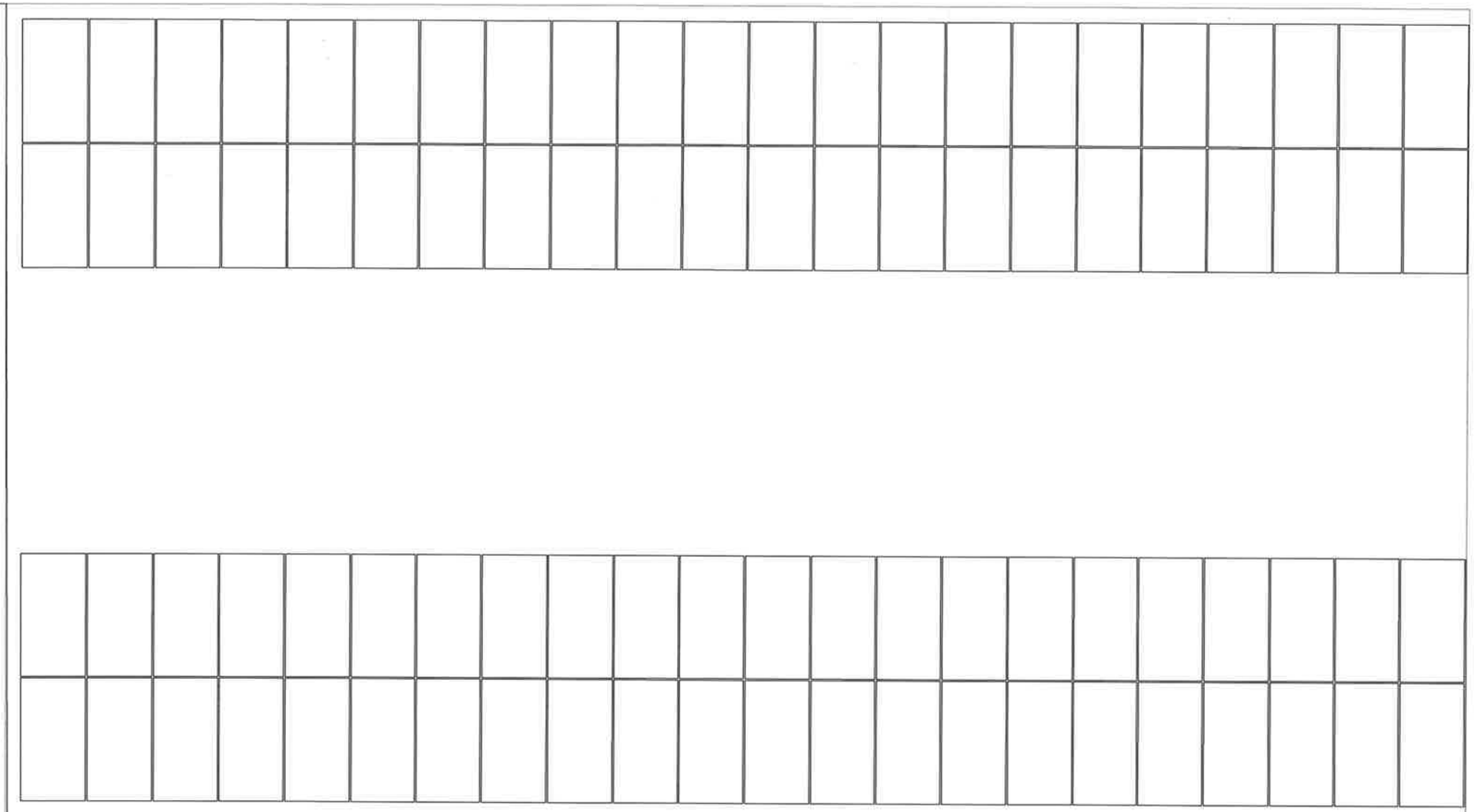
DESIGNED BY:
DAVID GUTIERREZ

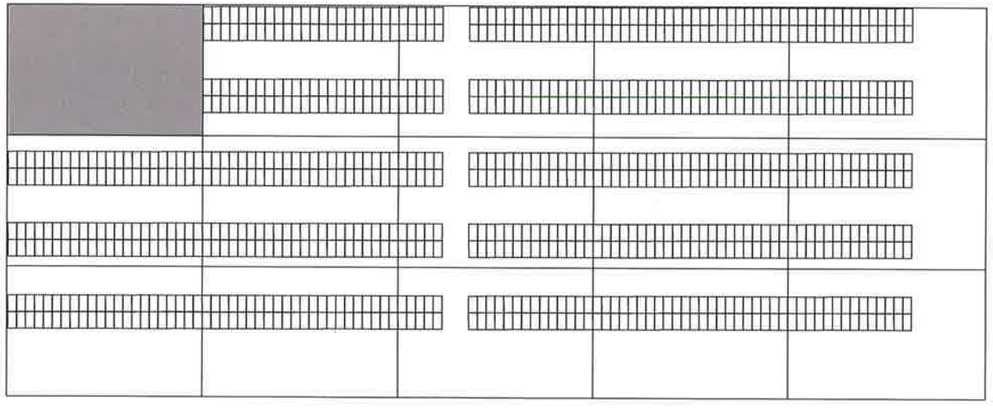
REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
O-501
SPECIFICATION SHEETS

ARRAY #1 FIELD NOTES





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4601 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

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SYSTEM INFORMATION

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(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
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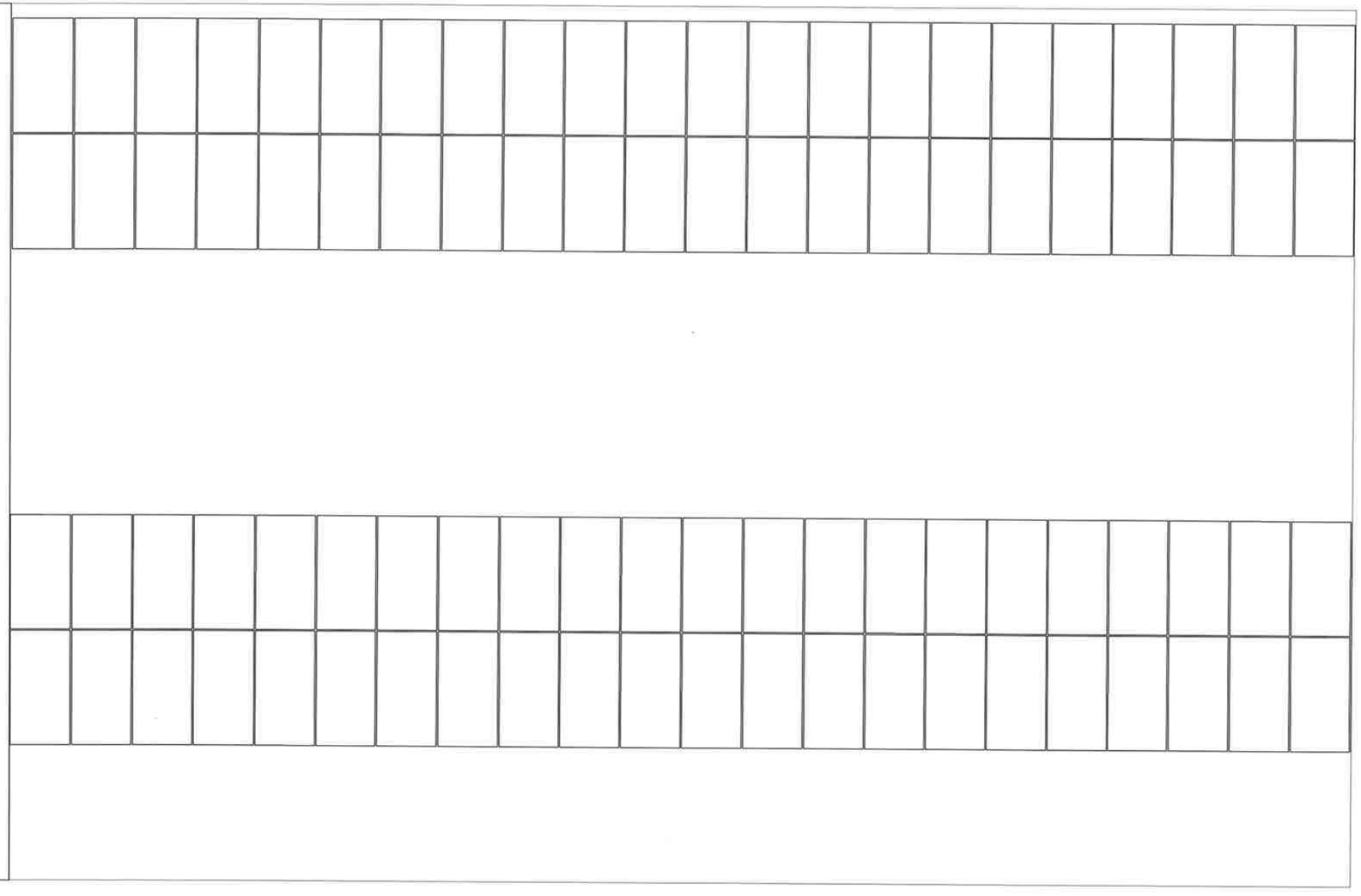
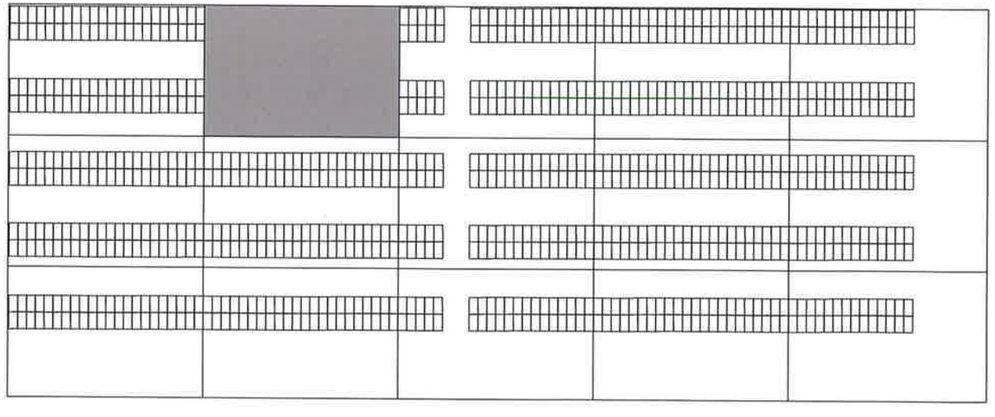
SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-101
FIELD ARRAY WIRE DIAGRAM

ARRAY #2 FIELD NOTES





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FREEDOM SOLAR LLC
4801 FREIDRICH LN. STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
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AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) 15ANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
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DESIGNED BY:
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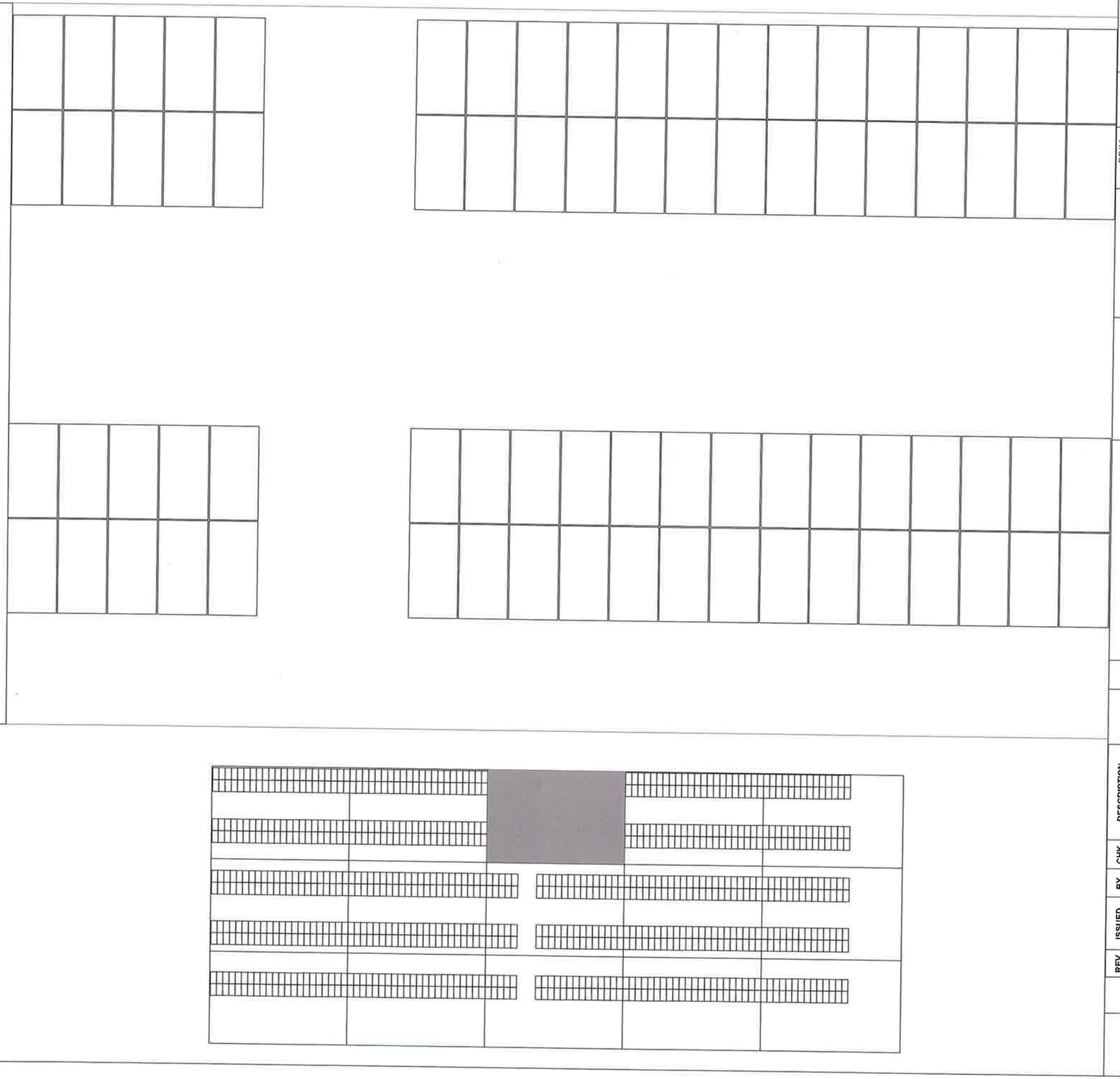
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-102
FIELD ARRAY WIRE DIAGRAM

ARRAY #3 FIELD NOTES



PROJECT PROVIDED BY:

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FREEDOM SOLAR LLC
4901 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4901 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
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DESIGNED BY:
DAVID GUTIERREZ

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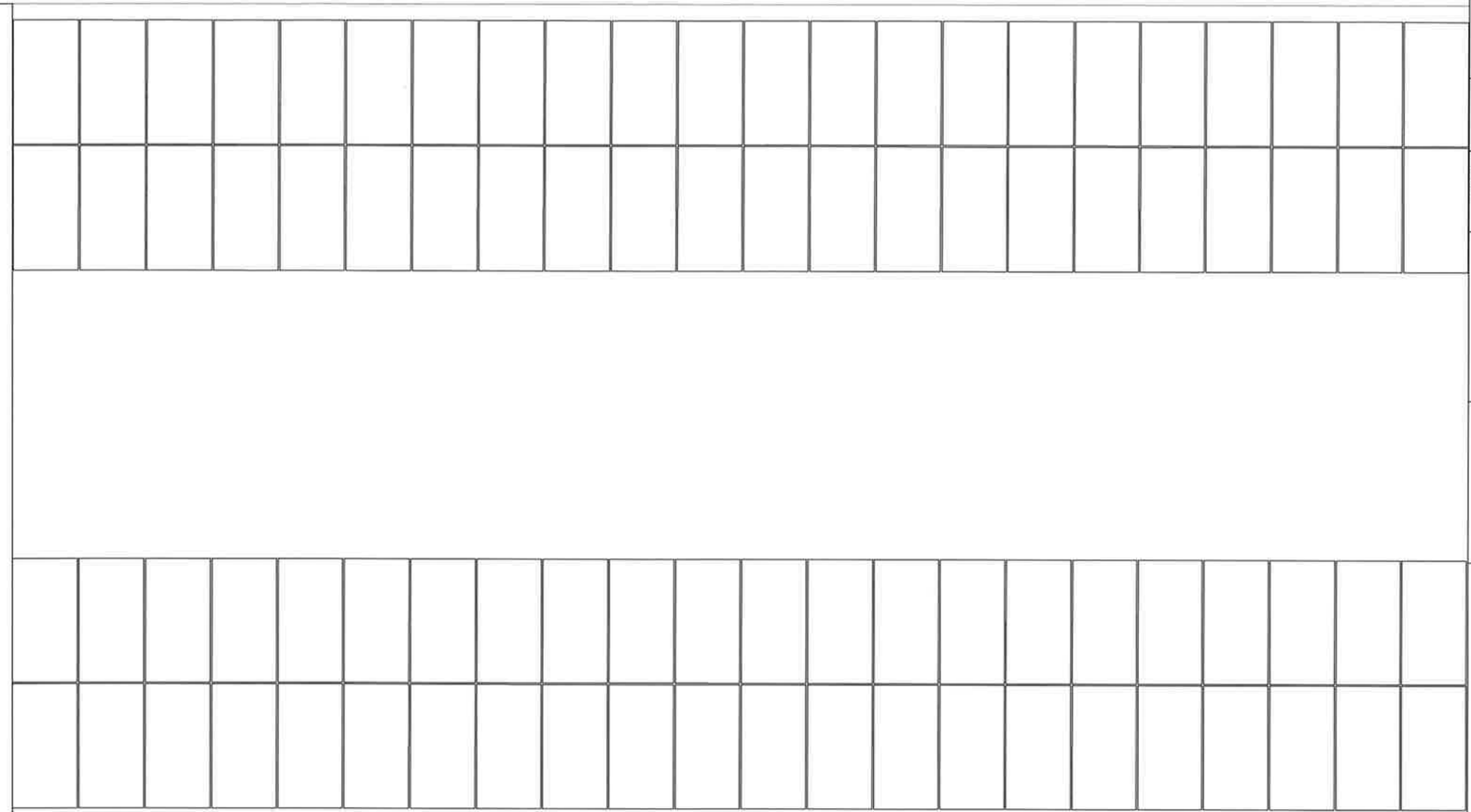
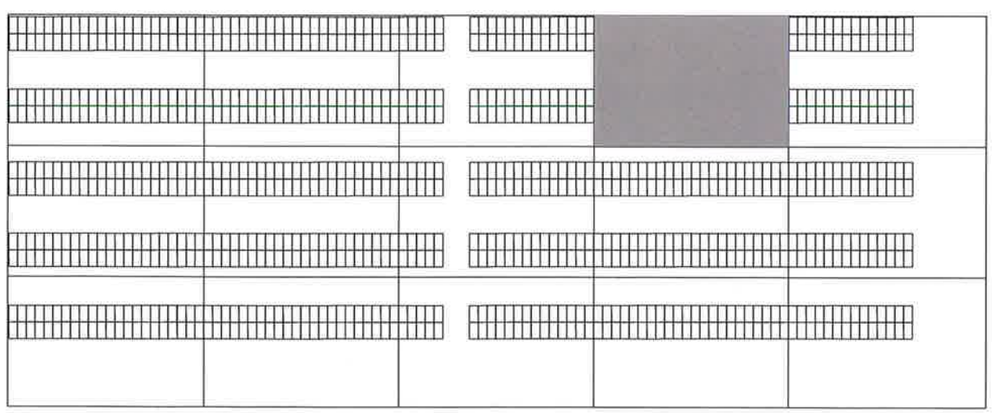
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-103
FIELD ARRAY WIRE DIAGRAM

ARRAY #4 FIELD NOTES





PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
360 kW AC SYSTEM
(956) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
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DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
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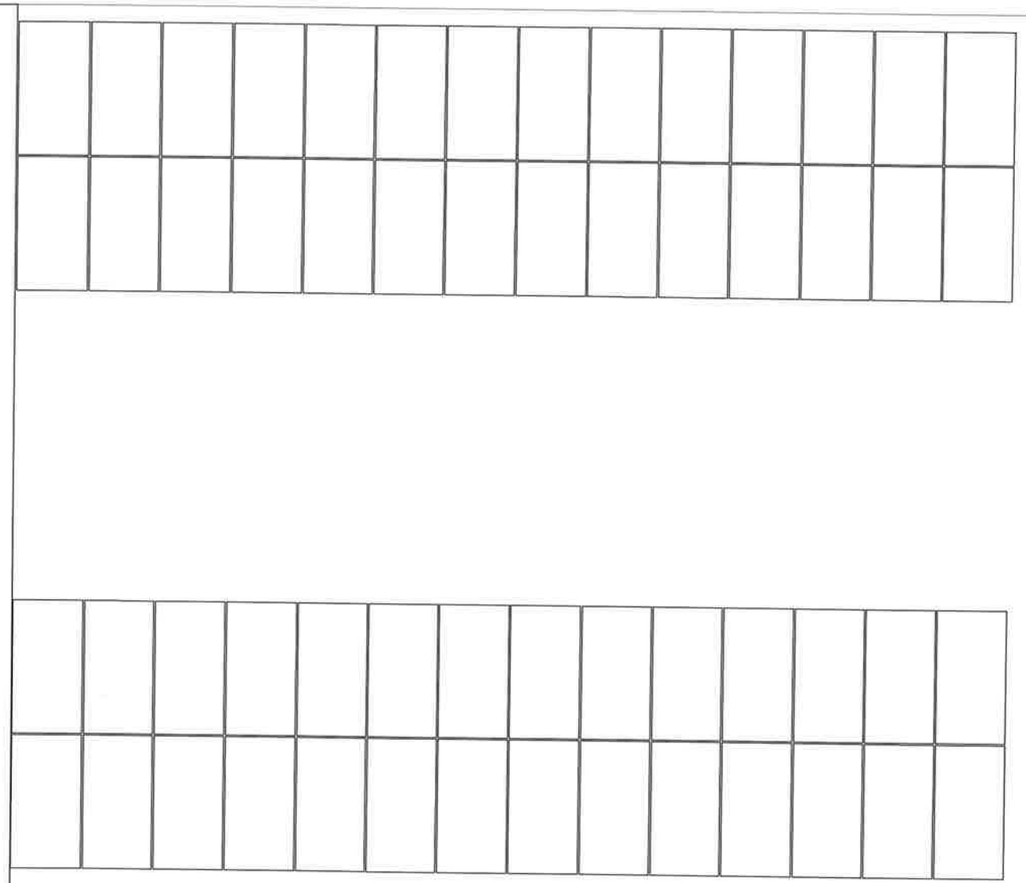
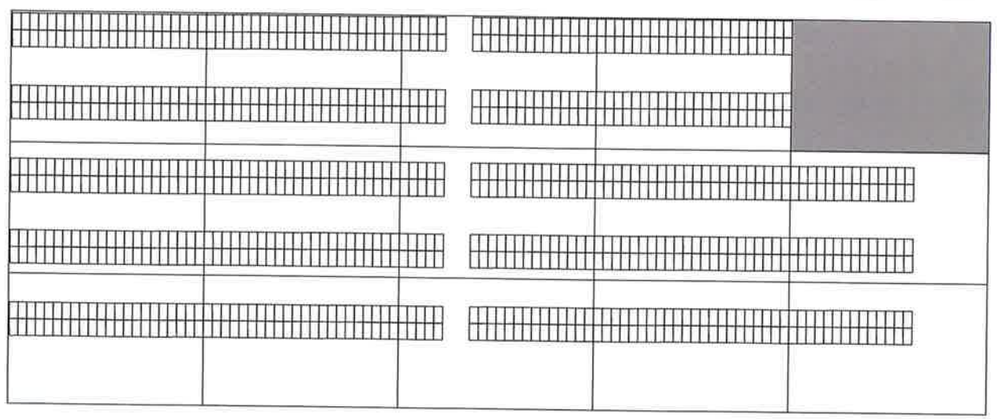
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-104
FIELD ARRAY WIRE DIAGRAM

ARRAY #5 FIELD NOTES





PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN. STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

485.15 kW DC SYSTEM
300 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST - PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
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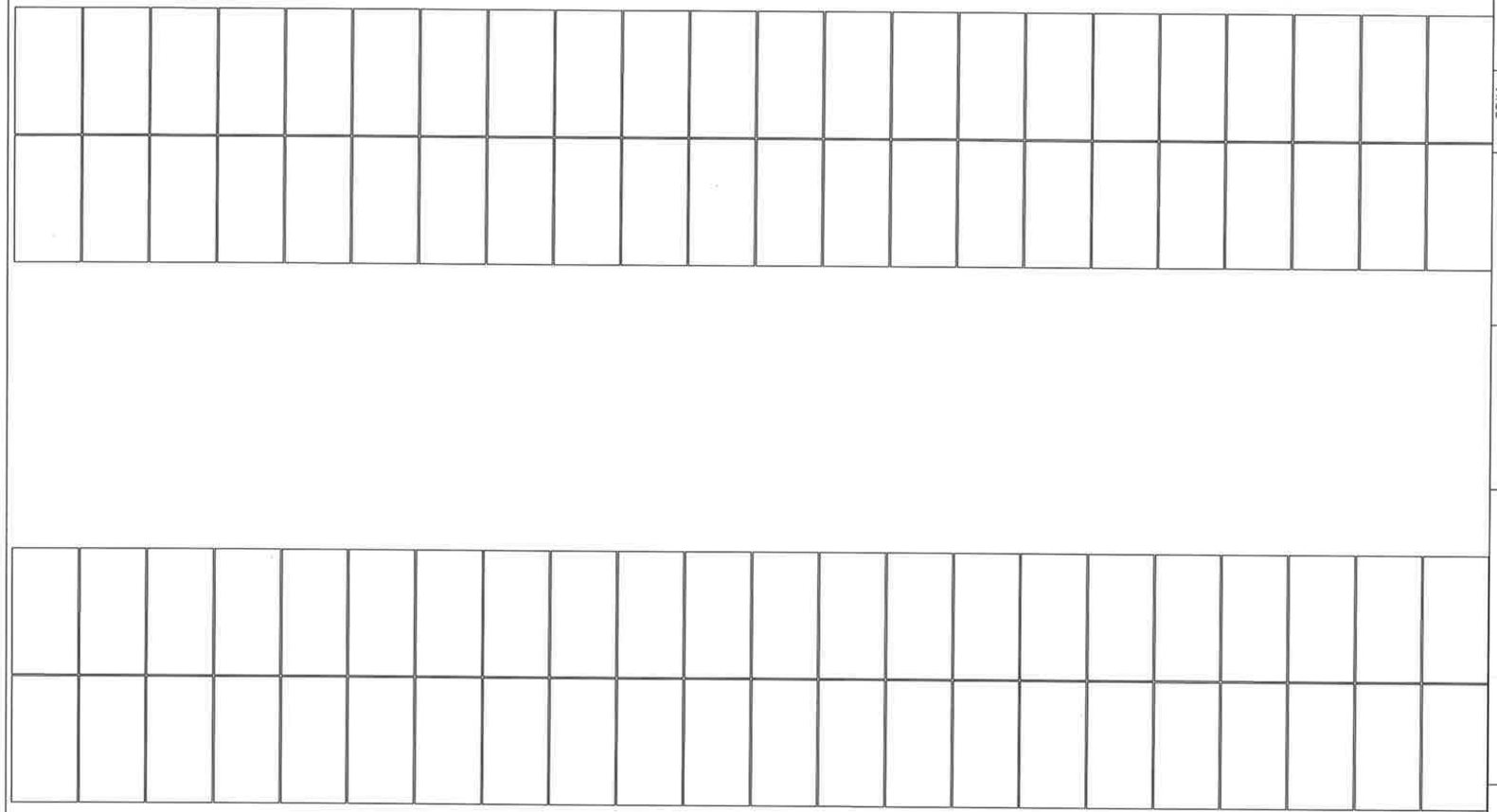
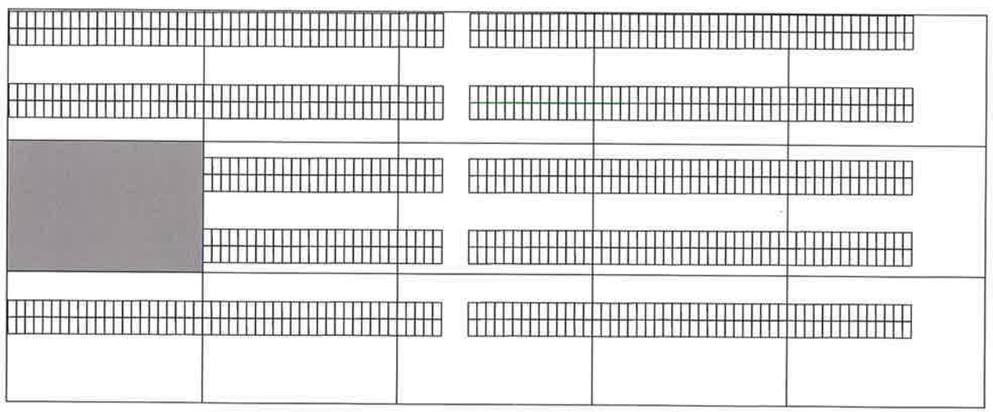
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-105
FIELD ARRAY WIRE DIAGRAM

ARRAY #6 FIELD NOTES





PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(1) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST. PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

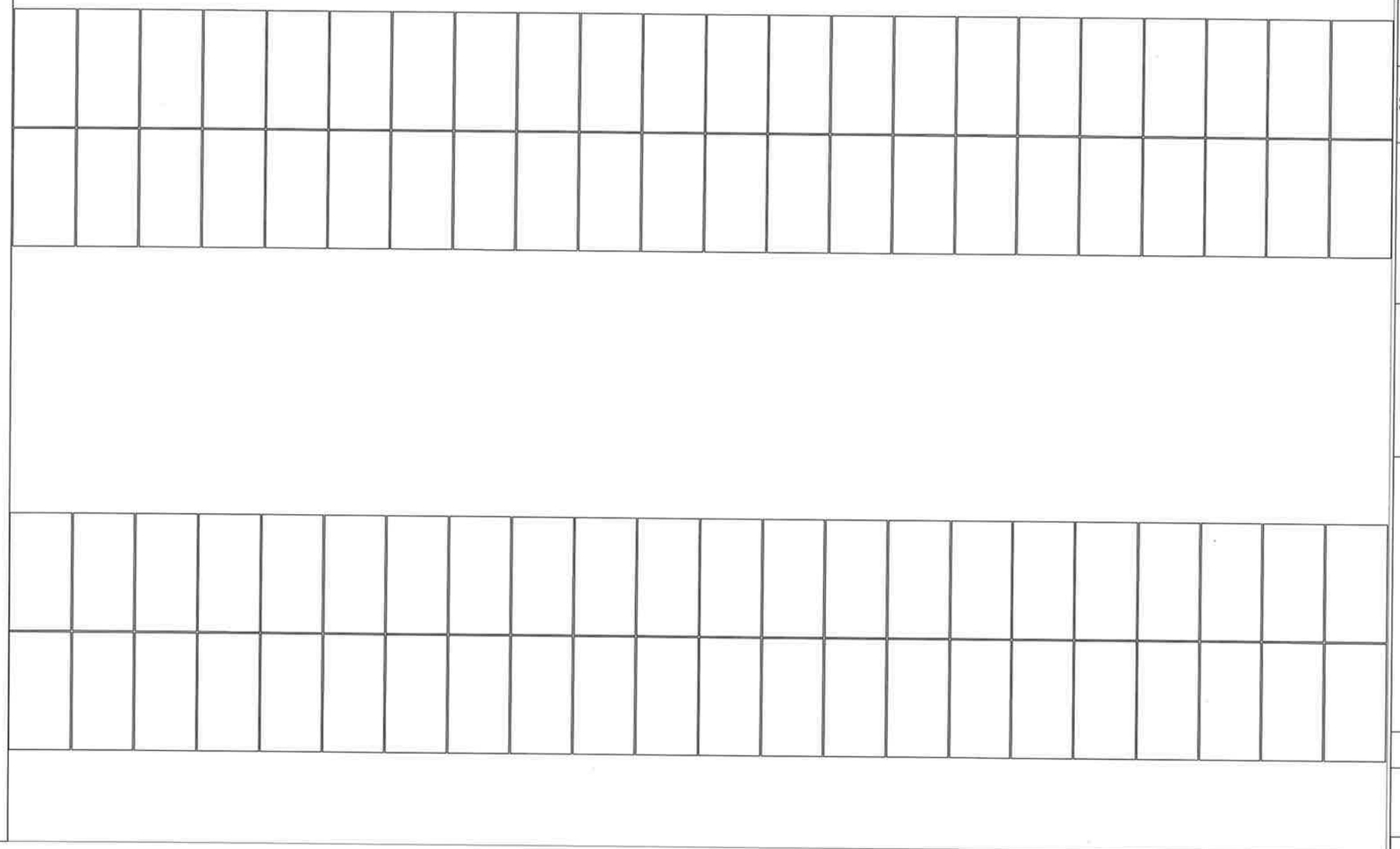
DESIGNED BY:
DAVID GUTIERREZ

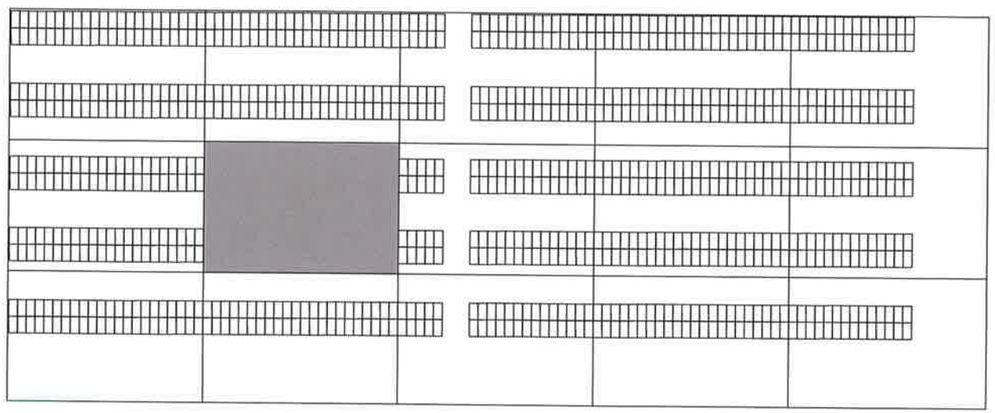
REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-106
FIELD ARRAY WIRE DIAGRAM

ARRAY #7 FIELD NOTES





PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480 15 kW DC SYSTEM
360 kW AC SYSTEM
(996) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

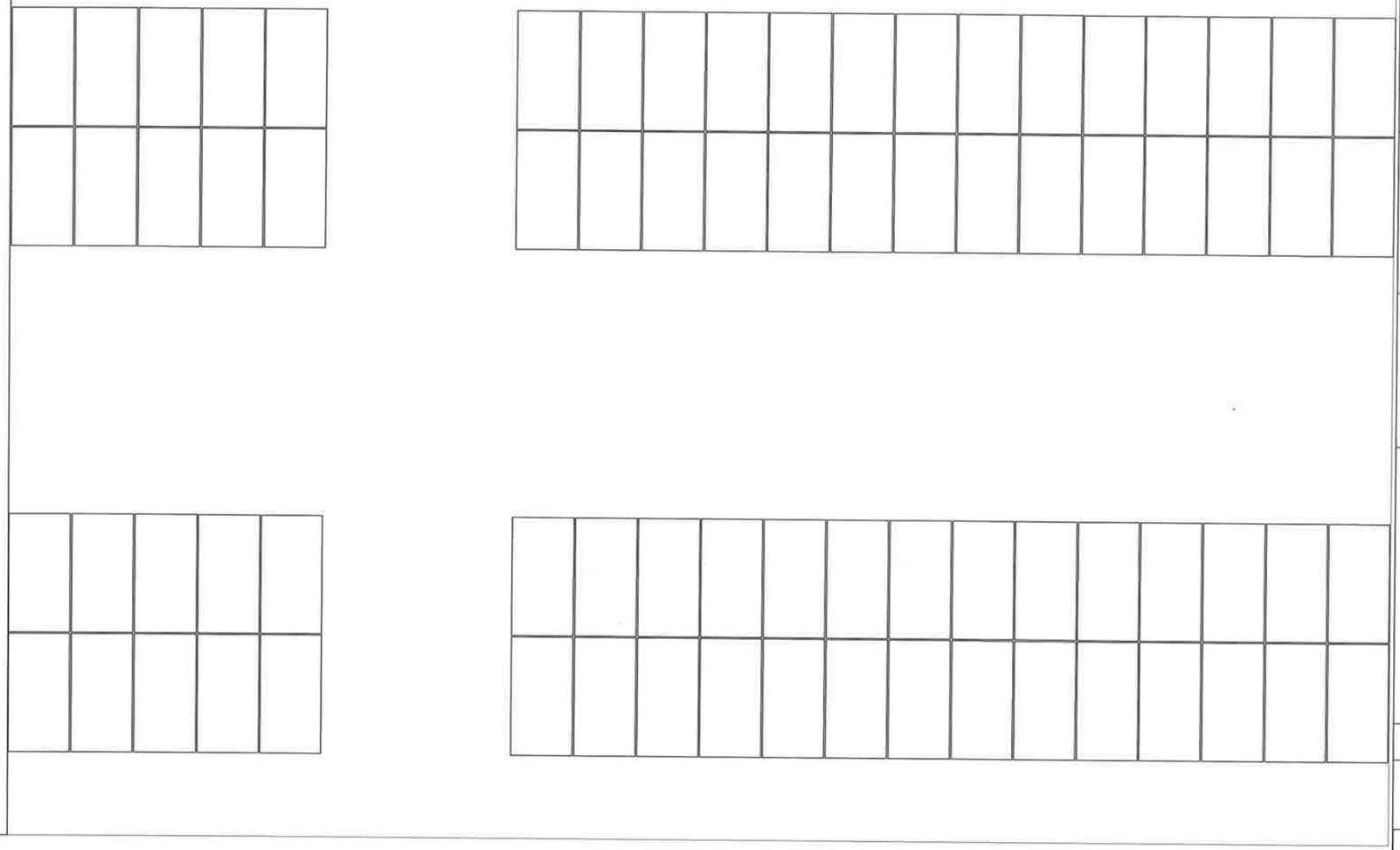
DESIGNED BY:
DAVID GUTIERREZ

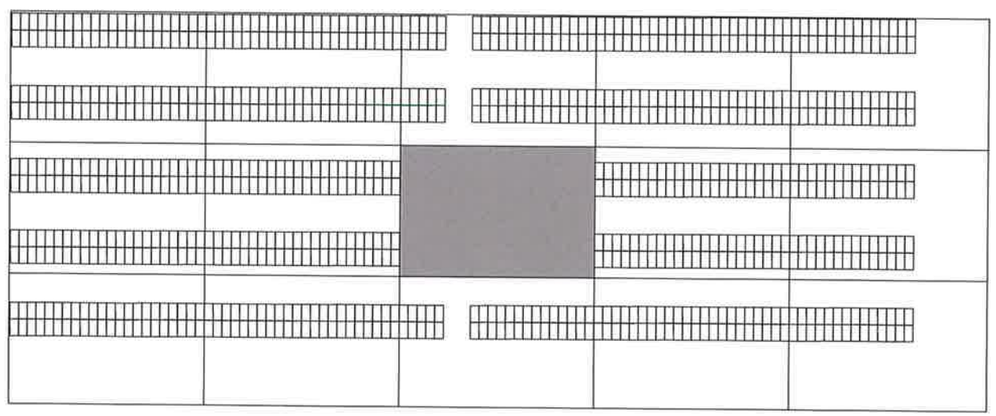
REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-107
FIELD ARRAY WIRE DIAGRAM

ARRAY #8 FIELD NOTES





PROJECT PROVIDED BY:

FREEDOM™ SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
300 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

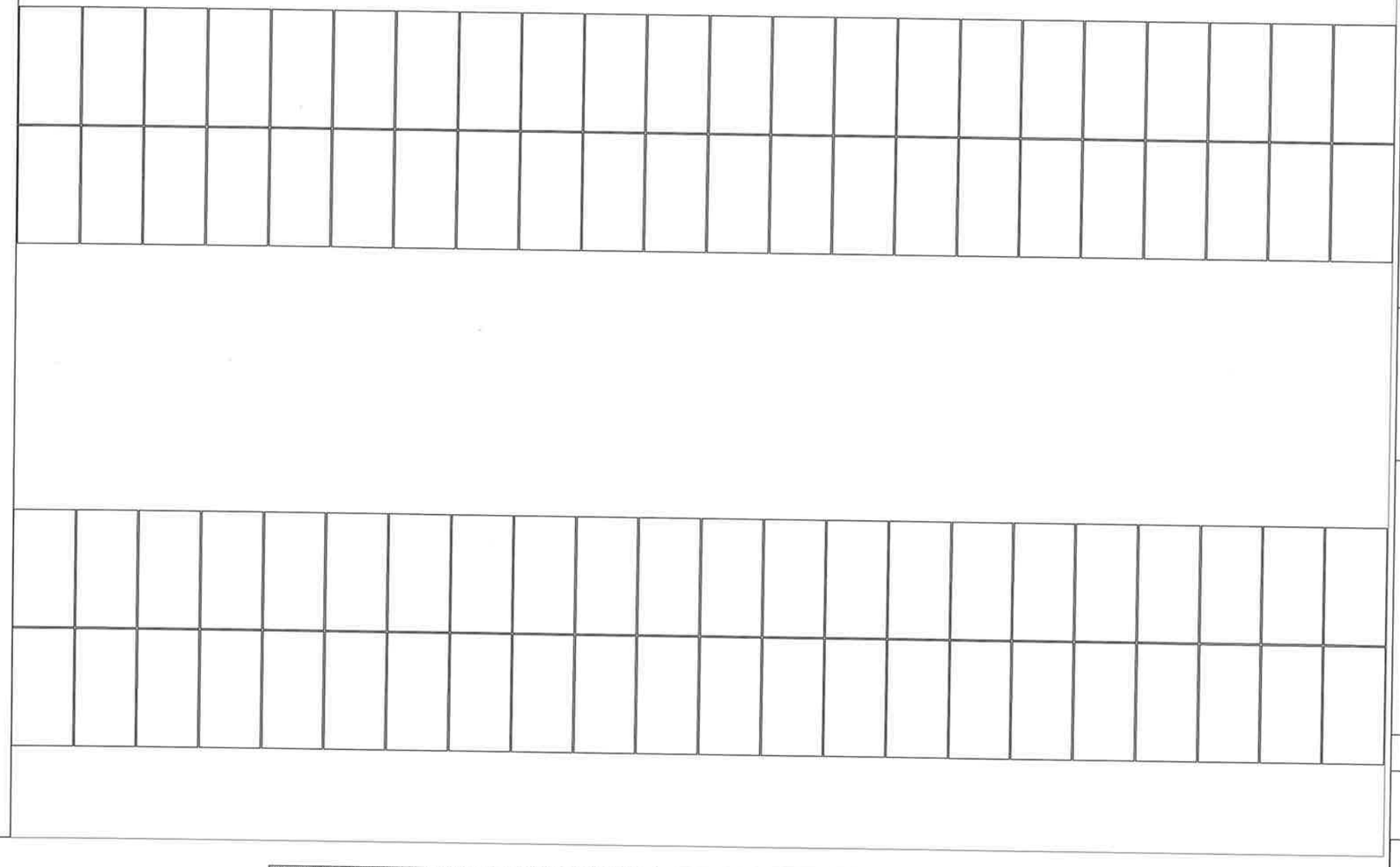
DESIGNED BY:
DAVID GUTIERREZ

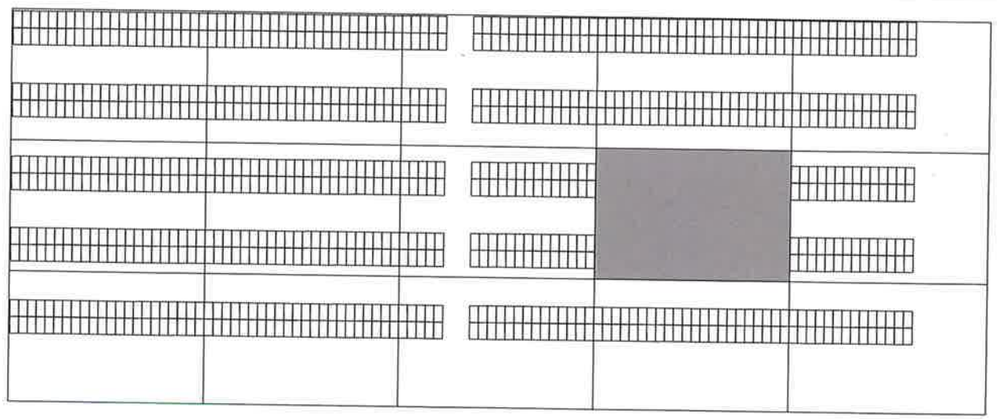
REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-108
FIELD ARRAY WIRE DIAGRAM

ARRAY #9 FIELD NOTES





PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
300 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(1) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

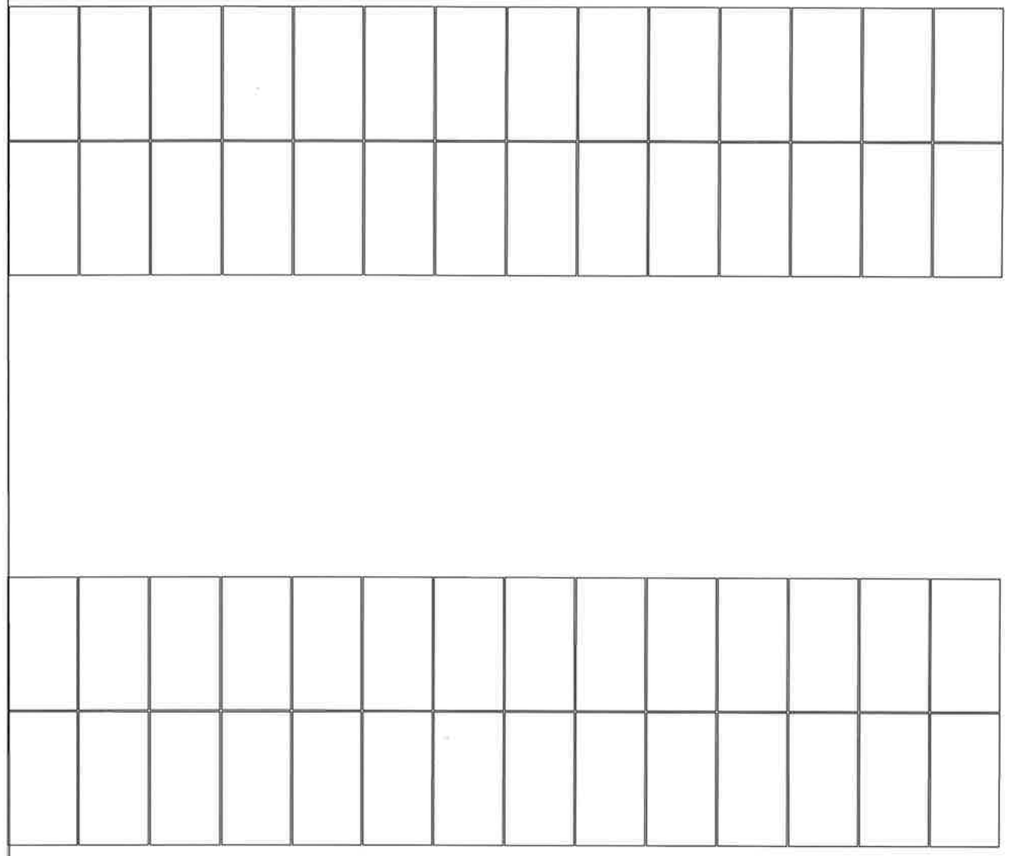
DESIGNED BY:
DAVID GUTIERREZ

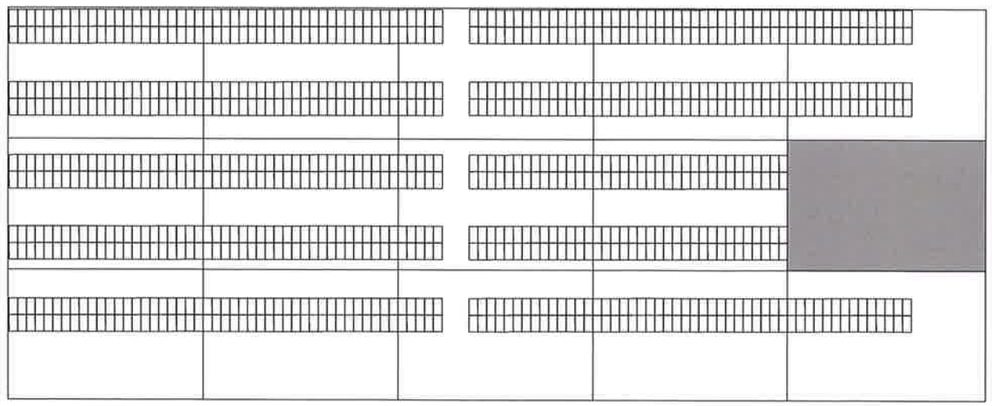
REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-109
FIELD ARRAY WIRE DIAGRAM

ARRAY #10 FIELD NOTES





PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4601 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4601 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

460.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q PEAK DUO XL-G10.3/BFG 465
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

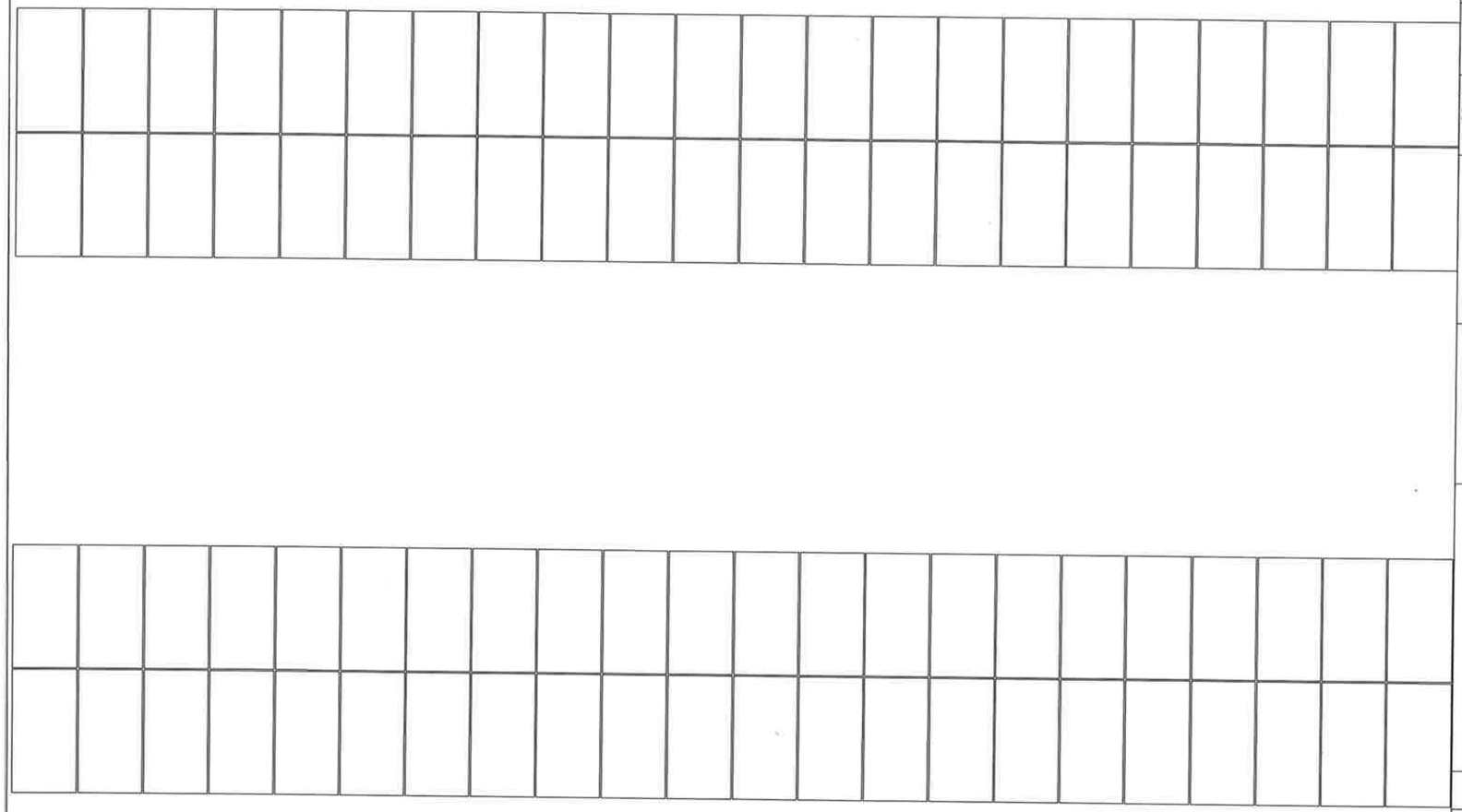
DESIGNED BY:
DAVID GUTIERREZ

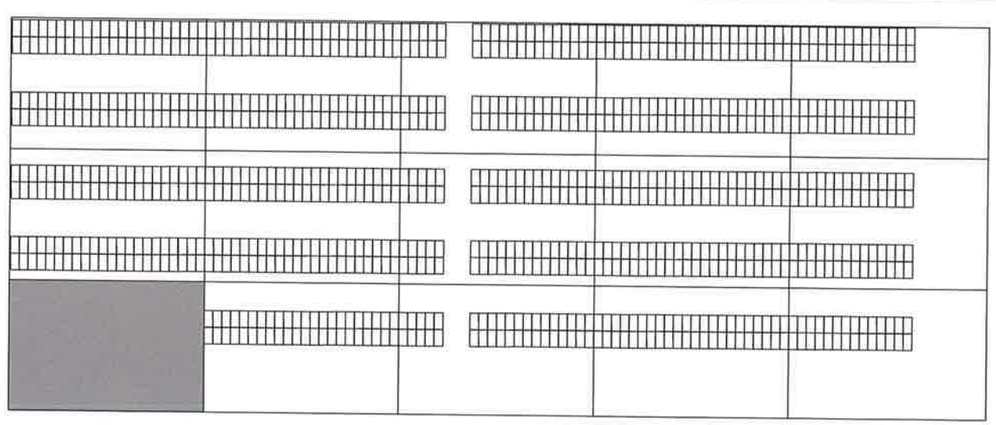
REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-110
FIELD ARRAY WIRE DIAGRAM

ARRAY #11 FIELD NOTES





PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
360 kW AC SYSTEM
(996) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

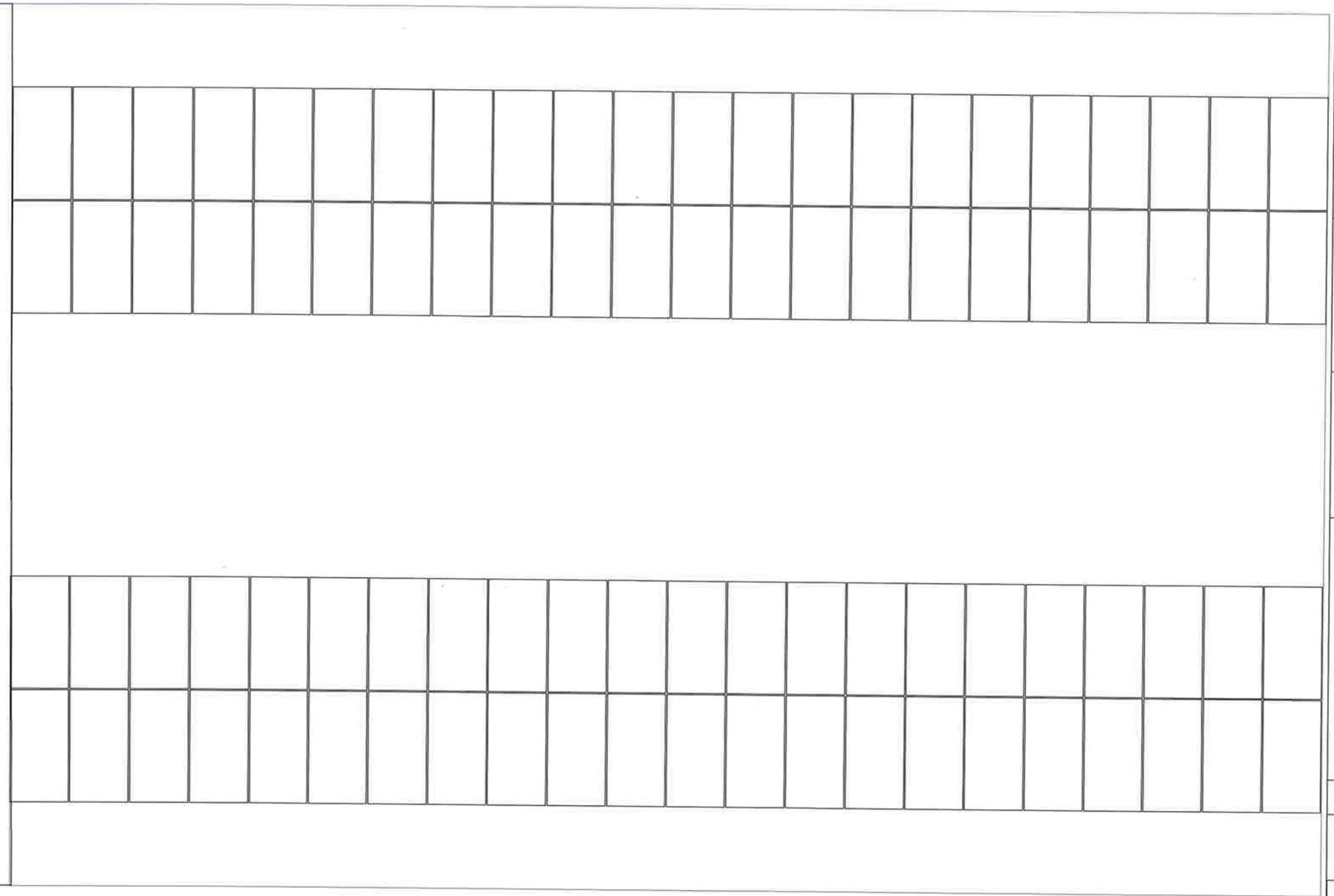
DESIGNED BY:
DAVID GUTIERREZ

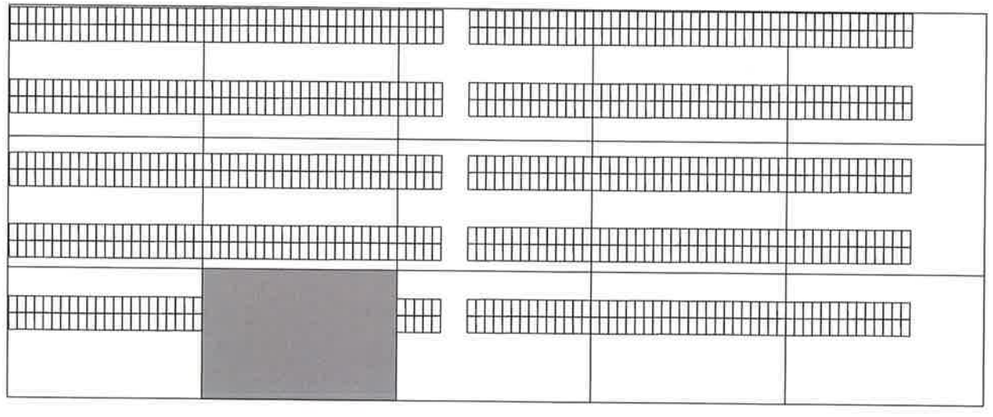
REV	ISSUED	BY	CHK	DESCRIPTION
*	1/12/2024	DG	JM	ISSUE FOR REVIEW
*	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-111
FIELD ARRAY WIRE DIAGRAM

ARRAY #12 FIELD NOTES





PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

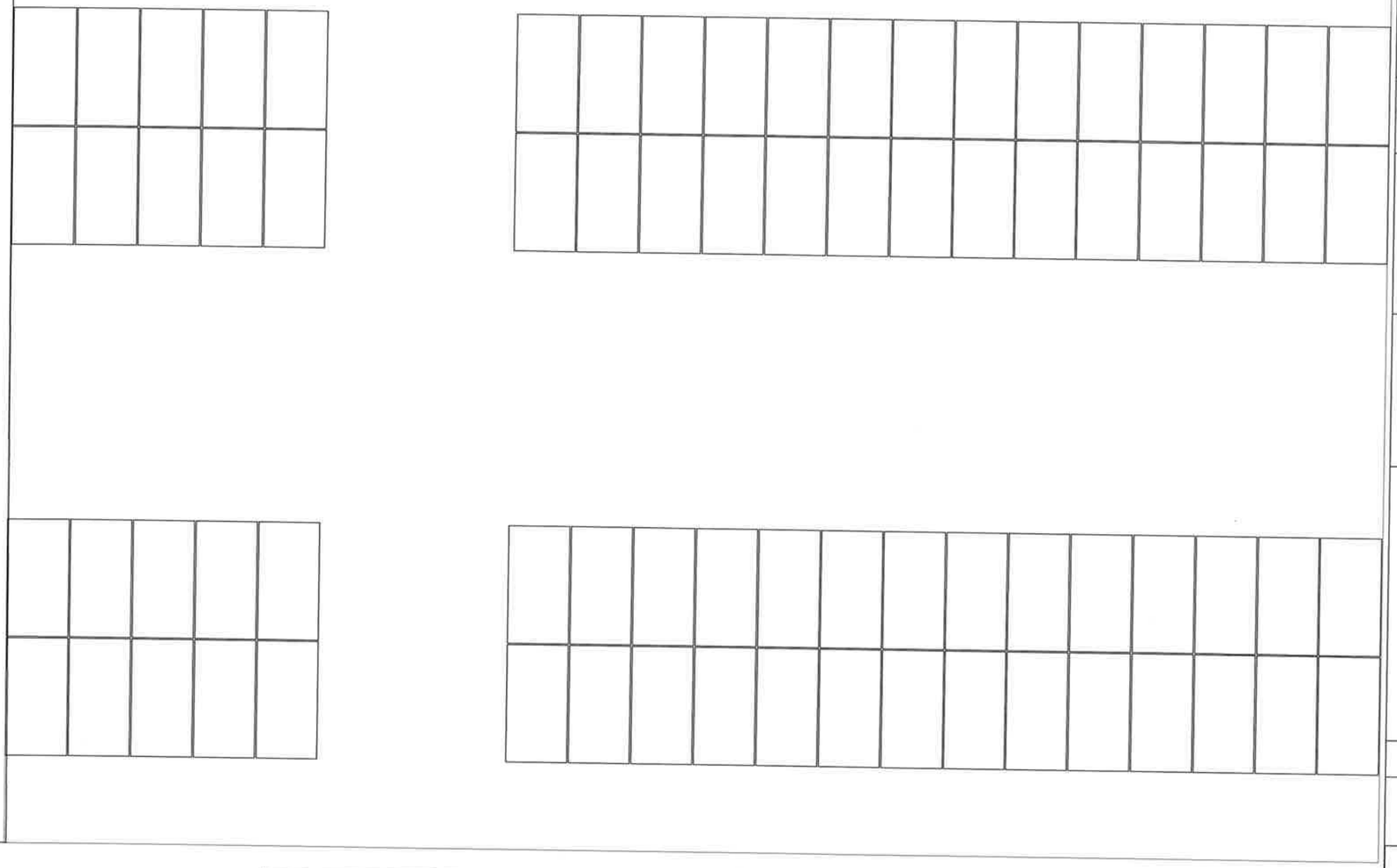
DESIGNED BY:
DAVID GUTIERREZ

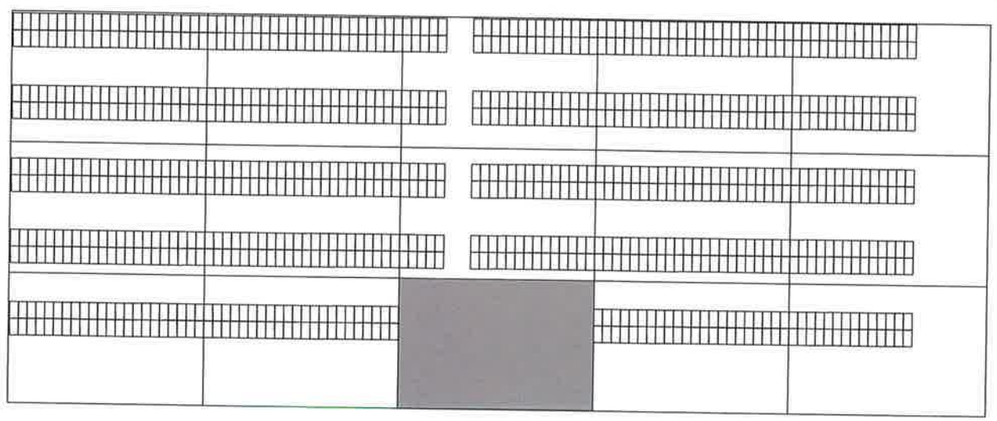
REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
*	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-112
FIELD ARRAY WIRE DIAGRAM

ARRAY #13 FIELD NOTES





PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4501 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4501 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 763-6313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

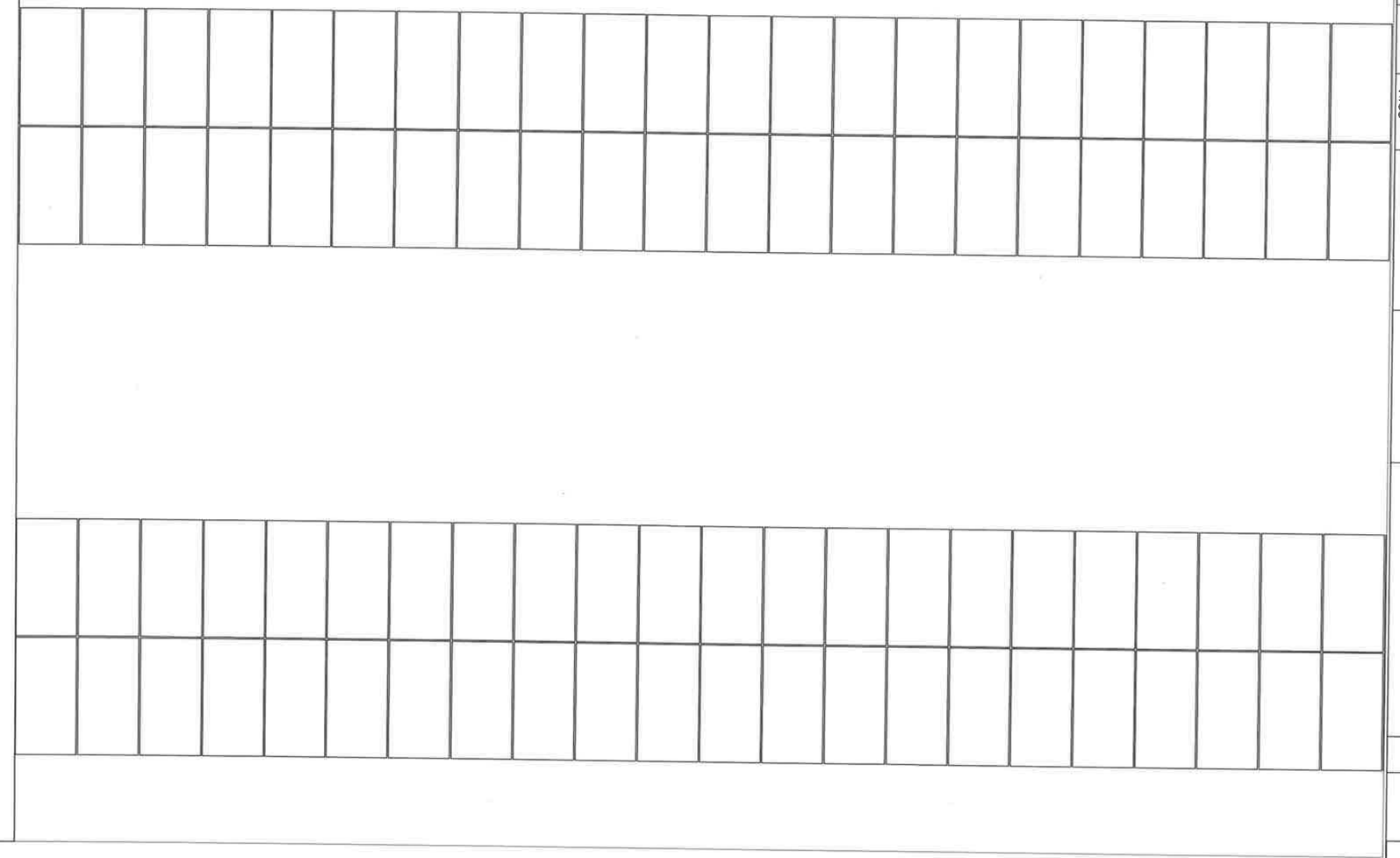
DESIGNED BY:
DAVID GUTIERREZ

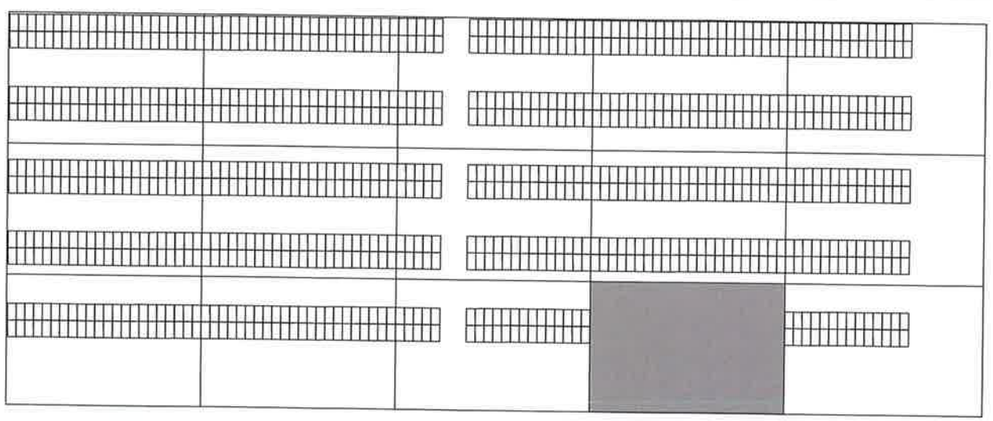
REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-113
FIELD ARRAY WIRE DIAGRAM

ARRAY #14 FIELD NOTES





PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 755-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
360 kW AC SYSTEM
(990) HANWHA Q PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

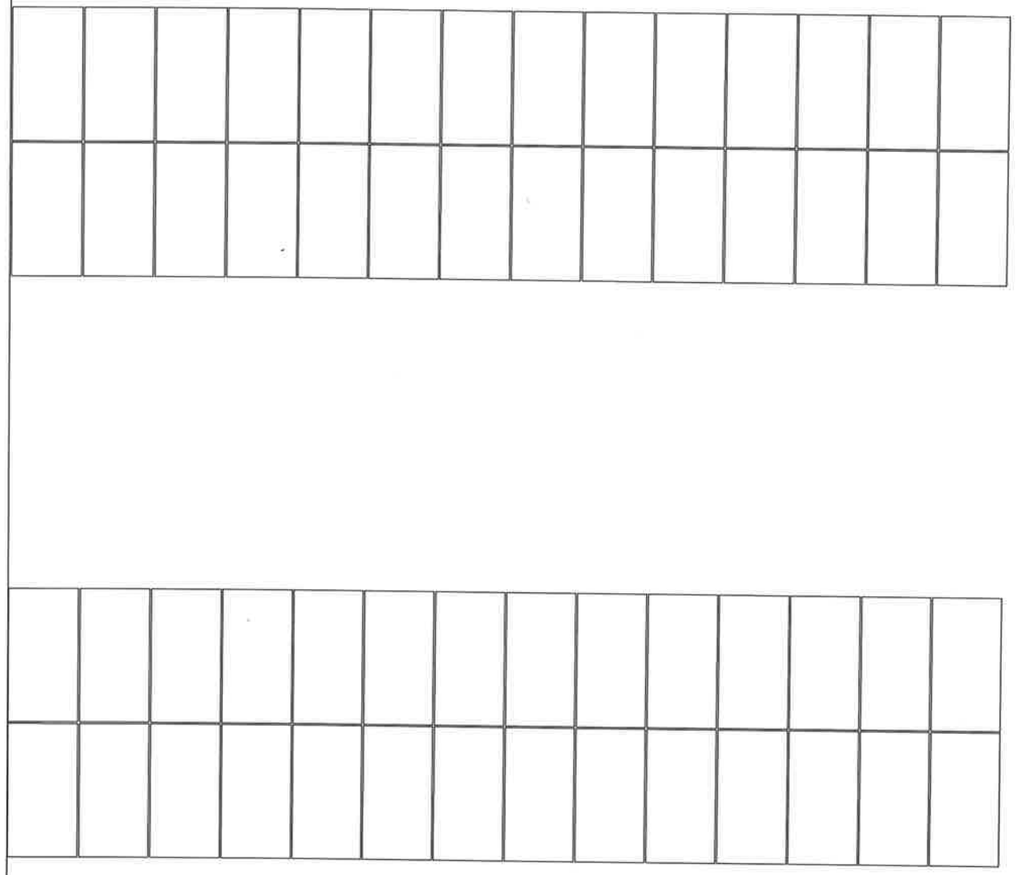
DESIGNED BY:
DAVID GUTIERREZ

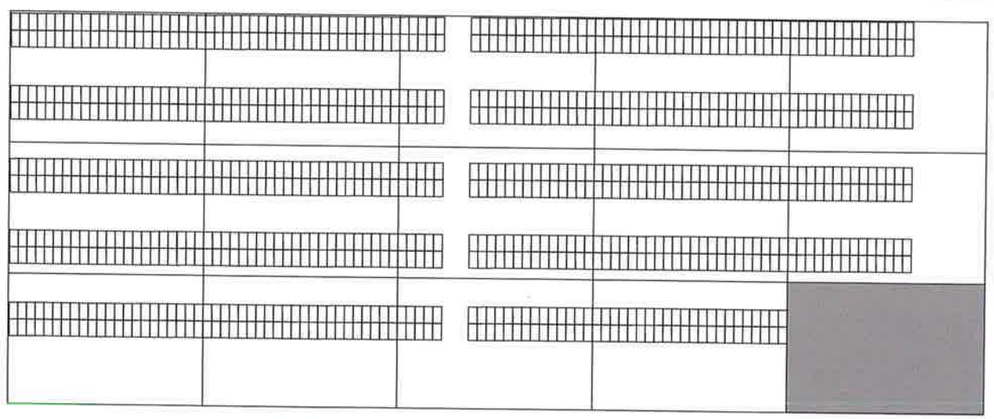
REV	ISSUED	BY	CHK	DESCRIPTION
*	1/12/2024	DG	JM	ISSUE FOR REVIEW
*	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	*	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-114
FIELD ARRAY WIRE DIAGRAM

ARRAY #15 FIELD NOTES





PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
300 kW AC SYSTEM
(990) HANWHA Q PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

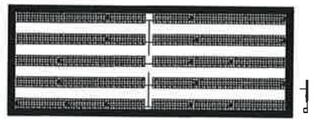
DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
-	3/1/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
Z-115
FIELD ARRAY WIRE DIAGRAM

SITE FIELD NOTES



H ST

US-50

PROJECT PROVIDED BY:

FREEDOM SOLAR POWER

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744

CONTRACTOR

FREEDOM SOLAR LLC
4801 FREIDRICH LN, STE 100
AUSTIN, TX 78744
(512) 759-8313

SYSTEM INFORMATION

480.15 kW DC SYSTEM
300 kW AC SYSTEM
(990) HANWHA Q.PEAK DUO XL-G10.3/BFG 485
(3) SOLAREDGE SE120K-US INVERTERS

ENGINEER OF RECORD

COMMERCIAL PV SYSTEM FOR
ESTES ROCKETS
1295 H ST, PENROSE, CO 81240
COORDINATES: 38.41235, -105.01490
UTILITY: BLACK HILLS ENERGY

PROJECT NUMBER:
COM-41720

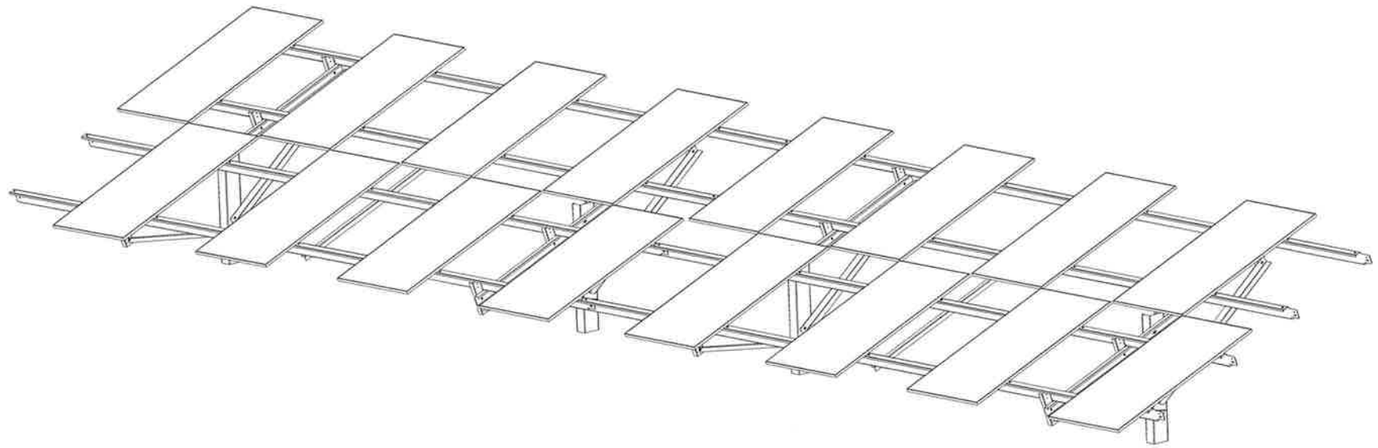
DESIGNED BY:
DAVID GUTIERREZ

REV	ISSUED	BY	CHK	DESCRIPTION
-	1/12/2024	DG	JM	ISSUE FOR REVIEW
,	3/12/2024	DG	JH	ISSUE FOR CONSTRUCTION
A	5/1/2024	DG	-	AHJ COMMENTS

SCALE:
AS SHOWN
SHEET SIZE: ARCH D
ORIGINAL SIZE: 24" X 36"

SHEET NO. & NAME:
X-101
SAFETY PLAN

OMCO SOLAR CHOICE™
GROUND MOUNTED SOLAR STRUCTURES
FOR
FREEDOM SOLAR POWER



DRAWING NUMBER	DRAWING DESCRIPTION
OS1.0	COVER SHEET
OS1.1	GENERAL STRUCTURAL NOTES
OS1.2	FOUNDATIONS
OS2.0	GENERAL LAYOUT
OS2.1	TYPICAL SECTIONS
OS2.2	FRAMING PLANS
OS3.0	DETAILS AND SECTIONS
OS3.1	STRUCTURAL DETAILS

OMCO SOLAR

COLORADO LICENSED Steven J. Baker 41831 PROFESSIONAL ENGINEER
2/26/24

CHOICE GROUND MOUNT
ESTES ROCKETS
1295 H ST
PENROSE, CO, 81240

REV	DATE	DRAWN	CHECK	RELEASE DESCRIPTION
00	1/30/24	AE		INITIAL RELEASE

PROJECT NAME:
ESTES ROCKETS

PROJECT NUMBER
5934517785

DRAWING NAME:
COVER SHEET

DRAWING NUMBER:
OS1.0

OMCO SOLAR
4550 W. WATKINS ST.
PHOENIX, AZ 85043
www.omcosolar.com

GENERAL STRUCTURAL NOTES:

1. THE TERM "CONTRACTOR" AS REFERRED IN THIS DOCUMENT SHALL MEAN FREEDOM SOLAR POWER. THE TERM "PROJECT OWNER" AS REFERRED TO IN THIS DOCUMENT SHALL MEAN ESTES ROCKETS.
2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REVIEW THE APPROVED STAMPED CONSTRUCTION DOCUMENT IN ITS ENTIRETY PRIOR TO BIDDING THE PROJECT, START OF FABRICATION, ORDERING HARDWARE & MISCELLANEOUS STEEL, START OF CONSTRUCTION AND ASSEMBLY.
3. IF A CONFLICT BETWEEN DRAWING DETAILS, SECTIONS, PLANS AND NOTES IS DISCOVERED, NOTIFY OMCO SOLAR IMMEDIATELY IN WRITING FOR CLARIFICATION AND/OR FOR APPROPRIATE RESPONSE PRIOR TO PROCEEDING WITH CONSTRUCTION AND/OR ASSEMBLY OF THE RACKING SYSTEM.
4. IN THE EVENT A DRAWING DISCREPANCY AND/OR DISCREPANCIES IN MATERIAL RECEIVED IS ENCOUNTERED OR DISCOVERED, NOTIFY OMCO SOLAR IMMEDIATELY IN WRITING FOR CLARIFICATION AND/OR FOR APPROPRIATE RESPONSE PRIOR TO PROCEEDING WITH CONSTRUCTION AND/OR ASSEMBLY OF THE RACKING SYSTEM.
5. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE ALL CONSTRUCTION WORK, RACKING ASSEMBLIES AND INSTALLATIONS ARE IN ACCORDANCE WITH THE LATEST APPROVED STAMPED CONSTRUCTION DOCUMENTS.
6. MEANS AND METHOD OF INSTALLATION, ASSEMBLY AND CONSTRUCTION SEQUENCES ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
7. IT IS THE RESPONSIBILITY OF THE CONTRACTOR/INSTALLER TO ENSURE PROPER TECHNIQUES ARE EMPLOYED AND TEMPORARY SHORING AND BRACING ARE PROVIDED FROM START TO COMPLETION OF THE PROJECT CONSTRUCTION PER APPROVED STAMPED CONSTRUCTION DOCUMENTS.
8. ANY WORK COMPLETED DEVIATING FROM THE CONSTRUCTION DOCUMENT SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE.
9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE ALL LATEST DRAWINGS ARE USED AND DISTRIBUTED TO ALL INVOLVED IN THE PROJECT AND SUBCONTRACTORS.
10. THE PROJECT OWNER SHALL TAKE ALL NECESSARY MEASURES TO PREVENT SOIL EROSIONS, WATER PONDING AND FLOODING AROUND PILES OR IN THE VICINITY.
11. UNLESS SHOWN, DETAILED OR NOTED IN THE CONSTRUCTION DOCUMENT, ANY FIELD MODIFICATIONS, DRILLING, FABRICATION, REPAIRS, DEVIATION AND ADJUSTMENTS IS PROHIBITED WITHOUT THE WRITTEN APPROVAL OF OMCO SOLAR.
12. WHERE MEMBER CORROSION PROTECTION IS COMPROMISED DURING STAGING, FIELD HANDLING, CONSTRUCTION, ASSEMBLY, ETC. CONTRACTOR SHALL REPAIR THE DAMAGE PER APPROVED FIELD REPAIR RECOMMENDATIONS PER OMCO SOLAR'S INSTALLATION MANUAL(S).
13. NOTIFY OMCO SOLAR IMMEDIATELY OF ANY FIELD ISSUES THAT MAY BE ENCOUNTERED DUE TO ARISE RELATING TO STRUCTURAL DAMAGE AND/OR CONSTRUCTION CHALLENGES DUE TO INCORRECT INFORMATION.
14. THE CONSTRUCTION AND FOUNDATION REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE LATEST ADOPTED BUILDING CODES AND STANDARDS AND THE LOCAL BUILDING DEPARTMENT "AUTHORITY HAVING JURISDICTIONS" AMENDMENTS.
15. IT IS THE OWNER'S RESPONSIBILITY TO ORDER ANY SPARE PARTS FOR THE PURPOSE OF REPAIRS OR REPLACEMENT AFTER PROJECT COMPLETION AT THE OWNER'S EXPENSE.
16. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT SAFE WORKING CONDITIONS EXIST AND SAFE CONSTRUCTION TECHNIQUES ARE FOLLOWED AND ALL NECESSARY PRECAUTIONS ARE IN PLACE, ADDRESSED AND RESPECTED BY ALL PARTIES INVOLVED WITH THE CONSTRUCTION OF THE PROJECT AT ALL TIMES FROM START TO COMPLETION OF THE PROJECT.
17. THE CONTRACTOR SHALL REVIEW AND VERIFY ALL DIMENSIONS, COORDINATE ALL FIELD CONDITIONS WITH THE APPROVED STAMPED CONSTRUCTION DOCUMENTS PRIOR TO PROCEEDING WITH THE PROJECT CONSTRUCTION.
18. IT IS THE RESPONSIBILITY OF THE PROJECT OWNER TO NOTIFY THE CONTRACTOR OF ANY INVESTIGATIONS RELATED TO ANY KNOWN OBSTRUCTION OR UNANTICIPATED SITE CONDITIONS THAT MAY ALTER THE GROUND MOUNT STRUCTURE DESIGN OR MAY HAVE AN ADVERSE EFFECT ON THE PROJECT CONSTRUCTION.
19. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THE CORRECT SOLAR MODULES ARE PROVIDED AND ASSEMBLED PER MODULE MANUFACTURER'S INSTALLATION MANUAL, THIS SET OF DRAWINGS, AND LATEST OMCO SOLAR CHOICE INSTALLATION MANUAL PROVIDED.
20. FIELD CUTTING OR WELDING OF COLD-FORM STRUCTURAL ELEMENTS IS NOT REQUIRED NOR PERMITTED WITHOUT THE WRITTEN APPROVAL BY OMCO SOLAR. IN ANY EVENT WHERE FIELD CUTTING AND/OR WELDING IS NECESSARY OR DESIRED, IT IS CRITICAL THAT OMCO SOLAR BE NOTIFIED IMMEDIATELY IN WRITING PRIOR TO FIELD CUTTING OR WELDING.

DESIGN CODES, DATA & CRITERIA

THE SOLAR STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH INTERNATIONAL BUILDING CODE (IBC) 2018 AND ASCE 7-18.

COLD FORMED STEEL DESIGN STRUCTURAL ELEMENTS SHALL BE PER AISI NORTH AMERICAN SPECIFICATION FOR DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS 2012 EDITION

FOR STRUCTURE OCCUPANCY AND RISK CATEGORY: I

WIND:

BASIC WIND SPEED (3 SECOND GUST): 100 MPH

WIND EXPOSURE CATEGORY: C

WIND TUNNEL TEST AND WIND LOAD ANALYSIS REPORT: PER CPP PROJECT 9795

WIND DESIGN PRESSURES: VARIES WITH MEMBERS AND COMPONENTS

SEISMIC:

SEISMIC IMPORTANCE FACTOR, I: = 1.00

MAPPED SPECTRAL RESPONSE ACCELERATIONS, SDS: = 0.17g, SD1: = 0.09g

SEISMIC DESIGN CATEGORY: = D

BASIC SEISMIC-FORCE-RESISTING SYSTEMS: = CANTILEVER COLUMN

SEISMIC SHEAR AT BEAM TO TILT: = 20 LBS

SEISMIC RESPONSE COEFFICIENT Cs: = 0.136

SEISMIC DESIGN BASE SHEAR: V = 0.16 KIPS

SITE CLASS: D

RESPONSE MODIFICATION COEFFICIENTS: R = 1.25

ANALYSIS PROCEDURE USED: EQUIVALENT LATERAL FORCE PROCEDURE

SNOW:

GROUND SNOW LOAD (Pg): = 35 PSF

SNOW EXPOSURE FACTOR (Ce): = 1.0

SNOW LOAD IMPORTANCE FACTOR (I): = 0.80

THERMAL FACTOR (Ct): = 1.0

SLOPE FACTOR (Cs): = 0.73

FLAT ROOF SNOW LOAD (Pf): = 19.6 PSF

DESIGN SNOW LOAD(Ps): = 14.4 PSF

DEAD LOAD:

MODULE: = 2.22 PSF

LIVE LOAD:

GROUND MOUNTED: = 0 PSF

REFERENCE CODES AND STANDARDS (SHALL BE LATEST U.N.O)

ASME - AMERICAN SOCIETY OF MECHANICAL ENGINEERS

ANSI - AMERICAN NATIONAL STANDARD INSTITUTE

ASTM - AMERICAN SOCIETY FOR TESTING AND MATERIALS

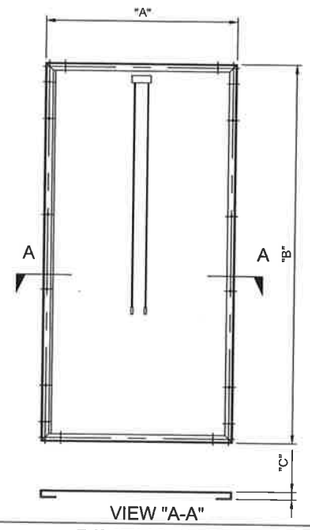
ASCE - AMERICAN SOCIETY OF CIVIL ENGINEERS

AISC - AMERICAN INSTITUTE OF STEEL CONSTRUCTION

AISI - AMERICAN IRON AND STEEL INSTITUTE

IBC - INTERNATIONAL BUILDING CODE

SOLAR MODULE SPECIFICATIONS



VIEW "A-A"

DIMENSIONS

DESCRIPTION	"A"	"B"	"C"	WEIGHT
Q.PEAK DUO XL-G10.3	44.65" [1134mm]	89.69" [2278mm]	1.38" [35mm]	61.73 LB [28KG]

NOTE: MODULE INSTALLATION SHALL BE PER MODULE MANUFACTURERS REQUIREMENTS.

MATERIAL SPECIFICATION NOTES:

1. COLD-FORMED STEEL: ASTM A653-17 SS OR HSLAS - MIN. YIELD AND TENSILESTRENGTHS SHOWN ON FRAMING PLANS.
2. STEEL PLATES SHALL BE PER ASTM A36, 36 KSI STEEL.
3. MATERIAL GALVANIZATION MINIMUMS: POSTS/PILES - G235
   HARDWARE - 15 MICRON
   ALL OTHER STEEL - G90
4. M8 FASTENERS: DIN933 CLASS 8.8.
5. FLANGE HEAD: HEX RIV NUT, OPEN END, STEEL THREAD PROOF LOAD MEETS CLASS 8 PER ISO 898-02.
6. M8, M10 AND M12 FLAT WASHERS: DIN125A AND/OR 3/8", 7/16" AND 1/2" USS F436 THRU-HARDENED.
7. M10 AND M12 FASTENERS: DIN933/931 CLASS 8.8.
8. M10 AND M12 HEX NUT: DIN934 CLASS 8.
9. ROUND PIPES SHALL BE PER ASTM A513-15 TYPE 1a, 1b OR 2.
10. MODULE CLAMPS SHALL BE ALUMINUM 6063-T6.
11. CLAMP SPACER SHALL BE ALUMINUM ASTM B221.

ABBREVIATIONS:

Assembly	ASS'Y	Material	MATL
Authority Having Jurisdiction	AHJ	Maximum	MAX
		Mega Watts	MW
Back to Back	B/B	Micrometer	um
Beam	BM	Millimeter	mm
Beam End	BE	Minimum	MIN
Bearing	BRG	Module	MOD
Between Centers	BC	Module Clamp	MC
Bolt Circle	BTC	Module Rail	MR
Both Faces	BFS	Multiple	MULT
Both Sides	BS		
Bracket	BRKT	North/South	NS
		Not To Scale	NTS
Cap Screw	CAP SCR	Number	NO
Cantilever	CANT'L		
Connection Bracket Long	CBL	On Center	OC
Connection Bracket Short	CBS	Outside Diameter	OD
Center	CTR	Outside Face	OF
Centerline	C.L.	Overall	OA
Center to Center	C/C		
Circular	CIR	Perpendicular	PERP
Clear	CLR	Photovoltaics	PV
Clockwise	CW	Places	PLCS
Configuration	CONFIG	Post/Pile	P
Connection	Conn	Point	PT
Construction Package	CP	Pounds	LBS
Continuous	CONT	Pounds per Square Foot	PSF
Counterclockwise	CCW		
		Quantity	QTY
Decimal	DEC		
Deep/Depth	DP	Radial	RDL
Detail	DTL	Radius	RAD
Diagonal Brace Lower/Upper	DBL, DBU	Rectangle	RECT
		Reference Line	REFL
Dimension	DIM	Required	REQD
Distance	DIST	Right Hand	RH
Double	DBLE	Round	RND
Drawing	DWG		
		Screw	SCR
Each	EA	Scope of Work	SOW
East/West Rack Beam	E/W RBT	Section	SECT
Top, Mid, Low	E/W RBM	Set screw	SSCR
	E/W RBL	Sheet	SHT.
Elevation	ELEV	Similar	SIM.
End to End	E/E	Single	SGL
Equal	EQL	Sleeve	SLV
Equally spaced	EQLSP	Slotted	SLTD
Elevation	ELEV	Socket	SKT
Existing	EX.	Socket head	SCH
Exterior	EXT	Square	SQ
		Square Meters	SQM
Face to Face	F/F	Standard	STD
Fastener	FSTNR	Steel	STL
Field Fast	F.F.	Surface	SURF
Fillet	FIL		
		Thick	THK
Gage	GA	Thread	TRD
Ground Mount	GM	Through	THRU
		Tilt Bracket	TB
Hexagonal	HEX	To Be Determined	TBD
Horizontal	HORIZ	Top Of	T.O.
Hot Dipped Galvnization	HDG	Typical	TYP
		Unless Noted Otherwise	UNO
Inch	IN		
Inside diameter	ID	Vertical	VERT
Interior	INT		
		Watt	WT
Kilo Pounds	kips	Wire Management	WM
Kilowatt	kW	Work Point	W.P.
Lateral Brace	LB		
Left hand	LH		
Length	L		
Lock Nut	LN		
Lockwasher	LKWASH		
Long	LG		

Project specific atmospheric loads (dead, snow, wind and seismic) have been calculated as prescribed by the latest locally accepted edition of the ASCE 7 (Minimum Design Loads and Associated Criteria for Buildings and Other Structures) Standard as interpreted by our internal Engineering Department and our Third-Party Engineer of Record for application to solar ground mount structures specifically. These project specific loads have been applied to the project racking structure, through the applicable load combinations, as prescribed by the latest locally accepted edition of the ASCE 7 Standard. Final custom project member sizes, quantities, spacings, connections and final pile embedment depths have been determined through structural analysis based specifically on the application of these above-described loads to the racking structure. Any alternate interpretation of the ASCE 7 Standard or disagreement with how loads were applied or how we performed our analysis by the customers internal engineering department or independent engineer(s), that results in an increase in member sizes or quantities, accepted by the customer shall be at the customer's expense. Any other liquidated damages that result from this acceptance shall be at the owner's expense.

OMCO SOLAR

COLORADO LICENSED BRYAN L. BAIRD 41831 PROFESSIONAL ENGINEER 2/20/24

CHOICE GROUND MOUNT
ESTES ROCKETS
1295 H ST
PENROSE, CO, 81240

REV	DATE	DRAWN	CHECK	RELEASE DESCRIPTION
00	1/30/24	AE		INITIAL RELEASE

PROJECT NAME:
ESTES ROCKETS

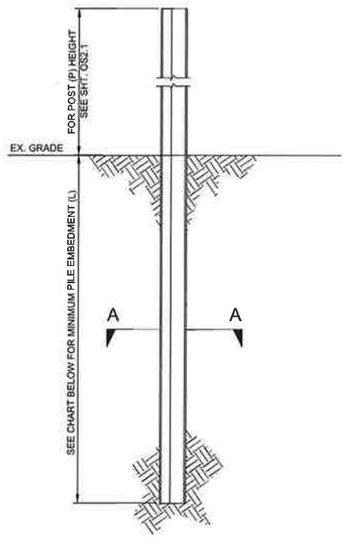
PROJECT NUMBER
5934517785

DRAWING NAME:
GENERAL NOTES

DRAWING NUMBER:
OS1.1

OMCO SOLAR
4550 W. WATKINS ST.
PHOENIX, AZ 85043
www.omcosolar.com

FOUNDATION INSTALLATION



VIEW "A-A"

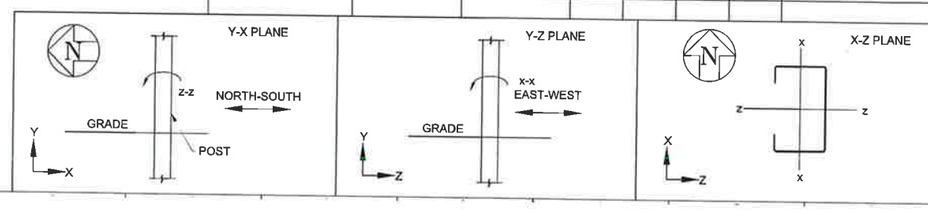
TYPICAL DRIVEN PILE (PD) 1

FOUNDATION NOTES

1. THE FOUNDATION DESIGN OF POST/PILES SHALL BE PER THE LOCAL AHJ ADOPTED BUILDING CODE, PILE REACTIONS AND/OR LOAD TESTING REPORTS PROVIDED. FOUNDATION DESIGN SHALL BE PER THE GOVERNING PILE REACTIONS RESULTING FROM THE STRUCTURAL ANALYSIS UTILIZING THE SPECIFIC PROJECT DESIGN MODULE, WIND LOADS, SNOW, AND SEISMIC LOAD SPECIFIED IN THIS SET. SEE TABLE THIS SHEET FOR POST REACTION AT GRADE AND MINIMUM EMBEDMENT REQUIREMENTS.
2. IT IS CRITICAL FOR PILES TO BE INSTALLED IN THE PROPER ORIENTATION AND LOCATION. REFERENCE LATEST OMCO CHOICE INSTALLATION MANUAL PROVIDED FOR ALL PILE INSTALLATION TOLERANCES, FOR ORIENTATION AND LOCATION.
3. TRENCHING OR EXCAVATION IN THE VICINITY OF PILE FOUNDATIONS SHALL SATISFY THE MINIMUM CLEARANCES NOTED BELOW BETWEEN EDGE OF TRENCH AND PILE.
   EAST-WEST TRENCHING = 60"
   NORTH-SOUTH TRENCHING = 36"
4. ALL CIVIL DESIGN, SITE LAYOUT, AND ASSOCIATED WORK SHALL BE DESIGNED, APPROVED, AND INSTALLED BY OTHERS.
5. PILES NOT DRIVEN TO THE SPECIFIED EMBEDMENT DEPTH SHALL BE REDESIGNED AND/OR MODIFIED AT THE CONTRACTOR'S EXPENSE. REDESIGN SHALL BE APPROVED AND/OR PROVIDED BY OMCO SOLAR.
6. IN THE EVENT OF ENCOUNTERING PILE REFUSAL, NOTIFY OMCO SOLAR IMMEDIATELY PRIOR TO MAKING ANY FIELD ADJUSTMENTS OR MODIFICATIONS.
7. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INFORM THE ENGINEER OF RECORD IF FIELD CONDITIONS AND SOIL CONDITIONS ARE NOT PER THE GEOTECHNICAL REPORT OR APPROVED STAMPED CONSTRUCTION DOCUMENTS.
8. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FOLLOW THE RECOMMENDATIONS PROVIDED IN THIS APPROVED CONSTRUCTION DOCUMENTS AND THE SITE GEOTECHNICAL REPORTS.
9. PILE SHALL NOT BE DRIVEN OR SET IN LOW POINTS WHERE WATER WILL BE ACCUMULATING OR PONDING.
10. FOUNDATION DESIGN PER GEOTECH REPORT #23235067 BY TERRACON ON 02/13/2024

NOTE: FOR PILE LOAD TESTING VALUES ON THE MAX POST REACTIONS AT GRADE TABLE SHALL BE MULTIPLIED BY THE APPROPRIATE SAFETY FACTORS AS FOLLOWS: FOR UPLIFT MULTIPLY POST REACTIONS BY 2.0, FOR DOWNFORCE MULTIPLY POST REACTIONS BY 1.65 AND FOR LATERAL MULTIPLY THE MOMENT BY 1.65 AND DIVIDE BY TESTING LOAD APPLICATION HEIGHT. TESTING SHALL BE PERFORMED PER ASTM D3689, D3966, AND D1143 STANDARDS.

MAX. POST REACTION AT GRADE							PILE SPECS
STRUCTURE IDENTIFIER	UPLIFT (KIPS) Y (-)	DOWN (KIPS) Y (+)	SHEAR (KIPS)		MOMENT (KIP-FT)		PD
			N-S	E-W	Z	X	L
E7	2.45	4.45	1.64	0.01	12.64	0.04	9'-0"
P7	1.75	3.74	1.24	0.01	8.73	0.03	9'-0"
P8	1.95	4.23	1.38	0.03	9.40	0.14	9'-0"



OMCO SOLAR

COLORADO LICENSED STEVEN J. BAUER 41531 PROFESSIONAL ENGINEER 2/20/24

CHOICE GROUND MOUNT
ESTES ROCKETS
1295 H ST
PENROSE, CO, 81240

REV	DATE	DRAWN	CHECK	RELEASE DESCRIPTION
00	1/30/24	AE		INITIAL RELEASE

PROJECT NAME: ESTES ROCKETS

PROJECT NUMBER 5934517785

DRAWING NAME: FOUNDATION INSTALLATION

DRAWING NUMBER: OS1.2

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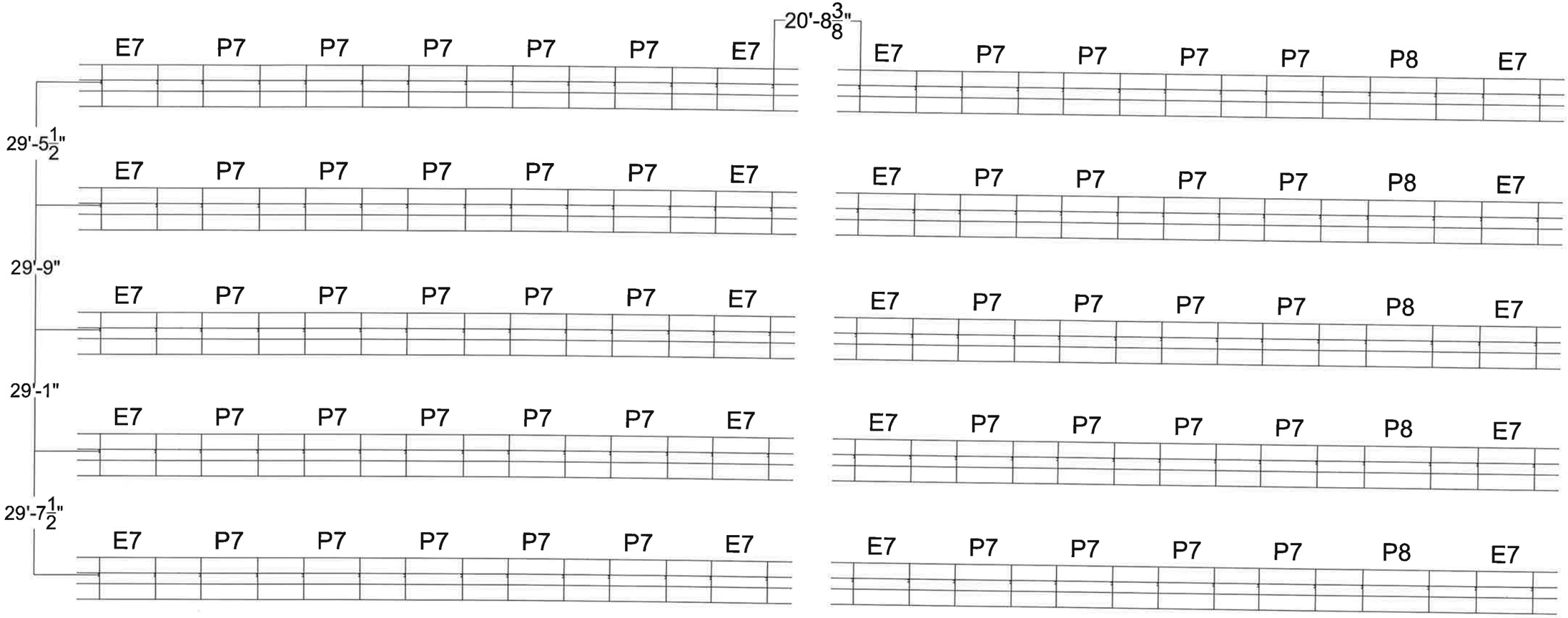
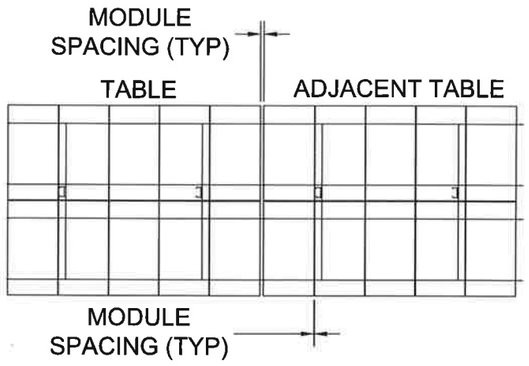
PHOENIX, AZ 85043
www.omcosolar.com

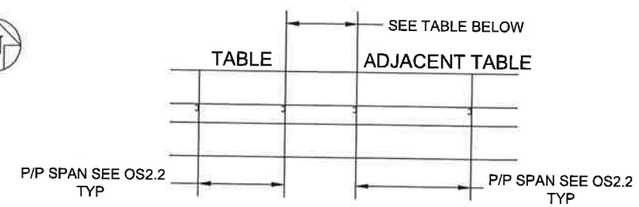


OVERALL STRUCTURE LAYOUT PLAN
(NTS)



END MOD/END MOD	MOD/MOD
2.57"	0.39"

ADJACENT TABLE MODULE SPACING EXAMPLE AND SCHEDULE
(NTS)



ADJACENT TABLE PILE SPACING EXAMPLE
(NTS)

Table	2x7	2x8
2x7	130.92	
2x8	136.69	142.45

TABLE TO ADJACENT TABLE PILE SPACING
NOTE: ALL DIMENSIONS IN INCHES

OMCO SOLAR

COLORADO LICENSED PROFESSIONAL ENGINEER
STEVEN J. BAUER
41831
2/20/24

CHOICE GROUND MOUNT
ESTES ROCKETS
1295 H ST
PENROSE, CO, 81240

REV	DATE	DRAWN	CHECK	RELEASE DESCRIPTION
00	1/30/24	AE		INITIAL RELEASE

PROJECT NAME:
ESTES ROCKETS

PROJECT NUMBER
5934517785

DRAWING NAME:
GENERAL LAYOUT

DRAWING NUMBER:
OS2.0

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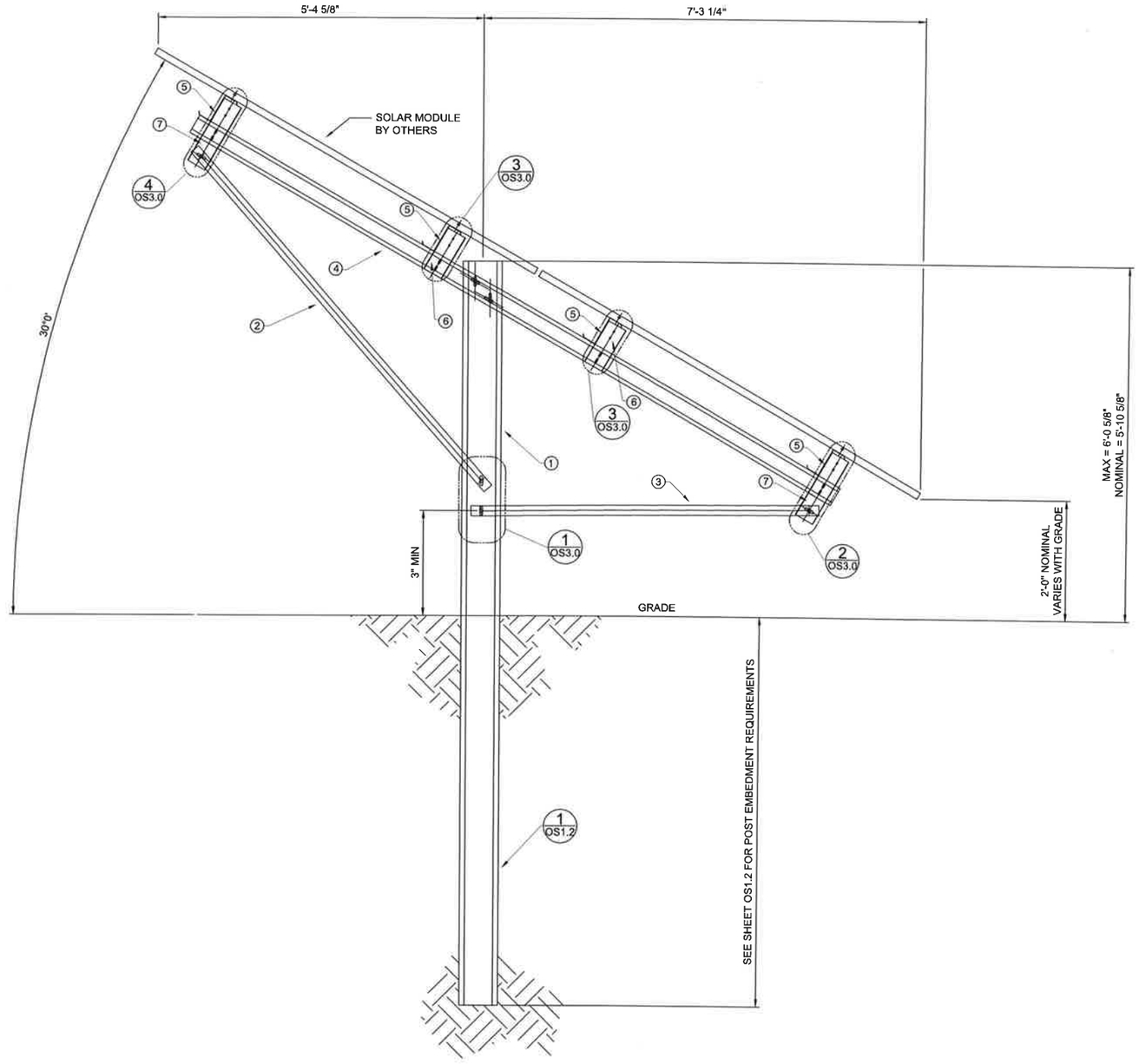
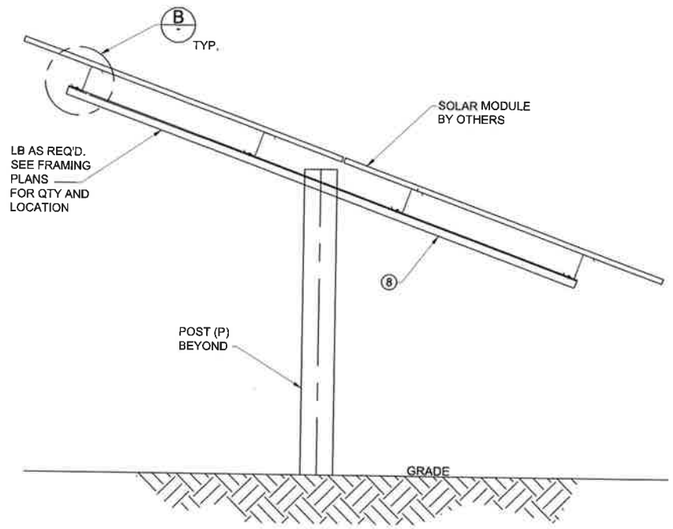
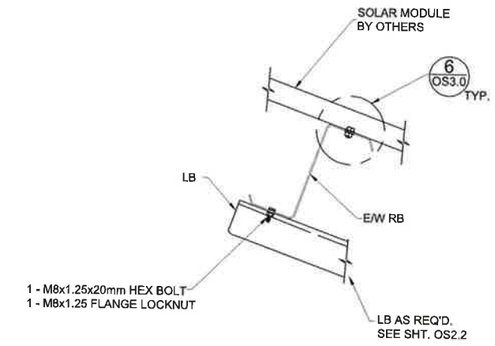
4550 W. WATKINS ST.
PHOENIX, AZ 85043
www.omcosolar.com



TYP. SECTION AT POST (A)
(NTS)



SECTION AT LB (C)



E/W RB TO LB CONNECTION (B)
TYP.

COMPONENTS

ITEM NO.	DESCRIPTION	MARK
1	POST	P
2	DIAGONAL BRACE UPPER	DBU
3	DIAGONAL BRACE LOWER	DBL
4	TILT BRACKET	TB
5	EAST/WEST RACK BEAM	E/W RB
6	"U" CONNECTOR BRACKET SHORT	CBS
7	"U" CONNECTOR BRACKET LONG	CBL
8	LATERAL BRACE	LB

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CHOICE GROUND MOUNT
ESTES ROCKETS
1295 H ST
PENROSE, CO, 81240

REV	DATE	DRAWN	CHECK	RELEASE DESCRIPTION
00	1/30/24	AE		INITIAL RELEASE

PROJECT NAME: ESTES ROCKETS

PROJECT NUMBER 5934517785

DRAWING NAME: TYPICAL SECTIONS

DRAWING NUMBER: OS2.1

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PHOENIX, AZ 85043
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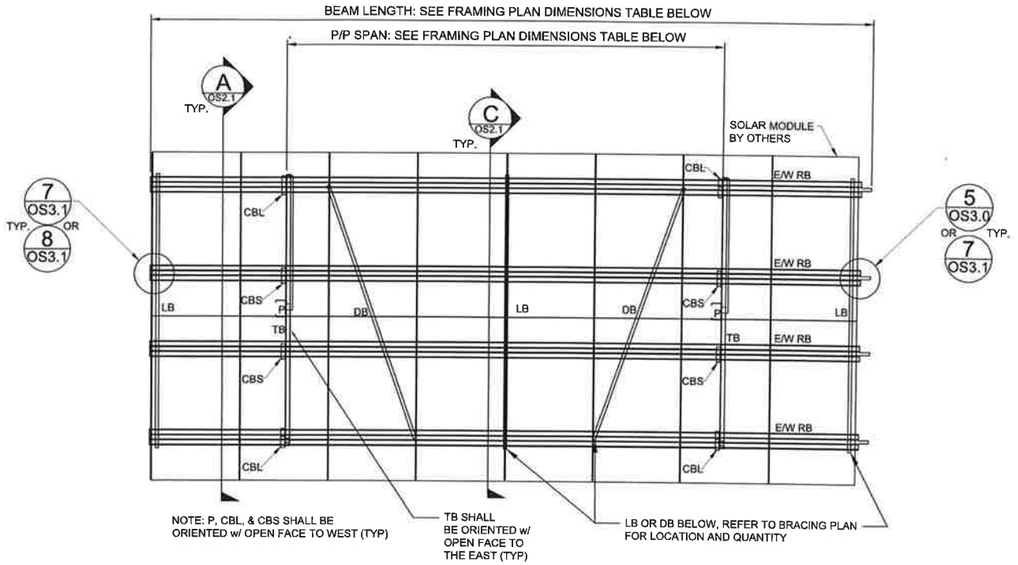
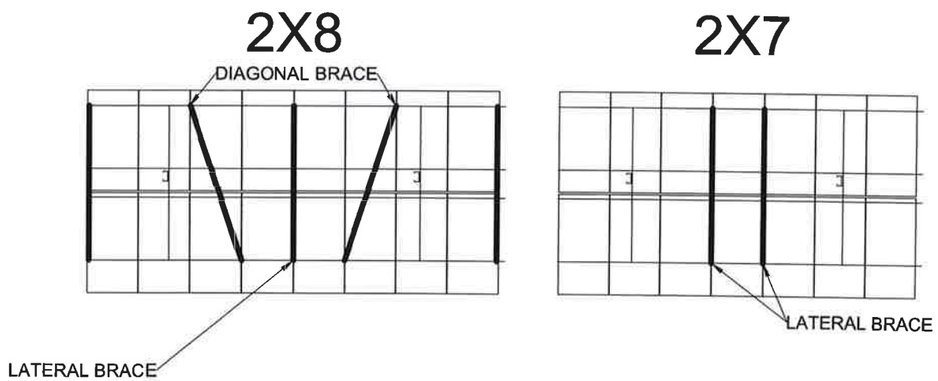
NOTE: 8 MODULE WIDE TABLE SHOWN FOR FRAMING SCHEDULE PURPOSE.



FRAMING PLANS
(NTS)

TABLE	BEAM LENGTH	P/P SPAN
E7	296.54"	162"
P7	296.54"	162"
P8	338.08"	192"

FRAMING PLAN DIMENSIONS



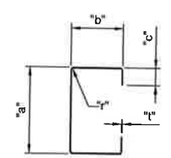
BRACING PLANS
(NTS)

BRACE PLAN NOTES:
- AT LATERAL BRACES ATTACH TO ALL FOUR RACK BEAMS
- AT DIAGONAL BRACES ATTACH TO ONLY THE MOST NORTH AND MOST SOUTH RACK BEAMS
- ALL BRACING MUST BE INSTALLED AND AT FINAL TORQUE WITH STRUCTURE SQUARE PRIOR TO MODULE INSTALLATION

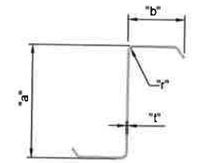
FRAMING SCHEDULE

E7,P7,P8								
MARK	MEMBERS	DIMENSIONS					Fy (ksi)	Fu (ksi)
		"a"	"b"	"c"	"t"	"r"		
P	POST	7.63"	4.5"	1"	0.145"	0.27"	57	70
DBU	DIAGONAL BRACE UPPER	2"	2"	-	0.092"	0.13"	57	70
DBL	DIAGONAL BRACE LOWER	2"	2"	-	0.092"	0.13"	57	70
TB	TILT BRACKET	4"	3"	1"	0.055"	0.06"	80	90
E/W RB	EAST/WEST RACK BEAM	6"	3"	-	0.055"	0.25"	80	90
CBS	CONNECTOR BRACKET SHORT	4"	2"	-	0.092"	0.13"	50	60
CBL	CONNECTOR BRACKET LONG	4"	2"	-	0.092"	0.13"	50	60
DB	DIAGONAL BRACE	1"	-	-	0.055"	0.05"	80	90
LB	LATERAL BRACE	1"	-	-	0.055"	0.05"	80	90

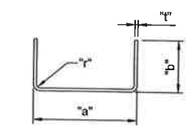
MEMBER PROFILES



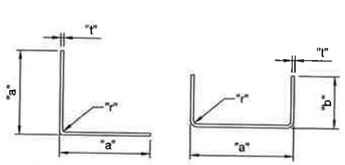
"P", "TB" PROFILE



"E/W RB" PROFILE



"CBL", "CBS", PROFILE



"DB", "DBU", "DBL", "LB", PROFILES

OMCO SOLAR

COLORADO LICENSED STEVEN J. BAUER 41531 PROFESSIONAL ENGINEER 2/26/24

CHOICE GROUND MOUNT
ESTES ROCKETS
1295 H ST
PENROSE, CO, 81240

REV	DATE	DRAWN	CHECK	RELEASE DESCRIPTION
00	1/30/24	AE		INITIAL RELEASE

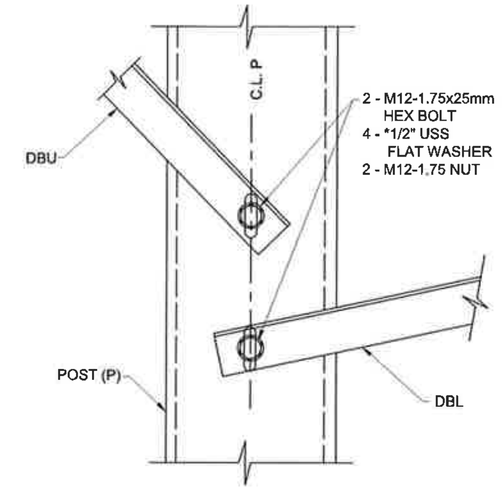
PROJECT NAME:
ESTES ROCKETS

PROJECT NUMBER
5934517785

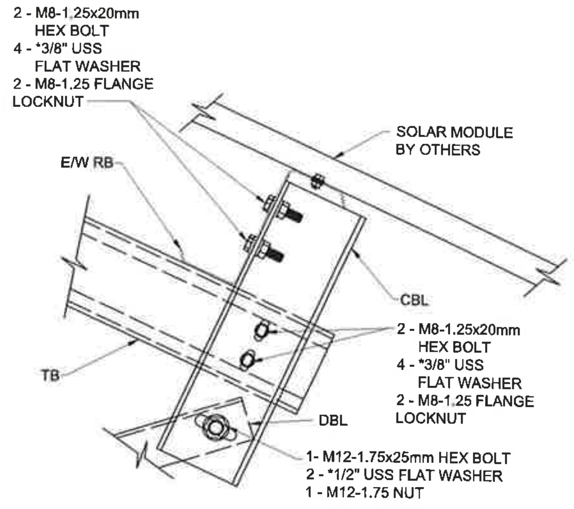
DRAWING NAME:
FRAMING PLANS

DRAWING NUMBER:
OS2.2

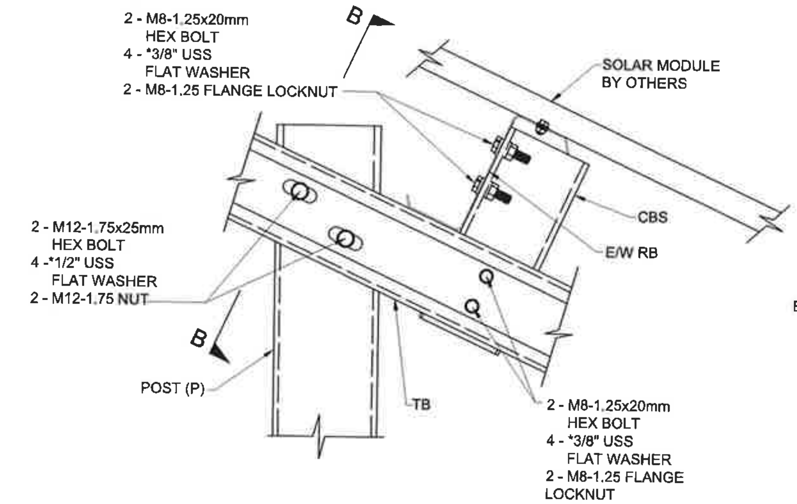
OMCO SOLAR
4550 W. WATKINS ST.
PHOENIX, AZ 85043
www.omcosolar.com

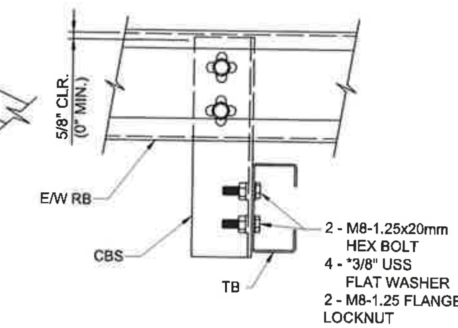


DBU & DBL TO POST (1)
*SEE NOTE



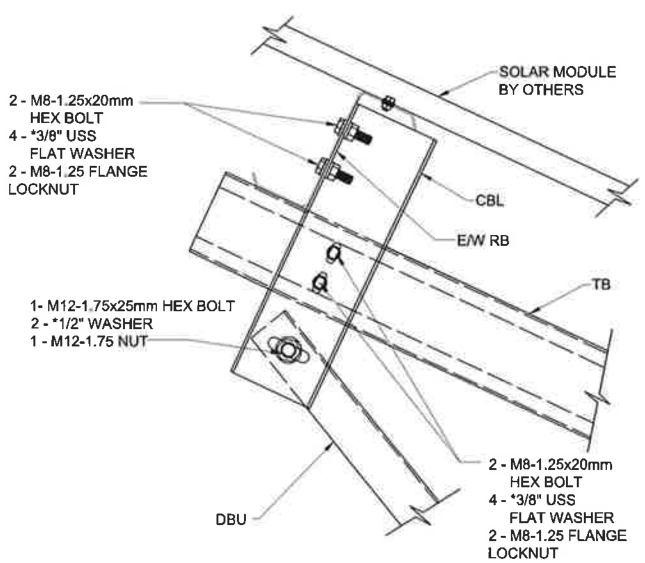
TB TO CBL E/W RB TO CBL (2)
DBL TO CBL *SEE NOTE



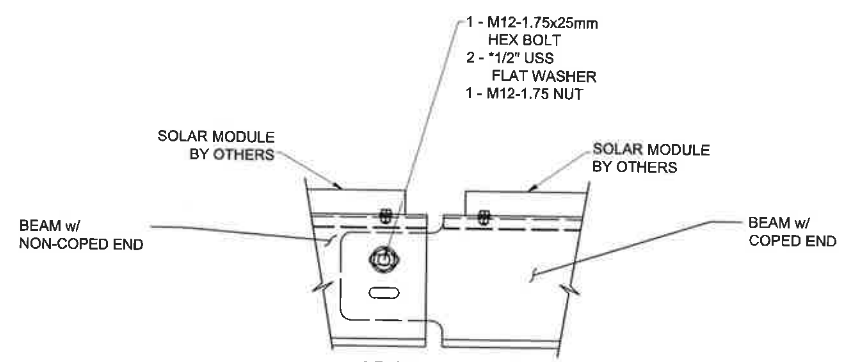


VIEW "B-B"

TB TO POST TB TO CBS (3)
E/W RB TO CBS *SEE NOTE

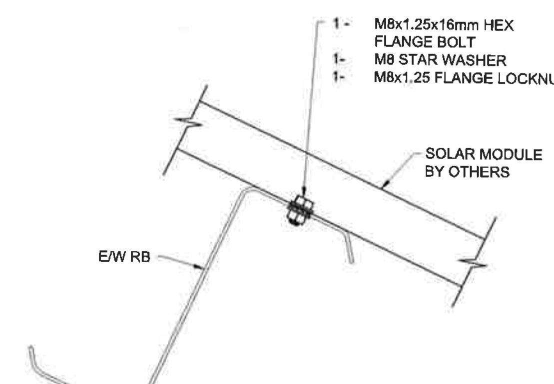


TB TO CBL E/W RB TO CBL (4)
DBL TO CBL *SEE NOTE



ADJACENT RACKS BEAM ENDS BOLTED CONNECTION

BEAM TO BEAM CONNECTION. (5)
NOTE: AT NON-STRUCTURAL RACK BEAM TO RACK BEAM, CONNECTIONS ONLY SINGLE BOLT IS REQUIRED FOR ELECTRICAL BONDING
*SEE NOTE



E/W RB TO MODULE (6)

		HOLE DIA./SLOT SPEC (in/mm)		
DETAIL	CONN DESC.	BOLT SIZE	HOLE DIA. / SLOT DIA. - OVERALL LENGTH	
1	DBU & DBL TO POST	M12-1.75x25mm	DBU & DLB 0.512"-0.512"	POST 0.531"-2.00"
2	TB TO CBL	M8-1.25x20mm	CBL 0.354/8.99	TB 0.354"-1.00"
	E/W RB TO CBL	M8-1.25x20mm	CBL 0.354/8.99	E/W RB 0.354"-RADIUS SLOTS
	DBL TO CBL	M12-1.75x25mm	DBU & DLB 0.512"-0.512"	CBL 0.531"-2.00"
3	TB TO POST	M12-1.75x25mm	TB 0.531"-2.00"	POST 0.531"-2.00"
	E/W RB TO CBS	M8-1.25x20mm	CBS 0.354/8.99	E/W RB 0.354"-RADIUS SLOTS
	TB TO CBS	M8-1.25x20mm	TB 0.354"-1.00"	CBS 0.354/8.99
4	TB TO CBL	M8-1.25x20mm	CBL 0.354/8.99	TB 0.354"-1.00"
	E/W RB TO CBL	M8-1.25x20mm	CBL 0.354/8.99	E/W RB 0.354"-RADIUS SLOTS
	DBL TO CBL	M12-1.75x25mm	DBU & DLB 0.512"-0.512"	CBL 0.531"-2.00"
5	E/W RB TO E/W RB	M12-1.75x25mm	E/W RB 0.531"-1.50"	E/W RB 0.531"-1.25"
6	E/W RB TO MOD	M8-1.25x16mm	E/W RB 0.354"-1.75"	MODULE 0.354"-0.551"

TORQUE REQUIREMENTS - UNLESS OTHERWISE NOTED	
CONNECTION TYPE	TORQUE
M6 CONNECTIONS	6.6 ft-lb (9 N-m)
M8 CONNECTIONS	16 ft-lb (22 N-m)
M10 CONNECTIONS	32 ft-lb (43 N-m)
M12 CONNECTIONS	55 ft-lb (75 N-m)

*NOTE: AT - 3/8", 7/16" AND 1/2" USS "OVERSIZED" FLAT WASHER, USE "OVERSIZED" THRU-HARDENED HIGH STRENGTH PER ASTM F436 (HRC 38 TO 45)

OMCO SOLAR

COLORADO LICENSED STEVEN J. BAUER 41531 PROFESSIONAL ENGINEER 2/20/24

CHOICE GROUND MOUNT
ESTES ROCKETS
1295 H ST
PENROSE, CO, 81240

REV	DATE	DRAWN	CHECK	RELEASE DESCRIPTION
00	1/30/24	AE		INITIAL RELEASE

PROJECT NAME: ESTES ROCKETS

PROJECT NUMBER 5934517785

DRAWING NAME: STRUCTURAL DETAILS

DRAWING NUMBER: OS3.0

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PHOENIX, AZ 85043
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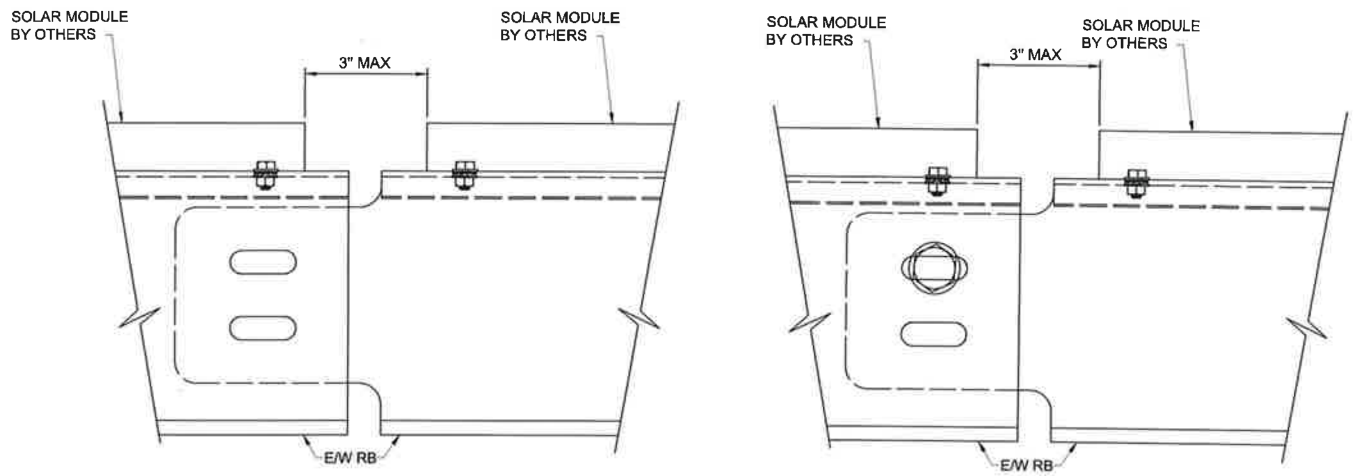
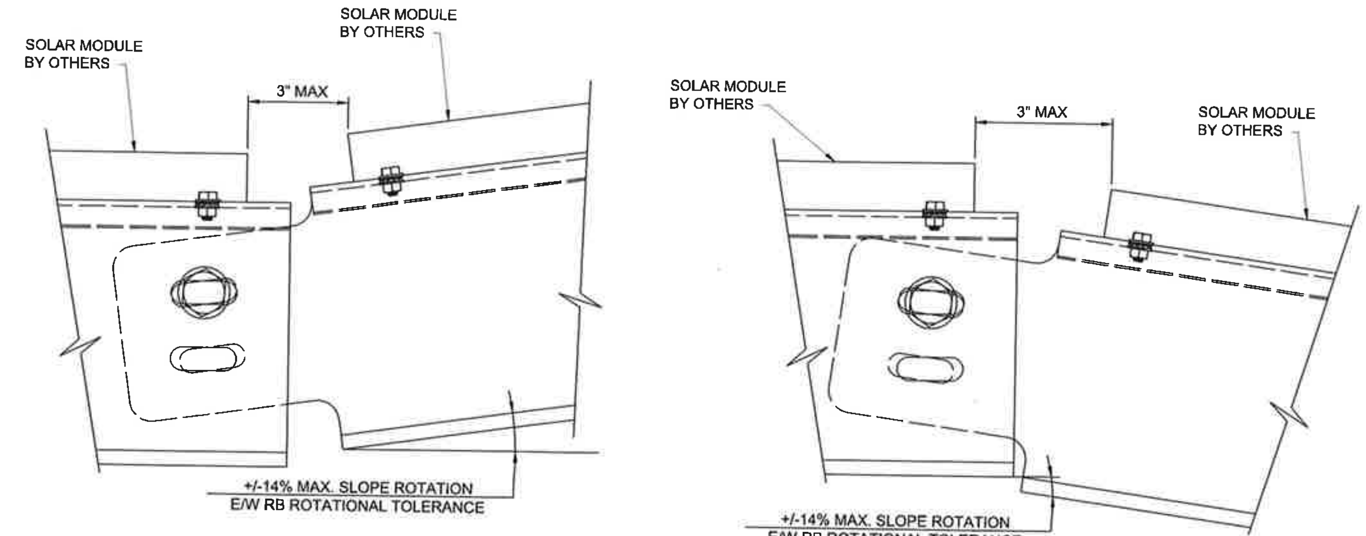


STRUCTURE SEPARATION SPACING

RACK BEAM TO RACK BEAM (CONNECTED)

ADJACENT E/W RACK BEAM DESIGN SPACING (7)



RACK BEAM TO RACK BEAM (VALLEY CONNECTION)

RACK BEAM TO RACK BEAM (HILL CONNECTION)

ADJACENT E/W RACK BEAM ARTICULATION (8)

*EXCEPTION: WHERE ALL TABLES ARE END TABLES, 3" MAX DOES NOT APPLY

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REV	DATE	DRAWN	CHECK	RELEASE DESCRIPTION
00	1/30/24	AE		INITIAL RELEASE

PROJECT NAME: ESTES ROCKETS

PROJECT NUMBER 5934517785

DRAWING NAME: STRUCTURAL DETAILS

DRAWING NUMBER: OS3.1

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PHOENIX, AZ 85043
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