Louden Tribe

P.O.Box 244
Galena, AK 99741
Phone: (907) 656-1711
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Louden Tribe 1.5MW Solar PV Install

Invitation to Bid No: LT-FY24-002 ; Racking

Publishing Date: Friday March 29th, 2024

Bid Due Date: Monday April 22nd , 2024

Louden Tribe Contact:

Brooke Sanderson

Louden Tribal Administrator

907-656-1711

brooke.sanderson@loudentribe.com

Tanana Chiefs Conference Contact:

Edward Dellamary

T.C.C. Rural Energy Specialist

907-452-8251 x3279

edward.dellamary@tananachiefs.org

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Louden Tribe Invitation to Bid LT-FY24-002

The Louden Tribe (Tribe) requests proposals for the award of a contract for procurement, construction, installation and foundation work services for a 1.483 MW DC solar array in the community of Galena, AK whose power output will integrated into the City of Galena owned electric distribution system via an Electrical RFP being put out at the same time. Contractors are encouraged to submit joint proposals on both RFPs if necessary to comprehensively meet the separate project components identified in the scope of services.

This Request for Proposals (RFP) details the overall scope of services desired, identifies specific qualifications, and required skills. Responses to this RFP will be used to select and negotiate with a qualified contractor(s) to provide the services described in the RFP. The Tribal Council will approve the award of this contract based on the evaluation criteria identified in this RFP.

This RFP is contingent on a grant being negotiated for funding and ***does not commit the Tribe to enter into a contract, nor does it obligate the Tribe to pay for any costs incurred in the preparation and submission of responses to this RFP***. The funding for this project will be covered under a US Department of Energy Grant that has been conditionally approved but which is being negotiated as this RFP is out for bid. The Tribe reserves the right at its sole discretion: to make selections of one or more contractors, to reject any or all submissions, to issue subsequent RFPs, to remedy technical errors in the RFP process, and to enter into a contract for all or some of the services described in this RFP.

Proposals must be received by the Louden Tribe, P.0. Box 244, Galena, Alaska 99741 or at the Tribal office located in Galena, Alaska 99741, by 12:00 p.m., local time on Monday April 22nd, 2024. All proposals must be emailed to Louden Tribe Administrator Brooke Sanderson - brooke.sanderson@loudentribe.com and their Project Manager at Tanana Chiefs Conference Edward Dellamary- Edward.Dellamary@tananachiefs.org. **Proposals received after the deadline will not be considered. FACSIMILE PROPOSALS WILL NOT BE ACCEPTED. Deadline for questions is Wednesday April 17th at 4:30 PM.**

RFP documents and supporting information may be obtained from Tanana Chiefs Conference at https://www.tananachiefs.org/category/bids/ or by calling (907) 452-8251, ext. 3279 and reaching out to Ed Dellamary, TCC Energy Program Manager. Supporting information that is available include a map of the community, photos and an electrical planset**.**

Major components of the project are outlined in the attached plans and include the following:

1. Contractor will procure 1.476 MW DC solar PV system (racking and solar panels) for Summer 2024, FOB Galena, AK with targeted installation date Fall 2024 – Spring 2025 – contractor will need to comply with NEPA analysis guidelines – all drilling must take place while ground is frozen & snow cover on the ground. Material to be sent on the barge, Ruby Marine, from Nenana to Galena.
2. Installation of all ground screw foundations for the Galena, AK solar array ; preference is that contractor utilizes equipment from APA racking for ground screws.
3. The full solar array is expected to utilize 1404, 10’ long ~3” diameter ground screws in 27 arrays of 96 modules each; or similar quantities. This will be a total needed solar array capacity of 1.476 MW or 2,592 modules. Each sub-array consists of 96 modules, 2 by 1 in portrait; and 52 ground screws per sub-array. Preference is that the contractor utilizes

SEG 550 Watt (SEG-550-BMA-TB ; Yukon Series, bifacial). Procure stramped drawings from APA.

a. There is currently 1 sub-array installed

4. Management of all material shipments into the community

The tribe reserves the right to waive informalities not inconsistent with the law and reject any or all bids.

Available on Tanana Chiefs Conference website: https://www.tananachiefs.org/category/bids/

SECTION 1 - Instructions to Bidders:

The community of Galena, and project partners in the region are actively working to reduce diesel fuel consumption and costs and are moving toward diesels-off operation on their islanded microgrid through the use of solar energy, battery storage, and advanced grid-forming inverters and control systems. As a future component of the Galena Alaska microgrid system there will be a 1-2MWh battery energy storage system. TCC Project Managers have confirmed with Ageto controller product designers that the system can be configured to work effectively in solar integration mode without the use of battery energy storage. A Battery Energy Storage System (BESS) will be integrated into the Galena Alaska Electric Grid at a future date and will be expected to integrate with the Ageto supervisory control however that portion of the project and the electrical portion of the solar project are not included as part of this RFP.

The Project is funded with both US Department of Energy Clean Energy Deployment on Tribal Lands funding and State of Alaska Renewable Energy Fund monies and must subscribe to pertinent DOE and State of Alaska requirements.

In addition to the above responsibilities, the Contractor will be required to:

- Travel to Galena
- Work together with the representatives of the following organizations during the stay in the Community and while performing the actual installation: Galena Tribal Council, City of Galena, Tanana Chiefs Conference, Sustainable Energy for Galena Alaska (SEGA)
- Use local labor work force to maximum extent possible
- Provide training for community designated representatives, SEGA and CITY utility operators

Proposal Format: Proposals must be typewritten or prepared in ink and must be attached to the form provided in this RFP. No oral, telephone, or facsimile proposals will be accepted.

Conformance to Proposal Requirements: Proposals must conform to the requirements of the RFP. All necessary attachments (residency statement, references, descriptive literature, etc.) must be submitted with the proposal. Proposal rates must be stated as indicated in the proposal.

Failure to comply with all requirements of the RFP may result in proposal rejection.

Exceptions: Any deviation from proposal specifications, terms and conditions may result in proposal rejection.

Time of Completion: Contractor must be able to complete the installation of a solar array before May 01, 2025. Contract shall terminate on or before May 30th, 2025, unless extended by mutual agreement.

Signature on Proposal: An authorized representative of the proposer must sign proposals in ink. Signature on a proposal certifies that the proposal is made without collusion with any person, firm, or corporation making a proposal for the same goods and/or services and is in all respects fair and without collusion or fraud. Signature on a proposal also certifies that the proposal is accurate and truthful in all respects, and that proposer has read and fully understands all proposal specifications, terms, and conditions.

Proposal Modification: Modifications or deletions made before submitting a proposal must be initialed in ink by the person signing the proposal. Proposals, once submitted, may be modified in writing before the time and date set for proposal closing. Any modifications shall be prepared on the proposer's letterhead, signed by an authorized representative, and state that the new document supersedes or modifies the prior proposal. Modifications must be submitted in a sealed envelope clearly marked "Proposal Modification," and identify the proposal number and closing date.

Proposal Withdrawals: Proposals may be withdrawn in writing on proposer's letterhead signed by an authorized representative and received by the Tribe prior to proposal closing time. Proposals may also be withdrawn in person before proposal closing time upon presentation of appropriate identification.

Protest of Proposal Specifications: A proposer who believes proposal specifications are unnecessarily restrictive or limit competition may submit a protest, in writing, to the Tribal Council. To be considered, protests must be received at least five (5) days before the proposal closing date. Envelopes containing protests should be marked as follows: *"Louden Solar Install RFP LT-FY24-002"*

Required Effort: Per Louden Tribe procurement guidelines, The Louden Tribe must make a good faith effort to ensure that small businesses and minority owned business, women's business enterprises and individuals or firms located within or owned in substantial part by persons residing in the area of a Louden Tribe project are used when possible

SECTION 2 - EVALUATION CRITERIA

The Tribe's Evaluation Committee will evaluate the RFP responses. The Committee will consider how well the proposal meets the Tribe's requirements as described in the RFP. It is important that the responses are clear and complete to ensure that the Committee can adequately understand all aspects of the proposal.

Minimum Criteria (no points)

1. At least 3 years in business
2. Significant, demonstrable experience with hybrid renewable-diesel power systems
3. Significant, demonstrable experience designing & installing Solar PV arrays in Alaska
4. At least 3 references from clients in Alaska

Criteria to be Scored

1. Price
2. Scope of Services
3. Prior experience performing similar work, and current capacity to perform work
4. A plan of commitment to use local hire for additional work and train them
5. Recommendation from References

Award:

The Louden Tribe review committee may consist of but is not limited to the Tribal Administrator, City of Galena Utility Manager, City of Galena City Manager, Tanana Chiefs Conference Energy Project Managers, Tribal Council Staff and the General manager for Sustainable Energy for Galena (SEGA), Alaska. The Tribe reserves the right to modify the membership of the Evaluation Committee.

The Evaluation Committee will rank the proposals against the criteria in this RFP and submit its recommendation to the council for approval and execution of a professional services agreement. The Council will award the contract at its sole discretion and judgment.

Louden Tribe may reject any proposal not in compliance with all prescribed bidding procedures and requirements in this RFP, and may reject any proposals upon a finding that it is in the Tribe's interest to do so. The Tribe also reserves the right to waive any informality in any proposal and to delete matters from proposals if not prohibited by law.

Louden Tribe Invitation to Bid LT-FY24-002

Bid of_____
(hereinafter called "BIDDER"), organized and existing under the laws of the State of_____
doing business as _____*,
to the LOUDEN TRIBE, a federally recognized tribe (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the **Louden Tribe 1.5MW Solar PV Install**, in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of the BID, each BIDDER certifies, and in the case of a joint BID each party thereto certifies as to his own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to the BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the PROJECT by May 1st, 2025. BIDDER further agrees to pay any liquidated damages in accordance with the Contract Documents.

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices or lump sum (Show total Price) :

Respectfully submitted:

_____	_____	
Signature	Address	
_____	_____	_____
Title	Telephone Number	Date

NON-COLLUSION AFFIDAVIT

UNITED STATES OF AMERICA

STATE OF ALASKA

I, _____, of _____,
(Name of Officer) (Firm Name)

being duly sworn, do depose and state:

That I, or the firm, association or corporation of which I am a member, a bidder, on the contract to be awarded, by the Louden Tribe of the State of Alaska, for the construction of that certain project designated as: the **Louden Tribe 1.5MW Solar PV Install**, located in Galena, Alaska, in the State of Alaska, have not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with such contract.

_____
(Signature)

Subscribed and sworn to this _____ day of _____, 2024.

_____
Notary Public
My Commission Expires:

Bid Schedule

The Bidder shall insert a unit bid price or a lump sum price in figures opposite each pay item and total price for which an estimated quantity appears in the bid schedule. The estimated quantity of work for payment on a lump bum basis will be “all required” and as further specified in the contract.

Louden Tribe BID SCHEDULE		Louden Solar PV and Microgrid Controller
Project LT-FY24-002		
Item No.	Item Description	Amount Bid
001	Racking and Material procurement (racking and foundation piers) plus shipping to Galena	
002	Labor/Subcontract for drilling/foundation installation	
003	Solar Panel Procurement and shipping to Galena	
004	Labor for installation of racking (above ground) and solar panels	
	Total Bid:	

CONTRACTORS QUALIFICATION QUESTIONNAIRE

A. FINANCIAL

1. Have you ever failed to complete a contract due to insufficient resources?

[ ] No [ ] Yes If YES, explain:

2. Describe any arrangements you have made to finance this work:

B. EQUIPMENT

1. Describe the equipment you have available and intend to use for this project. List the item, quantity, make, model, size/capacity and present market value.

2. What percent of the total value of this contract do you intend to subcontract? _____ %

3. Do you propose to purchase any equipment for use on this project?
[ ] No [ ] Yes If YES, describe type, quantity, and approximate:

4. Do you propose to rent any equipment for this work?
[ ] No [ ] Yes If YES, describe type and quantity:

5. Is your bid based on firm offers for all materials necessary for this project?
[ ] Yes [ ] No If NO, please explain:

C. EXPERIENCE

1. Have you had previous construction contracts or subcontracts in a Rural Community?
[ ] No [ ] Yes (If yes where and please provide contact info)

Describe the most recent or current applicable contract, its completion date, and scope of work:

2. List, as an attachment to this questionnaire, other construction projects you have completed, the dates of completion, scope of work, and total contract amount for each project completed in the past 5 years which are pertinent to this project.

I hereby certify that the above statements are true and complete.

_____ _____
Name of Contractor Name and Title of Person Signing

_____ _____
Signature Date

Part 2 - General Provisions

Scope of Work

The Louden Tribe is releasing this bid document for the procurement and installation of a 1.483MW grid-tied solar PV array in the community of Galena, Alaska. The associated electrical will be put out in an adjacent electrical, communication and controller RFP. The work will include a small amount of clearing but the majority of the site is clear. Foundation work will need to be completed during months when the ground conditions are frozen. Contractor is responsible for acquiring their own housing in the community of Galena. Contractor is responsible for the procurement of all material and shipping of said material into the community. Local barge vendors that serve the community include Ruby Marine based in Nenana, AK.

1. The community in partnership with Tanana Chiefs Conference has completed extensive design work over the past 18 months and a planset is available as part of this packet and will be used as the basis of design
2. Although we have not procured solar modules for this project yet we have identified SEG 550 watt bifacial monocrystalline panels as the basis of design – selected panels must meet design criteria of the racking vendor and be approved by vendor
3. AP Alternatives racking and 10' long 3" diameter ground screws have been specified for this project with a 35 deg tilt
4. This project does not require Davis Bacon wage rates

Measurement and Payment

Payment for the project will be in the form of multiple completion milestones and payment dates once an eligible contractor is selected. Contractor will be paid after receipt of properly prepared invoices. Louden Tribe and their consultants/Partners will inspect and approve all work to ensure it complies with applicable codes and standards. Any concerns or issues that the tribe has with the contractors work as completed will be addressed by a 3rd party arbitrator if they cannot be resolved between the tribe and contractor directly. No final payment will be made until the tribe is confident that all work has been completed to their standards and specifications.

Insurance Requirements

The Louden Tribe shall be named as an additional insured on all insurance policies required for this project. All of the insurance coverages shall be considered to be primary and noncontributory to any other insurance carried by the Louden Tribe, whether through self-insurance or otherwise.

All specialty trades such as electrical, plumbing and mechanical must have appropriate licensing and be certified by the State of Alaska for the work being performed.

Certificate of Insurance

Contractor must furnish a certificate of insurance within the (10) days of receipt of the Notice-of-Intent to Award and must endorse polices to provide for a thirty (30) day prior notice of cancellation, nonrenewal or material change of the policies. Failure to furnish satisfactory evidence of insurance or lapse of policy is a material breach of the contract and grounds for termination of this agreement. Each policy shall be endorsed with a waiver of subrogation in favor of the Owner. All other insurance policies required of the Contractor by this agreement shall be endorsed to provide that such insurance shall apply as primary insurance and that any

insurance or self-insured carried by the Owner will be excess only and will not contribute with the insurance required by this agreement. All other insurance policies required of the Contractor and subcontractors by this Agreement shall be endorsed to name the Owner as additional insured. All insurance shall be on an occurrence from acceptable to the Owner and having an A.M. Best rating of “A” or better.

1. Workers’ Compensation and Employers’ Liability Insurance as required by any applicable law or regulation. Employers’ liability insurance shall be in the amount no less than $500,000 each accident for bodily injury, $500,000 policy limit for bodily injury by disease and $500,000 each employee for bodily injury by disease. The Contractor shall be responsible for Workers’ Compensation Insurance for any subcontractor who directly or indirectly provides services under this contract. This coverage must include statutory coverage for states in which employees are engaging work. If there is an exposure of injury to Contractor’s employees under the U.S. Longshoremen’s Harbor Workers’ Compensation Act, the Jones Act, or under laws, regulations or statutes applicable to maritime employee, coverage shall be included for such injuries or claims. The coverage shall include waiver of subrogation against the Tribe.

2. Commercial General Liability Insurance: The Contractor is required to provide Commercial General Liability (CGL) insurance with limits not less than $2,000,000 combined single limit per occurrence and $2,000,000 in the aggregate not excluding premises operations, independent contractors, products, and completed operations, broad form property damage, blanket contractual, explosion, collapse and underground hazards. **Limits may be a combination of primary and excess (umbrella) policy forms.**

3. Comprehensive Automobile Liability Insurance: Covering all owned hired and non-owned vehicles with coverage limits not less than $500,000 single limit per occurrence bodily injury and property damage.

4. Property Insurance: The Contractor shall submit to the Owner evidence of All Risk Builder’s Risk Insurance for all physical loss, including earthquake and flood (100% completed value basis) upon the entire work naming the Owner, the Contractor and the subcontractors as additional insured parties and as their interests may appear to the full contract sum thereof, until the project is completed by the Contractor and accepted by the Owner. The policy, by endorsement, shall specifically State “Louden Tribe Solar PV Install”

A. PROOF OF INSURANCE: The Contractor shall furnish the Owner with a Certificate of Insurance or where requested by the Owner, the policy declaration page with required endorsements attached thereto showing the type, amount, effective dates and dates of expiration of all policies. All endorsements shall reference policy number and the project name and project number. The Owner is the Louden Tribe and is to be identified on all certificates and endorsements.

B. To the fullest extent permitted by law, the Contractor shall defend, indemnify and hold harmless the Louden Tribe its officers, and employees from and against any and all loss, expense, damage, claim, demand, judgment, fine, charge, lien, liability, action, cause of action, or proceedings of any kind whatsoever (whether arising on account of damage to or loss of property, or personal injury, emotional distress or death) arising directly or indirectly in connection with the performance or activities of the Contractor hereunder, whether the same arises before or after completion of the contractor’s operations or expiration of this Agreement,

except for damage, loss or injury resulting from the Owner's gross negligence or willful misconduct.

C. Without limiting its indemnification, the Contractor shall maintain, until acceptance of the project by the Owner, occurrence type coverage of the kinds and minimum amounts set forth above. All insurance limits are minimum. If the Contractor's policy contains higher limits, the Owner shall be entitled to coverage to the extent of such higher limits. The Owner, at its sole discretion, may raise or lower the limit.

Part 3 – Map of Galena

Part 4 – Design Documents

1. Electrical Planset
2. APA Titan Duo Solar Racking
3. Solar Panel Specification

Part 4 – Design Documents

1. Electrical Planset
2. APA Titan Duo Solar Racking- PLEASE NOTE: THIS PLANSET IS REPRESENTATIVE ONLY OF THE TYPE OF RACKING BASED ON THE SIMILAR TYPE OF RACKING USED FOR THE GALENA PILOT PROJECT.
3. Solar Panel Specification
4. Inverter Specifications

Community Map
GALENA

64° 44' 10" N 156° 54' 49" W (NAD 83)
Approximate Elevation: 153' at Airport CL Mon.
Township 9 South, Range 10 East, K.R.M., AK
U.S.G.S. Quadrangle "NULATO C2-C3-D2-D3", Alaska
NULATO RECORDING DISTRICT

LEGEND

- Residential Building
- Commercial Building
- Public Building
- Edge of Water
- Electric
- Underground Telephone
- ANCSA 17(b) Easements

0 200 400
SCALE IN FEET

SCALE: 1"=200'
Date of Photography: July 10, 2009
Magnetic Declination computed by U.S.G.S. Geomag
Program using WMM-2005.COF model as of September 12, 2009

SHEET 4 of 8

MAP NOTES
This map was prepared by the Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs (Commerce) using funding from Federal Emergency Management Agency and US Department of the Interior Bureau of Indian Affairs. Commerce contracted with Global Positioning Services, Inc. in June of 2009 to prepare the map.

This map should not be construed as a survey. On-site surveys should be conducted prior to engineering or construction. This map was compiled to meet horizontal and vertical accuracy in accordance with national map accuracy standards.

Property and utility information has been generated from readily available sources with limited accuracy checks. Property information is not intended to represent a title search of the Recorders Office record. Utility location is approximate and shows only the main lines. Generally, the information is current as of December 2009. ANTHC provided sanitation facility records.

This map is based on photography acquired on July 7 & 10, 2009, at a nominal scale, of 1 in = 800 ft. Aero-Metric Anchorage prepared the orthophoto and topographic mapping. The topographic contours were prepared at two (2) foot intervals with index contours every ten (10) feet.

FLOOD NOTES
The US Army Corps of Engineers (USACE) report "Alaska Communities Flood Hazard Data 2009", has a published flood of record which occured in 1971 with a flood elevation of 134.7' Mean Sea Level (MSL) (1943 Datum) at "Old Town". The flood control dike surrounding the Air Force Base was constructed at 136 ft Mean Sea Level (MSL) (1943 Datum). Published Flood Insurance Maps (FIRM) show detailed flood plain information. In 1955, The U.S. Geological Survey (USGS) re-adjusted the vertical datum. The 1955 datum is 23.3' higher than the 1943 datum.

BUILDING KEY

1. Christian Church
2. Coffee Shop
3. Daycare Center
4. School
5. School
6. School Maint.
7. High School
8. Elementary School
9. City Pool
10. City Clinic
11. Elders Home
12. Court House
13. Louden Offices
14. B&B
15. Store
16. Store
17. Sweetirs Store
18. Radio Station
19. Radio Station
20. Business Hall

Plat#	Lot#	BL#	Name	Document	Rec Date	Bk & Pg/Rec.
83-04	10	2-A	Gana-a' Yoo Limited	Quit Claim Deed	6/28/1994	18 943-944
84-04	4	2	Gana-a' Yoo Limited	Statutory Warr. Deed	11/2/1998	23 429
84-04	10	4	City of Galena	Statutory QCD	1/10/1997	20 795-796
84-04	11	4	Catholic Bishop of Northern AK	Notice	6/11/2007	2007-000101-0
84-04	3	7	Gana-a' Yoo Limited	Statutory Warr. Deed	4/2/1999	23 766-767
84-04	1	10	City of Galena	Statutory QCD	8/9/2005	2005-000107-0
84-04	9	13	United State of America	Warranty Deed	6/22/1984	11 144-145
84-04	10	13	United State of America	Warranty Deed	6/22/1984	11 144-145
84-06	9	1B	United State of America	Warranty Deed	4/5/1985	12 140-141
84-06	13	1B	United State of America	Warranty Deed	4/5/1985	12 142-143

Future site of Solar PV Array

New Campion road which has VOR powerline adjacent to it

Site of Galena Battery Storage System - need any plat info

17° E Magnetic North
True North
64°45'00" N
156°51'55" W
Topographic Extents

SEC. 33 QCD & Agreement to City of Galena Bk. 10, Pgs. 888-893 3/27/1984

SEC. 32 QCD & Agreement to City of Galena Bk. 10, Pgs. 888-893 3/27/1984

USS 6664 Lot 7 QCD & Agreement to City of Galena Bk. 10, Pgs. 888-893 3/27/1984

USS 6664 Lot 4 QCD & Agreement to City of Galena Bk. 10, Pgs. 888-893 3/27/1984

By Metes & Bounds Quitclaim Deed to Takaana Development Corp. 2003-000093 6/20/2003

ALEXANDER LAKE TOWNSITE SECOND ADDITION AMENDED Plat No. 84-6

ALEXANDER LAKE TOWNSITE FIRST ADDITION Plat No. 83-4

ALEXANDER LAKE TOWNSITE THIRD ADDITION Plat No. 2008-4

ALEXANDER LAKE TOWNSITE Plat No. 84-4

TRACT AA
TRACT BB
TRACT CC
TRACT DD
TRACT A
TRACT N
TRACT L
TRACT Z

REPLAT LOT 8 Plat No. 2004-4
REPLAT LOT 12 Plat No. 2004-5
REPLAT OF LOT 27 Plat No. 83-1
REPLAT OF LOT 1 Plat No. 84-2
REPLAT LOTS 2 & 3 Plat No. 95-2

Warranty Deed to United States of America Bk. 12, Pgs. 144-145 4/5/1985

Warranty Deed to City of Galena 2007-000092-0 5/11/2007

QCD to Gana-a' Yoo Ltd. Bk. 13, Pg. 13 5/29/1986

QCD to Gana-a' Yoo Ltd. Bk. 13, Pg. 11 5/29/1986

Subdivided By M&B 2005-000078-0

Stat. Warr. Deed to Gana-a' Yoo Ltd. Bk. 15, Pg. 329 2/3/1989

QCD to City of Galena Bk. 9, Pgs. 358 10/26/1983

Grant of Easement to City of Galena Bk. 19, Pgs. 466-470 9/18/1995

Quit Claim Deed Louden Tribal Council 2006-000039-0 4/11/2006

TRACT A GALENA SENIOR HOUSING SUBD. Plat No. 2005-1

APPROXIMATE LOCATION 60' Wide Existing Road EIN 13e C5

APPROXIMATE LOCATION 25' Wide Utility Easement EIN 21 i

US SURVEY No. 6664 Lot 4 QCD & Agreement to City of Galena Bk. 10, Pgs. 888-893 3/27/1984

CAMPION ROAD (TIGER FREEWAY)

LOUDEN LOOP
GABE'S DRIVE
SOOGA DRIVE
TOM COOK LOOP
ANTOSKI ROAD
DENEGA LANE
GEORGE TIMMIE DRIVE
ALEXANDER AVENUE
NIGELNER DRIVE
JOHNSON HENRY LANE
LOUDEN LOOP

ALEXANDER LAKE
YUKON RIVER

FIREWOOD GATHERING
HUNTING THROUGHOUT COMMUNITY
SEWAGE LAGOON
POWER PLANT
STORAGE
PLAYGROUND
SCHOOL PROPERTY
GRAVEL SITE
BOAT/ BARGE LANDING

64°44'25" N
156°53'00" W

GALENA COMMUNITY MAP SHEET 4 1"=200' (2009 PHOTOGRAPHY)

CITY OF GALENA SOLAR
1529kW DC PV ARRAY
GALENA, AK 99741

SCOPE OF WORK

THE PROJECT SCOPE INCLUDES THE INSTALLATION OF A GRID-TIED SOLAR PHOTOVOLTAIC SYSTEM IN GALENA , AK.

THE INSTALLATION CONSISTS OF A GROUND MOUNT SOLAR ARRAY, 9 STRING-INVERTER(S), AND RELATED ELECTRICAL METERING AND SAFETY EQUIPMENT. ALL EQUIPMENT WILL BE INSTALLED AS REQUIRED BY APPLICABLE CODES AND THE LOCAL UTILITY COMPANY. DURING DAYLIGHT HOURS THIS PHOTOVOLTAIC SYSTEM (SOLAR ELECTRIC) WILL PROVIDE ELECTRICITY IN PARALLEL WITH THE LOCAL UTILITY SERVICE PROVIDER. DURING A GRID OUTAGE, THE ENERGY STORAGE SYSTEM WILL PROVIDE THE FACILITY ELECTRICAL SYSTEM WITH BACKUP POWER

SYSTEM DESCRIPTION

FACILITY SERVICE VOLTAGE: 4160V, 3 PHASE, 4 WIRE
(2688) SEG, SEG-550-BMA-TB, 550WDC, PERC MONO,
(8) SMA AMERICA, SUNNY HIGH POWER 125-US-20, 125kVA, STRING-INVERTER(S), 480VAC, 3ϕ

(88) HANWHA Q CELL, Q.PEAK DUO XL-G11, 575WDC, MONO-CRYSTALLINE,
(1) SMA AMERICA, STP 50-US-41, 50kVA, STRING-INVERTER, 480VAC, 3ϕ
(1) SMA AMERICA, SUNNY TRI POWER CORE1 50-US, 50kVA, STRING-INVERTER(S), 480VAC, 3ϕ

1529kW DC TOTAL (1478.4kW + 50.6kW)

1050.000kW AC PV (OUTPUT SOFTWARE DERATED TO 1MW TOTAL)

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 A WORKMAN LIKE 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 AS SPECIFIED ON THE STRUCTURAL SHEETS. 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.

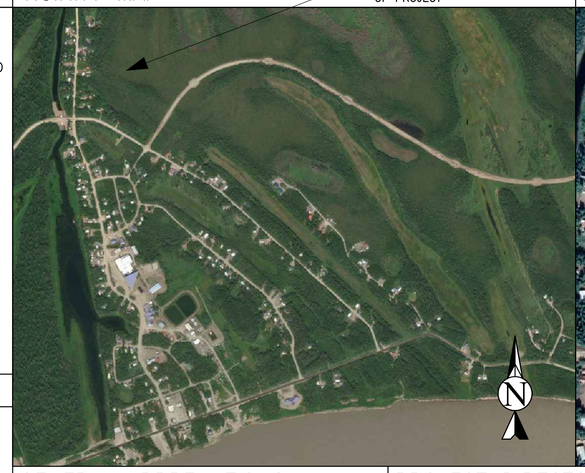
ALL LAYOUT DIMENSIONS ARE SHOWN TO THE NEAREST 1 INCH U.O.N.

APPLICABLE CODES

INTERNATIONAL BUILDING CODE, 2018
NATIONAL ELECTRICAL CODE, 2020
NATIONAL ELECTRICAL SAFETY CODE, 2020

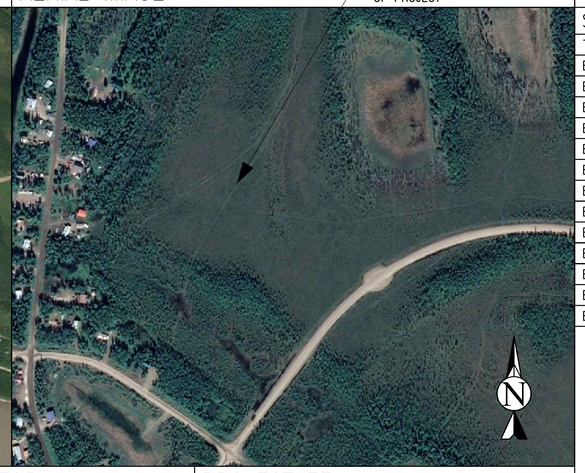
VICINITY MAP

PROPOSED LOCATION OF PROJECT



AERIAL IMAGE

PROPOSED LOCATION OF PROJECT



GENERAL ABBREVIATIONS

(E)	EXISTING
AHJ	AUTHORITY HAVING JURISDICTION
AL	ALUMINUM
APPROX	APPROXIMATE
ARY	ARRAY
ASHRAE	AMERICAN SOCIETY OF HEATING REFRIGERATING AND AIR CONDITIONING ENGINEERS
BLDG	BUILDING
CL	CENTERLINE
DAS	DATA ACQUISITION SYSTEM
DIA	DIAMETER
DO	DITTO
EW	EAST-WEST
FBO	FURNISHED BY OTHERS
FF	FORWARD FACING
GALV	GALVANIZED
HDG	HOT DIP GALVANIZED
HVAC	HEATING VENTILATION AND AIR CONDITIONING
IBC	INTERNATIONAL BUILDING CODE
ID	INSIDE DIAMETER
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS
MFR	MANUFACTURER
MOD	SOLAR MODULE
NEC	NATIONAL ELECTRICAL CODE
NS	NORTH-SOUTH
NTS	NOT TO SCALE
OAE	OR APPROVED EQUIVALENT
OC	ON CENTER
OD	OUTSIDE DIAMETER
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
PV	PHOTOVOLTAIC
PVC	POLY VINYL CHLORIDE
SCH	SCHEDULE
SS	STAINLESS STEEL
SSS	SOLAR SUPPORT STRUCTURE
STC	STANDARD TEST CONDITIONS
TBD	TO BE DETERMINED
TOF	TILT AND ORIENTATION FACTOR
TP	TAMPER PROOF
TSRF	TOTAL SOLAR RESOURCE FACTOR
TYP	TYPICAL
UL	UNDERWRITERS LABORATORIES
UON	UNLESS OTHERWISE NOTED
VIF	VERIFY IN FIELD
WP	WEATHER PROOF

REV 1.0

PROJECT DIRECTORY

OWNER
CITY OF GALENA

AUTHORITY HAVING JURISDICTION
GALENA CITY COUNCEL

PROJECT TEAM

CONTRACTOR
FIRM: TANANA CHIEFS CONFERENCE
CONTACT: DAVE MESSIER
PHONE: (907)-452-8251

SYSTEM DESIGNER
FIRM: MAYFIELD RENEWABLES
CONTACT: GREG KAMPS
PHONE: (541)-754-2001

SHEET INDEX

SHEET NUMBER	SHEET TITLE
T-1	TITLE PAGE
ELECTRICAL	
E-0.0	ELECTRICAL SPECIFICATIONS
E-0.1	COMMISSIONING PLAN NOTES
E-1.0	ELECTRICAL SITEPLAN
E-1.1	ELECTRICAL GROUND PLAN
E-1.2	PLAN DETAILS
E-1.3	PLAN DETAILS
E-2.0	DC SINGLE LINE DIAGRAM
E-2.1	AC SINGLE LINE DIAGRAM
E-2.2	ELECTRICAL SPECIFICATIONS
E-3.0	ELECTRICAL DETAILS
E-4.0	LABELS & MARKINGS
E-5.0	DATA SHEETS

Mayfield Renewables
2210 NW Hayes Ave
Corvallis, OR 97333
541.754.2001

STAMP:

NOT FOR CONSTRUCTION

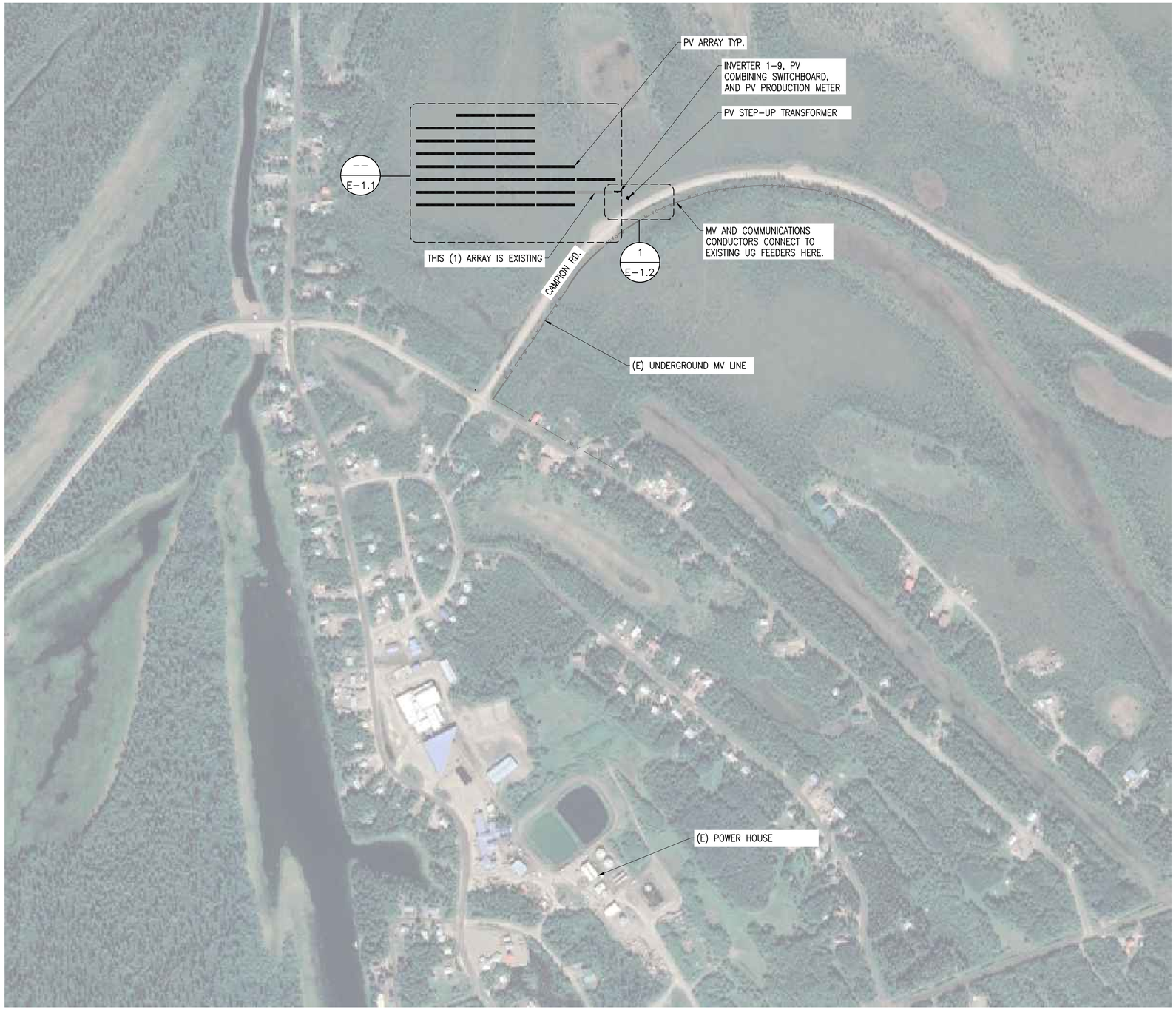
CITY OF GALENA SOLAR
GALENA, AK 99741

PROJECT NUMBER:
22-3270C

SCALE
NTS
ORIGINAL SIZE 24"X36"
SHEET SIZE ARCH "D"
0 ½" 1"

REV	ISSUED	BY	DESCRIPTION
	11/30/22	GK	75% REVIEW SET
	2/1/24	GK	CD IFP - ISSUED FOR PERMIT

SHEET NO. & NAME:
T-1
TITLE PAGE



ELECTRICAL SITEPLAN

SCALE: 1" = 250'

0 250' 500'

Mayfield Renewables
2210 NW Hayes Ave
Corvallis, OR 97333
541.754.2001

STAMP:

NOT FOR CONSTRUCTION

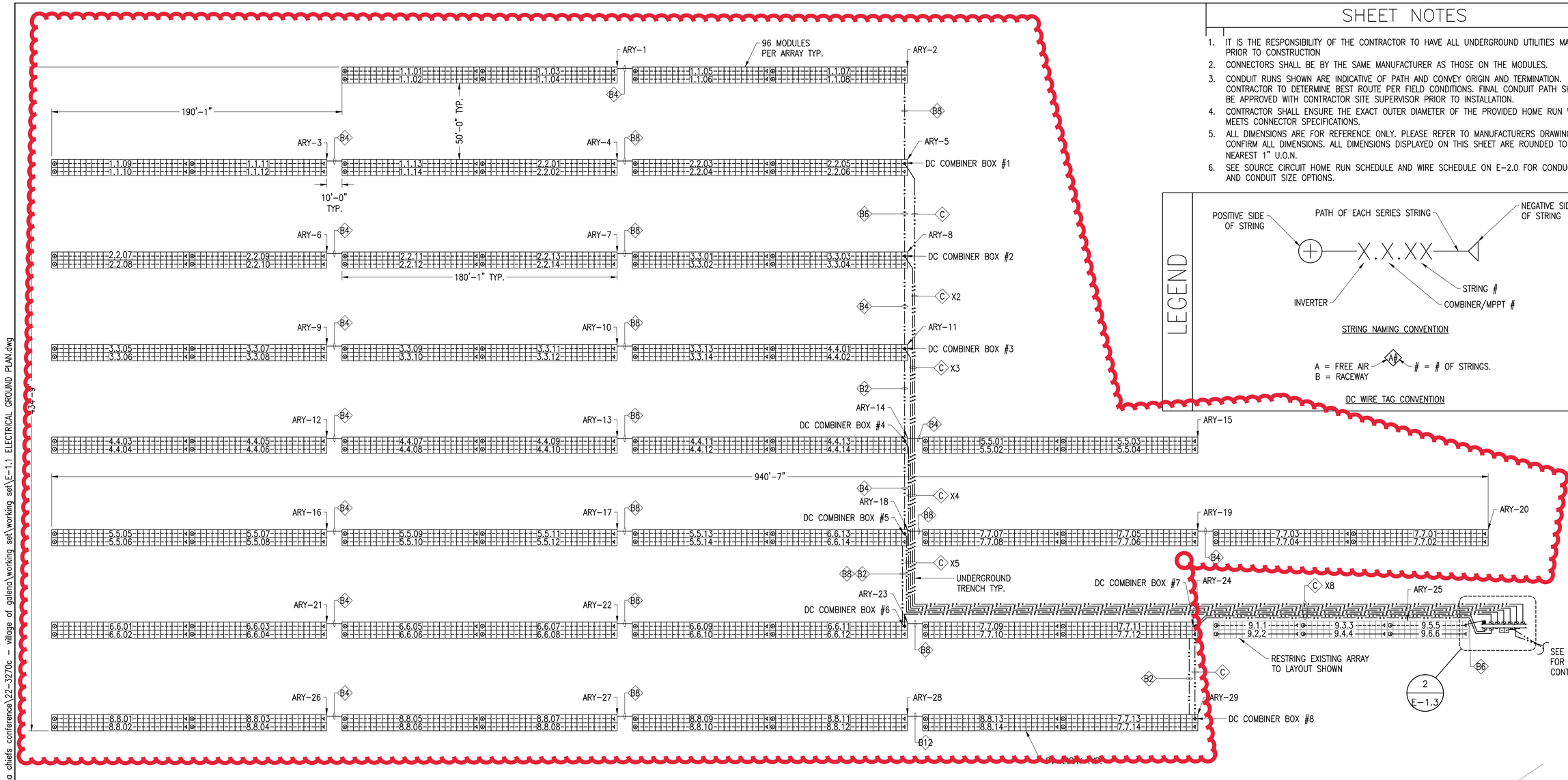
CITY OF GALENA SOLAR
GALENA, AK 99741

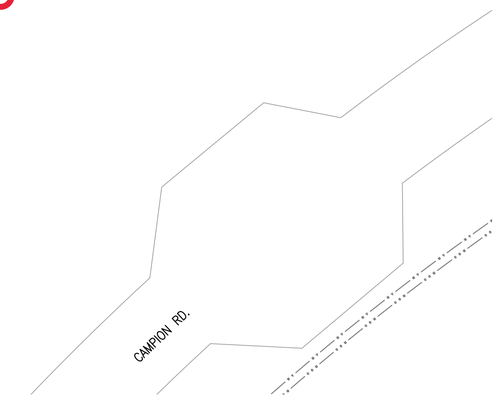
PROJECT NUMBER:
22-3270C

SCALE
AS SHOWN
ORIGINAL SIZE 24"X36"
SHEET SIZE ARCH "D"
0 ½" 1"

REV	ISSUED	BY	DESCRIPTION
	11/30/22	GK	75% REVIEW SET
	2/1/24	GK	CD IFP - ISSUED FOR PERMIT
		BB	

SHEET NO. & NAME:
E-1.0
ELECTRICAL SITEPLAN





SHEET NOTES

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE ALL UNDERGROUND UTILITIES MARKED PRIOR TO CONSTRUCTION
2. CONNECTORS SHALL BE BY THE SAME MANUFACTURER AS THOSE ON THE MODULES.
3. CONDUIT RUNS SHOWN ARE INDICATIVE OF PATH AND CONVEY ORIGIN AND TERMINATION. CONTRACTOR TO DETERMINE BEST ROUTE PER FIELD CONDITIONS. FINAL CONDUIT PATH SHALL BE APPROVED WITH CONTRACTOR SITE SUPERVISOR PRIOR TO INSTALLATION.
4. CONTRACTOR SHALL ENSURE THE EXACT OUTER DIAMETER OF THE PROVIDED HOME RUN WIRING MEETS CONNECTOR SPECIFICATIONS.
5. ALL DIMENSIONS ARE FOR REFERENCE ONLY. PLEASE REFER TO MANUFACTURERS DRAWINGS TO CONFIRM ALL DIMENSIONS. ALL DIMENSIONS DISPLAYED ON THIS SHEET ARE ROUNDED TO THE NEAREST 1" U.O.N.
6. SEE SOURCE CIRCUIT HOME RUN SCHEDULE AND WIRE SCHEDULE ON E-2.0 FOR CONDUCTOR AND CONDUIT SIZE OPTIONS.

LEGEND

STRING NAMING CONVENTION

A = FREE AIR
B = RACEWAY
A# = # OF STRINGS.

DC WIRE TAG CONVENTION

ELECTRICAL GROUND PLAN

SCALE: 1/32" = 1'-0"

0 32' 64'

Mayfield Renewables
2210 NW Hayes Ave
Corvallis, OR 97333
541.754.2001

STAMP:

NOT FOR CONSTRUCTION

CITY OF GALENA SOLAR
GALENA, AK 99741

PROJECT NUMBER: 22-3270C

SCALE
AS SHOWN
ORIGINAL SIZE 24"X36" SHEET SIZE ARCH "D"
0 ½" 1"

REV	ISSUED	BY	DESCRIPTION
	11/30/22	GK	75% REVIEW SET
	2/1/24	GK	CD IFP - ISSUED FOR PERMIT

SHEET NO. & NAME:
E-1.1
ELECTRICAL GROUND PLAN

TITAN duo

GALENA

---- GALENA, AK 99741

SOLAR PHOTOVOLTAIC ARRAY

PROJECT NUMBER: 220925

CONSTRUCTION SET

APPROVED

REV: A
2/16/2023

CUSTOMER

Tanana Chiefs Conference

TANANA CHIEFS
122 1ST AVE
FAIRBANKS, AK 99701
(P) 907-452-8251

RACKING PROVIDER

APA SOLAR RACKING

20-345 COUNTY ROAD X
RIDGEVILLE CORNERS, OHIO 43555
(P) 419.267.5280
(F) 419.267.5214
WWW.APALTERNATIVES.COM

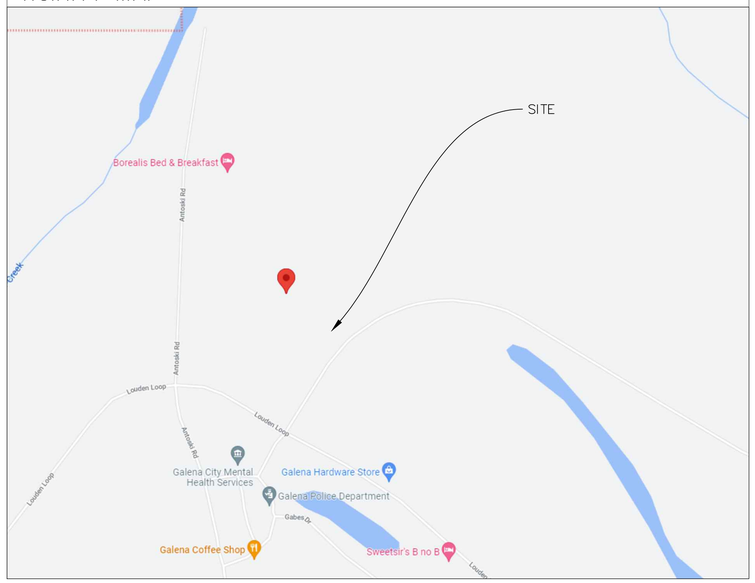
STRUC. ENGINEER OF RECORD

the jdi group
architects & engineers

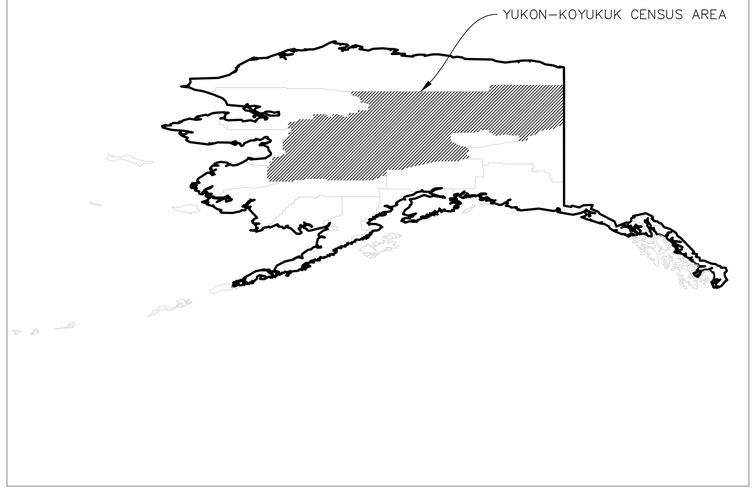
360 W. DUSSEL DR.
MAUMEE, OH 43537
|P| 419.725.7161
|F| 419.725.7160

VICINITY MAP

COORDINATES: 64.753220, -156.876862



COUNTY MAP



SHEET INDEX – CONSTRUCTION

		REV
GENERAL		
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G-100	PROJECT NOTES	A
G-200	PV MODULE SPEC SHEET	A
G-300	RACKING DIMENSIONS	A
G-301	RACKING DIMENSIONS	A
G-302	4-RAIL TRANSVERSE BRACE: 92.5" SPANS	A
LAYOUT		
L-100	SITE LAYOUT	A
L-150	ROW TECHNICAL DATA	A
L-200	SITE FOUNDATIONS: OVERVIEW	A
L-300	SITE TABLES: OVERVIEW	A
L-400	SITE TRANSVERSE BRACES: OVERVIEW	A
L-500	SITE CABLES: OVERVIEW	A

FOUNDATION EMBEDMENT DATA

HELIX SIZE	EMBEDMENT DEPTH
3" X 110"	104"

PROJECT SPECIFICATIONS

GENERAL	
SOLAR PANEL	Q CELLS
PANEL WATTAGE	575 W
PANEL STYLE	156 CELL
PANEL QTY	88
SITE WATTAGE (KW)	50.60
TILT ANGLE	40°
FRONT LIP CLEARANCE	36"

SITE PLAN

AERIAL MAP PROVIDED FOR REFERENCE ONLY

DRAWING NUMBER: G-000

GENERAL NOTES

1. VERIFY ONSITE CONDITIONS, TO VERIFY CONFORMANCE TO CONSTRUCTION DOCUMENTATION. VERIFY ALL FIELD DIMENSIONS AND THE SHAPES AND SIZES OF STRUCTURAL MEMBERS TO ENSURE THE PROPER STRENGTH, FIT, AND LOCATION OF THE STRUCTURAL WORK. CONDITIONS WHICH MAY PREVENT THE PROPER EXECUTION AND COMPLETION OF THE WORK MUST BE REPORTED TO APA SOLAR, IN WRITING, BEFORE RESUMING WORK.
2. APA SOLAR IS NOT RESPONSIBLE FOR WORK CONDUCTED BY OTHER CONTRACTORS OR FIRMS, EXCEPT WHERE SPECIFICALLY CONTRACTED BY APA SOLAR. THIS INCLUDES WORK WITHIN THE SCOPE OF APA SOLAR CONTRACT, BUT CONDUCTED BY OTHERS WITHOUT THE EXPLICIT APPROVAL BY APA SOLAR.
3. WORK DONE BY OTHERS INCLUDE, EXCEPT WHERE EXPLICITLY CONTRACTED TO DO SO WITHIN THE CONTRACT DOCUMENTS.
   - 3.1. SITE WORK AND DEVELOPMENT, INCLUDING BUT NOT LIMITED TO GRADING, CONSTRUCTION ROADS, FENCING, SEEDING, EROSION CONTROL.
   - 3.2. ALL ELECTRICAL WORK.
   - 3.3. ALL GROUNDING AND BONDING.
   - 3.4. ALL SHADING AND PRODUCTION ANALYSIS.
4. THE APA SOLAR CONSTRUCTION SET IS DESIGNED FROM PV MODULE DATA SHEETS PROVIDED BY THE CUSTOMER. CUSTOMER IS RESPONSIBLE FOR VERIFYING THAT THE PV MODULES DELIVERED TO SITE MATCH DATA SHEETS PROVIDED TO APA SOLAR. APA SOLAR IS NOT RESPONSIBLE FOR PV MODULE DISCREPANCIES DUE TO MISMATCH BETWEEN PROVIDED SPEC SHEETS AND ACTUAL MODULES.
5. SEE MANUFACTURER'S DRAWINGS AND INSTALLATION MANUAL FOR ADDITIONAL INFORMATION ON THE RACK ASSEMBLIES.
6. INSTALLATION CONTRACTOR RESPONSIBLE FOR ALL CONSTRUCTION EQUIPMENT, METHODS, AND SEQUENCES.
7. CUSTOMER IS RESPONSIBLE FOR VERIFYING CORROSION COMPATIBILITY WITH FOUNDATION POSTS.

ADDITIONAL DOCUMENTATION

ADDITIONAL ENGINEERING DOCUMENTATION DEVELOPED FOR THIS PROJECT & GENERAL DOCUMENTATION INTENDED TO BE USED ON THIS PROJECT:

1. HELICAL FOUNDATION TEST REPORT
2. PV MODULE INSTALLATION MANUAL, (PROVIDED BY CUSTOMER)
3. APA RACKING INSTALLATION MANUAL
4. APA FIELD SIGN OFF AND QA CHECKLIST

CONSTRUCTION

1. LOCATION OF UNDERGROUND UTILITIES SHALL BE VERIFIED PRIOR TO START OF WORK.
2. INSTALLATION CONTRACTORS ARE RESPONSIBLE FOR REVIEWING, UNDERSTANDING, AND FOLLOWING ALL DIRECTIONS, MEASUREMENTS, AND GUIDELINES CONTAINED IN THIS DRAWING PACKET AND IN ANY DOCUMENTATION INTENDED TO BE USED IN CONJUNCTION WITH THIS PACKET.
3. GOOD INDUSTRY PRACTICES ARE EXPECTED TO BE USED IN THE ASSEMBLY OF ALL STRUCTURAL COMPONENTS OF THIS PROJECT.
4. ALL WORK TO BE DONE IN A WORKMAN-LIKE MANNER.
5. ALL AREAS SHOULD BE CLEANED BEFORE LEAVING. REFER TO THE CONTRACT DOCUMENTS FOR PROJECT SPECIFIC OBLIGATIONS.
6. ALL INSTALLATION CONTRACTORS MUST COMPLY WITH APPLICABLE SAFETY REQUIREMENTS WHILE ON THE WORK SITE.
7. CARE SHOULD BE USED WHEN HANDLING PV MODULES. ANY PANELS EXPOSED TO SUNLIGHT SHOULD BE TREATED AS IF IT IS FULLY CHARGED. MOST PANELS ARE CAPABLE OF PRODUCING 600VDC DURING DAYLIGHT HOURS.
8. FOUNDATION POST TOLERANCES
   - 8.1. ± 1" VARIATION IN HEIGHT.
   - 8.2. ± 1" VARIATION IN NORTH-SOUTH DIRECTION.
   - 8.3. ± 1" VARIATION IN EAST-WEST DIRECTION.
   - 8.4. ± 2° VARIATION IN POST PLUMBNESS.
9. ACCURATELY LOCATE AND INSTALL FOUNDATION POSTS BY SUCH METHODS AND EQUIPMENT SO AS NOT TO IMPAIR THE FOUNDATION STRENGTH OR DAMAGE FOUNDATIONS OR ADJACENT CONSTRUCTION.
6. INSTALLATION CONTRACTOR RESPONSIBLE FOR ALL CONSTRUCTION EQUIPMENT, METHODS, AND SEQUENCES.
7. DISTURBED GALVANIZED SURFACES SHALL BE TOUCHED UP WITH AN APPROVED COLD GALVANIZING COMPOUND.
8. GOOD INDUSTRY PRACTICE SHALL BE USED IN THE ASSEMBLY OF ALL STRUCTURAL COMPONENTS OF THIS PROJECT.

STEEL

1. ALL FASTENERS SHALL BE THE TYPE AND SIZE INDICATED ON THE DRAWINGS.
2. ALL BOLTS, WASHERS, AND NUTS SHALL BE STAINLESS STEEL OR CORROSION-RESISTANT EQUIVALENT.
3. STRUCTURAL SHAPES, TUBING, AND COLD-FORMED SHAPES SHALL CONFORM TO THE ASTM GUIDELINES INDICATED WITHIN THE STAMPED STRUCTURAL PERMIT PACKAGE.
4. ALL STRUCTURAL MATERIALS SHALL HAVE ADEQUATE CORROSION PROTECTION FOR THE ENVIRONMENT. ABOVE GRADE STRUCTURAL STEEL SHALL BE HOT DIPPED GALVANIZED PER ASTM A123 OR AN APPROVED EQUIVALENT SHALL BE EVALUATED BY THE ENGINEER.
5. SEE CONNECTIONS PRINT FOR FASTENER TORQUE VALUES.

BRACING

1. BRACING SHALL BE INSTALLED BETWEEN EVERY SET (NORTH/SOUTH) OF FOUNDATION POSTS.
2. CABLE BRACING SHALL BE INSTALLED IN AN CROSSING FORMATION BETWEEN ADJACENT REAR POSTS (EAST/WEST) AT A MINIMUM OF THE FIRST TWO AND LAST TWO BAYS OF EACH ROW.
3. ADDITIONAL BRACING MAY BE REQUIRED BY THE ENGINEER, PER THE STRUCTURAL PERMIT PACKET.
4. REFER TO STRUCTURAL PERMIT PACKAGE FOR TYPICAL END OF ROW CONDITIONS REGARDING CABLE BRACING.
5. CABLE BRACING SHALL BE INSTALLED TAUT. IT IS A MOTION LIMITING ELEMENT.

FOUNDATION POSTS

1. STRUCTURAL PRINTS CONTAIN ONLY MAXIMUM ALLOWABLE SPANS. FOR FIELD CONSTRUCTION FOUNDATION SPACING, REFER TO DIMENSIONS IN CONSTRUCTION SET.
2. CUSTOM FOUNDATION SPACING MAY BE PRESENT AT ENDS OF ROW, DEPENDENT ON ROW LENGTH.
3. START OVERHANG DIMENSIONS MEASURED FROM PANEL END TO FIRST FOUNDATION SET.
4. ANY/ALL CUSTOM FOUNDATION SPACING AND CUSTOM FOUNDATION CABLES SHALL BE TO THE FAR EAST AND/OR FAR WEST, AS INDICATED IN CONSTRUCTION SET.

SITE SURVEYING

1. CUSTOMER SHALL ENSURE COMPLETION OF NECESSARY EXCAVATION AND FURNISH SURVEY POINTS, LINES, AND/OR LEVELS AS REQUIRED TO INSTALL FOUNDATIONS AT THEIR INDICATED LOCATIONS.
2. SURVEY POINTS SHALL MARK FOUNDATION LOCATIONS, TO FOLLOW THE SITE SPECIFIC NEEDS FOR THE SYSTEM BEING INSTALLED. NORTH AND SOUTH LOCATIONS WHEN APPLICABLE.
3. SURVEY POINTS ARE RELATIVE TO EACH OTHER. ANY ABSOLUTE SURVEY REQUIREMENTS (GPS, ETC.) OR POINTS RELATIVE TO FEATURES NOT INDICATED BY APA SOLAR (DISTANCE FROM EASEMENTS, OR FENCELINES) ARE THE RESPONSIBILITY OF THE CUSTOMER.
4. IT IS THE RESPONSIBILITY OF THE CUSTOMER TO VERIFY EASEMENTS, SETBACK, FIRE LANES, AND OTHER DISTANCES REQUIRED BY THE AHJ. FAILURE TO PROPERLY VERIFY AND MARK SUCH DISTANCES MAY RESULT IN PROJECT DELAYS AND ADDITIONAL COSTS TO BE COVERED BY THE CUSTOMER.
5. UNDER SPECIFIC CIRCUMSTANCES, TERRAIN AND SITE PROPERTIES MAY INDICATE TO PROJECT ENGINEERS THE NEED FOR ADDITIONAL SURVEY POINTS.
6. CAD DATA IS MASTER, UNLESS OTHERWISE NOTED.

ELECTRICAL

1. UNLESS SPECIFIED BY CONTRACT DOCUMENTS, APA SOLAR IS NOT RESPONSIBLE FOR ANY WORK CONCERNING THE ELECTRICAL SYSTEMS OR COMPONENTS, INCLUDING BUT NOT LIMITED TO, ELECTRICAL INSTALLATION AS THEY PERTAIN TO THE RACKING HARDWARE, PV MODULES, OR THE SITE.
2. APA SOLAR ALSO NOT RESPONSIBLE FOR GROUNDING AND BONDING COMPONENTS, REQUIREMENTS AND INSTALLATION METHODS.
3. ELECTRICAL COMPONENTS, INCLUDING THOSE FOR BONDING, GROUNDING, AND WIRE MANAGEMENT, PROVIDED BY APA SOLAR (GRATIS OR PAID), ARE PROVIDED AS COMPONENTS ONLY. APA SOLAR IS NOT RESPONSIBLE FOR THEIR USAGE OR INSTALLATION AND PROVIDE NO GUARANTEE TO THEIR LIFE OR ADHERENCE TO APPLICABLE BUILDING CODES.
4. ANY DRAWING, NOTE, OR DOCUMENTATION PROVIDED BY APA SOLAR, REFERENCING ANY ELECTRICAL, GROUNDING, OR BONDING COMPONENT OR INSTALLATION IS PROVIDED AS REFERENCE ONLY, AND SHALL NOT BE TAKEN AS PROOF OF APA SOLAR RESPONSIBILITIES OR LIABILITY, EXCEPT WHERE EXPLICITLY DEFINED IN THE CONTRACT DOCUMENTS.
5. MOUNTING OF ELECTRICAL EQUIPMENT TO APA SOLAR RACKING, WHEN NOT EXPLICITLY PREAPPROVED BY APA SOLAR, IS FORBIDDEN. SUCH MOUNTING MAY BE APPROVED BY APA SOLAR, UPON REQUEST AND WRITTEN APPROVAL BY AP ALTERNATIVE ENGINEERS.

SPECIAL INSPECTION

SPECIAL INSPECTIONS ARE NOT REQUIRED BY APA SOLAR OR THE STRUCTURAL ENGINEER OF RECORD, THE JDI GROUP. WHERE REQUIRED BY OWNER, CUSTOMER, AND/OR AUTHORITY HAVING JURISDICTION, MINIMUM INSPECTION SHALL INCLUDE THE FOLLOWING NOTES AND TABLE BELOW.

1. ALL SPECIAL INSPECTORS SHALL BE RETAINED BY OWNER/CUSTOMER. THE EXTENT OF THE INSPECTION SHALL COMPLY WITH THE CONTRACT DOCUMENTS, THE BUILDING CODE REQUIREMENTS, AND LOCAL JURISDICTION. IT IS THE OWNER/CUSTOMER'S RESPONSIBILITY TO GIVE PROPER NOTIFICATION TO THE SPECIAL INSPECTOR AND PROCEED WITH THE WORK ONLY AFTER THE SPECIAL INSPECTOR'S APPROVAL.
2. FAILURE TO NOTIFY THE SPECIAL INSPECTOR MAY RESULT IN OWNER/CUSTOMER HAVING TO REMOVE WORK FOR THE PURPOSE OF INSPECTION AT THE OWNER'S/CUSTOMERS EXPENSE.
3. SPECIAL INSPECTORS SHALL KEEP RECORDS OF ALL INSPECTIONS. RECORDS SHALL BE FURNISHED TO THE OWNER, ENGINEER OF RECORD, AND LOCAL JURISDICTION AS REQUIRED.

SPECIAL INSPECTION & TESTING SCHEDULE		
	CONTINUOUS	PERIODIC
STRUCTURAL STEEL FABRICATION		
MATERIAL IDENTIFICATION		X
HIGH STRENGTH BOLTS – MATERIAL IDENTIFICATION OF BOLTS, NUTS, & WASHERS		X
WELD FILLER MATERIALS – IDENTIFICATION AND CONFIRMATION OF COMPLIANCE WITH DESIGN DOCUMENTS		X
STRUCTURAL STEEL ERECTION		
MATERIAL IDENTIFICATION		X
INSTALLATION OF HIGH STRENGTH BOLTS		X
WELDED CONNECTIONS		X
MEMBER SIZES AND PLACEMENT		X
GENERAL CONFORMANCE WITH DESIGN DOCUMENTS		X
DRIVEN DEEP FOUNDATION ELEMENTS		
VERIFY ELEMENT MATERIALS, SIZE, LENGTHS COMPLY WITH DESIGN DOCUMENTS	X	
DETERMINE CAPACITIES OF TEST ELEMENTS & CONDUCT ADDITIONAL LOAD TESTS, AS REQ.	X	
OBSERVE DRIVING OPERATIONS, MAINTAIN RECORDS	X	
VERIFY PLACEMENT LOCATIONS & PLUMBNESS	X	

THIS TABLE PER IBC 2012, TABLE 1705

ABBREVIATIONS

ADMOD	ADVANCED MODULAR GROUND MOUNT
AHJ	AUTHORITY HAVING JURISDICTION
ALT	ALTERNATE, ALTERNATIVE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APA	APA SOLAR, LLC
APPD	APPROVED
APPROX	APPROXIMATE
ASTM	AMERICAN SECTION OF THE INTERNATIONAL ASSOCIATION FOR TESTING MATERIALS
AZ	AZIMUTH
BLDG	BUILDING
CAD	COMPUTER AIDED DESIGN
CMB	COMBINER BOX
DC	DIRECT CURRENT
DIA	DIAMETER
DWG	DRAWING
(E)	EXISTING
EOR	ENGINEER OF RECORD
EW	EAST TO WEST
G.C.	GENERAL CONTRACTOR
G,GND	GROUND
GALV	GALVANIZED
IBC	INTERNATIONAL BUILDING CODE
ID	INSIDE DIAMETER
KW	KILOWATT
MFG	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
MTD	MOUNTED
MW	MEGAWATT
(N)	NEW
NEC	NATIONAL ELECTRIC CODE
NO	NUMBER
NS	NORTH TO SOUTH
OD	OUTSIDE DIAMETER
PE	PROFESSIONAL ENGINEER
PV	PHOTOVOLTAIC
REV	REVISION
SCH	SCHEDULE
SF	SQUARE FOOT/FEET
SHCS	SOCKET HEAD CAP SCREW
SPEC	SPECIFICATION
SS	STAINLESS STEEL
STD	STANDARD
TBD	TO BE DETERMINED
TYP	TYPICAL
UL	UNDERWRITERS LABORATORIES
VDC	VOLTS DIRECT CURRENT
W	WATT

LEGEND

- FENCELINE
- EASEMENT
- PROPERTY LINE
- CARTRIDGE (2 PV MODULES)
- FOUNDATION POST (FOUNDATION)
- CABLE BRACING
- SURVEY POINTS
- REVISION CLOUD
- REVISION ID TAG
- COMPRESSION TEST LOCATION
- TENSION TEST LOCATION
- DRIVABILITY TEST LOCATION
- FOUNDATION POST NUMBER
- ROW NUMBER

CUSTOMER

Tanana Chiefs Conference

TANANA CHIEFS
122 1ST AVE
FAIRBANKS, AK 99701
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RACKING PROVIDER

APA SOLAR RACKING

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(P) 419.267.5280
(F) 419.267.5214
WWW.APALTERNATIVES.COM

RACKING TYPE

TITAN DUO

STRUCTURAL ENGINEER OF RECORD

the jdi group
architects & engineers

360 W. DUSSEL DR.
MAUMEE, OH 43537
|P| 419.725.7161 |F| 419.725.7160

PROFESSIONAL SEAL/STAMP

SITE NAME: GALENA
SITE ADDRESS: – – –
SITE CITY, STATE: GALENA, AK 99741

SHEET REVISIONS		
REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	2/16/2023

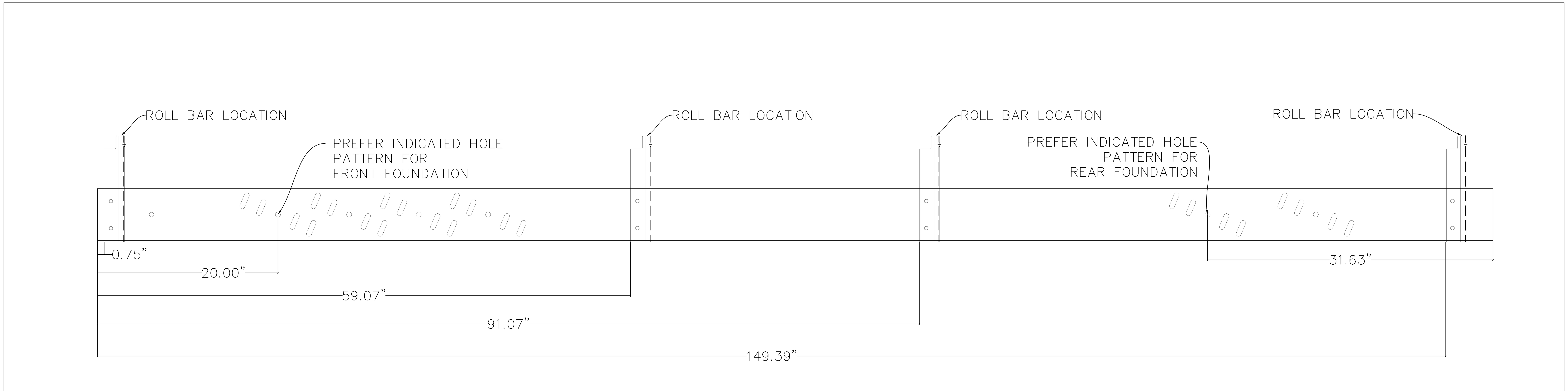
APPROVED

DRAWN	REVIEWED	APPROVED	SIZE
AB	MR	JR	D

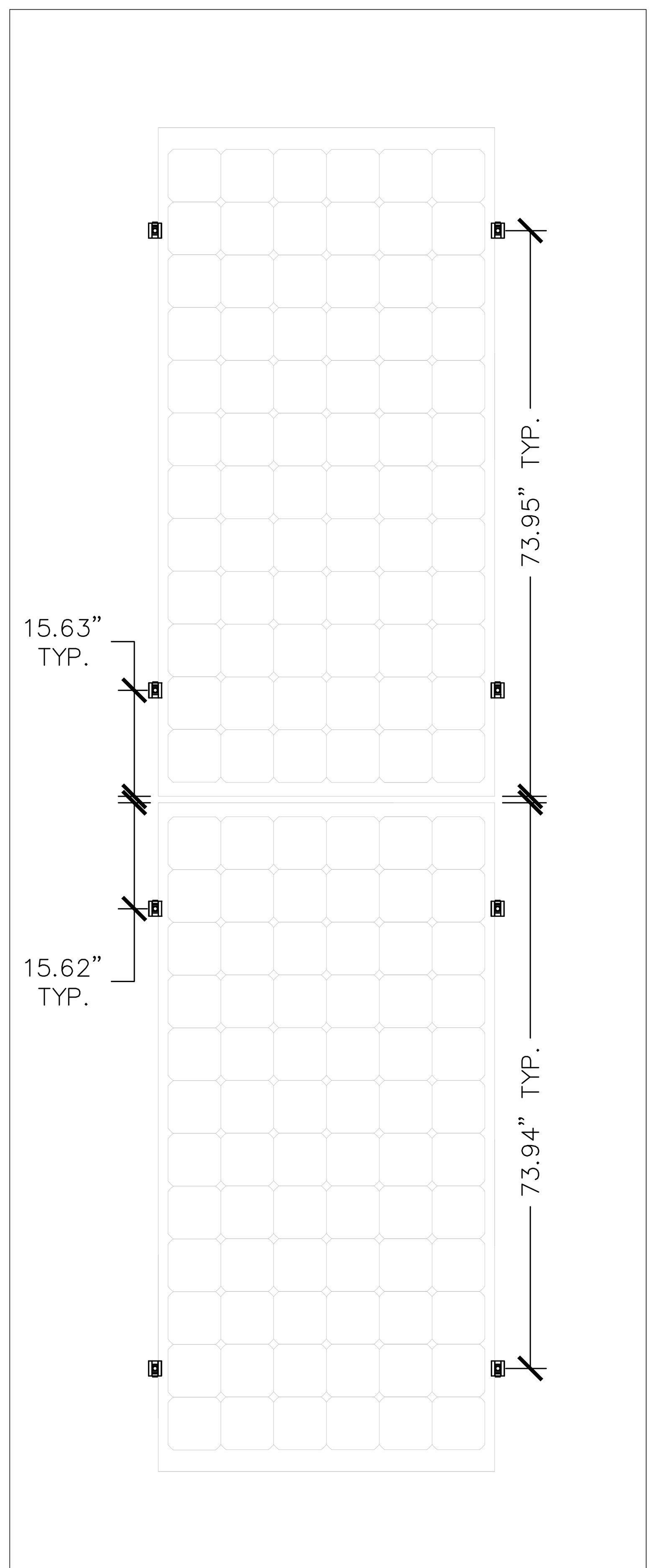
SHEET NAME: PROJECT NOTES

PROJECT NUMBER: 220925

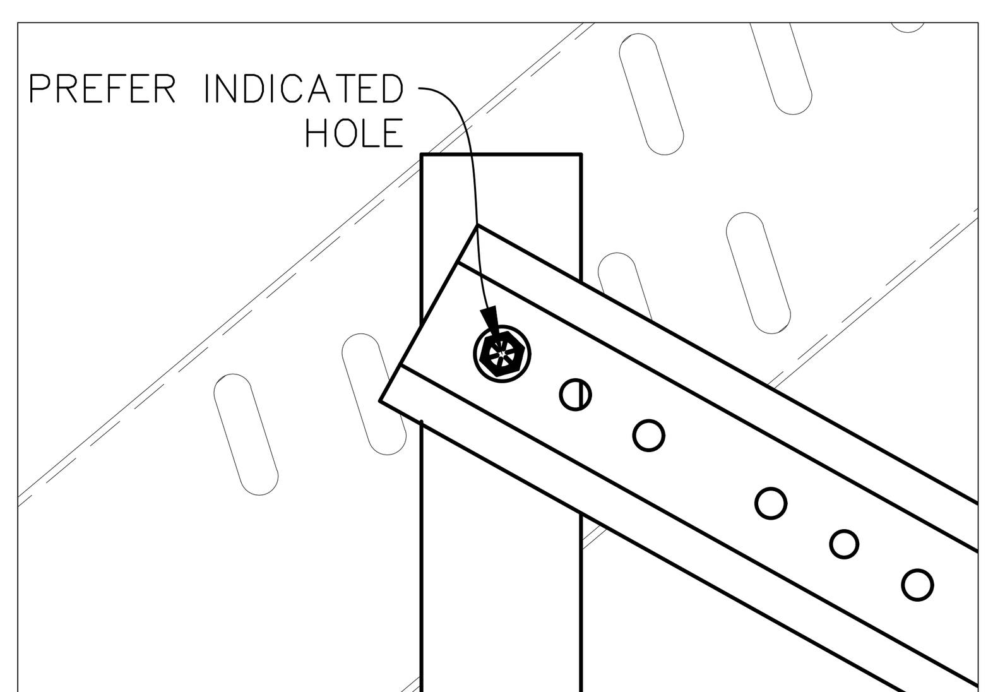
DRAWING NUMBER: G-100 REV. A



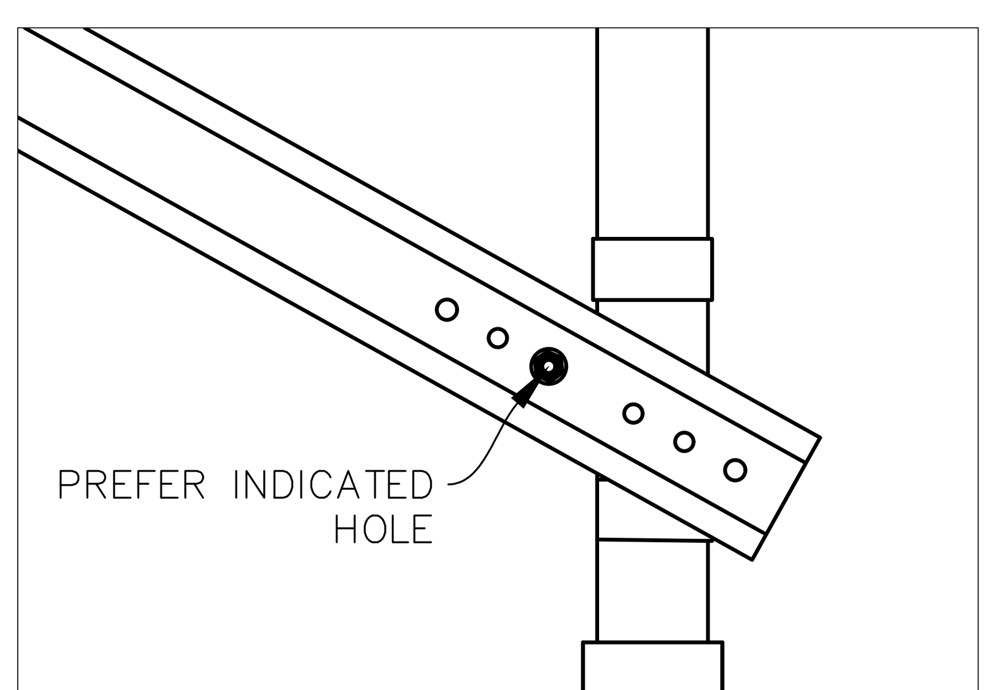
D1 CHORD CONNECTION POINTS



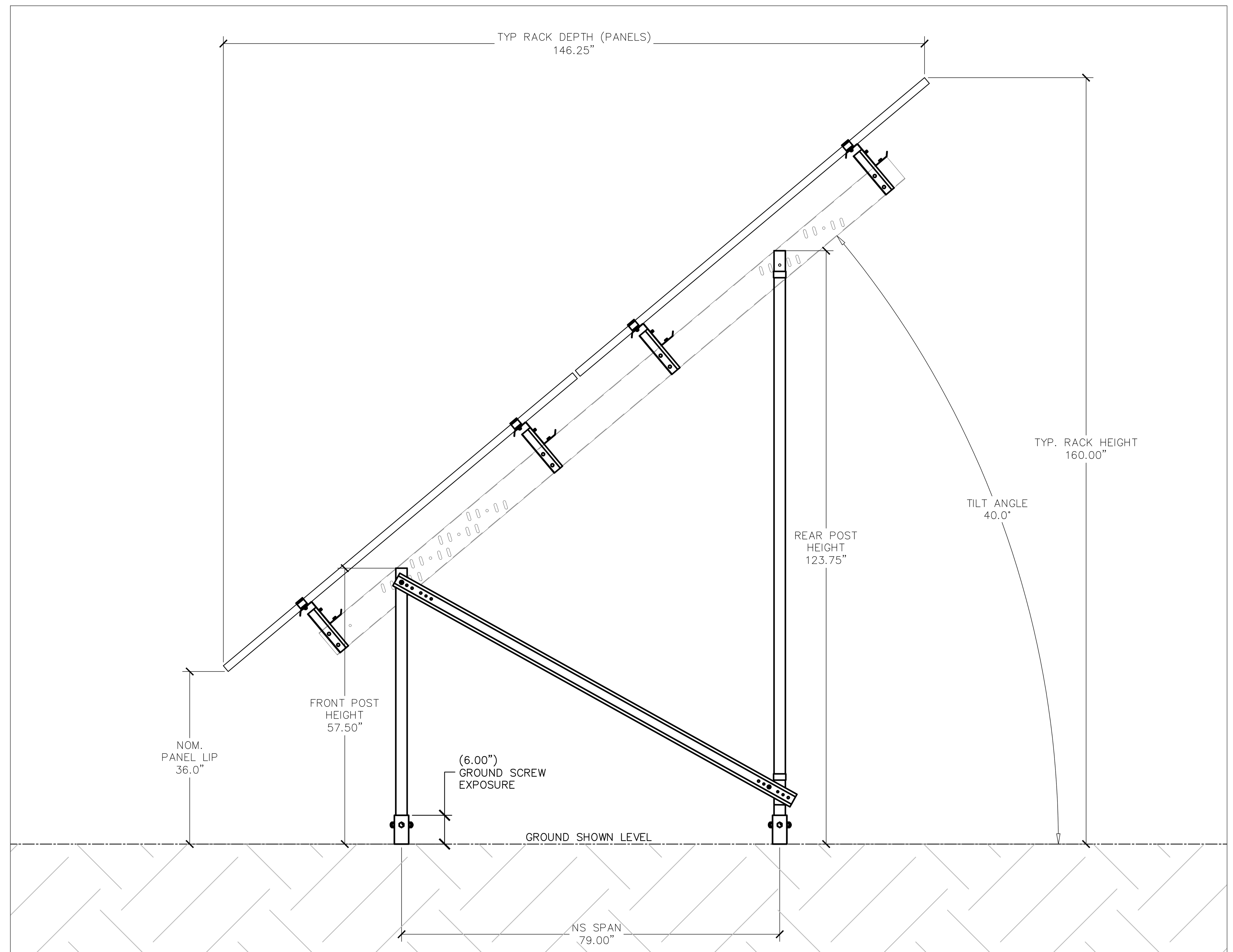
A2 PANEL SET CLAMP LOCATIONS



B3 KNEE BRACE / FRONT FOUNDATION



A3 KNEE BRACE / TUBE CLAMP HOLE



A4 RACK SETUP DIMENSIONS

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PROFESSIONAL SEAL/STAMP

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SITE ADDRESS: - - - -
SITE CITY, STATE: GALENA, AK 99741

SHEET REVISIONS

REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	2/16/2023

APPROVED

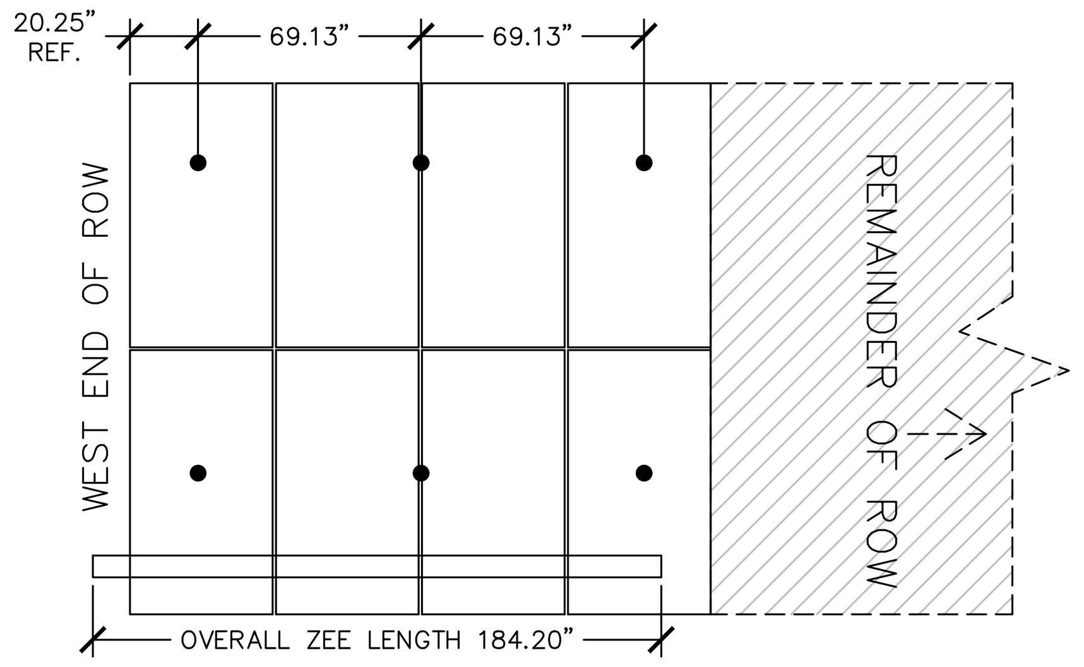
DRAWN	REVIEWED	APPROVED	SIZE
AB	MR	JR	D

SHEET NAME: RACKING DIMENSIONS

PROJECT NUMBER: 220925

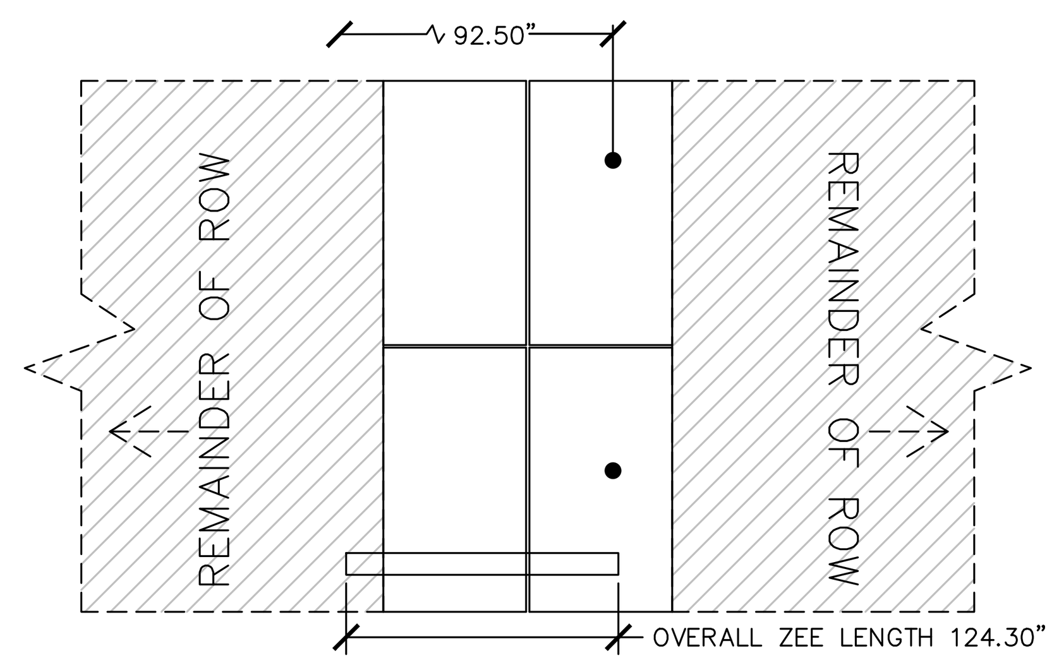
DRAWING NUMBER: G-300 REV. A

ZEE PART# A747-4WS-138



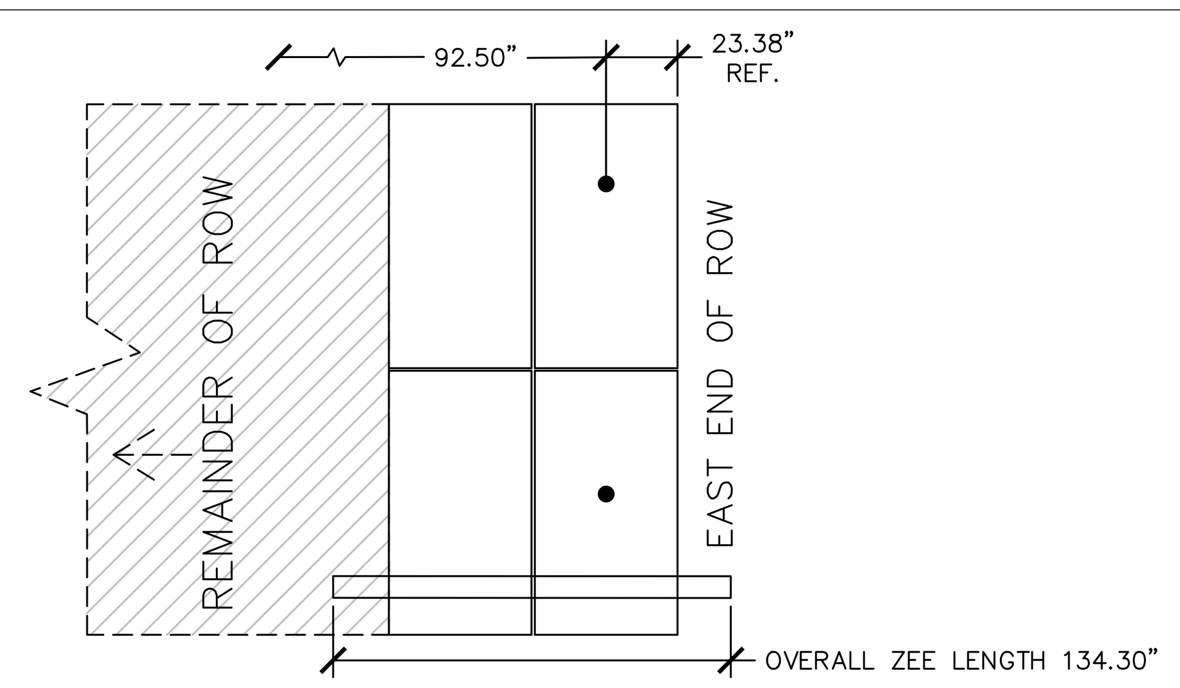
E1 TABLE DIMENSIONS: 4WS

ZEE PART# A747-2C-93



D1 TABLE DIMENSIONS: 2C

ZEE PART# A747-2E-93



C1 TABLE DIMENSIONS: 2E

NOTES

1. PLACE END CLAMPS AT ALL ZEE SPLICES.
2. TABLE NUMBERS INDICATE HOW MANY MODULE SETS ARE BETWEEN END CLAMPS.
3. THE TABLE NUMBER IS WITHIN THE ZEE PURLIN PART NUMBER.

REF.EXAMPLE: ZEE PART# A747-2C-93

TABLE NUMBER

PROJECT BRACE DIMENSIONS

	SHORT E/W (SE69)	LONG E/W (SE93)
LENGTH	116.50"	131.25"
DIAMETER	1/8"	1/8"
PART #	A354-495	A354-510
COLOR CODE	YELLOW	RED
SPAN	69.13" E/W	92.50" E/W

1. E/W CROSS BRACING REAR FOUNDATIONS ONLY
2. BRACE ALL EW SPANS CROSSING CABLE BRACES.
3. PLACE KNEE BRACE BETWEEN EVERY NORTH-SOUTH FOUNDATION SPAN.
4. SEE ROW TECHNICAL DATA SHEETS L-150 AND BRACING PLAN L-500 FOR EXACT BRACING LOCATIONS.

A4 BRACING LENGTHS/USEAGE

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A	INITIAL RELEASE	2/16/2023

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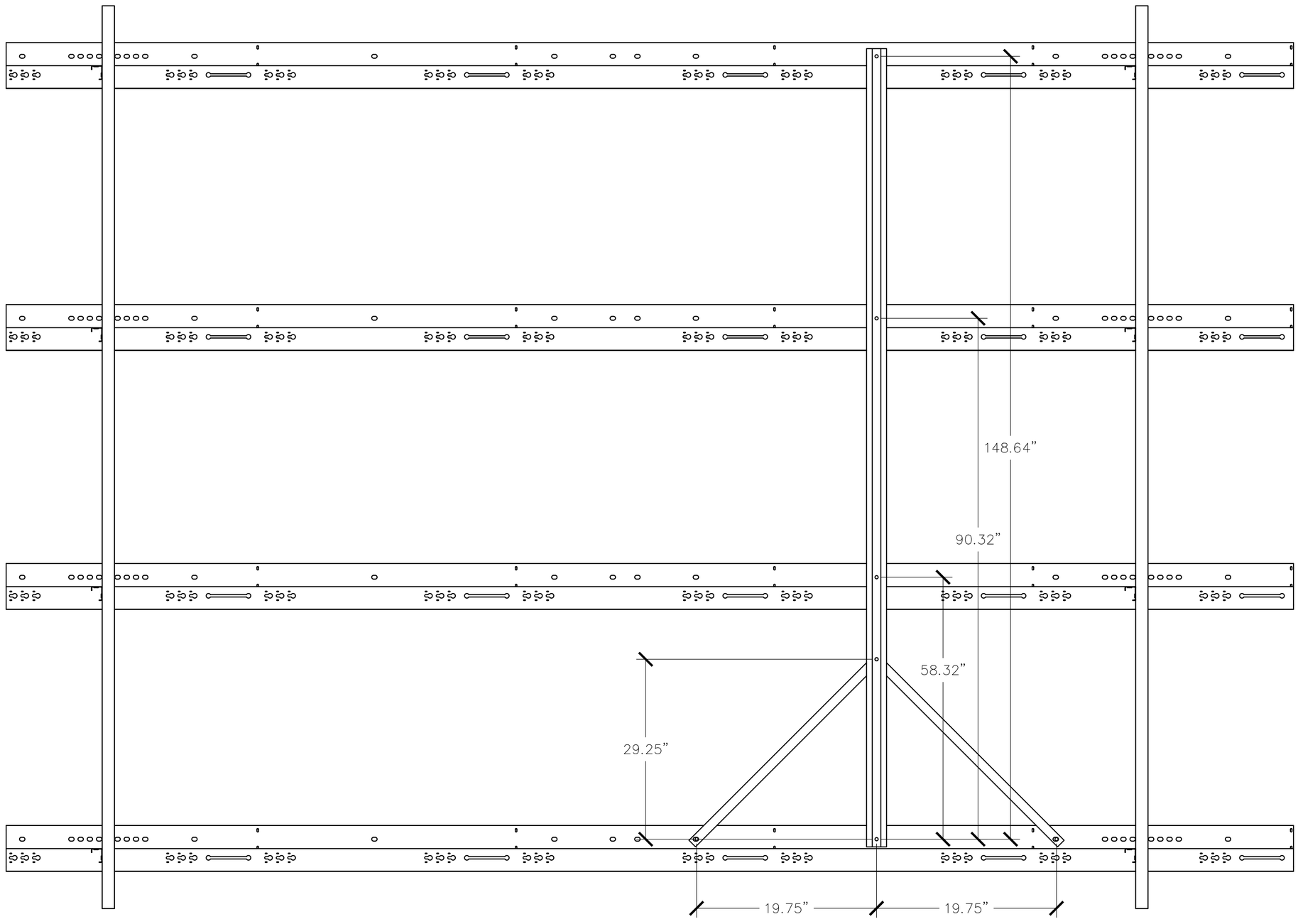
AB	MR	JR	D

SHEET NAME: RACKING DIMENSIONS

PROJECT NUMBER: 220925

DRAWING NUMBER: G-301 REV. A



A1 TRANSVERSE BRACE ATTACHMENT

VIEW SHOWN FROM UNDERNEATH RACK

FOR 92.50" SPANS: ALIGN FRONT TRANSVERSE BRACE HOLE TO INDICATED HOLE ON THE ZEE. THEN ATTACH STRAPS TO THE HOLES 19.75" FROM THE INDICATED HOLE ON THE ZEE. THEN ATTACH BOTH STRAPS TO THE TRANSVERSE BRACE HOLE 29.25" FROM THE FRONT TRANSVERSE BRACE HOLE.

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REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	10/17/2016

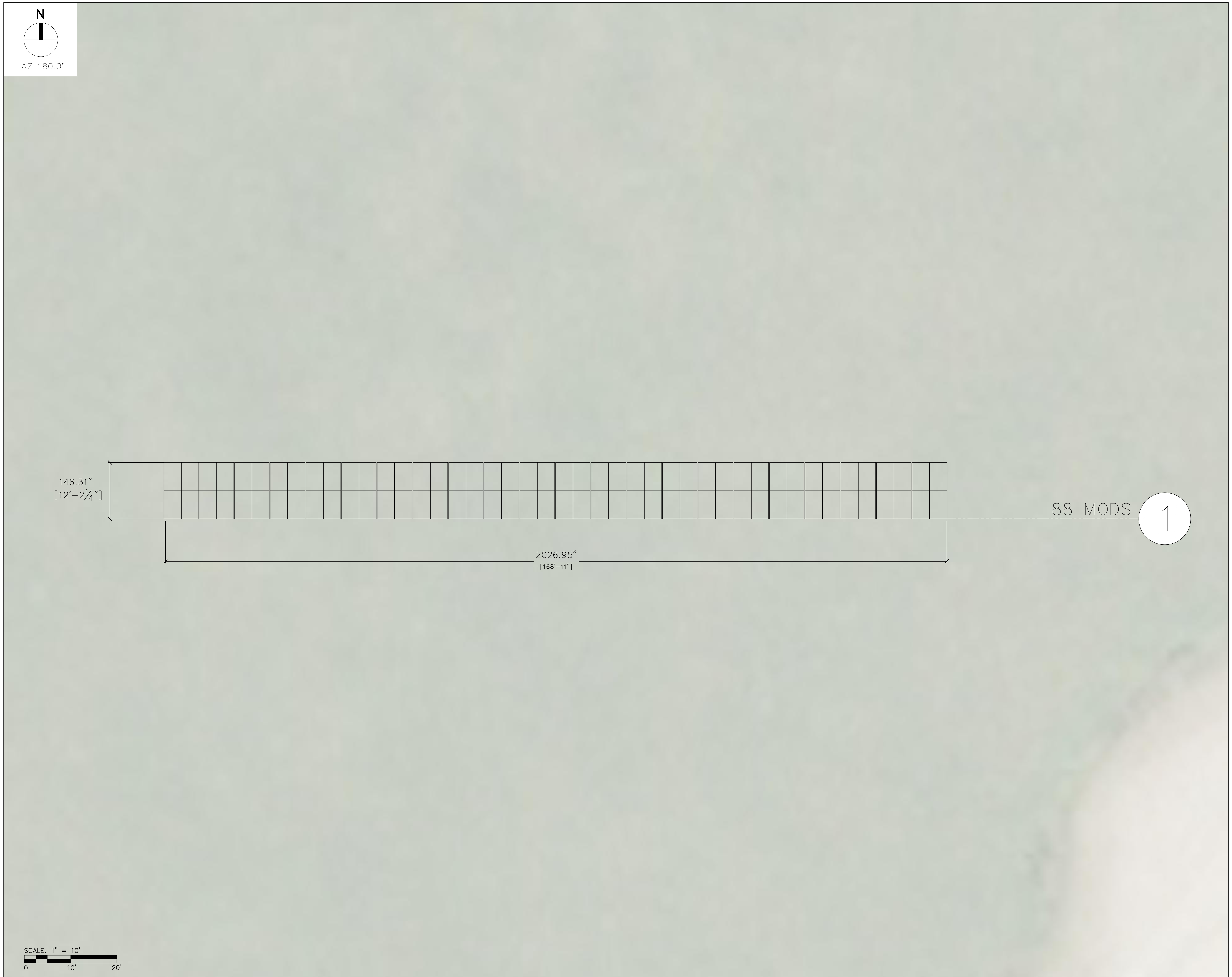
APPROVED

DRAWN	REVIEWED	APPROVED	SIZE
AB	MR	JR	D

SHEET NAME
4-RAIL TRANSVERSE BRACE: 92.50" SPANS

PROJECT NUMBER
220925

DRAWING NUMBER: G-302
REV.: A



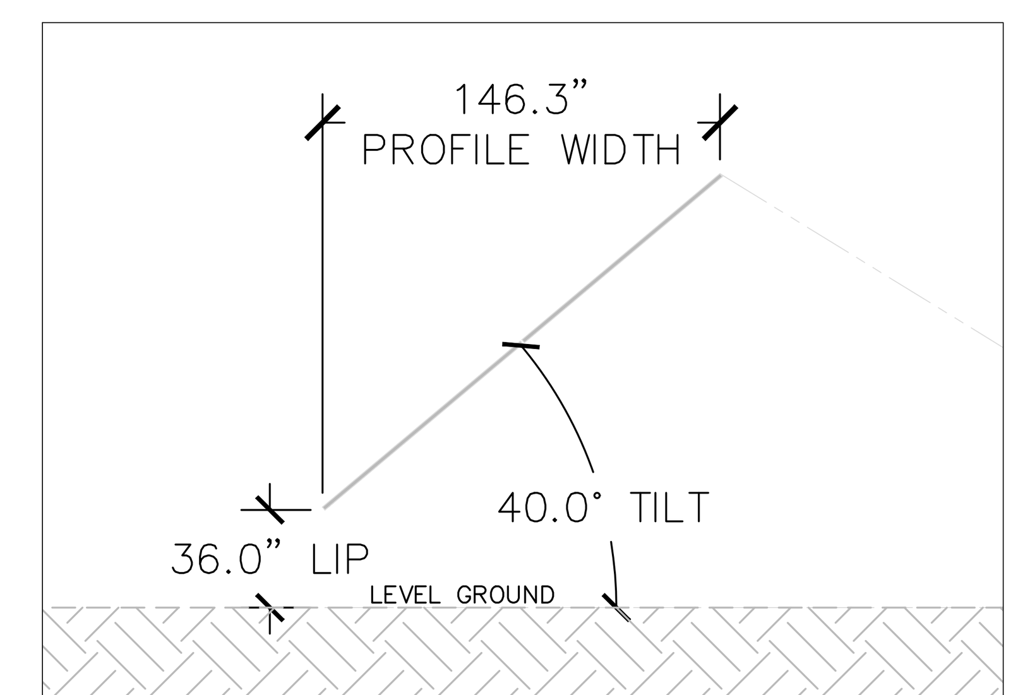
A1 SITE LAYOUT

NOTES

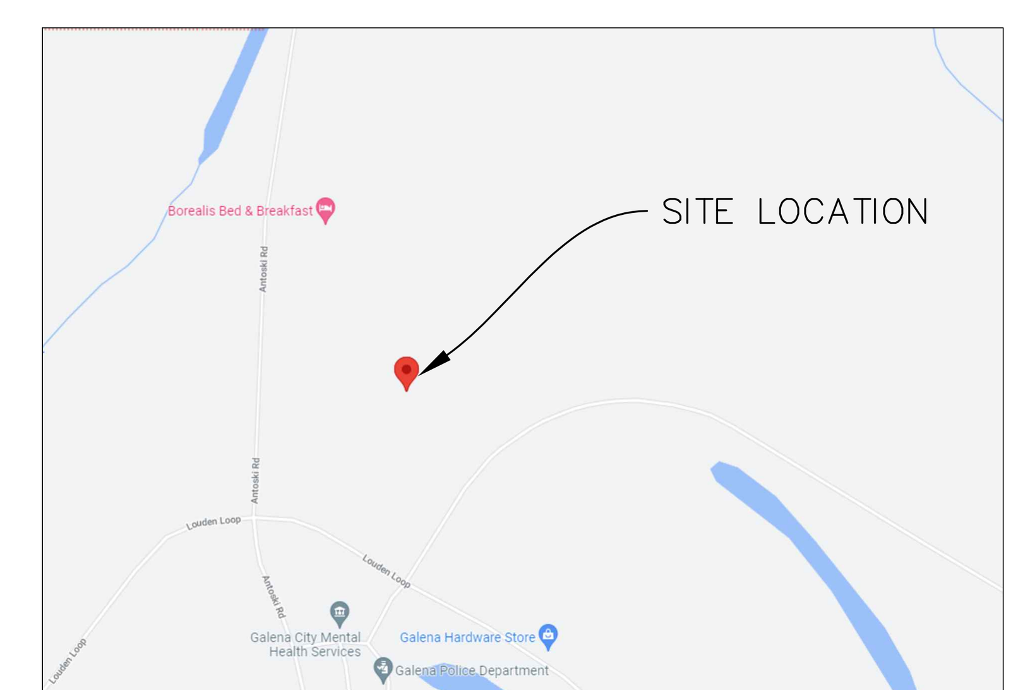
1. ADDITIONAL CLEARANCES, AISLES, OFFSET, FIRE ACCESS ROADS, INVERTORS, & PADS AS REQUIRED
2. ADDITIONAL INFORMATION REQUIRED TO CONSIDER SHADING IN AFFECTED AREAS
3. LOCATION AND VERIFICATION OF SETBACK DESIGNATIONS REQUIRED
4. LOCATION OF PROXIMITY FENCE IN RELATION TO SURVEYED AREA NOT KNOWN
5. TOPOGRAPHICAL FEATURES/CONCERNS, FROST PENETRATION DEPTH, SOIL TYPES/FEATURES NOT KNOWN

PROJECT TOTALS	
TOTAL DC SYSTEM SIZE (KW)	50.60
TOTAL MODULE COUNT	88

PROJECT SUMMARY	
RACKING TILT	40°
RACKING MODEL	TITAN DUO
MODULE MODEL	Q CELLS
MODULE TYPE	156 CELL
MODULE DIMENSIONS	95.12 X 44.65 X 1.38
ARRAY AZIMUTH	180° S
MODULE DC RATING (W)	575
NO. MODULES	88
DC SYSTEM SIZE (KW)	50.60
NO. ROWS	1



B6 RACK PROFILE



A6 KEY MAP

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REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	2/1/2023

APPROVED

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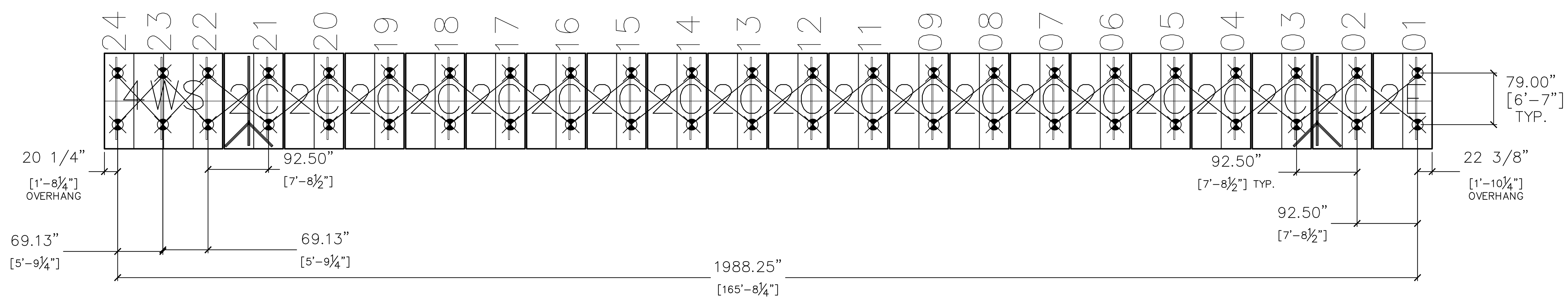
AB	MR	JR	D

SHEET NAME: SITE LAYOUT

PROJECT NUMBER: 220925

DRAWING NUMBER: L-100 REV. A



C1 | 88 MODULE ROW KEY / ROWS: 1

ROW BILL OF MATERIALS – TITAN	88 MODS	
ROW	1	
EAST – WEST ZEE RAILS	4	
PV MODULES	88	
FOUNDATION SETS	24	
KNEE BRACE	24	
TRANSVERSE BRACE	2	
CABLE BRACE SHORT 69.13"	4	
CABLE BRACE LONG 92.50"	40	
EAST – WEST ZEE RAILS	4	MODS PER
A747-4W-134	4	8
A747-4C-178	76	4
A747-3C-134	4	4

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REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	2/16/2023

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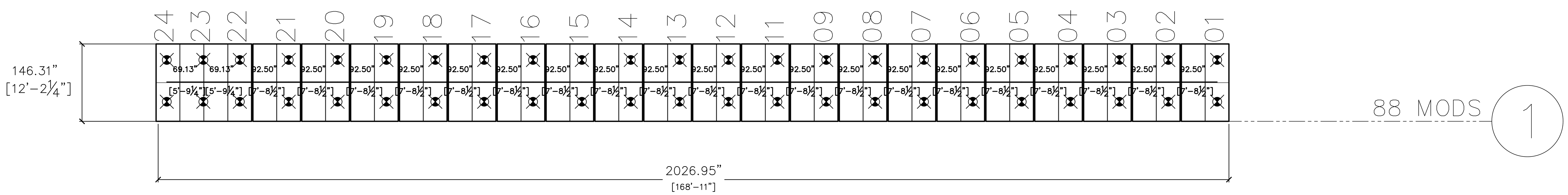
SHEET NAME: ROW TECHNICAL DATA

PROJECT NUMBER: 220925

DRAWING NUMBER: L-150 | REV. A

N

AZ 180.0°



ROW TECHNICAL DATA

ROW LABEL	ROW ID	DETAIL
88	1	C1/L-190

SCALE: 1" = 10'
0 10' 20'

A1 SITE FOUNDATION LOCATIONS MAP

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SHEET REVISIONS

REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	2/9/2023

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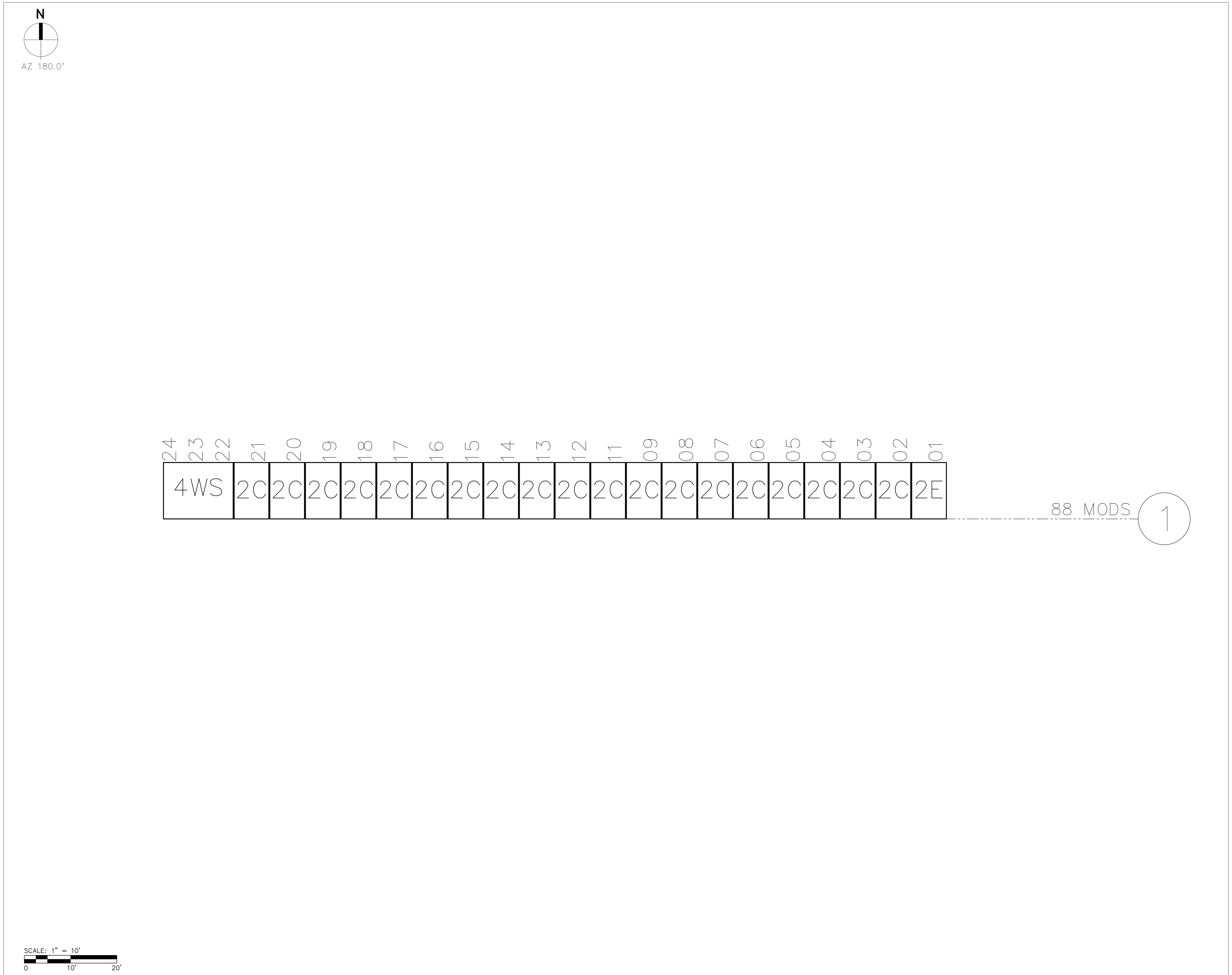
DRAWN	REVIEWED	APPROVED	SIZE
AB	MR	JR	D

SHEET NAME
SITE FOUNDATIONS: OVERVIEW

PROJECT NUMBER
220925

DRAWING NUMBER
L-200

REV.
A



A1 SITE TABLES MAP

ROW TECHNICAL DATA

ROW LABEL	ROW ID	DETAIL
88	1	C1/L-190

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SITE NAME: GALENA

SITE ADDRESS: - - - -

SITE CITY, STATE: GALENA, AK 99741

SHEET REVISIONS

REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	2/16/2023

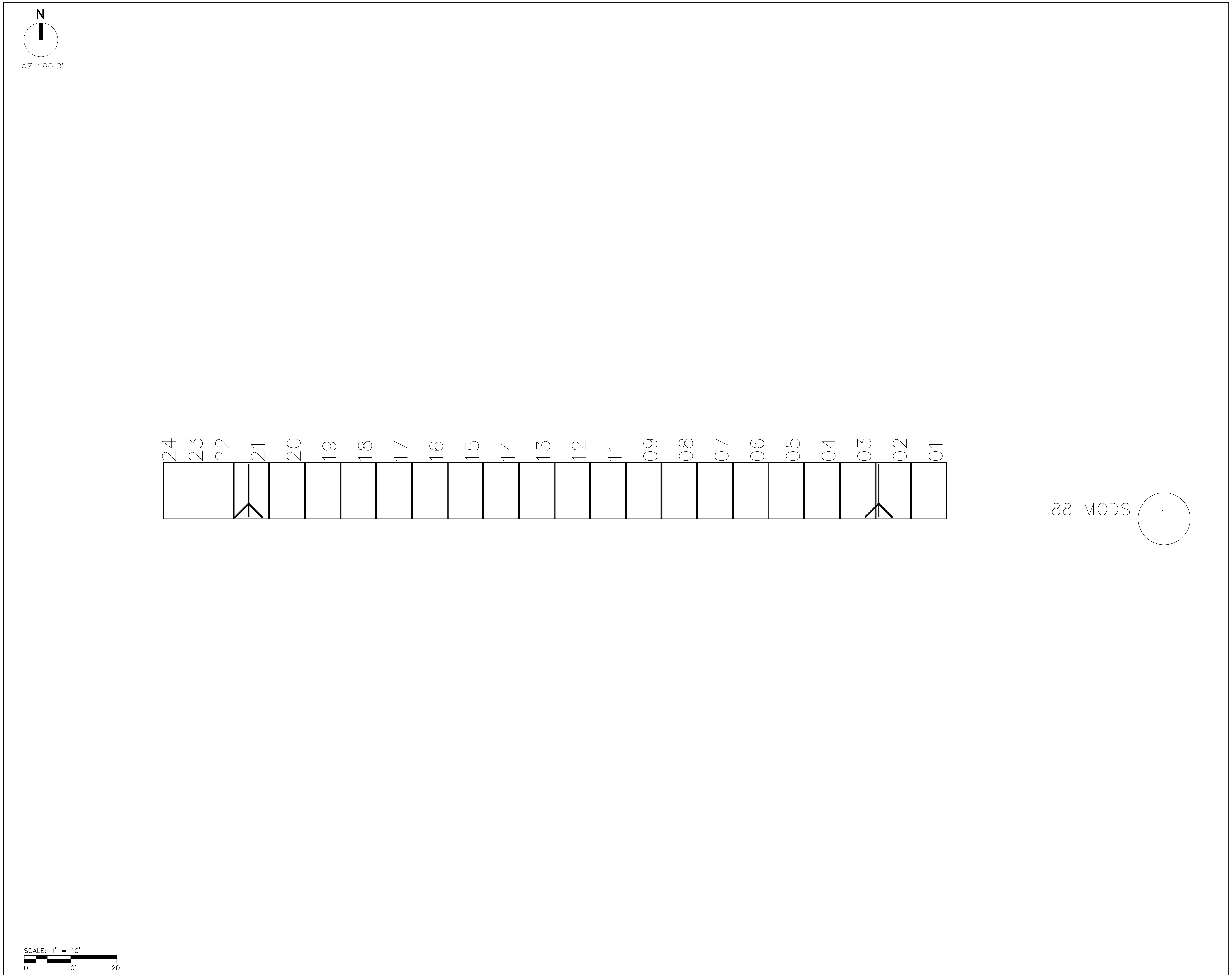
APPROVED

DRAWN	REVIEWED	APPROVED	SIZE
AB	MR	JR	D

SHEET NAME: SITE TABLES: OVERVIEW

PROJECT NUMBER: 220925

DRAWING NUMBER: L-300 REV. A



A1 SITE TRANSVERSE BRACE LOCATIONS MAP

ROW TECHNICAL DATA		
ROW LABEL	ROW ID	DETAIL
88	1	C1/L-190

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SHEET REVISIONS

REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	2/16/2023

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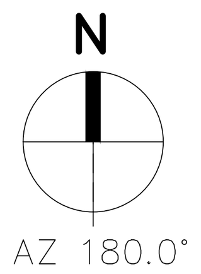
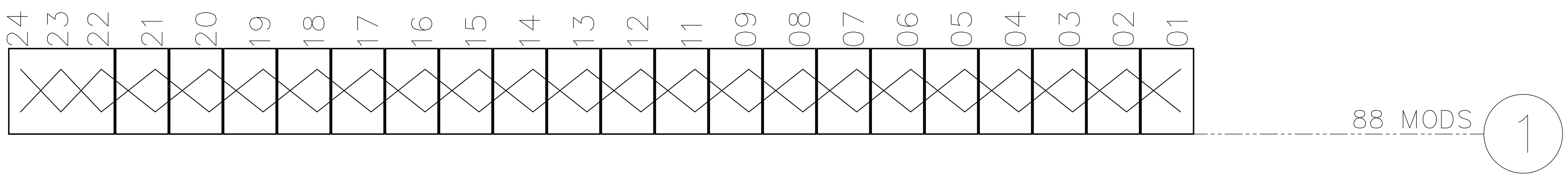
SHEET NAME: SITE TRANSVERSE BRACE: OVERVIEW

PROJECT NUMBER: 220925

DRAWING NUMBER: L-400

REV.: A





SCALE: 1" = 10'
0 10' 20'

A1 SITE CABLE LOCATIONS MAP

ROW TECHNICAL DATA		
ROW LABEL	ROW ID	DETAIL
88	1	C1/L-190

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SHEET REVISIONS		
REV.	DESCRIPTION	DATE
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AB	MR	JR	D

SHEET NAME
SITE CABLES: OVERVIEW

PROJECT NUMBER
220925

DRAWING NUMBER	REV.
L-500	A

SEG SOLAR

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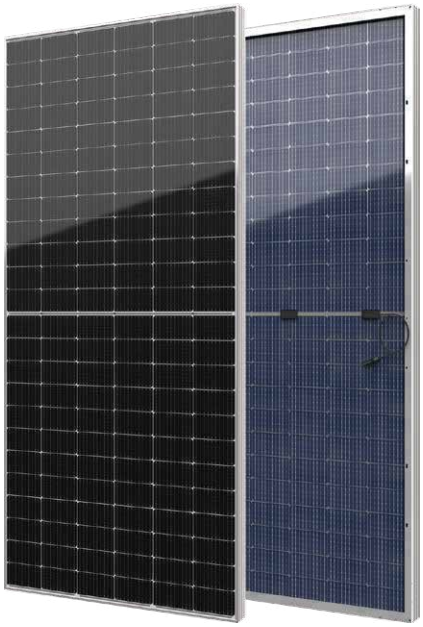
YUKON Series

Half-Cell
Transparent Backsheet Module

540-555W
Module Power Output

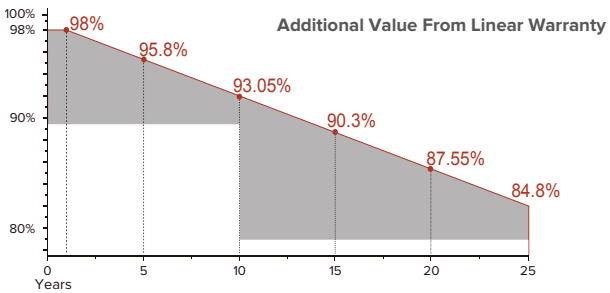
21.48%
Max Efficiency



Key Features

- High module conversion efficiency
- Better temperature coefficient
- Super multi busbar technology
- Low attenuation long warranty
- Superior load capacity
- Higher bifacially
- USA based liability insurance
- Houston, Texas based company

Warranty



15 <Years> Guarantee on product material and workmanship

25 <Years> Linear power output warranty

Product Certification

IEC61215:2016; IEC 61730:2016;	UL1703; UL61730/ETL/CEC
IEC62804	PID
IEC61701	Salt Mist
IEC62716	Ammonia Resistance
IEC60068	Dust and Sand
IEC61215	Hailstone
Fire Type (UL61730):Type1	
ISO14001:2015; ISO9001:2015; ISO45001:2018	

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About SEG Solar

SEG Solar is a leading manufacturer of high-performance solar panels for residential, commercial, and utility applications. The company, headquartered in Houston,Texas, is committed to providing cost-effective and reliable solar solutions that help customers reduce their energy costs and carbon footprint.

Download Datasheet

YUKON Series SEG-XXX-BMA-TB(144Cells)

Electrical Characteristics

Module Type	SEG-540-BMA-TB			SEG-545-BMA-TB			SEG-550-BMA-TB			SEG-555-BMA-TB		
	Front STC	Front NOCT	Back STC	Front STC	Front NOCT	Back STC	Front STC	Front NOCT	Back STC	Front STC	Front NOCT	Back STC
Maximum Power -Pmp(W)	540	406	378	545	409	382	550	414	385	555	418	389
Open Circuit Voltage -Voc(V)	49.50	46.18	49.48	49.60	46.32	49.58	49.70	46.40	49.68	49.80	46.47	49.78
Short Circuit Current -Isc(A)	13.81	11.16	9.74	13.90	11.23	9.80	14.00	11.32	9.87	14.10	11.40	9.94
Maximum Power Voltage -Vmp(V)	41.55	38.39	41.61	41.80	38.41	41.86	42.05	38.58	42.10	42.31	38.75	42.35
Maximum Power Current -Imp(A)	13.00	10.59	9.09	13.04	10.65	9.13	13.08	10.73	9.15	13.12	10.79	9.19
Module Efficiency STC-ηm(%)	20.90			21.10			21.29			21.48		
Power Tolerance(W)	(0, +3%)											
Maximum System Voltage	1500V DC											
Maximum Series Fuse Rating	25 A											

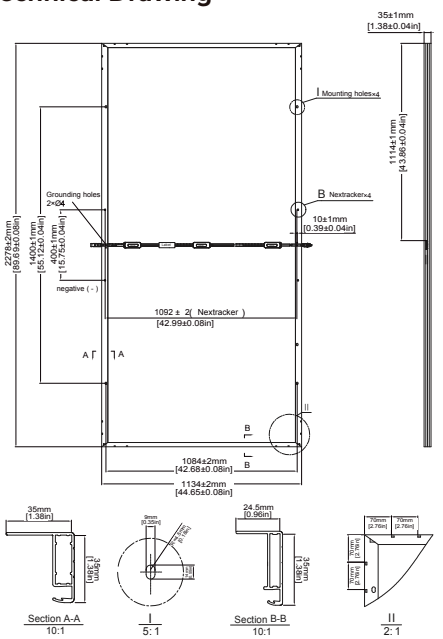
STC: Irradiance 1000 W/m² module temperature 25°C AM=1.5 NOCT: Irradiance 800W/m² ambient temperature 20°C module temperature 45°C wind speed: 1m/s Power measurement tolerance: +/-3%

Mechanical Specifications

External Dimension	2278 x 1134 x 35 mm
Weight	27.0 kg
Solar Cells	PERC Mono 182 x 91mm(144 pcs)
Front Glass	3.2 / mm AR coating tempered glass / low iron
Frame	Anodized aluminium alloy
Junction Box	IP68 / 3 diodes
Connector Type	QC4.10
Cable Type / Length	12 AWG PV Wire（UL）/1200 mm
Mechanical Load(Front)	5400 Pa / 113 psf*
Mechanical Load(Rear)	3600 Pa / 75 psf*

*Refer to SEG installation Manual for details

Technical Drawing



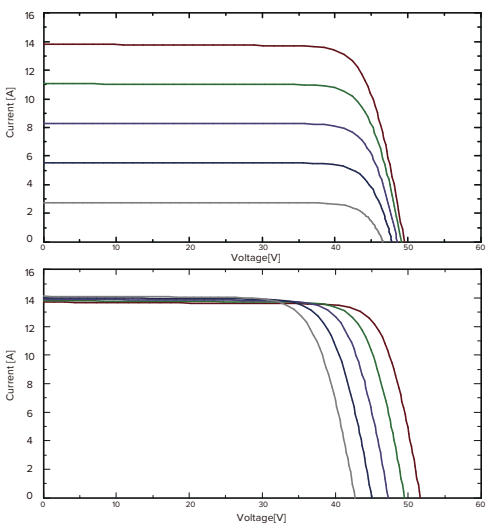
*Refer to SEG installation Manual for details

Packing Configuration

Container	20'GP	40'HQ
Pieces per Pallet	31	31
Pallets per Container	4	20
Pieces per Container	124	620

341kw/container

I-V Curve



Temperature Characteristics

Pmax Temperature Coefficient	-0.35 %/°C
Voc Temperature Coefficient	-0.27 %/°C
Isc Temperature Coefficient	+0.05 %/°C
Operating Temperature	-40~+85 °C
Nominal Operating Cell Temperature (NOCT)	45±2 °C

Cost effective

- Modular architecture reduces BOS and maximizes system uptime
- Compact design and high power density maximize transportation and logistical efficiency

Maximum flexibility

- Scalable 1,500 VDC building block with best-in-class performance
- Flexible architecture creates scalability while maximizing land usage

Simple install, commissioning

- Ergonomic handling and simple connections enable quick installation
- Centralized commissioning and control with SMA Data Manager

Highly innovative

- SMA Smart Connected reduces O&M costs and simplifies field-service
- Powered by award winning ennexOS cross sector energy management platform

SUNNY HIGHPOWER PEAK3 125-US / 150-US

A superior modular solution for utility power plants

The new Sunny Highpower PEAK3 is SMA's latest addition to a comprehensive portfolio of utility solutions. This 1,500 VDC inverter offers high power density in a modular architecture that achieves a cost-optimized solution for utility-scale PV integrators. With fast, simple installation and commissioning, the Sunny Highpower PEAK3 is accelerating the path to energization. SMA has also brought its field-proven Smart Connected technology to the PEAK3, which simplifies O&M and contributes to lower lifetime service costs. The PEAK3 utility system solution is powered by the ennexOS cross sector energy management platform, 2018 winner of the Intersolar smarter E AWARD.

Technical Data *	Sunny Highpower PEAK3 125-US	Sunny Highpower PEAK3 150-US
Input (DC)		
Maximum array power	187500 Wp STC	225000 Wp STC
Maximum system voltage	1500 VDC	
MPP voltage range	710 V ... 1425 V	855 V ... 1425 V
MPP trackers	1	
Maximum operating input current	180 A	
Maximum input short-circuit current	325 A	
Output (AC)		
Nominal AC power	125000 W	150000 W
Maximum apparent power	125000 VA	150000 VA
Output phases / line connections	3 / 3-PE	
Nominal AC voltage	480 V	600 V
Compatible transformer winding configuration	Wye-grounded	
Maximum output current	151 A	
Rated grid frequency	60 Hz	
Grid frequency / range	50 Hz, 60 Hz / -6 Hz ... +6 Hz	
Power factor at rated power / adjustable displacement	1 / 0.0 leading ... 0.0 lagging	
Harmonics (THD)	<3%	
Efficiency		
CEC efficiency (preliminary)	98.5 %	98.5 %
Protection and safety features		
Ground fault monitoring: Riso / Differential current	● / ●	
DC reverse polarity protection	●	
AC short circuit protection	●	
Monitored surge protection (Type 2): DC / AC	● / ●	
Protection class / overvoltage category (as per UL 840)	I / IV	
General data		
Device dimensions (W / H / D)	770 / 830 / 444 mm (30.3 / 32.7 / 17.5 in.)	
Device weight	85 kg (185 lbs)	
Operating temperature range	-25°C ... +60°C (-13°F ... +140°F)	
Storage temperature range	-40°C ... +70°C (-40°F ... +158°F)	
Audible noise emission (full power @ 1m and 25°C)	< 65 dB(A)	
Internal consumption at night	< 5 W	
Topology	Transformerless	
Cooling concept	OptiCool (forced convection, variable speed fans)	
Enclosure protection rating	Type 4X (as per UL 50E)	
Maximum permissible relative humidity (non-condensing)	100%	
Additional information		
Mounting	Rack mount	
DC connection	Terminal lugs - up to 600 kcmil CU/AL	
AC connection	Screw terminals - up to 300 kcmil CU/AL	
LED indicators (Status/Fault/Communication)	●	
SMA Speedwire (Ethernet network interface)	● (2 x RJ45 ports)	
Data protocols: SMA Modbus / SunSpec Modbus / Webconnect	● / ● / ●	
OptiTrac Global Peak (shade tolerant MPP tracking)	●	
PID Mitigation Solution	O	
Integrated Plant Control / Q on Demand 24/7	● / ●	
Off-grid capable / SMA Fuel Save Controller compatible	● / ●	
SMA Smart Connected (proactive monitoring and service)	●	
Certifications (pending as of June 2018)		
Certifications and approvals	UL 1741, UL 1998, IEEE 1547, CAN/CSA-C22.2 No.62109	
FCC compliance	FCC Part 15, Class A	
Grid interconnection standards	UL 1741 SA - CA Rule 21, HECO Rule 14H, PRC-024-02	
Advanced grid support capabilities	L/HFRT, L/HVRT, Volt-VAr, Volt-Watt, Frequency-Watt, Ramp Rate Control, Fixed Power Factor	
Warranty		
Standard	5 years	
Optional extensions	10 / 15 / 20 years	
Type designation	SHP 125-US-20	SHP 150-US-20

* Preliminary data as of June 2018 ● Standard features O Optional features

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