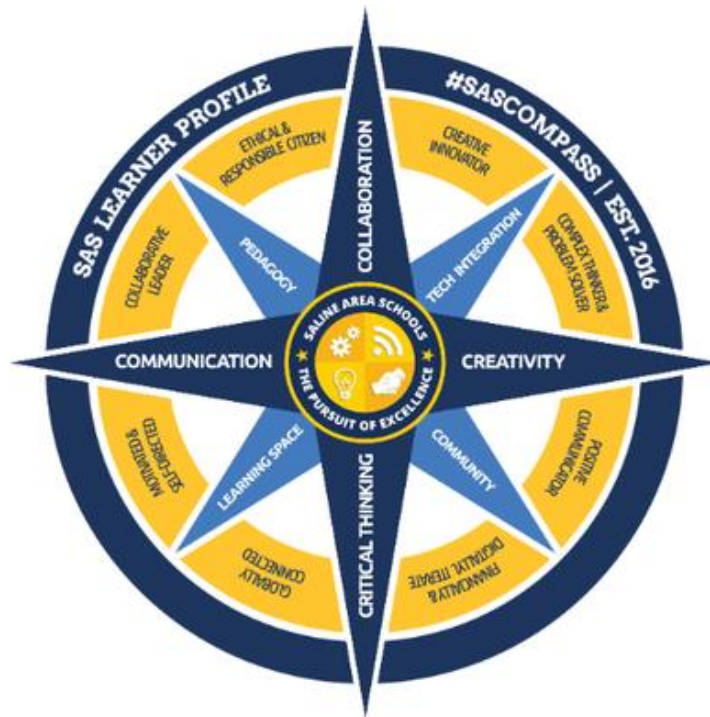


**REQUEST FOR PROPOSALS
FOR
ROOF-MOUNT SOLAR ARRAY INSTALLATION**



SALINE AREA SCHOOLS
Attention: Miranda Owsley
7265 North Ann Arbor Street
Saline, Michigan 48176
Telephone: (734) 401-4000
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I. OVERVIEW

1.1. PURPOSE

The purpose of the Request For Proposals (“RFP”) is for Saline Area Schools (the “School District”) to obtain proposals from qualified installation contractors to provide a comprehensive installation of the Roof-Mount Solar array for Saline Middle School (the “Work”).

1.2. SELECTION TIMELINE

NOTE: Throughout the remainder of this RFP, a prospective contractor is referred to as the “Contractor.”

The School District’s anticipated timeline for its selection process is:

| | |
|---|--|
| Issuance of this RFP | <u>April 22, 2024</u> |
| <u>Non-Mandatory</u> Pre-Proposal Meeting at Saline Middle School – 7265 North Ann Arbor Street, Saline, MI | 10 a.m. Local Time, <u>April 26, 2024</u> |
| Deadline for written Requests For Clarifications | 4 p.m. Local Time, <u>April 30, 2024</u> |
| DUE DATE FOR PROPOSALS | 1:30 p.m. Local Time, <u>May 6, 2024</u> |
| Contractor Interviews | T.B.D. May 7, 2024 |
| School District’s Consideration of the Contract | <u>May 14, 2024</u> |
| Commencement of Work | Approx. <u>July 1, 2024</u> per Roofing Schedule (Attach. D) |
| Students Return / Work Hours Change | <u>August 26th, 2024</u> |
| Expected Substantial Completion of Work | October 01, 2024 |
| DTE Permission to Operate (PTO Not Responsibility of Contractor) | TBD |
| Expected Final Project Close Out | Oct 01 – Nov 01, 2024 |

PLEASE NOTE: The School District reserves the right, in its sole and absolute discretion, to make modifications to the above selection timeline as it determines to be in its best interest.

II. SUBMISSION OF PROPOSALS

2.1. PROPOSAL SUBMISSION DEADLINE AND REQUIREMENTS

The Due Date for receipt of Proposals is:

May 6, 2024 at 1:30 p.m Local Time. EDT (the “Due Date”)

- 2.1.1.** Sealed proposals should be submitted through Buildingconnected.com with the following link: <https://app.buildingconnected.com/public/5cc9d7f637c1a90018cb55dc>. No physical bids will be accepted in person or via delivery service.

- 2.1.2. Late Proposals:** Each Contractor is responsible for submission of its Proposal. Proposals or Proposal revisions received after the Due Date will not be accepted or considered. The School District is not liable for any delivery or postal delays.
- 2.1.3. Returned Proposals:** All Proposals received after the Due Date will be unopened and made available to the respective Contractor for pick-up, at its sole cost and expense.
- 2.1.4. Signed Original Proposal:** Each Proposal must be signed by an authorized member of the Contractor’s firm. This member should be the highest-ranking officer at the local level. NO ORAL, FAX, or E-MAILED Proposals will be accepted. Each Proposal must be submitted on the Proposal Forms attached to this RFP.
- 2.1.5. Opening of Proposals:** At the Due Date stated above and with the following virtual link: meet.google.com/vlc-ujbd-tzt or phone number (318) 702-0114 PIN 397 129 640#, all submitted Proposals shall be publicly opened and read aloud. Any interested parties may attend. No immediate decision will be rendered.
- 2.1.6. E-Mail Clarifications:** The School District intends to communicate with Contractors via e-mail (e.g., RFP clarifications and addenda). Except for the delivery of the Proposal itself, references in this RFP to “written” form of communications include e-mail.
- 2.1.7. Additional Requests For Clarification:** Prospective Contractors may request that the School District clarify information contained in this RFP. All such requests must be made in writing via email. The School District will attempt to provide a written response to all written Requests For Clarification within five (5) business days after the receipt of such request. The School District will not respond to any Request For Clarification received after **4 p.m. on April 30, 2024**. Requests For Clarification and inquiries must be made via e-mail. All Requests For Clarification must be directed to Mark Paulus at lecoleplanners3@gmail.com. (Subject Line: Roof-Mount Solar Install RFP Request For Clarification). No response will be made to any oral questions. All questions and answers will be posted on the School District’s website. It is each Contractor’s responsibility to check the School District’s website prior to the RFP Due Date to ensure that it has received all of the information, including, but not limited to, all Addenda to this RFP.
- 2.1.8. Restrictions On Communication:** From the issue date of this RFP until a Contractor is selected and the selection announced, a prospective Contractor shall not communicate about the subject of this RFP or a Contractor’s Proposal with the School District, its Board of Education, or any individual member, administrators, faculty, staff, students, employees, or its Construction Manager, if any, except for additional Requests For Clarification in accordance with Paragraph 2.1.7 above, or as otherwise required by applicable law.
- 2.1.9. Addenda to the RFP:** If it becomes necessary to revise any part of this RFP, notice of the revision will be e-mailed to all parties that requested a copy of this RFP. All addenda will be issued through the School District’s website and all addenda shall become a part of this RFP. Each Contractor must in its Proposal, to avoid any miscommunication, acknowledge all addenda which it has received, but the failure of a Contractor to receive, or acknowledge receipt of, any addendum shall not relieve the Contractor of the responsibility for complying with the terms thereof.

- 2.1.10. RFP/Proposal Information Controlling:** The School District intends that all Contractors shall have equal access to information relative to this RFP, and that this RFP contains adequate information. No information communicated, either verbally or in writing, to or from a Contractor shall be effective unless confirmed by written communication contained in an addendum to this RFP, a Request For Clarification or other written response thereto, or in the Proposal.
- 2.1.11. Finality of Decision:** Any decision made by the School District, including the Contractor selection, shall be final.
- 2.1.12. Reservation of Rights:** The School District reserves the right, in its sole and absolute discretion (for this provision and all other provisions contained in this RFP), to accept or reject, in whole or in part, any or all Proposals with or without cause. The School District further reserves the right to waive any irregularity or informality in the RFP process or any Proposal, and the right to award the Contract to other than the Contractor(s) submitting the best financial Proposal (low bidder). The School District reserves the right to request additional information from any or all Contractors. The School District reserves the right to select one or more Contractors to perform the Work on behalf of the School District. In the event the Contractor's Proposal is accepted by the School District and the Contractor asserts exceptions, special considerations or conditions after acceptance, the School District, in its sole and absolute discretion, reserves the right to reject the Proposal and award the Contract to another contractor.
- 2.1.13. Release of Claims:** Each Contractor by submitting its Proposal releases the School District from any and all claims arising out of, and related to, this RFP process and selection of a Contractor.
- 2.1.14. Contractor Bears Proposal Costs:** A recipient of this RFP is responsible for any and all costs and liabilities incurred by it or others acting on its behalf in preparing or submitting a Proposal, or otherwise responding to this RFP, or any negotiations incidental to its Proposal or this RFP.
- 2.1.15. Irrevocability of Proposals:** All Proposals submitted shall not be withdrawn and shall be irrevocable for a minimum period of ninety (90) calendar days following the Due Date for receipt of Proposals set forth above.
- 2.1.16. Collusive Bidding:** The Contractor certifies that its Proposal is made without any previous understanding, agreement, or connection with any person, firm or corporation making a Proposal for the same Work and is in all respects fair, without outside control, collusion, fraud, or otherwise illegal action.

2.2. PROPOSAL REQUIREMENTS AND FORMAT

This outlines the information that must be provided by each Contractor and the required format for its Proposal. Any Proposal not providing the required information, or not conforming to the format specified, may be disqualified on that basis. Please also refer to Sections 2.1, 4.1, and 4.2 of this RFP for additional Proposal requirements. Attached to this RFP is a form of contract under which the Work requested under this RFP shall be provided by the successful Contractor (the “Contract” and referred to throughout the Contract as the “Agreement”) (See also Section 3.1 of this RFP). The Contract contains many details relative to the Work requested by the School District, the terms and conditions under which the Work shall be provided by the Contractor, and should be reviewed carefully by each Contractor prior to submitting a Proposal.

Any exceptions to the terms and conditions contained in this RFP or the form of Contract attached to this RFP, or any other special considerations or conditions requested or required by the Contractor MUST be specifically enumerated by the Contractor and be submitted as part of its Proposal, together with an explanation as to the reason such terms and conditions of the RFP or form of Contract cannot be met by, or, in the Contractor’s opinion, are not applicable to, the Contractor. The Contractor shall be required and expected to meet the specifications and requirements as set forth in this RFP and the form of Contract in their entirety, except to the extent exceptions or special considerations or conditions are expressly set forth in the Contractor’s Proposal and those exceptions or special considerations or conditions are expressly accepted by the School District. All Pricing factors must be clearly indicated in the Proposal Forms provided as part of the Contractor’s Proposal.

Each Proposal must include, at a minimum, the following:

- 2.2.1** A detailed list setting forth any exceptions to this RFP and/or the Contract, or other special considerations or conditions of the Contractor, including explanations of such exceptions or the reason such terms and conditions of the RFP or form of Contract cannot be met by, or on the Contractor’s opinion are not applicable to, the Contractor.
- 2.2.2** References – Each Proposal must include detailed evidence that the Contractor is currently providing Work for other public school districts (preferred) or similar sized projects. The Contractor must provide this information, including contact names, addresses, phone numbers, and type and scope of work provided. This should include projects of similar size and scope as the School District.
- 2.2.3** Evidence of the Contractor’s ability to provide adequate insurance coverages as required by this RFP and the Contract to protect the interests of the Contractor and the School District.
- 2.2.4** Demonstrate that the Contractor understands and will comply with all regulatory laws, codes, and requirements of any Local, State, and Federal law that apply to the requirements and obligations under this RFP and the Contract.
- 2.2.5** A completed Proposal Pricing Form provided as **ATTACHMENT A**.
- 2.2.6** A completed Familial Disclosure Affidavit provided as **ATTACHMENT B**.
- 2.2.7** A completed Iran Economics Sanctions Act Affidavit of Compliance provided as **ATTACHMENT C**.

2.3. CONTRACTOR'S RESPONSIBILITIES

2.3.1. PROJECT LOCATION

- **Saline Middle School**
- Address: 7190 N Maple Rd, Saline, MI 48176
- Educational Core Hours: Weekdays 7:00 am to 3:15 pm starting August, 26, 2024
 - i. Work before Educational Core Hours begin on August 26, 2024 not subject to any timing or site restrictions.
 - ii. Disruptive work to take place after the commencement of the school year must plan to work around Educational Hours unless exception granted by the District.
 - iii. Unless otherwise clarified by the District, Disruptive Solar Work shall be deemed to be:
 - Major Material Hoisting/Lifting
 - Solar Roof Anchors (By Others)
 - Major Racking Installation
 - Ballast Block Installation
 - Major Module Installation
 - Building Shutdowns
 - iv. Non-Disruptive Solar Work:
 - MLPE (rapid shutdown) devices
 - AC Electrical Work: AC Conductor, Conduit, and Combiner Installation
 - Inverter Installation & Wiring
 - Painting Conduit (as required)
 - AC panel board wiring
 - Zero Export plant controller and meter (if required) installation.
 - Power Quality Relay & UPS (shown in drawing) installation.
 - System Commissioning (Not Requiring Power Disruption)

2.3.2. GENERAL SCOPE

- CONTRACTOR is to be the comprehensive Electrical & Mechanical Contractor for the project and will be responsible for all installation and professional services necessary to complete the system as designed. This work is to include, but is not limited to, coordination with local governance, procuring non-owner furnished material, coordination with District Project Managers and District Roofer, and Construction of all aspects of the PV project unless otherwise excluded within this document.
- District desires to retain Contractor, and Contractor desires to be retained, to perform or cause to be performed all work to construct and/or install the PV project and all the necessary ground/site preparations at the Site.
- Contractor must be in the business of constructing and/or installing solar facilities.
- Contractor must have all necessary licenses to perform work.
- All work performed must be warrantied per state requirements after commissioning or at a minimum must provide a 1-year workmanship warranty in addition to maintaining manufacturer warranties.
- Contractor to reference the included Design Drawings.
- The Contractor shall provide all labor, supervision, and equipment to the extent not provided by District; materials, consumables, and all necessary transportation, staging,

loading, unloading, and rigging to produce electrically and mechanically complete and commercially functional Solar Roof-Mount System per the referenced drawings. This is, including, but not limited to, competent supervision, shop drawings, samples, tools and scaffolding as are necessary for the proper performance of the Work

- Contractor shall procure and install all items not specifically provided by District that may be necessary to produce a complete and functioning system. These items may include but are not limited to the items detailed in the “Contractor Procured Materials” section below, and will otherwise encompass all material not provided by the School District.
- The locations and electrical installation of the system shall be based on the final construction drawings. Contractor is responsible for information that relates to their scope of work that may be present on drawings other than electrical. District will send or provide link to all updated drawings and revisions to Contractor.
- District will provide engineered drawings to Contractor. Contractor shall physically verify site conditions to ensure final layout and placement of conduit raceways, equipment, clearances, proposed trench paths, and any additional project detailing that does not otherwise disrupt original design intent of occupied space unless written approval has been given to Contractor by District.
- Permitting
 - i. All work shall follow all applicable codes, standards, and publications that are in effect, and which are consistent with industry standards and requirements defined by local AHJ.
 - ii. Host AHJ for all inspections
- Procurement
 - i. Additional electrical balance of system required to be a turn-key operational system excluding District supplied materials
 - ii. All Contractor procured materials listed below.
- Construction Management
 - i. Contractor shall inform the School District of any subcontractors utilized.
 - ii. Contractor is required to provide an appointed Contractor representative for construction management correspondence. This representative will need to be available for meetings and check ins with the District Project Manager.
 - iii. Contractor to provide all tools, Contractor materials, lifts safety equipment, and necessary to perform all the work outlined in this scope of work.
 - (A) **District’s roofer will provide up to (3) 8-hour periods in which the solar installation Contractor shall be permitted to utilize the on-site lift and operator to move solar material. Date and times to be coordinated through District.**
 - iv. Contractor to perform all construction work outlined in the Construction Activities section below as specified in the construction plans.
 - v. Installation of all District procured material.
 - vi. Proper sequencing of construction activities as to minimize impact to customer. Contractor will assist the District Project Manager in developing the Project Schedule during the preconstruction phase of the project.
 - vii. Responsible for correspondence and working with District Project Manager, including daily reports, weekly construction status updates, and look ahead updates.

- viii. Contractor responsible for meeting Project Schedule.
- ix. Contractor should be handling any Inspection of installation for Quality Assurance/Quality Checks.
- x. Contractor to host all City, County, and Utility inspections as required.
- xi. Any shutdowns to be approved by and in coordination with customer.
- xii. Contractor is responsible for Health and Safety while working on this project.

2.3.3. SCHOOL DISTRICT Procured Materials

- Issued for Construction (IFC) set engineering drawings
- PV modules
- Rooftop Racking system
- Rooftop mechanical attachments
- Roofing Slip Sheets
- Rooftop AC Combiner
- AC disconnects
- DAS/Monitoring system (Data loggers)
- Inverters
- MLPE (rapid shutdown) devices
- AC panel board
- Zero Export plant controller and meter (if required)
- Power Quality Relay & UPS (shown in drawing)
- Ballast Block

2.3.4. CONTRACTOR Procured Materials (may include but is not limited to)

- DC wire (Copper per IFC)
- AC wire (Aluminum Base Bid, Copper Alternate. Per Conductor Scheduled Provided)
- Ground wire (Copper per IFC)
- Conduit (EMT, Liquid Tight)
- Data cables- excluding fiber
- Furnish and install equipment for interconnection per drawings.
- Balance of materials to integrate the solar array and provide a turn-key, operational solar installation (wire management, connectors, etc.)
- PPE & Safety equipment
- Required NEC equipment labeling per the construction plans.

2.3.5. SCOPE OF WORK

- All construction activities to follow District construction plans, stamped by licensed Professional Engineer.
- Installation of all DC Wiring and grounding.
- Installation of all AC Wiring.
- Installation of Required Conduit (Paint to Match Exterior at Auditorium and Gymnasium elevation changes)
- Installation of all Electrical Balance of System equipment.
- Mechanical installation of PV module racking system.
- Coordinate with District's roofer to maintain compatible installation schedule.

- Field locate mechanical roofing attachment on roofs and coordinate with District’s roofer for attachment installation.
- Mechanical installation of PV Modules (1,346 Approximate Modules).
- Electrical and Mechanical installation of all inverters.
- Electrical and Mechanical installation of all NEP devices
- Install, wire, and commission monitoring equipment.
- Installation and programming of plant controller and/or relays as required by DTE.
- Interconnections to existing facilities at one point of common coupling (POCC) in compliance with most recent NEC electrical code subsection “point of connection.”
- Labeling of all equipment per NEC, Authority Having Jurisdiction (AHJ), and Utility requirements.
- Contractor is responsible to correct any installation mistakes or deviations from approved plans made without prior District approval.
- System acceptance (verification that the system is performing in accordance with manufacturer’s specifications and warranties). District’s approval and acceptance of the work shall be delivered by written confirmation.
- Contractor is responsible for providing all tools and equipment necessary to perform Work per this Job Order.
- Contractor is responsible for system startup, testing, and commissioning.
- Contractor is responsible for demobilization and returning to previous site conditions.
- Contractor to manage correspondence and coordination with Authority Having Jurisdiction (“AHJ”) with proper correspondence back to District Project Manager for any necessary engineering or design changes requested by AHJ.
- Contractor encouraged to provide best practices and support energy team in satisfying requests from AHJ.
- SCOPE OF WORK FOR UTILITY GRADE METER INSTALL Meter installed based on DTE discretion during interconnection application process. Preferred installation is completed by DTE. Contractor work should include cost of all equipment required and provided by DTE (likely meter, meter equipment, and communication connection) as well as pads, recorders, connection cabinet, instrument transformer housing, conduit for communication links (if required) and conduit for conductors between the instruments. All equipment must meet DTE specs as required in the SIM manual.

2.3.6. SCOPE OF WORK – ALTERNATE 2

- All Scope of Work as written for the Base Project above with the following alterations:
 - i. Removal of a 60kW section of solar modules (122 Modules, for new Module Total of 1,224), associated racking, anchors, and (1) inverter from scope.
 - Modules removed from eastern side of building – per Attachment H layout diagram
 - ii. Addition of (1) Zero-Export Plant Controller (or Overcurrent Protection) package as shown in single-line-diagram in Attachment H (“Alt 2: Zero Export Single Line Diagram”) below or as required by DTE.
 - iii. Addition of a power quality relay at point of interconnect.

2.3.7. MISCELLANEOUS

- Time is the essence of this Contract.
- Contractor will be responsible for keeping the area in which the Work is being performed in an orderly fashion and at the end of each day will clean up and remove from such area all rubbish, debris, surplus material, dirt, grease marks, etc. Trash, rubbish and debris will be properly disposed of in the appropriate, designated receptacles.
- Contractor will not interfere with Work being performed by any other contractors on the site and will not interfere with the operation of Owner's business operations.
- If Contractor determines that any item cannot be delivered as required to maintain the project schedule the Contractor shall immediately notify the Owner's Representatives (Ameresco, etc) by telephone and confirm in writing and shall advise Owner's Representatives (Ameresco, etc) of the anticipated delivery date and the effect on the project schedule.
- Contractor shall attend periodic meetings at the job site as required by Owner or Owners Representatives.
- All existing Site conditions, equipment locations, and dimensions shall be verified prior to performing any work. If approximate locations are shown on a plan set, actual locations shall be shown in the final as-built documentation.
- Megger testing shall be performed at 1000 Vdc for all AC circuits 480. A minimum of 250 megaohms resistance to ground is required.
- The Contractor shall supply a detailed commissioning plan outlining tests performed, measurements taken, and what equipment was used during commissioning.
- After all requirements of the drawings have been fully completed, representatives of Owner will inspect the work. The Contractor shall provide competent personnel to demonstrate the operation of any item or System to the full satisfaction of each representative.
- The Contractor must ensure data feeds are accurate and transmitting properly to the third-party DAS aggregation system.
- The Contractor must provide a full equipment list including serial numbers, quantities, and make/model for all Contractor supplied material.
- The Contractor must document System start-up procedures.
- The Contractor must provide as-built photographs and as-built documents for inverter installations, DAS connections, roof penetrations, etc.
- Installation commencement may proceed without DTE interconnection approval in anticipation of final Permission to Operate.

2.3.8. Additional Testing/Inspection Requirements:

- For behind the meter systems, the Contractor shall tie-into existing building switchgear as early in the construction process as possible. The main disconnects must be locked in the open (OFF) position until Owner provides permission to close the circuits.
- Marking Test in black – For all bolts that have a specified torque value per the manufacturer's installation manuals, once the bolt is tightened, mark clearly the surface of the fastener, nut or bolt and continuing the mark onto the surface being clamped for reference.
- After bolts are tightened, perform torque audits from a random sample to verify that the proper amount of torque was applied and mark in red on top of the existing black mark.

The random sampling associated with the torque audit shall include no less than five percent of those bolts tightened and marked unless a lower value is agreed upon by the Owner. The method of auditing shall consist of measuring the torque of the random sampling via torque wrench. Contractor shall use the torque audit method and the Torque Audit Inspection Form. Prior to Final Completion, Contractor shall provide Owner a completed torque audit inspection form and all copies of the applicable torque wrench calibration certificates.

- Install and configure all monitoring hardware, per the plans.
- Install all other equipment, not specifically addressed, per the plans.
- As applicable, Contractor shall install all ballast blocks as shown on plans.
- As applicable, Contractor shall coordinate all roof penetration flashing work, damage repairs, etc. with roofer/installer of existing roof system and roofer is required to be certified by the manufacturer of the existing roof system. As soon as reasonably possible, roofer contact information will be provided after Contractor has been awarded and contract has been executed. Contractor shall have right to petition Owner's Representatives to collect multiple bids for roofing work if system quality or schedule is deemed to be compromised and the Owner or Owner's Representatives shall approve or deny request at its sole discretion.
- Contractor will use due care not to penetrate the roof membrane. If, however, Contractor penetrates the roof of any Premises or Improvement on which the System is installed, during System installation or any System repair, Contractor will promptly repair the affected roof utilizing a roof installer certified by the roofing system manufacturer in order to maintain the existing roof warranty in full. If the roof is not under a manufacturer's warranty, then Contractor will indemnify and hold Owner harmless from and against any roof damage it causes as a direct result of Contractor's roof penetrations to install the System.
- During construction; Contractor to provide and install necessary protection (such as plywood, insulation panels, and/or Masonite) over the roofing membrane/ system and create pathways for construction traffic.
- If Contractor damages any other part of the Premises or any Improvement (including roof damages not covered above), Contractor will, after written approval by the Owner or Owner's Representatives, repair or reimburse Owner for such damage, as agreed by the Parties. If Contractor cannot repair the damages within 24 hours in the event of an emergency, Owner has the right to retain its own vendors, and Contractor will be responsible for the full reimbursement of reasonable, out-of-pocket costs incurred by Owner to remedy such damage.
- Provide and install AC disconnect switches per NEC and interconnect agreement requirements beyond those listed in Plans.
- All strut and hardware shall be galvanized steel. Where hardware contacts aluminum components, hardware shall be stainless steel A316. Where galvanized materials are cut thereby exposing non-galvanized materials, an approved galvanizing spray component shall be applied to prevent oxidation at that area.
- Provide and install breakers, disconnects and fuses as per plans.
- Procure and install PV panel jumper wires as listed and specified on plans if required.
- Provide and install AC power for monitoring system, if not currently available at the Site.

- All conduit, not already sized by District, as shown on plans, shall be sized appropriately based on fill de-rates for number and type of conductors.
- All conduit shall enter combiner boxes and/or junction boxes from the bottom or side and shall not enter from the top without proper raintight connectors.
- All conduit shall be installed per Electrical Code requirements, including but not limited to locations and quantity of supports and expansion joints.
- Ground Conductor “GEC” for DC runs should be jacketed.
- Wire management is an important and visible part of the PV array. All wiring should be run along the solar panel frames and concealed and bundled neatly whenever possible. Refer to Drawings and Specifications for further wire management details. Wire management should utilize:
 - Splicing is not allowed unless approved by engineer of record
 - Spiral Wrap on all exposed DC conductor drip loops only coming from rack to the inverter, use Weather Resistant Polyethylene.
 - Heyco SunBundlers. Specifications shall be submitted to School District at least ten (10) business days prior to installation. Excess length shall be clipped and discarded appropriately, and any metal clips/crimps shall be hidden from view. Any clips or clamps used must be submitted to School District for approval.
 - Contractor shall provide School District all wire management methods and designs for School District approval prior to Contractor’s installation.
 - Approved crimping tools shall be used in achieving crimps on ground wires.
 - No wire or other material installed by Contractor shall shade modules at any time.
 - Appropriate safety considerations and NEC requirements shall be followed for all interconnection procedures. Contractor will schedule all shut-downs with utility and Owner per feedback and request from Contractor.
- Furnish and install all electrical and building components necessary for the completion of the project, as per plans.
- Contractor shall provide the appropriate testing to ensure a completely operational System interconnected with the utility. Such testing shall include, but not be limited to, string testing of the array, combiners, re-combiners (if applicable), complete inverter start-up testing, monitoring system communication testing, and performance testing of the System.
- All inspections to be completed in accordance with project schedule, except that a delay in an inspection or a scheduled shut down (or other work scheduled by the Contractor required for interconnection) due to the Owner, or a request from the Owner, that has an impact on the project schedule shall extend all guaranteed dates listed by a commercially reasonable amount based on the impact to the overall project schedule.
- All labeling to be completed prior to AHJ inspection or Contractor commissioning.
- Test and commission the System at Substantial Completion using Owner’s template for System commissioning.
- Megger Testing per District’s Project Manager’s specifications (to be provided).
- If such procedures for testing, inspection or approval reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for Contractor’s Construction Manager’s services and expenses shall be at Contractor’s expense.

- Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by Contractor and promptly delivered to Owner's Construction Manager. Contractor shall obtain and deliver promptly to Owner's Construction Manager the final certificates of acceptance or approval as issued by the approving authority(ies) for the project and all certificates of final inspection for any part of the Work and all operating permits for any electrical or mechanical apparatus, as applicable, which may be required by law to permit full use and occupancy of the premises or use of the finished project, as applicable under this Agreement, by Contractor. Receipt of such permits, approvals or certificates by Owner or Owner's Construction Manager shall be a condition precedent to final completion and acceptance of the Work.

- **PREVENT DAMAGE** – Contractor shall take necessary precautions to properly protect the Work and the work of others from damage caused by Contractor's operations. Should Contractor cause damage to the Work or property of Contractor or others, Contractor shall promptly remedy such damage to the satisfaction of Contractor, or Contractor may so remedy and deduct the costs thereof from any amounts due or to become due Contractor. Contractor places special emphasis on the protection of persons and existing structures, and there shall be no compromise as to the degree of protection required.
 - i. Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property caused in whole or in part by Contractor a sub-Contractor, or anyone directly or indirectly employed by any or them, or by anyone for whose acts they may be liable and for which Contractor is responsible, except for damage or loss attributable to acts or omissions of Contractor or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of Contractor.

- **DESIGNATED WORK AREA** – Contractor shall establish principal axis lines of the Work and site whereupon Contractor shall lay out and be strictly responsible for the accuracy of the Work and for any loss or damage to Contractor or others by reason of Contractor's failure to set out or perform the Work correctly. Contractor shall exercise prudence so that actual final conditions and details shall result in perfect alignment of finish surfaces and interconnection with the work of others.

- **WARRANTY** – Contractor shall guarantee or warranty the Work for the minimum period of one (1) year from the date(s) of Substantial Completion.

- **SAFETY** – Contractor shall take all reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to employees and other property on site.
 - i. Contractor shall comply with applicable provisions of the Federal Occupational Safety and Health Act (“OSHA”), In addition to all other laws, ordinances, rules regulations, and orders of any Federal, state, or local public authority having jurisdiction for the safety of persons or property, including but not limited to the local fire department and board of health. Contractor shall promptly notify Contractor upon becoming aware of an inspection under, or any allege violation of OSHA or any other provision of federal, state or local law, relating in any way to undertaking of this Agreement.
 - ii. Contractor shall erect and maintain, (i.e. flagging, temporary barricades, etc.) as required by existing conditions and performance of this Agreement, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying sub-Contractors and users of adjacent sites and utilities.
 - iii. Contractor shall designate a responsible member of Contractor’s organization at the site of the Work whose duty shall be the prevention of accidents. This person shall be Contractor’s superintendent unless otherwise designated by
 - iv. Contractor in writing to School District and District’s Construction Manager and shall be specifically referenced by name and title as part of Contractor’s Health and Safety Plan.
 - v. Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.
 - vi. Contractor shall at all times protect excavations, trenches, buildings and Materials, from rain water, ground water, backup or leakage of sewers, drains and other piping, and from water of any other origin. Contractor shall remove promptly and dispose of properly, any accumulation of water. Contractor shall provide and operate all pumps, piping and other equipment necessary to this end.
 - vii. Contractor shall notify the School Distict’s Project Manager of the occurrence of any accident or injury or the existence of any unsafe condition on or about the jobsite, within 15 minutes upon discovery of such accident, injury or condition. When so ordered, Contractor shall stop any part of the work which School District or its Representatives deems unsafe until corrective measures satisfactory to School District have been taken. The Contractor shall complete and submit to the Owner’s Project Manager a completed written Accident/Injury Investigation Report (District’s Form) within 24-hours of the occurrence. The Contractor shall conduct employee post-accident/Injury drug testing as soon as practicable following and incident in accordance with established policies and guidelines.

- **NOTICES** – Contractor shall give notice and comply with applicable laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.
- **HAZARDOUS MATERIALS** – When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, Contractor shall exercise utmost care and carry on such activities under the supervision of properly qualified personnel and in accordance with all Federal, State and local regulations. Storage locations of explosives and hazardous materials shall be coordinated through and approved by the School District’s Project Manager.
- **FIRE PROTECTION RESPONSIBILITIES** – Contractor shall provide and maintain in good operating condition suitable and adequate fire protection equipment and services, and shall comply with all reasonable recommendations regarding fire protection made by the representatives of the fire insurance company carrying insurance on the Work by the local fire chief or fire marshal. The area within the site limits, including all storage areas, shall be kept orderly and clean, and all combustible rubbish shall be promptly removed from the site.
- **WASTE** – Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under this Agreement. At completion of the Work, the Contractor shall remove from and about the project waste materials, rubbish, Contractor’s tools, construction equipment, machinery and surplus materials. Immediately prior to School District’s Construction Manager’s inspection for Substantial Completion, Contractor shall cause the premises to be completely and thoroughly cleaned by professional cleaners.
- **LOADING AND UNLOADING** – Contractor shall load trucks arriving at and leaving the site in a manner that will prevent the dropping of Materials or debris on the streets. Contractor shall secure and cover transport equipment and loose Materials to ensure that Materials do not become airborne during transit. Contractor shall remove spills of materials in public areas immediately at no additional cost to the Owner.
- **MATERIAL HANDLING & STORAGE** – In the event the Work includes installation of Materials or equipment furnished by others, it shall be the responsibility of Contractor to examine the items so provided and handle, store and install the items with such skill and care as to ensure a satisfactory and proper installation. Loss or damage due to acts of Contractor or its sub-Contractors shall be deducted from any amounts due or to become due to Contractor. Unless otherwise specified in this Contract or directed, in writing, by Owner, Contractor shall arrange for and effectuate safe, sufficient, and proper storage at the Premises of all reusable equipment, or materials located at the Premises prior to commencement of the Work which Contractor removes or disconnects in performing the Work. To the extent that Contractor is responsible, in accordance with the provisions of this Contract, for disposing of any such equipment or materials Contractor shall be responsible for disposing of any hazardous or toxic substances that may exist in any such equipment or materials (for example, lamps, in ballasts, fluorescent bulbs, capacitors or

transformers) prior to such disposal in a manner which complies with all applicable local, State and Federal laws.

- **WORK STOPPAGE** – Contractor shall employ only such labor as can work in harmony with any other trades on the job and as will not cause dissension among any other workers or cause any work stoppage. If a work stoppage occurs on the job, whether by workers employed by Contractor or by others because of matters relating to Contractor's work, the School District shall have the right to terminate this Agreement in accordance with the procedures. In any event, and in addition to any other remedies set forth herein, Contractor shall be responsible to School District for all losses, damages and expenses incurred by School District as a result of any such work stoppage.
- **CONSTRUCTION MANAGEMENT** – Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures (including, without limitation, all safety precautions and programs) and for coordinating all portions of the Work under this Agreement unless the Contract Documents give other specific instructions to these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, Contractor shall give timely written notice to School District's Construction Manager that such means, methods, techniques or procedures referred to in the Contract Documents are not safe or suitable and shall not proceed with that portion of the Work without further written instructions from the Engineer of Record and School District. If Contractor is then instructed by School District in writing to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by Contractor. The School District's determination as to whether any instructions concerning means, methods, techniques, sequences or procedures contained in the Contract Documents may be safely and suitably carried out shall be the responsibility of Contractor, and all loss, damage, or liability, or cost of correcting defective work arising from the employment of any construction means, methods, techniques, sequences or procedures shall be borne by Contractor, notwithstanding that such construction means, methods, techniques, sequences or procedures are referred to, indicated or implied by the Contract Documents, unless Contractor has given timely notice to the School District's Construction Manager in writing that such means, methods, techniques, sequences or procedures are not safe or suitable, and School District has then instructed Contractor in writing to proceed. In no event shall Contractor employ construction means, methods, procedures and techniques that violate (1) requirements of any warranties applicable to the Work, or (2) laws, ordinances, regulations rules, orders, permits and approvals which bear upon Contractor's performance of the Work or upon the completed Work and its use.
- **LABOR UNIONS** – Contractor and all sub-Contractors shall make all provisions necessary to avoid any disputes with labor unions. Contractor shall be responsible for any delays, damages or extra costs incurred as a result of such disputes. Contractor shall be responsible for the maintenance of labor relations among its employees and the employees

of its sub-Contractors in such manner as will provide for harmony as far as practical among workers at the project site. Prior to contracting with any sub- Contractor, the School District will require such sub-Contractor to certify its willingness to cooperate with not only the other sub- Contractors hired by Contractor, but also with School District, any other sub-Contractors hired by the School District, and their sub-contractors. Any sub-Contractor not cooperating shall, in School District’s reasonable discretion, be dismissed by the School District and a replacement sub-Contractor shall be hired at Contractor’s expense.

- **SCHEDULE** – In the event (i) that the performance of the Work as of a Milestone Date has not progressed or reached the level of completion required by the Construction Schedule and (ii) Contractor fails to submit a Corrective Plan that is approved by School District or the progress of the Work is not brought back into compliance with the Construction Schedule on the date proposed by an approved Corrective Plan, School District shall have the right to order Contractor to take corrective measures to expedite the progress of the Work. Including, without limitation, (1) working additional shifts or overtime, (2) supplying additional manpower, equipment, and facilities, and (3) other similar measures (hereinafter referred to collectively as “Extraordinary Measures”). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The School District’s right to require Extraordinary Measure is solely for the purpose of ensuring Contractor’s compliance with the Construction Schedule. Contractor shall not be entitled to an adjustment in the Contract Price in connection with Extraordinary Measures required by School District. The School District may exercise the rights furnished as frequently as reasonably necessary to ensure that Contractor’s performance of the Work complies with the Milestone Dates set forth in the Construction Schedule.
 - i. All major roof equipment installation Work (racking, modules, etc.) or Work that would cause significant noise must be complete before August 26, 2024 (when school resumes) or scheduled for after school hours.
 - ii. Contractor must coordinate and work around School District’s selected Roofer’s schedule regarding rain and other delays.
 - iii. Contractor must be available as necessary for all commissioning and as required by DTE to place system into service, submit incentive applications, and to provide answers to questions that may arise by governing or oversight bodies during or after project completion, and to assist logging equipment and dashboarding parties for startup and training.

- **WORKMANSHIP** – The Work will be free from defects not inherent in the quality required or permitted; and that the Work will conform to the requirements of new and of recent manufacture unless otherwise specified; and that all Work will be of good quality, free from faults and defects, and in conformance with the Contract Documents; and that the portion of Work that is not construction or other installation shall be performed in a professional, high-quality manner consistent with industry standards. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. Any defect or deficiency in the portion of Contractor’s Work and which is identified by Owner or its Representatives after the delivery of such Work shall be remedied by Contractor promptly and at no cost to Owner.

Contractor's warranty excludes remedy for damage or defect caused by abuse, modifications not executed by Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Engineer of Record, Contractor shall furnish satisfactory evidence as to the kind and quality of Materials and equipment.

- **APPROVALS** – Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by Owner's Construction Manager and the Engineer of Record. The portions of the Work that are the subject of the approved submittal shall be completed in accordance with such approved submittal. Work shall be in accordance with approved submittals except that Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by Owner's Construction Manager's approval of Shop Drawings, Product Data, Samples or similar submittals unless Contractor has specifically informed Owner's Construction Manager in writing of such deviation at the time of submittal and (1) The Engineer of Record has given written approval to the specific deviation as a minor change in the Work or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by Owner's Construction Manager's approval thereof.
- **COMMUNICATION** – Contractor shall direct attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Engineer of Record on previous submittals. In the absence of such approval, unless such written notice has been given, the Engineer of Record's approval of a resubmission shall not apply to such revisions, resubmitted Shop Drawing, Product Data, Sample, or similar submittal and shall not constitute approval of any changes not requested on the prior submittal.

- **PROFESSIONAL SERVICES** – Professional design services or certifications by a design professional related to systems, Materials or equipment are specifically required of Contractor by the Contract Documents. Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional’s written approval when submitted to Owner’s Construction Manager. Contractor shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals. Contractor’s Construction Manager will review, approve or take other appropriated action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Contractor shall be responsible for the adequacy of the performance or design criteria required by the Contract Documents.
- **PERMITS, FEES AND LICENSES** – Unless otherwise provided in the Contract Documents, Contractor shall secure and pay for the building permit and all other permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Work which are customarily secured after execution of the Agreement and which are legally required as of the date of this Agreement. Contractor shall give adequate notices to authorities pertaining to Contractor's Work the Project and secure and pay for all federal, state, and local permits, fees, licenses, assessments, inspections and taxes necessary to complete Contractor's Work the Project in accordance with the Contract Documents. Contractor shall not be compensated for additional costs resulting from laws, ordinances, rules, regulations and taxes enacted after the date of the Agreement.
- **SUBCONTRACTS** – Contractor shall disclose any active disputes between such proposed person or entity and Owner (either directly or through a sub-Contractor). Notwithstanding anything to the contrary, (a) Owner may reject any person or entity engaged in any such dispute without adjusting the contract Schedule and/or the Contract Price and (b) if Contractor fails to disclose any active dispute with a person or entity proposed for a portion of the Work that is thereafter engaged by Contractor to perform a portion of the Work,

 - i. Owner may later require Contractor to dismiss and replace such person or entity without adjusting the contract Schedule and/or the Contract Price.
 - ii. Notwithstanding anything to the contrary, if a dispute first arises between Owner and a person or entity engaged by Contractor to perform a portion of the Work (either directly or through a Contractor) after the execution of the subcontract, Owner may require Contractor to dismiss and replace such person or entity; provided, however, that the Contract Price and/or contract Schedule shall be increased or decreased by the difference, if any, occasioned by such change.
 - iii. Contractor shall not contract with a proposed person or entity to whom Owner or Owner’s Construction Manager has made reasonable and timely objection.

- iv. If Owner or Owner's Construction Manager has reasonable objection to a person or entity proposed by Contractor, Contractor shall propose another to whom Owner or Owner's Construction Manager has no reasonable objection. If the proposed but rejected sub-Contractor was reasonably capable of performing the Work and of complying with bonding, insurance and other applicable requirements under the Contract Documents, the Contract Price and contract Schedule shall be increased or decreased by the difference, if any occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute sub-Contractor's Work. However, no increase in the Contract Price or contract Schedule shall be allowed for such change unless Contractor has acted promptly and responsively in submitting names as required.
- v. Contractor shall not change a sub-Contractor, person or entity previously selected if Owner or Owner's Construction Manager makes reasonable objection to such substitute.
- vi. Contractor shall provide Contractor (from time to time, but no less frequently than quarterly, and at the time of Substantial Completion) a cumulative list of all sub-Contractors, and of every person who has given Contractor a written contract for the furnishing of labor or Materials, or labor and Materials, or rental equipment, appliances or tools for completion of the Work.
- vii. Any sub-Contractor shall be bound by the terms and conditions set forth in this Agreement, which terms shall be incorporated in such sub-subcontract agreement by reference with the necessary adaptations. In the event of a conflict between the terms and conditions of this Agreement and the sub-subcontract agreement, the terms and conditions of this Agreement shall prevail.

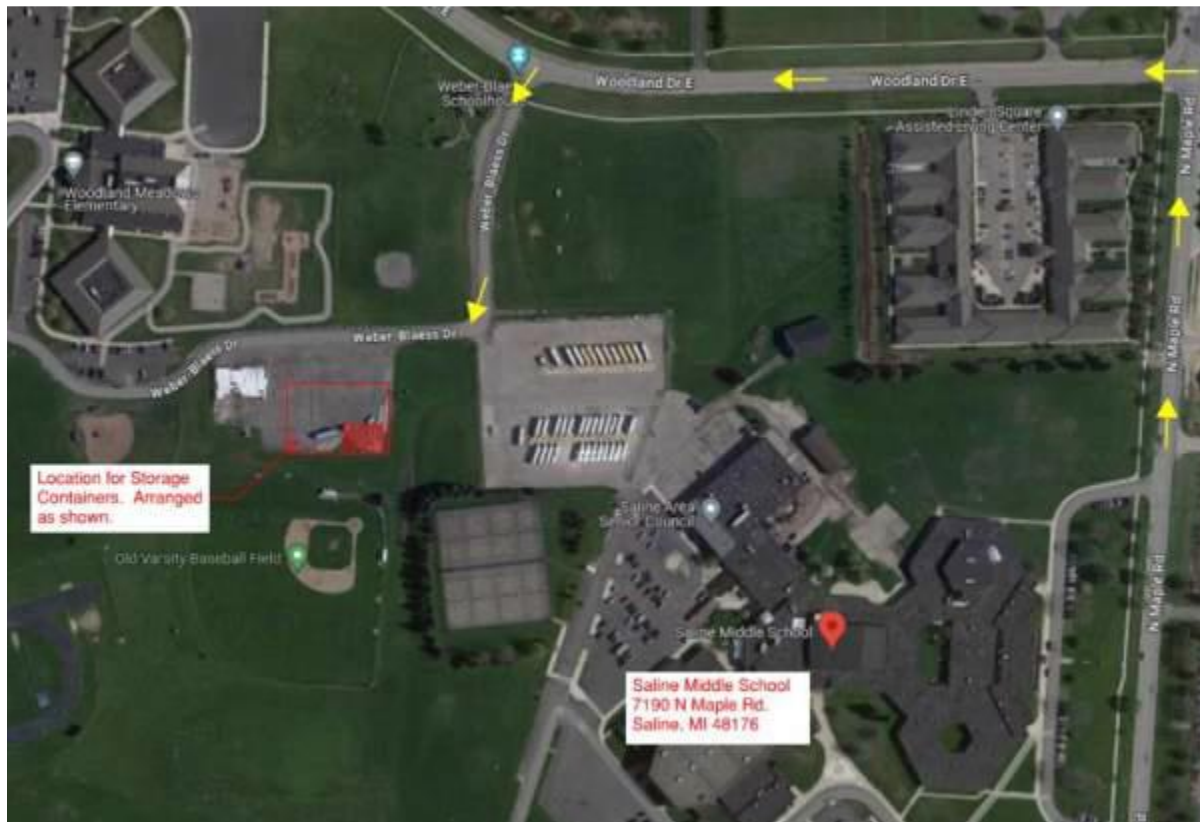
2.4. SPECIFICATIONS

2.4.1. OVERVIEW OF SPECIFICATION ATTACHMENTS

- **Attachment E** – Project Site Plan & IFC Drawing Set
- **Attachment F** – Base & Alternate 1 Copper Conductor Schedules
- **Attachment G** – Ameresco Wire Management Best Practices & Requirements
- **Attachment H** – ALTERNATE 2: Preliminary Non-Export Site Plan & Single Line Diagram
- **Attachment I** – Racking Details

2.4.2. Additional Project Specifications & Supporting Information

- Material Storage On Site Location



Note: Material is stored in on-site locked Connex trailers ready for installer.

III. CONTRACTUAL OBLIGATIONS

3.1. FORM OF CONTRACT

3.1.1. **Form of Contract:** This is a Request For Proposals only. Proposals will be treated as offers to enter into the Contract (as defined above) with the School District. The School District and successful Contractor shall memorialize their contractual relationship and obligations using the form of example Contract attached hereto as **ATTACHMENT D.** The Contract contains many details relative to the Work required under this RFP, as well as the terms and conditions under which the Work shall be provided by the successful Contractor. The Contract should be reviewed carefully by each Contractor prior to submitting a Proposal. Any exceptions to the terms and conditions contained in the Contract, or any other special considerations or conditions requested or required by the Contractor relative to this RFP or the form of Contract shall be expressly/specifically enumerated by the Contractor and be submitted as part of its Proposal, together with an explanation as to the reason such terms and conditions cannot be met by, or, in the Contractor's opinion are not applicable to, the Contractor, provided however, that exceptions or special conditions of the Contractor will not be binding upon the School District unless those exceptions or special conditions are expressly accepted by the School District, and incorporated into the final Contract. Following the selection of the successful Contractor by the School District, the Contract will be finalized by the parties. The below sections contain information relative to selected provisions of the Contract and/or the expectations of the School District relative to the provision of the Work.

- **Familial Disclosure Affidavit:** All Contractors must provide familial disclosure in compliance with MCL 380.1267 and attach this information to its Proposal. The Proposal must be accompanied by a sworn and notarized statement disclosing any familial relationship that exists between the owner and/or any employee of the Contractor and any member of the School District's Board of Education or the School District's Superintendent. The School District will not accept a Proposal that does not include this sworn and notarized disclosure statement. The Familial Disclosure Affidavit is attached to this RFP as **ATTACHMENT B.**
- **Iran Economic Sanctions Act:** In accordance with Michigan Public Act No. 517 of 2012, all Proposals must be accompanied by a sworn and notarized statement certifying that the Contractor is not an Iran Linked Business. The School District will not accept a Proposal that does not include this sworn and notarized statement. The Affidavit of Compliance – Iran Economic Sanctions Act is attached to this RFP as **ATTACHMENT C.**
- **Bid Security:** Contractors must submit with its Proposal bid security in the form of a Bid Bond issued by a qualified surety or certified

check/money order in an amount of five percent (5%) of the Proposal (“Bid Security”). Failure to include this Bid Security with the Contractor’s Proposal will result in the rejection of your Proposal. If a Bid Bond is posted by a Contractor, it shall be from a Treasury Surety licensed to do business in the State of Michigan, and the attorney-in-fact who executes the Bid Bond on behalf of the Contractor shall attach a certified, current copy of its power of attorney. In the event a certified check/money order is submitted, it shall be made payable to “Saline School District.” The School District shall not be liable for any interest earned thereon. The Bid Security shall be forfeited as liquidated damages, and not as a penalty, if the Contractor withdraws its Proposal after the Due Date for submission of Proposals or, upon acceptance of its Proposal by the School District, the Contractor fails to execute the form of Contract acceptable to the School District, substantially evidencing and incorporating this RFP and its Proposal and fails to provide the required Performance Bond and/or Payment Bond, if any, and the required insurance certificates, within fifteen (15) days of an award of a Contract to the Contractor. Bid Bonds shall be duly executed by the Contractor, as principal and by a surety that is properly licensed and authorized to do business in the state in which the Work is to be performed. All sureties providing bonds for this Project must be listed in the latest version of the Department of Treasury’s Circular 570, entitled “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies”, with the bond amount less than or equal to the underwriting limitation, and/or have an A.M. best rating of A- or better. Bid Security shall be returned to all non-successful Contractors within a reasonable time after the award of a Contract and execution of a Contract by the successful Contractor. The bid bond can be included with the proposal as submitted through Buildingconnected.com. If the bid security is a certified check/money order, this must be delivered to the following address: 7265 North Ann Arbor Street, Saline, Michigan 48176 prior to the bid due date and time.

- **Performance Bond:** Successful Contractors whose Proposals are \$50,000 or more will be required to furnish Performance and Payment Bonds, in a form satisfactory to the School District, in the amount of 100% of its Proposal by a Treasury-listed Surety licensed to do business in the State of Michigan, and the attorney-in-fact who executed the Performance and Payment Bonds on behalf of the Contractor shall attach a certified, current copy of its power of attorney. The cost of the Bonds shall be included in each Proposal.
- **Governing Law:** The Contract shall be governed by and construed in accordance with the laws of the State of Michigan. The parties hereby agree to the exclusive jurisdiction and venue of courts sitting in Oakland County, Michigan.

- **General Indemnification:** Contractor shall indemnify, defend and hold harmless the School District, its Board of Education, its Board Members, in their official and individual capacities, its administrators, employees, agents, contractors, successors and assignees, from and against any and all claims, counter claims, suits, debts, demands, actions, judgments, liens, costs, expenses, damages, injuries and liabilities, including actual attorney's fees and actual expert witness fees arising out of or in connection with Contractor's performance of the Contract and/or from Contractor's violation of any of the terms of the Contract, including, but not limited to: (i) the negligent acts or willful misconduct of the Contractor, its officers, directors, employees, successors, assignees, contractors and agents; (ii) any breach of the terms of the Contract by the Contractor, its officers, directors, employees, successors, assignees, contractors and agents; (iii) any violation or breach of any applicable Federal, State or local law, rule, regulation, ordinance, policy and/or licensing and permitting requirements applicable to the Contract; or (iv) any breach of any representation or warranty by the Contractor, its officers, directors, employees, successors, assignees, contractors and agents under the Contract. The Contractor shall notify the School District by certified mail, return receipt requested, immediately upon actual knowledge of any claim, suit, action, or proceeding for which Saline School District may be entitled to indemnification under the Contract. This paragraph shall survive the expiration or earlier termination of the Contract.
- **Compliance With Laws:** Contractor shall comply with any and all applicable federal, state, and local laws, rules, ordinances, policies, and regulations, including any licensing and permitting requirements, under the Contract. Contractor, including its personnel, employees, contractors, consultants, and agents shall be responsible for knowing the School District's policies concerning appropriate behavior of persons in School District facilities and, on School District properties, including for example, the prohibitions of sexual harassment and smoking, and shall comply with all such policies. Contractor represents and warrants to the School District that it shall at all times be in compliance with any and all applicable federal and state laws, rules, ordinances, policies and regulations, and licensing and permitting requirement applicable to the Contract. Contractor shall indemnify, defend, and hold School District harmless from any liability from its failure to so comply.
- **Right to Terminate on Breach:** Each party shall have, in addition to all other remedies available to it, the right to terminate the Contract immediately upon written notice to the other party that the other party has committed a material breach of any of its obligations herein and such material party has committed a material breach of any of its obligations herein and such material breach shall not have been cured or corrected within ten (10) days following written notice of the same.

Furthermore, if the School District must regularly request that the Contractor cure breaches of the Contract, such circumstances shall be grounds for termination of the Contract for cause, even if each breach on its own would not be material.

- i. **Events Upon Termination:** Upon termination of the Contract by either party for Breach or default of the other party, each party shall be entitled to exercise any other right, remedy or privilege which may be available to it under applicable law or proceed by appropriate court action to enforce the terms of the Contract or to recover damages for the breach of the Contract. Upon termination of the Contract, the Contractor shall immediately provide the School District with any and all drawings and documentation regarding the Work. In the event of termination, title to all supplies, materials, equipment or products purchased by the Contractor for integration into the Work shall pass to the School District, and Contractor shall deliver possession of said supplies, materials, equipment or products to the School District at a location to be designated by the School District.
- **Pricing:** Prices quoted are to be F.O.B. to Saline School District. All purchases Prices shall be net; including transportation, insurance and delivery charges fully prepaid by the successful Contractor to destinations indicated in the Proposal.
 - **Taxes:** This project is NOT exempt from taxes.
 - **Proposal Withdrawal:** Contractors may withdraw its Proposals any time before the Due Date. Proposals may not be withdrawn for at least 90 days after the Due Date.
 - **Competition:** The name of a model, manufacturer, or brand in this RFP shall not be considered as exclusive of other brands. Brands and models specified in this RFP are preferred. The School District expects all supplies, materials, equipment, or products bid by a Contractor to meet or exceed the Specifications set forth in this RFP. Further, it is the School District's intent that this RFP permit competition. Accordingly, the use of any patent, proprietary name, or manufacturer's name is for demonstrative purposes only and is not intended to curtail competition. Whenever any supplies, material, equipment, or products requested in this RFP are specified by patent, proprietary name or by the name of the manufacturer, unless stated differently, such specification shall be considered as if followed by the words "or comparable equivalent," whether or not such words appear. The School District in its sole and absolute discretion, shall have the right to determine if the proposed equivalent products/brands submitted by the Contractor meet the

Specifications contained in this RFP and possess equivalent and/or better qualities. It is the Contractor's responsibility to notify the School District in writing if any Specifications or suggested comparable equivalent products/brands require clarification by the School District prior to the Due Date for Proposals. Any and all deviations from Specifications must be noted on the Proposal Form.

IV. PROPOSAL

4.1. PROPOSAL FORMS

Each Contractor shall submit its Proposal using the Proposal Pricing Form attached hereto as **ATTACHMENT A**, along with any other information required by this RFP or deemed necessary and appropriate by the Contractor for evaluation of its Proposal.

4.2. PROPOSAL CHECKLIST

In addition to the Proposal Pricing Form and any information required under Section 4.1 above, please attach copies of the following documents to your Proposal:

- 4.2.1.** Proposal Pricing Form and detailed list setting forth any exceptions to the RFP and/or Contract, or other special considerations or conditions of the Contractor, including explanations of such exceptions or the reason such terms and conditions of the RFP or form of Contract cannot be met by, or are not applicable to, the Contractor.
- 4.2.2.** List of Contractor's References (K-12 references preferred) with which Contractor has contracted to perform Work or services similar to the Work described herein. The Contractor must provide this information, including contact names, addresses, phone numbers, and type and scope of Work/services provided including the size of the array and date of installation.
- 4.2.3.** Contractor's Verification of addenda to the RFP, if any.
- 4.2.4.** Evidence of the Contractor's ability to provide adequate insurance coverages as required by this RFP and the Contract to protect the interests of the Contractor and the School District.
- 4.2.5.** A completed Familial Disclosure Affidavit, which is attached hereto as **ATTACHMENT B**.
- 4.2.6.** A completed Iran Sanctions Act Affidavit of Compliance, which is attached hereto as **ATTACHMENT C**.

ATTACHMENT A

PROPOSAL PRICING FORM – PAGE 1

(Please complete & submit this sheet along with any clarifications)

Project: Saline Area Schools – Middle School Roof-Mount Solar Array
Bid/Quote: Solar Sub Installation Request for Proposal (RFP)
Date: _____ **due by Monday May 6th at 1:30 PM EST**
Sub: _____ **Contact:** _____
Address: _____ **Office #:** _____
Cell #: _____ **E-mail:** _____

Preferred (Not Required) Qualifications

- Completed at least 4 rooftop solar array projects in the past year: Qty: _____
- Completed at least 1 anchor-mount solar array projects in the past two years.
 - o Total Anchor-Mount Solar Projects Completed in Last Two Years: _____
- NABCEP Certification
- Contractor or its subcontractors have service technicians within a 2 hour drive of project:
 - o Physical location of nearest service location: _____
 - o Number if service technicians within the desired drive time: _____

Project Requirements

- Appropriate Licensure Required by Authorities Having Jurisdiction Yes
- Contractor in Good Standing with State of Michigan Yes
- Project Bid Submission Meets All RFP Requirements: Yes
- Bid Meets all ITC Direct Pay Labor Requirements for <1MW Systems Yes
- Desired Estimated First Date of On-Site Mobilization: _____/_____/2024
- Proposed Duration-Based Project Gantt-Chart Schedule: Attached
- References/System-Size/Contacts for Similar Projects: Attached
- Ability to limit “Disruptive Work” outside core hours after 08/26/24 Yes
- Planned Final Completion & Commissioning by 10/01/24: Yes

This Solar Sub Installation Quote/Bid Sheet must be submitted to qualify for acceptance. Please include any other vendor generated quote/detail sheet that may support your proposed equipment evaluation.

PROPOSAL PRICING FORM – PAGE 2

(Please complete & submit this sheet along with any clarifications)

A. CONTRACTOR PRICING

| | | Base Project w/ Selected AC Cond. | Alternate 2 – Smaller Non-Export System |
|-------|---|--|--|
| Bid 1 | Total Base Project (Alum.) Fixed Price | \$ _____ | \$ _____ |
| Bid 2 | Total Alt 1 Project (Copper) Fixed Price: | \$ _____ | \$ _____ |

Summary of Project Costs

| | | | |
|---------|---|----------|--------|
| 1B1.1 | Total Labor-Associated Costs: | \$ _____ | |
| 1B1.2-A | Base Aluminum AC Conductor Schedule Costs (Includes Tax): | \$ _____ | |
| 1B1.2-B | ALT 1: Copper AC Conductor Schedule Costs (Includes Tax): | \$ _____ | |
| 1B1.3 | Total Other Equipment Costs (Includes Tax) | \$ _____ | |
| 1B1.4 | Total Subcontractor Costs: | \$ _____ | |
| 1B1.5 | Equipment Rental Associated Costs: | \$ _____ | |
| 1B1.6 | Other: | \$ _____ | |
| 1B1.7 | Overhead and Project Management Costs: | \$ _____ | |
| 1B1.8 | Payment and Performance Bond: | \$ _____ | |
| 1B1.9 | Sub-Total of Costs (Base) (1B1.1, 1B1.2-A, 1B1.3-8) | \$ _____ | |
| 1B1.10 | Sub-Total of Costs (Alternate 1) (1B1.1, 1B1.2-B, 1B1.3-8) | \$ _____ | |
| 1B1.11 | Allowance (Per District Approval) | \$ _____ | 20,000 |

Summary of Installation Manpower

| | | | |
|-------|---|-------|---------------|
| 1B2.1 | Electrician Associated Man-Hours | _____ | @ \$ _____/hr |
| 1B2.2 | Mechanical Associated Man-Hours | _____ | @ \$ _____/hr |
| 1B2.3 | Material Handling/Staging Man-Hours | _____ | @ \$ _____/hr |
| 1B2.4 | Other Associated Man-Hours | _____ | @ \$ _____/hr |
| 1B2.5 | Total # of Man Hours (1B2.1-1B2.4) | _____ | |
| 1B2.6 | Max crew size anticipated at project height | _____ | |
| 1B2.7 | Avg anticipated crew size: | _____ | |
| 1B2.8 | Racking/Module Installation Duration | _____ | days |
| 1B2.9 | Total Project Duration | _____ | days |

ALTERNATE 2: SMALLER NON-EXPORT SYSTEM

| | | |
|-------|---|----------|
| 2B1.1 | Total Base (Aluminum) Deduct (inclusive Labor / Material & Tax) | \$ _____ |
| 2B1.2 | Total Alt 1 (Copper) Deduct (inclusive Labor / Material & Tax) | \$ _____ |

PROPOSAL PRICING FORM – PAGE 3

(Please complete & submit this sheet along with any clarifications)

B. ACKNOWLEDGEMENT OF ADDENDA TO RFP

The Contractor acknowledges receipt of the following addenda:

Addendum Number _____ dated _____

Addendum Number _____ dated _____

Addendum Number _____ dated _____

The undersigned understands that the School District reserves the right to accept or reject in whole or in part any and all Proposals, to waive informalities and irregularities therein, and to award the Contract to other than the Contractor(s) submitting the best financial Proposal (low bidder) and to award the Contract to one (1) or more Contractors in the School District's sole and absolute discretion.

If award is made to our firm based upon our Proposal, we agree to enter into the attached form of Contract with the School District to furnish the Work in strict accordance with this Request For Proposal, the Contract, and our Proposal.

My signature certifies that the Proposal as submitted complies with all terms and conditions as set forth in this Request For Proposal and the Contract, unless specifically enumerated as an exception as part of our Proposal.

I hereby certify that I am authorized to sign as a Representative for the firm.

CONTRACTOR HEREBY SUBMITS THIS PROPOSAL PRICING FORM IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE RFP.

Name of Contractor: _____

(Signature/Principal)

(Name Printed)

Date: _____

ATTACHMENT D

CONTRACT EXAMPLE

EXAMPLE CONTRACT

I. This Contract (“Contract”) is made on _____, 20__ (“Effective Date”), between **SALINE AREA SCHOOLS**, a Michigan public school district (“School District”), whose address is 7265 North Ann Arbor Street, Saline, Michigan 48176 and _____, a _____ (“Contractor”), whose address is _____. The School District and Contractor may each be referred to herein as a “Party” and collectively as the “Parties.”

RECITALS

A. The School District issued a Request For Proposal For _____ dated _____, as amended by [INSERT ADDENDA BY NAME AND DATE HERE] (collectively the “RFP”), the purpose of which was to solicit proposals from qualified contractors to furnish to the School District all of the materials and labor required to _____ identified in the RFP in accordance with the terms and conditions contained in the RFP and the Specifications attached thereto (the “Work”).

B. In response to the RFP, the Contractor submitted to the School District a Proposal dated _____, to perform the Work contemplated by the RFP.

C. The Parties have, in accordance with the provisions of the RFP, conducted negotiations concerning the Contractor’s Proposal to the RFP. The Contractor’s Proposal together with written clarifications of the Parties, if any, are attached hereto, incorporated by reference, and marked as **Exhibit A** (collectively referred to as the “Proposal”).

D. Pursuant to the terms of the RFP, the Contractor is required to enter into a written contract in accordance with the School District’s written acceptance of its Proposal.

E. The Parties agree that certain terms, conditions, and provisions of the RFP and the Proposal must be further clarified and that certain additional terms and conditions need to be expressly set forth by way of this Contract.

NOW THEREFORE, in consideration of the foregoing and the mutual covenants set forth herein, the Parties agree as follows:

- **1. RESTATEMENT CONSTITUTES THE CONTRACT**
 - (a) **Incorporation By Reference.** The object of this Contract is to formalize in one document the complete agreement between the Parties, and to do so by specifically incorporating by reference into this Contract the RFP, the Proposal, and other related documents, and by including certain additional necessary or appropriate Contract terms, particularly where the

Contract terms agreed to by the Parties during the RFP negotiation process do not correspond with the RFP and/or the Proposal.

(b) Order of Precedence. The Contract Documents, which are all incorporated herein by reference, include the following:

This Contract, including all Attachments hereto;
The RFP, including the Specifications attached thereto; and
Contractor's Proposal.

To the extent that the terms and conditions of the Contract Documents are in conflict, the terms and conditions shall be interpreted in the above-referenced order from 1 to 3. However, the Parties also agree that where there is not a conflict between any of the terms and conditions contained in the above-referenced Contract Documents, all of the Contract Documents shall be binding upon both Parties, except to the extent the exceptions contained in the Contractor's Proposal are not expressly accepted by the School District in writing and incorporated into this Contract.

• **2. TERM AND TERMINATION**

(a) This Agreement shall commence as of the Effective Date and all Work hereunder shall be completed no later than _____ and shall be in compliance with the Project Schedule attached hereto as **Exhibit B**.

(b) Each Party shall have, in addition to all other remedies available to it, the right to terminate this Contract upon written notice to the other Party that the other Party has committed a material breach of any of its obligations herein and such material breach shall not have been cured or corrected within ten (10) days following written notice of the same. Furthermore, in addition to the rights of the School District under this Paragraph if the School District must regularly request that the Contractor to cure breaches of this Contract, such circumstances shall be grounds for termination of this Contract for cause, even if each breach on its own would not be material. Upon termination of this Contract by the School District for breach or default of the Contractor pursuant to this Paragraph, the School District shall be entitled to exercise any other right, remedy, or privilege which may be available to it under applicable law or proceed by appropriate court action to enforce the terms of the Contract or to recover damages for the breach of this Contract. If this Contract is terminated in accordance with any of the provisions contained herein, all rights of the Contractor under this Contract shall cease. Regardless of the basis for termination, the School District shall neither be liable to, nor obligated to pay, the Contractor for any incidental or consequential damages or lost profits, or costs incurred for Work not actually performed.

(c) Notwithstanding anything contained herein to the contrary, the School District may terminate this Contract at any time and for any reason or no reason at all upon written notice to the Contractor.

3. WARRANTY

The Contractor warrants and represents that its Work, will be in accordance with all applicable federal, state, and local laws and regulations for a minimum of two (2) years from completion of the Work.

4. INSURANCE

The Contractor shall maintain, at its expense, during the term of this Contract the following insurance:

(a) Worker’s Compensation Insurance with statutory limits and Employer’s Liability Insurance with a minimum limit of \$1,000,000 each occurrence.

(b) Comprehensive General Liability Insurance with a minimum combined single limit of \$1,000,000 per occurrence and \$3,000,000 in the aggregate, in the same amount made for bodily injury and property damage. The policy is to include products and completed operations, cross liability, broad form property damage, independent bidders, and contractual liability coverage. The policy shall be endorsed to provide thirty (30) days written notice to the School District of any material change of coverage, cancellation, or non-renewal of coverage.

(c) If Subcontractors are likely to be used, the Comprehensive General Liability policy shall include coverage for independent contractors.

(d) Automobile Liability insurance covering all owned, hired, and non-owned vehicles with personal protection insurance and property insurance to comply with the provisions of the Michigan no-fault Insurance Law, including residual liability insurance with a minimum combined single limit of \$1,000,000 each occurrence of bodily injury and property damage.

(e) All insurance policies shall be issued by companies licensed to do business in the State of Michigan. The companies issuing the policies must be domestic (on-shore) companies and have an A-rating by AM Best.

(f) The Contractor shall be responsible for payment of all deductibles contained in any insurance policy required in this Contract.

(g) Other requirements: Evidence of your insurance coverages, required herein, is to be provided to the School District and must indicate:

1. A Best’s rating for each of your insurance carrier at A-VII or better,
2. “Saline School District” is endorsed as an additional insured on the General Liability policies.
3. All consultants must be listed as additional insured.

5. CONTRACTOR’S COMPENSATION

Based upon the School District’s RFP and the Contractor’s Proposal, the School District shall pay the Contractor for its Work as follows:

6. MISCELLANEOUS

(a) Notices. All notices hereunder shall be in writing and shall be effective when sent by facsimile or electronic mail (provided, however, that any notice which could materially affect the rights of either Party shall also be sent by courier as provided herein) or a nationally known courier service such as DHL or Federal Express, addressed to the addresses written below, or to such other address as either Party may have last designated in writing in the manner herein provided. Such notice shall be deemed given when received, but in any event no later than four (4) days after sent by the internationally known courier. All notices shall be sent to the following address:

If to the Contractor:

Attention:

Copy To:

If to the School District: Saline Area Schools
7265 North Ann Arbor Street
Saline, Michigan 48176

(b) Assignment. This Contract and any other interest herein may not be assigned or transferred, in whole or in part, by either Party without the prior written consent of the other Party, which consent shall not be unreasonably withheld, and any assignment or transfer without such consent shall be null and void. This Contract shall be binding upon the successors, and subject to the above, assigns of either Party.

(c) Severability. If any provision of this Contract is held invalid or unenforceable, the remainder of this Contract shall nevertheless remain in full force and effect. If any provision is held invalid or unenforceable with respect to particular circumstances, it shall nevertheless remain in full force and effect in all other circumstances.

(d) Independent Contractor; No Joint Venture. It is expressly agreed that Contractor is acting hereunder as an independent contractor and under no circumstances shall any of the employees of either Party be deemed the employees of the other for any purpose. This Contract shall not be construed as authority for either Party to act for the other Party in any agency or other capacity or to make commitments of any kind for the account of, or on behalf of, the other Party, except to the extent, and for the purposes, expressly provided for and set forth herein, and no partnership or joint venture is created hereby.

(e) Modifications. No provision of this Contract or any Exhibit hereto may be modified without the prior written consent of both Parties.

(f) Captions. The captions used in this Contract are for convenience only and shall not affect in any way the meaning or interpretation of the provisions of this Contract.

(g) Governing Law. This Contract shall be construed in accordance with, and its performance governed by, the laws of the State of Michigan. The Parties hereby agree to the exclusive jurisdiction and venue of courts sitting in Wastenaw County, Michigan.

(h) Taxes. Contractor is responsible for sales taxes and any other applicable taxes related to the Work provided under this Contract.

(i) Entire Agreement. This Contract and all Exhibits and documents incorporated herein by reference constitute the entire agreement between the Parties, and supersedes all previous agreements, whether written or oral.

IN WITNESS WHEREOF, the undersigned have caused this Contract to be duly executed on the dates indicated below.

CONTRACTOR:

SCHOOL DISTRICT:

By: _____

By: _____

Its: _____

Its: _____

Date: _____

Date: _____

ATTACHMENT E

PROJECT SITE PLAN & IFC DRAWING SET

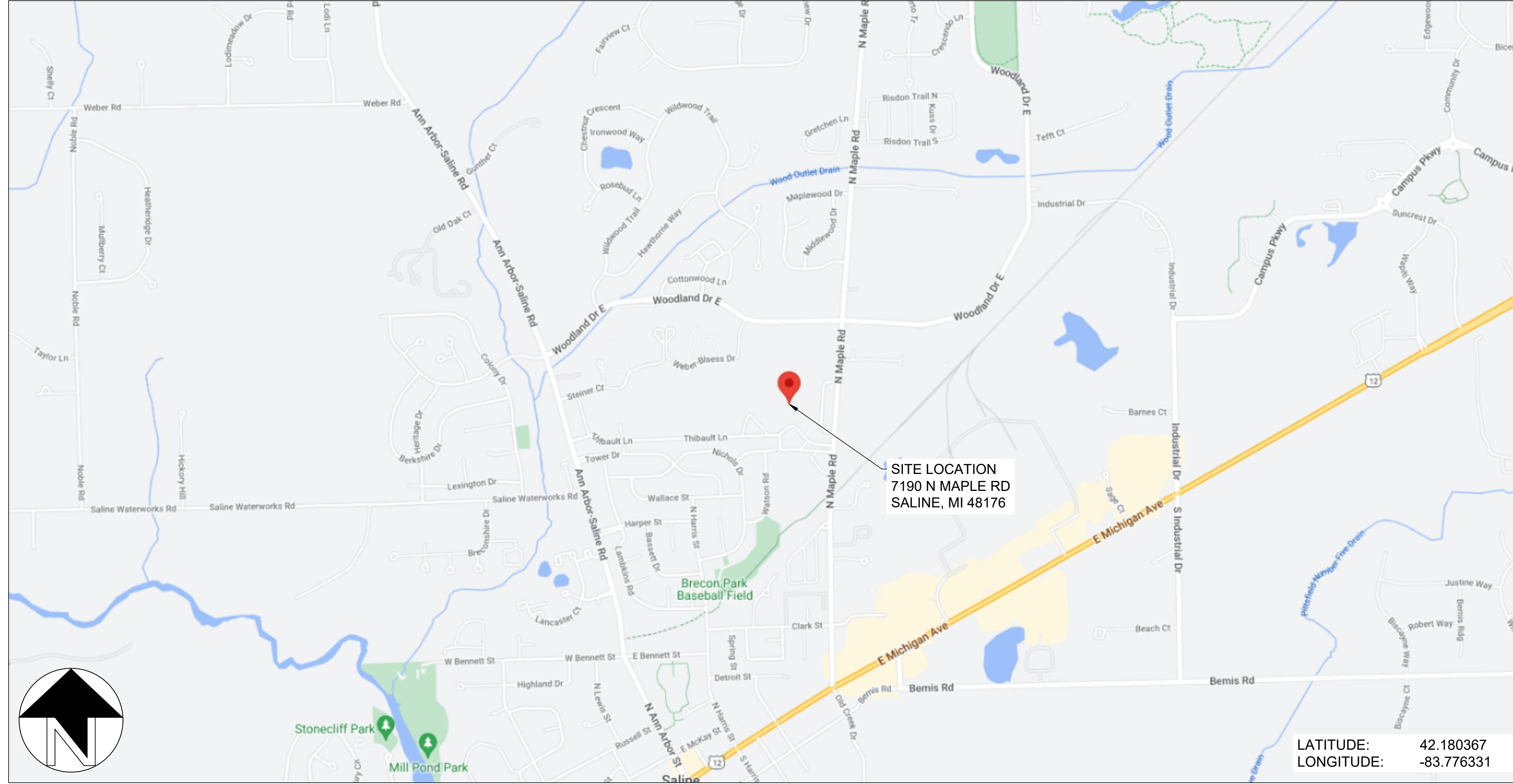
SALINE MIDDLE SCHOOL

7190 N MAPLE RD, SALINE, MI 48176

ROOFTOP PV SYSTEM - ISSUED FOR CONSTRUCTION

DRAWING INDEX

- G01 - TITLE SHEET
- G10 - OVERALL SITE PLAN
- G20 - ARRAY PLAN
- G30 - FIRE ACCESS PLAN
- E01 - ELECTRICAL NOTES
- E10 - ELECTRICAL SITE PLAN
- E11 - EQUIPMENT PLANS / ELEVATION
- E20 - DC STRINGING PLAN
- E30 - ONE LINE DIAGRAM
- E31 - THREE LINE DIAGRAM
- E32 - AC & DC CALCULATIONS
- E33 - AC & DC CALCULATIONS
- E50 - LABELING
- E60 - GROUNDING DETAILS
- E70 - EQUIPMENT SPECS



LATITUDE: 42.180367
LONGITUDE: -83.776331

PROJECT NOTES:

1. CONSULT DGEN ENERGY PARTNERS & AMERESCO BEFORE DEVIATING FROM THIS DRAWING PACKAGE.
2. PROJECT TYPE: NET METERING
3. UTILITY COMPANY: DTE ENERGY
4. INTERCONNECTION VOLTAGE: 480Y/277V

COMMERCIAL CONSTRUCTION DESIGN PARAMETERS

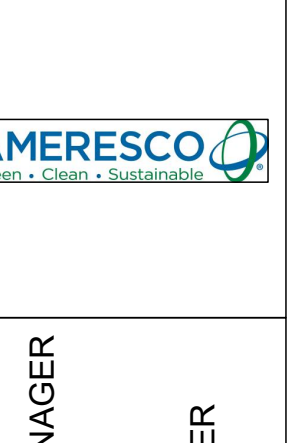
HIGH TEMPERATURE: 28.9°C
LOW TEMPERATURE: -34.0°C

APPLICABLE CODES

- NATIONAL ELECTRICAL CODE - NFPA 70 2023 (NEC)
- STANDARD FOR ELECTRICAL SAFETY IN THE WORKFORCE - NFPA 70E 2018
- INTERNATIONAL ELECTRICAL TESTING ASSOCIATION - ANSI/NETA STANDARD
- UL 1703 - SOLAR MODULES
- UL 1741 - INVERTERS, COMBINER BOXES (UL1741SA WHERE APPLICABLE)
- UL 2703 - RACKING RAILS, MOUNTS AND CLAMPS FOR PV MODULES

FOR OFFICIAL USE ONLY:

| CLIENT INFORMATION | |
|--------------------|---------------------------------|
| CLIENT | dGEN ENERGY PARTNERS & AMERESCO |
| ADDRESS | 30 N GOULD ST. SUITE 5736 |
| MUNICIPALITY | SHERIDAN, WY 82801 |
| PHONE | 574-904-4477 |
| EMAIL | BRANDON@DGENENERGY.COM |

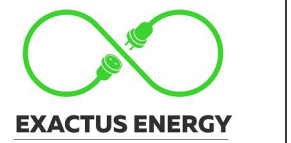


| SYSTEM CHARACTERISTICS | |
|------------------------|--------|
| DC SIZE (KW DC) | 757.35 |
| AC SIZE (KW AC) | 540.00 |
| DC/AC RATIO | 1.40 |

SCOTT ROMAN
SENIOR PROJECT MANAGER
419-262-9966

JOSE PEREZ
PROJECT MANAGER
401-692-5069

| MODULE INFORMATION | |
|---------------------------|------------------|
| MANUFACTURER | ZN SHINE SOLAR |
| MODEL NUMBER(S) | ZXM7-SHDB144-550 |
| PMAX @ STC (W) | 550 |
| ISC (A) | 13.89 |
| IMP (A) | 13.13 |
| VOC (V) | 50.2 |
| VMP (V) | 41.9 |
| TEMP COEFF OF VOC (%/°C) | -0.29 |
| TEMP COEFF OF PMAX (%/°C) | -0.35 |
| VOC @ MIN TEMP | 58.79 |
| VMP @ MAX TEMP | 36.2 |
| NUMBER OF MODULES | 1377 |



ELECTRICAL
CERTIFICATION

| INVERTER INFORMATION | |
|-----------------------------------|-------------------|
| MANUFACTURER | CPG |
| MODEL NUMBER(S) | SCA60KTL-DOUS-480 |
| MAXIMUM DC INPUT VOLTAGE (V) | 1000 |
| MAXIMUM DC INPUT POWER (W) | 90000 |
| NOMINAL AC OUTPUT VOLTAGE (V) | 480 |
| MPPT OPERATING VOLTAGE RANGE (V) | 200 - 950 |
| NOMINAL AC POWER (W) | 60000 |
| MAX CONTINUOUS OUTPUT CURRENT (A) | 72.2 |
| NUMBER OF INVERTERS | 9 |

SALINE MIDDLE SCHOOL
7190 N MAPLE RD
SALINE, MI 48176

DRAWN BY
JM

CHECKED BY
RB

DATE
19-Apr-2024

| MLPE INFORMATION | |
|----------------------------|----------|
| MANUFACTURER | NEP |
| MODEL NUMBER(S) | PV/G-2-L |
| MODULES PER MLPE | 2 |
| MAXIMUM SYSTEM VOLTAGE (V) | 1500 |
| RATED DC INPUT POWER (W) | NA |
| MAX VOLTAGE PER INPUT (V) | 90 |
| RSD INTEGRATED? | Yes |
| NUMBER OF MLPES | 378 |

DRAWING LEVEL
ISSUED FOR CONSTRUCTION

| REV. | DATE | DRAWING LEVEL |
|------|-------------|-------------------------|
| A | 19-APR-2024 | ISSUED FOR CONSTRUCTION |
| B | | |
| C | | |
| D | | |
| E | | |

SHEET SIZE
36X24 SHOULD
MEASURE 1":

SCALE
NTS

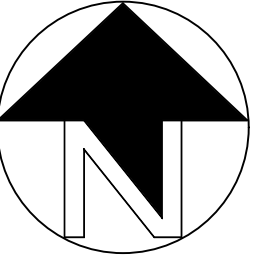
SHEET TITLE

G01

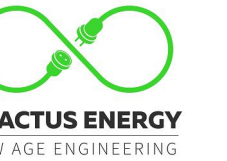
TITLE SHEET

NOTES:

1. ALL DIMENSIONS TO BE FIELD VERIFIED. LOCATIONS SHOWN ARE APPROXIMATE.
2. ALL PV ELECTRICAL EQUIPMENT TO BE INSTALLED AS PER INSTALLATION MANUALS AND NEC REQUIREMENTS.
3. CARE SHALL BE TAKEN TO ENSURE CONDUITS AND RACEWAYS ARE ORIENTED TO MINIMIZE INTERFERENCE WITH FIRE ACCESS WALKWAYS.
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5. PROPERTY LINE DETERMINED FROM PUBLICLY AVAILABLE GIS DATA.
6. THIS DRAWING PROVIDES AN OVERVIEW ONLY AND AS SUCH SHOULD NOT BE RELIED ON FOR EXACT DIMENSIONS.
7. MODULE LAYOUT IS SUBJECT TO CHANGE BASED ON AVAILABLE STRUCTURAL CAPACITY AND POWER GRID AVAILABILITY.
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9. TREES DO NOT SHADE ANY ROOF UNLESS TREE HEIGHT IS SPECIFIED.
10. ALL DIMENSIONS REPRESENT THREE-DIMENSIONAL PATH PROJECTIONS OF WHICH THE ROOF'S PITCH CAN INFLUENCE THE ACCURACY OF THE MEASUREMENTS.



SCOTT ROMAN
SENIOR PROJECT MANAGER
419-262-9966
JOSE PEREZ
PROJECT MANAGER
401-692-5069



ELECTRICAL
CERTIFICATION

SALINE MIDDLE SCHOOL
7190 N MAPLE RD
SALINE, MI 48176

DRAWN BY
JM

CHECKED BY
RB

DATE
19-Apr-2024

DRAWING LEVEL
ISSUED FOR
CONSTRUCTION

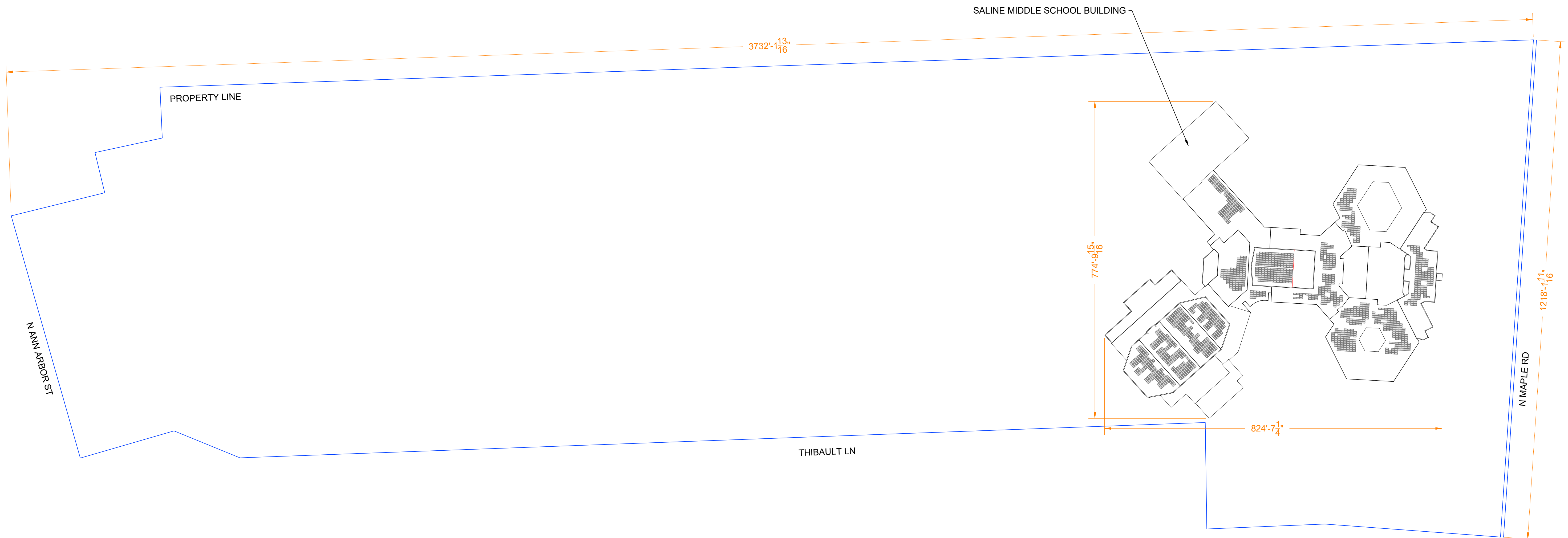
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|------|-------------|--|
| A | 19-APR-2024 | |
| B | | |
| C | | |
| D | | |
| E | | |

SHEET SIZE
36X24 SHOULD
MEASURE 1":

SCALE
1:1500

SHEET TITLE

G10
OVERALL
SITE PLAN



NOTES:

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LEGEND

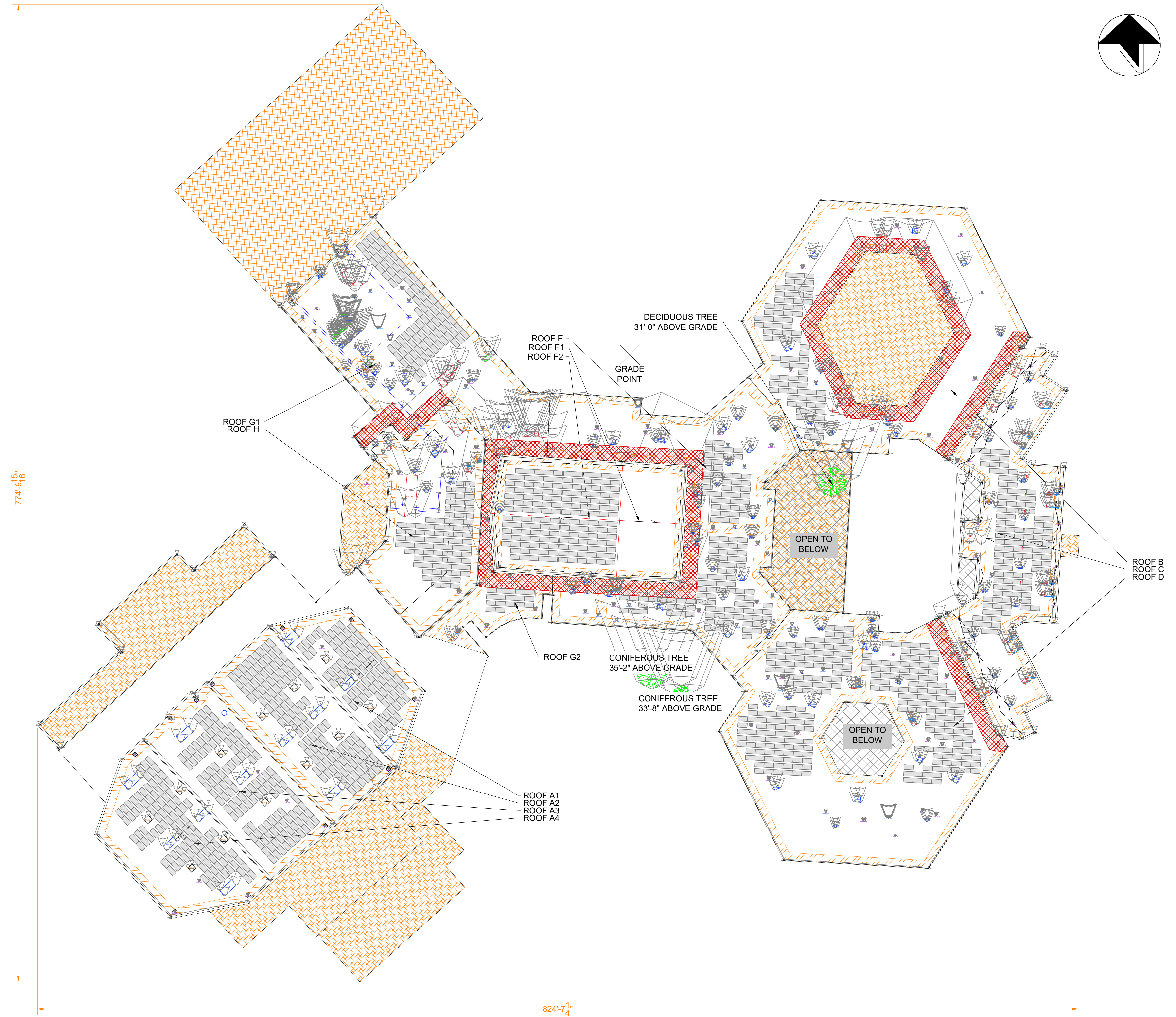
| | | | |
|--|--------------------|--|------------------|
| | DRAIN | | ACCESS |
| | VENT | | ELECTRICAL |
| | GAS | | ROOF SEAM |
| | RTU | | SATELLITE |
| | BOX | | SKYLIGHT |
| | SHADOW | | SUPPORT |
| | TREE | | UNSURVEYED |
| | RIDGE | | FIRE ACCESS PATH |
| | STRUCTURAL KEEPOUT | | |

PROJECT DETAILS

| | |
|-------------------|---------------------------|
| SYSTEM SIZE | 757.35 KWDC |
| NUMBER OF MODULES | 1377 |
| MODULE MODEL | ZNSHINE ZXM7-SHDB144 550W |
| MODULE SIZE | 89.68" X 44.65" |
| SITE SURVEY DATE | 26-02-2024 |

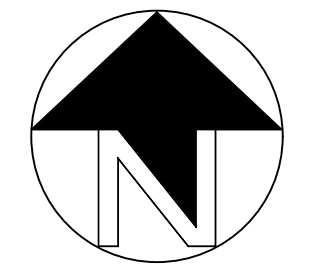
ROOF DETAILS

| ROOF # | PITCH | ARRAY AZIMUTH | MODULE TILT | MODULE COUNT | MATERIAL | HEIGHT ABOVE GRADE |
|--------|-------|---------------|-------------|--------------|----------|--------------------|
| A1 | 1° | 228° | 10° | 85 | BUR | 33'-10" |
| A2 | FLAT | 228° | 10° | 119 | BUR | 34'-2" |
| A3 | FLAT | 228° | 10° | 119 | BUR | 34'-2" |
| A4 | 1° | 228° | 10° | 102 | BUR | 33'-10" |
| B | FLAT | 183° | 10° | 85 | EPDM | 12'-4" |
| C | 1° | 183° | 10° | 117 | EPDM | 14'-6" |
| D | FLAT | 183° | 10° | 265 | EPDM | 12'-4" |
| E | FLAT | 183° | 10° | 133 | EPDM | 12'-4" |
| F1 | 9.5° | - | - | - | EPDM | 25'-4" |
| F2 | 4.7° | 183° | 10° | 165 | EPDM | 25'-4" |
| G1 | FLAT | 228° | 10° | 85 | EPDM | 12'-9" |
| G2 | FLAT | 183° | 10° | 17 | EPDM | 12'-9" |
| H | FLAT | 183° | 10° | 85 | EPDM | 19'-3" |



774'-9¹⁵/₁₆"

824'-7¹/₄"



AMERESCO
 Solar • Commercial • Residential

SCOTT ROMAN
 SENIOR PROJECT MANAGER
 419-262-9966

JOSE PEREZ
 PROJECT MANAGER
 401-692-5069

EXACTUS ENERGY
 NEW AGE ENGINEERING

ELECTRICAL
 CERTIFICATION

SALINE MIDDLE SCHOOL
 7190 N MAPLE RD
 SALINE, MI 48176

DRAWN BY
 JM

CHECKED BY
 RB

DATE
 19-Apr-2024

DRAWING LEVEL
 ISSUED FOR CONSTRUCTION

| DRAWING LEVEL | ISSUED FOR CONSTRUCTION |
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| DATE | 19-APR-2024 |
|------|-------------|
| REV. | A B C D E |

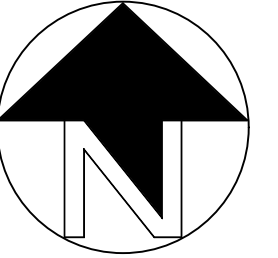
SHEET SIZE
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 MEASURE 1":

SCALE
 1:450

SHEET TITLE
G20
 ARRAY PLAN

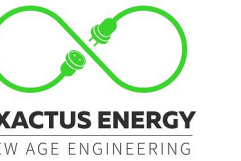
NOTES:

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SCOTT ROMAN
SENIOR PROJECT MANAGER
419-262-9966

JOSE PEREZ
PROJECT MANAGER
401-692-5069



ELECTRICAL
CERTIFICATION

SALINE MIDDLE SCHOOL
7190 N MAPLE RD
SALINE, MI 48176

DRAWN BY
JM

CHECKED BY
RB

DATE
19-Apr-2024

DRAWING LEVEL
ISSUED FOR CONSTRUCTION

| DRAWING LEVEL | ISSUED FOR CONSTRUCTION |
|---------------|-------------------------|
| | |

| REV. | DATE |
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| A | 19-APR-2024 |
| B | |
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| E | |

SHEET SIZE
36X24 SHOULD
MEASURE 1":

SCALE
1:450

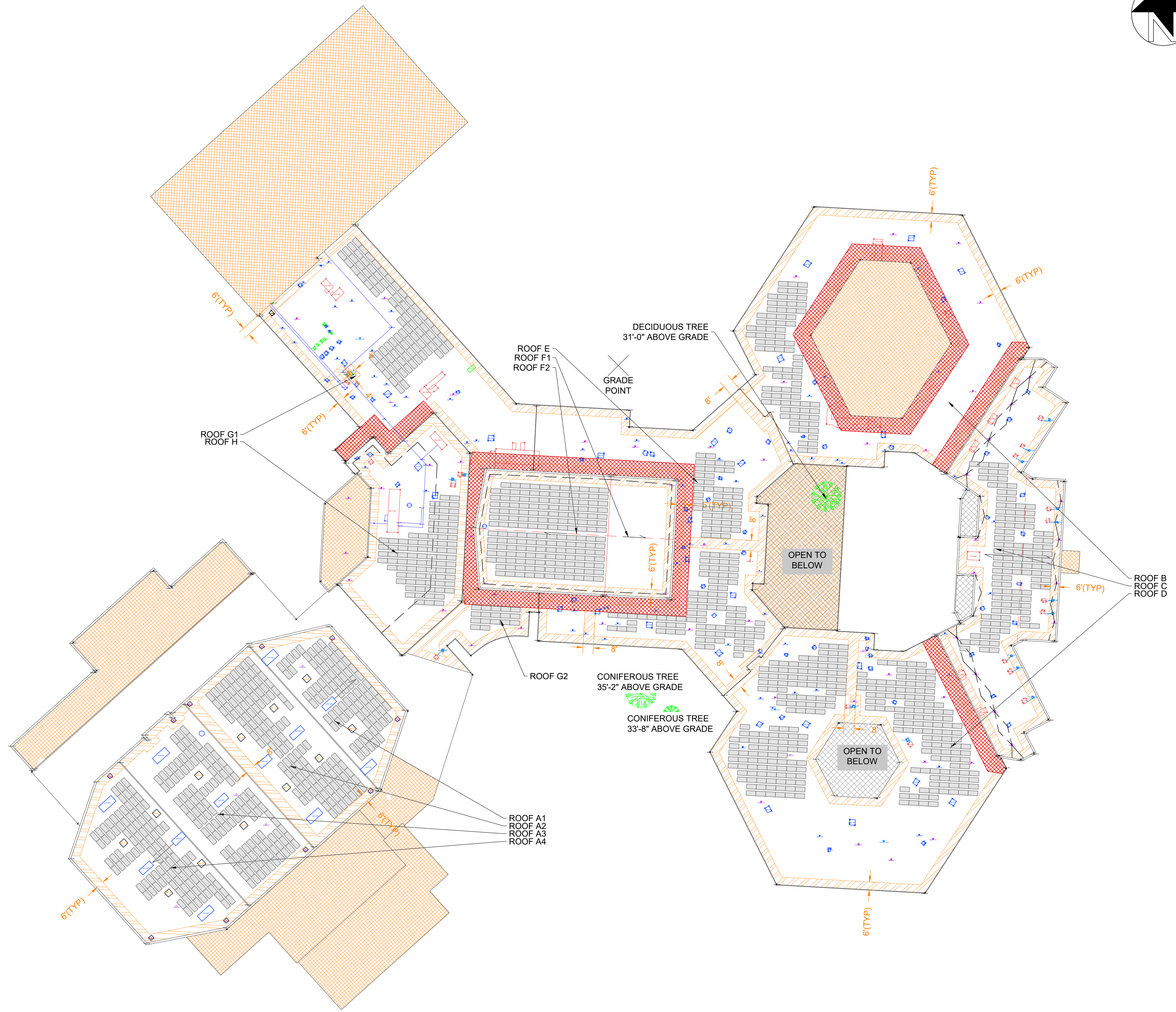
SHEET TITLE

G30
FIRE ACCESS
PLAN

| LEGEND | | | |
|--------|---------------------|--|------------------|
| | DRAIN | | ACCESS |
| | VENT | | ELECTRICAL |
| | GAS | | ROOF SEAM |
| | RTU | | SATELLITE |
| | BOX | | SKYLIGHT |
| | SHADOW | | SUPPORT |
| | TREE | | UNSURVEYED |
| | RIDGE | | FIRE ACCESS PATH |
| | STRUCTURAL KEEP-OUT | | |

| PROJECT DETAILS | |
|-------------------|---------------------------|
| SYSTEM SIZE | 757.35 KWDC |
| NUMBER OF MODULES | 1377 |
| MODULE MODEL | ZNSHINE ZXM7-SHDB144 550W |
| MODULE SIZE | 89.68" X 44.65" |
| SITE SURVEY DATE | 26-02-2024 |

| ROOF DETAILS | | | | | | |
|--------------|-------|---------------|-------------|--------------|----------|--------------------|
| ROOF # | PITCH | ARRAY AZIMUTH | MODULE TILT | MODULE COUNT | MATERIAL | HEIGHT ABOVE GRADE |
| A1 | 1° | 228° | 10° | 85 | BUR | 33'-10" |
| A2 | FLAT | 228° | 10° | 119 | BUR | 34'-2" |
| A3 | FLAT | 228° | 10° | 119 | BUR | 34'-2" |
| A4 | 1° | 228° | 10° | 102 | BUR | 33'-10" |
| B | FLAT | 183° | 10° | 85 | EPDM | 12'-4" |
| C | 1° | 183° | 10° | 117 | EPDM | 14'-6" |
| D | FLAT | 183° | 10° | 265 | EPDM | 12'-4" |
| E | FLAT | 183° | 10° | 133 | EPDM | 12'-4" |
| F1 | 9.5° | - | - | - | EPDM | 25'-4" |
| F2 | 4.7° | 183° | 10° | 165 | EPDM | 25'-4" |
| G1 | FLAT | 228° | 10° | 85 | EPDM | 12'-9" |
| G2 | FLAT | 183° | 10° | 17 | EPDM | 12'-9" |
| H | FLAT | 183° | 10° | 85 | EPDM | 19'-3" |



ELECTRICAL NOTES SPECIFIC TO PHOTOVOLTAIC SYSTEMS

- UNLESS SPECIFIED OTHERWISE THIS SOLAR PV SYSTEM IS CONNECTED TO OPERATE IN PARALLEL WITH UTILITY ELECTRICAL SERVICE.
- ALL EQUIPMENT (INCLUDING PV INVERTERS, COMBINERS, PULL BOXES, ENCLOSURES) SHALL BE LISTED BY A NATIONAL RECOGNIZED TESTING LABORATORY (NRTL) FOR ITS PURPOSE.
- INVERTERS TO BE INSTALLED AT 90° (VERTICAL) UNLESS OTHERWISE NOTED.
- CONDUITS AND CABLES SHALL NOT ENTER THE TOP OF ANY OUTDOOR ENCLOSURE UNLESS OTHERWISE NOTED OR REVIEWED AND APPROVED BY PROJECT ENGINEER.
- ALL CIRCUIT BREAKERS INSTALLED THAT ARE SUBJECT TO REVERSE POWER FLOW SHALL BE LISTED AND LABELED AS BACKFEED COMPATIBLE.

WIRING AND WIRING METHODS

CONDUITS AND RACEWAYS

- HAND HOLE, PULL BOXES, OR CONDUIT BODIES SHALL BE INSTALLED WHEN RACEWAY HAS MORE THAN 360° OF WIRE BENDS.
- RMC TO BE USED WHEN CONDUIT IS EXPOSED TO DAMAGE OR BETWEEN POINT OF INTERCONNECTION AND FIRST OVERCURRENT PROTECTION DEVICE (EXCLUDING CABLE LIMITERS) WHEN MAKING SUPPLY-SIDE CONNECTIONS TO EXISTING EQUIPMENT.
- EXPANSION FITTING (WITH BONDING JUMPERS) TO BE INSTALLED FOR EVERY 100' OF STRAIGHT METAL CONDUIT RUN AND WHERE CONDUIT RUN PASSES OVER EXISTING EXPANSION JOINT.
- EMT ACCEPTABLE AS RACEWAY WHERE NOT EXPOSED TO PHYSICAL DAMAGE. OTHERWISE IMC OR RMC SHALL BE USED.
- USE MYERS (OR APPROVED EQUIVALENT) HUB LISTED TO PROVIDE MOISTURE PROTECTION FOR CONDUIT ENTRANCES IN ALL APPLICABLE LOCATIONS.
- LIQUID TIGHT FLEXIBLE METAL CONDUIT IS GENERALLY SUITABLE FOR INSTALLATION IN WET AND DRY LOCATIONS. SHOULD IT BE EMPLOYED, SUPPORTS WILL BE NO MORE 12 INCHES FROM BOXES (JUNCTION BOX, CABINETS, OR CONDUIT FITTING) AND NO MORE THAN 36 INCHES APART.
- FURNISH AND INSTALL ALL FITTINGS AND SPECIAL DEVICES NECESSARY FOR THE PROPER INSTALLATION, CONNECTION AND OPERATION OF THE SYSTEM. CONDUIT ELBOWS SHALL BE OF THE SAME MAKE, QUALITY AND FINISH AS THE CONDUIT USED.
- SUPPORT AND SECURELY FASTEN CONDUIT AS PER NEC CHAPTER 3 REQUIREMENTS FOR THE SPECIFIC CONDUIT TYPE.
- OUTDOOR CONDUITS WITH A NEGATIVE SLOPE TOWARDS ELECTRICAL EQUIPMENT SHALL HAVE A PULL BOX OR VAULT ADJACENT TO THE ENTRY POINT INTO THE ELECTRICAL EQUIPMENT. EQUIP PULL BOXES WITH METHOD FOR DRAINING CONDENSATION AND/OR WATER ENTRY.
- CONDUIT SHALL BE TYPE LFMC FOR A MINIMUM OF 24" WHERE CONDUIT CONNECTIONS ARE MADE TO DRY-TYPE TRANSFORMERS.
- PV SOURCE CIRCUITS AND PV OUTPUT CIRCUITS USING SINGLE-CONDUCTOR CABLE LISTED AND IDENTIFIED AS PHOTOVOLTAIC (PV) WIRE OF ALL SIZES, WITH OR WITHOUT A CABLE TRAY MARKING/RATING, SHALL BE PERMITTED IN CABLE TRAYS INSTALLED IN OUTDOOR LOCATIONS, PROVIDED THAT THE CABLES ARE SUPPORTED AT INTERVALS NOT TO EXCEED 12" AND SECURED AT INTERVALS NOT TO EXCEED 54".
- WHEREVER THE CONDUIT ENTERS OR LEAVES THE BUILDING ENVELOPE THE RACEWAY OR SLEEVE SHALL BE FILLED WITH AN APPROVED MATERIAL TO PREVENT THE CIRCULATION OF WARM AIR TO A COLDER SECTION OF THE RACEWAY OR SLEEVE, PER NEC 300.7(A).

CONDUCTORS AND CONDUCTOR INSTALLATION

- SEE TABLE 1 FOR LOW VOLTAGE CONDUCTOR COLOR CODING.
- EXPOSED PV SOLAR MODULE WIRING WILL BE PV WIRE, 90°C, WET RATED AND UV RESISTANT - NO EXCEPTIONS. STRING WIRING AND HOMERUNS SHALL BE SECURED TO UNDERSIDE OF RACKING AND MODULES USING ZIP TIES OUTDOOR RATED FOR UV OR INDUSTRY APPROVED ALTERNATIVE.
- THE MATING CONNECTORS SHALL BE OF THE LATCHING OR LOCKING TYPE. WHERE MATING CONNECTORS ARE NOT OF THE IDENTICAL TYPE AND BRAND, THEY SHALL BE LISTED AND IDENTIFIED FOR INTERMATABILITY, AS DESCRIBED IN THE MANUFACTURER'S INSTRUCTIONS.
- PV STRING HOME RUNS SHALL BE LABELED ON BOTH ENDS, AT ARRAY AND INVERTERS. INVERTER OUTPUT CONDUCTORS SHALL BE LABELED AT BOTH ENDS, AT INVERTER AND PANELBOARD. LABELS SHALL MATCH DESIGNATIONS IN THESE DRAWINGS.
- THE PHOTOVOLTAIC SOURCE CIRCUITS AND PHOTOVOLTAIC OUTPUT CIRCUITS OF THIS PROPOSED SOLAR SYSTEM SHALL NOT BE CONTAINED IN THE SAME RACEWAY, CABLE TRAY, CABLE, OUTLET BOX, JUNCTION BOX, OR SIMILAR FITTING AS FEEDERS OR BRANCH CIRCUITS OF OTHER SYSTEMS UNLESS THE CONDUCTORS OF THE DIFFERENT SYSTEMS ARE SEPARATED BY A PARTITION OR ARE CONNECTED TOGETHER.
- WHEN PERFORMING TERMINATIONS WITH ALUMINUM WIRE, STRIP INSULATION TO EXPOSE APPROPRIATE

LENGTH OF CONDUCTOR, APPLY CORROSION INHIBITING COMPOUND AND WORK INTO CONDUCTOR WITH EMERY CLOTH OR WIRE BRUSH, APPLY COMPOUND TO TERMINATION (IF NOT PROVIDED BY MANUFACTURER), MAKE TERMINATION AND CLEAN EXCESS COMPOUND FROM INSULATION AND TERMINATION. MANUFACTURER'S SPECIFICAITONS FOR CABLE AND TERMINATIONS (MECHANICAL OR COMPRESSION-TYPE) SHALL BE FOLLOWED FOR ALL TERMINATIONS.

- ALL TERMINATIONS, WHETHER MECHANICAL, COMPRESSION OR PART OF ASSEMBLIES SUCH AS CIRCUIT BREAKERS SHALL BE RATED FOR THE SIZE AND TYPE (CU/AL) OF CONDCUTOR TO BE TERMINATED. COORDINATE NUMBER AND TYPE OF TERMINATIONS BETWEEN CONDUCTOR SIZE(S) ON PLANS AND EQUIPMENT.
- CONNECTION SHALL BE TORQUED PER DEVICE LISTING, OR MANUFACTURES RECOMMENDATIONS. CONNECTORS ARE TO BE MARKED WITH PERMANENT MARKING PAINT, AFTER TORQUING.
- SUPPORT CONDUCTORS IN VERTICAL CONDUITS IN ACCORDANCE WITH THE REQUIREMENTS OF NEC.
- ALL BARE CU WIRES SHALL BE INSTALLED AWAY FROM CONTACT WITH DISSIMILAR METALS.
- ALL LOW VOLTAGE AC WIRING SHALL BE TYPE THWN-2 RATED AT 90°C UNLESS OTHERWISE NOTED. XHHW-2 IS ALSO ACCEPTABLE.
- PV WIRE SHALL BE SUPPORTED AND SECURED BY CABLE TIES LISTED AND IDENTIFIED FOR SECUREMENT AND SUPPORT (OR SIMILAR FITTINGS DESIGNED AND INSTALLED SO AS NOT TO DAMAGE THE CABLE) AT INTERVALS NOT EXCEEDING 24" AND WITHIN 12" OF EVERY CABLE ENTRY INTO ENCLOSURES SUCH AS JUNCTION BOXES.
- CONTRACTOR SHALL AVOID LOCATING ROOF-MOUNTED CONDUITS IN IDENTIFIED FIRE PATHS/FIRE CLEARANCE AREAS. IF CONDUIT IS TO BE RUN IN THESE AREA, IT SHALL BE FOR AS SHORT A DISTANCE AS POSSIBLE.

GROUNDING

- THE CONTRACTOR SHALL FURNISH AND INSTALL GROUNDING NECESSARY IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.
- PHOTOVOLTAIC INVERTERS SHALL BE EQUIPPED WITH INTEGRATED GROUND FAULT AND ARC FAULT PROTECTION TO REDUCE FIRE HAZARDS.
- ONLY ONE CONNECTION TO DC CIRCUITS AND ONE CONNECTION TO AC CIRCUITS WILL BE USED FOR SYSTEM GROUNDING.
- EQUIPMENT GROUNDING CONDUCTORS AND SYSTEM GROUNDING CONDUCTORS WILL HAVE AS SHORT A DISTANCE TO GROUND AS POSSIBLE AND A MINIMUM NUMBER OF TURNS.
- NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER GROUNDING; NOTING THAT TERMINAL LUGS BOLTED ON AN ENCLOSURE'S FINISHED SURFACE MAY BE INSULATED BY PAINT/FINISH. PAINT AT POINT OF CONTACT SHALL BE PROPERLY REMOVED TO ENSURE GROUND CONNECTION.
- RACKING COMPONENTS AND STRUCTURAL SUPPORTS MUST BE ELECTRICALLY BONDED TOGETHER BY AN ACCEPTABLE MEANS. PROPOSED RACKING SHALL BE UL2703 LISTED AND INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
- MODULES SHALL BE GROUNDED WITH EQUIPMENT GROUNDING CONDUCTORS BONDED TO A LOCATION APPROVED BY THE MANUFACTURER WITH A MEANS OF BONDING LISTED FOR THIS PURPOSE.
- GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, INCLUDING BUT NOT LIMITED TO GROUND RODS, GROUNDING LUGS, GROUNDING CLAMPS, ETC.
- ALL EQUIPMENT GROUNDING CONDUCTORS SHALL BE COPPER, UNLESS OTHERWISE NOTED.

GENERAL EQUIPMENT/ENCLOSURES

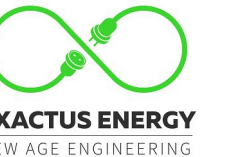
- PROVIDE DANGER WARNING, AND CAUTION LABELS AS REQUIRED BY NESC, NEC OR OSHA STANDARDS ON EQUIPMENT ENCLOSURES, DOORS, ACCESS PLATES AND BARRIERS.
- ALL OUTDOOR ENCLOSURES SHALL BE NEMA 3R, 4 OR 4X.
- ALL OUTDOOR ENCLOSURES REQUIRE AN APPROVED MEANS OF DRAINAGE AND VENTILATION. ALL NEMA 3R SHALL BE EQUIPPED WITH A WEEP HOLE OR A LISTED DRAIN PLUG.
- UTILIZE RAINLIGHT FITTINGS FOR ALL CABLE ENTRIES. CONDUITS WITH ONE OPEN END (I.E. PV WIRE FROM UNDER PV ARRAY TRANSITIONING TO CONDUIT) SHALL BE SEALED TO PREVENT WATER INGRESS.
- WHERE DISCONNECTING MEANS OF EQUIPMENT OPERATING ABOVE 30V ARE READILY ACCESSIBLE TO UNQUALIFIED PERSONS, ANY ENCLOSURE DOOR OR HINGED COVER THAT EXPOSES LIVE PARTS WHEN OPEN SHALL BE LOCKED OR REQUIRE A TOOL TO OPEN.
- WHERE REQUIRED, EQUIPMENT SHALL BE ANCHORED TO CONCRETE PADS OR FOUNDATIONS PER MANUFACTURER'S INSTRUCTIONS USING GALVANIZED STEEL ANCHOR BOLTS EMBEDDED IN PAD OR WITH 6 INCH DEEP EPOXY ANCHOR BOLTS.
- WHERE ELECTRICAL EQUIPMENT IS INSTALLED IN A LOCATION THAT IS LIKELY TO BE EXPOSED TO PHYSICAL DAMAGE, THE ELECTRICAL EQUIPMENT SHALL BE APPROPRIATELY PROTECTED (I.E. BOLLARDS).

TABLE 1

| AC CONDUCTORS | | |
|-------------------------------------|--|---|
| VOLTAGE | 480Y/277V | 208Y/120V |
| PHASE A | BROWN | BLACK |
| PHASE B | ORANGE | RED |
| PHASE C | YELLOW | BLUE |
| GROUNDED (NEUTRAL) | GREY | WHITE |
| EQUIP. GROUND (EGC) | GREEN | |
| GROUNDING ELECTRODE CONDUCTOR (GEC) | GREEN | |
| DC CONDUCTORS | | |
| UNGROUND SOURCE CIRCUIT | (+) PERMANENTLY DYED RED. WHITE NOT PERMITTED. | (-) PERMANENTLY DYED BLACK. WHITE OR RED NOT PERMITTED. |
| EQUIPMENT GROUND (EGC) | GREEN OR BARE | |



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ELECTRICAL
CERTIFICATION

SALINE MIDDLE SCHOOL
7190 N MAPLE RD
SALINE, MI 48176

DRAWN BY
JM

CHECKED BY
RB

DATE
19-Apr-2024

DRAWING LEVEL
ISSUED FOR
CONSTRUCTION

| | | | | | |
|---------------|-------------------------|--|--|--|--|
| DRAWING LEVEL | ISSUED FOR CONSTRUCTION | | | | |
|---------------|-------------------------|--|--|--|--|

| | | | | | |
|------|-------------|---|---|---|---|
| DATE | 19-APR-2024 | | | | |
| REV. | A | B | C | D | E |

SHEET SIZE
36X24 SHOULD
MEASURE 1":

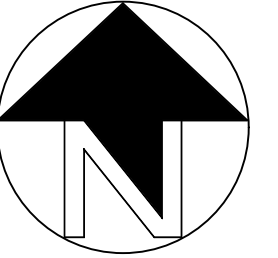
SCALE
NTS

SHEET TITLE

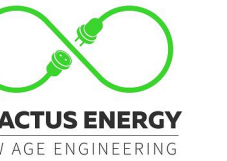
E01
ELECTRICAL
NOTES

NOTES:

1. ALL DIMENSIONS TO BE FIELD VERIFIED. LOCATIONS SHOWN ARE APPROXIMATE.
2. ALL PV ELECTRICAL EQUIPMENT TO BE INSTALLED AS PER INSTALLATION MANUALS AND NEC REQUIREMENTS.
3. CARE SHALL BE TAKEN TO ENSURE CONDUITS AND RACEWAYS ARE ORIENTED TO MINIMIZE INTERFERENCE WITH FIRE ACCESS WALKWAYS.
4. EXACT LOCATION AND SPACING OF PHOTOVOLTAIC MODULES TO BE ESTABLISHED ACCORDING TO THE FINAL CONFIGURATION DETERMINED BY INSTALLER AND RACKING MANUFACTURER
5. PROPERTY LINE DETERMINED FROM PUBLICLY AVAILABLE GIS DATA.
6. THIS DRAWING PROVIDES AN OVERVIEW ONLY AND AS SUCH SHOULD NOT BE RELIED ON FOR EXACT DIMENSIONS.
7. MODULE LAYOUT IS SUBJECT TO CHANGE BASED ON AVAILABLE STRUCTURAL CAPACITY AND POWER GRID AVAILABILITY.
8. ROOF AND MODULE LAYOUTS ARE BASED ON INFORMATION COLLECTED DURING THE SITE SURVEY. ROOF ALTERATIONS MADE AFTER THE SURVEY DATE WILL NOT BE REFLECTED IN THIS DRAWING.
9. TREES DO NOT SHADE ANY ROOF UNLESS TREE HEIGHT IS SPECIFIED.
10. ALL DIMENSIONS REPRESENT THREE-DIMENSIONAL PATH PROJECTIONS OF WHICH THE ROOF'S PITCH CAN INFLUENCE THE ACCURACY OF THE MEASUREMENTS.



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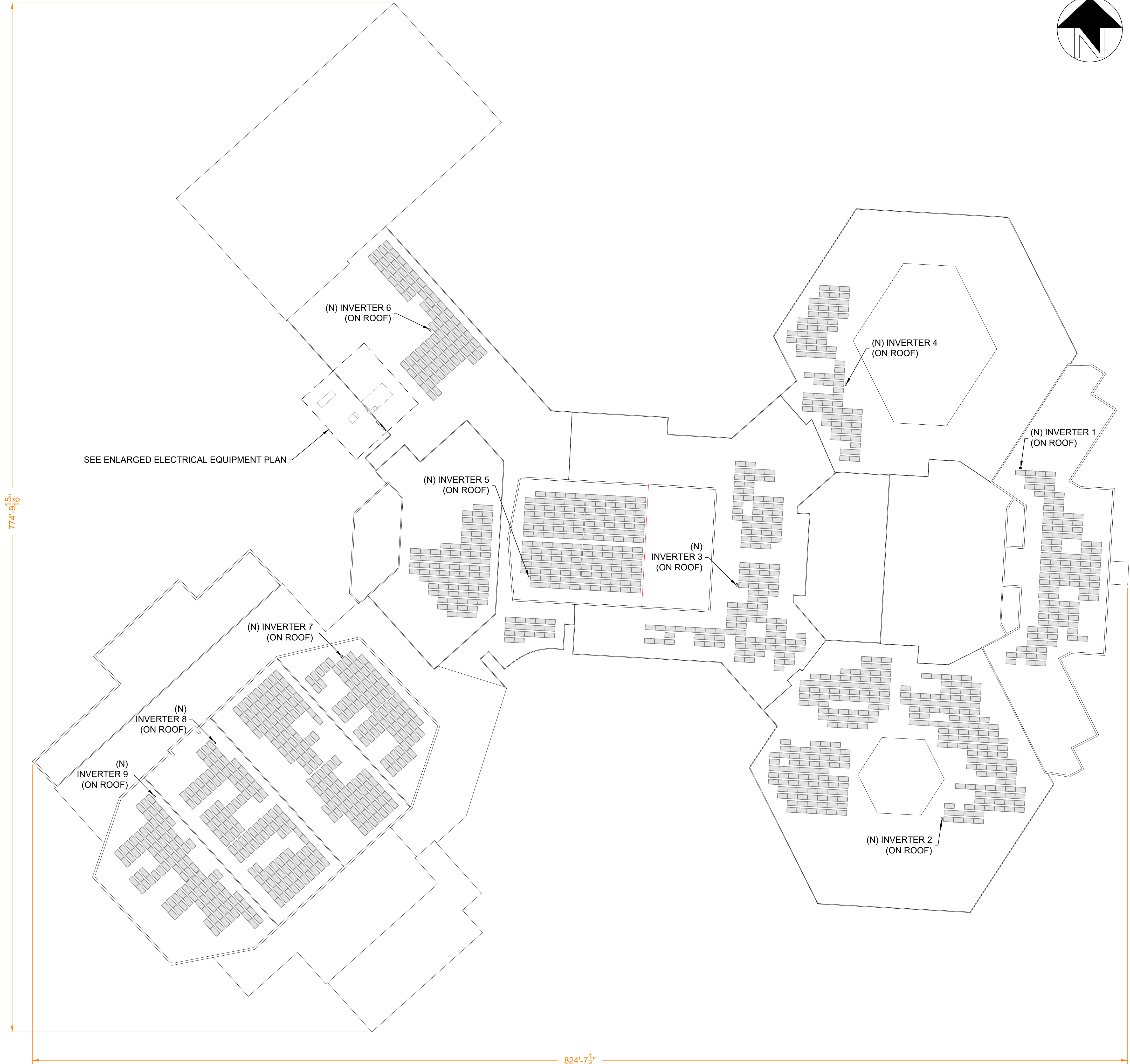
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| A | 19-APR-2024 | ISSUED FOR CONSTRUCTION |
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| C | | |
| D | | |
| E | | |

SHEET SIZE
36X24 SHOULD
MEASURE 1":

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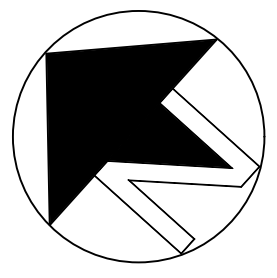
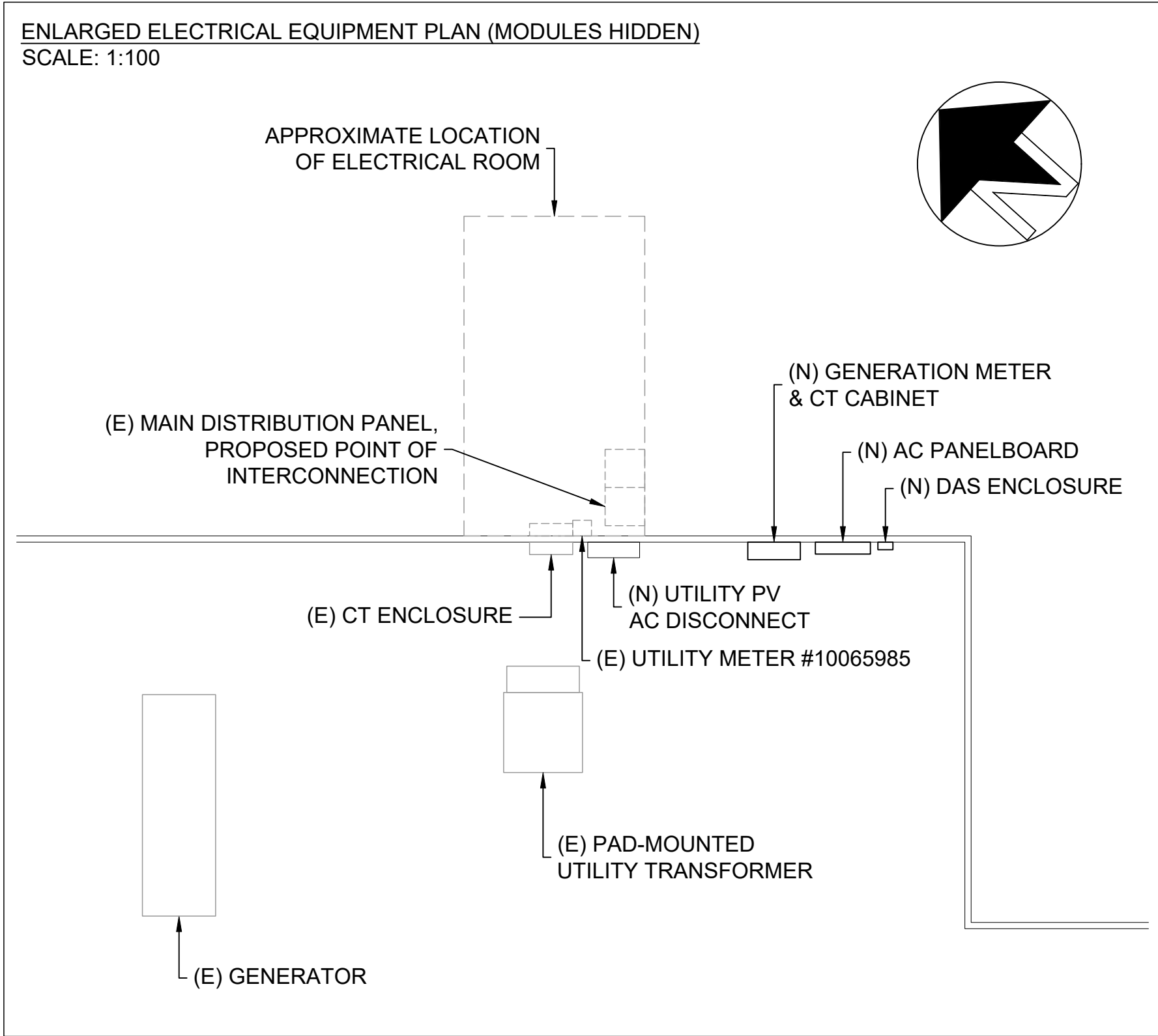
SHEET TITLE

E10
ELECTRICAL
SITE PLAN



774'-9¹⁵/₁₆"

824'-7¹/₄"



| | |
|---------------|-------------------------|
| DRAWING LEVEL | ISSUED FOR CONSTRUCTION |
|---------------|-------------------------|

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|------|-------------|
| DATE | 19-APR-2024 |
| REV. | A B C D E |

SHEET SIZE
36X24 SHOULD
MEASURE 1":

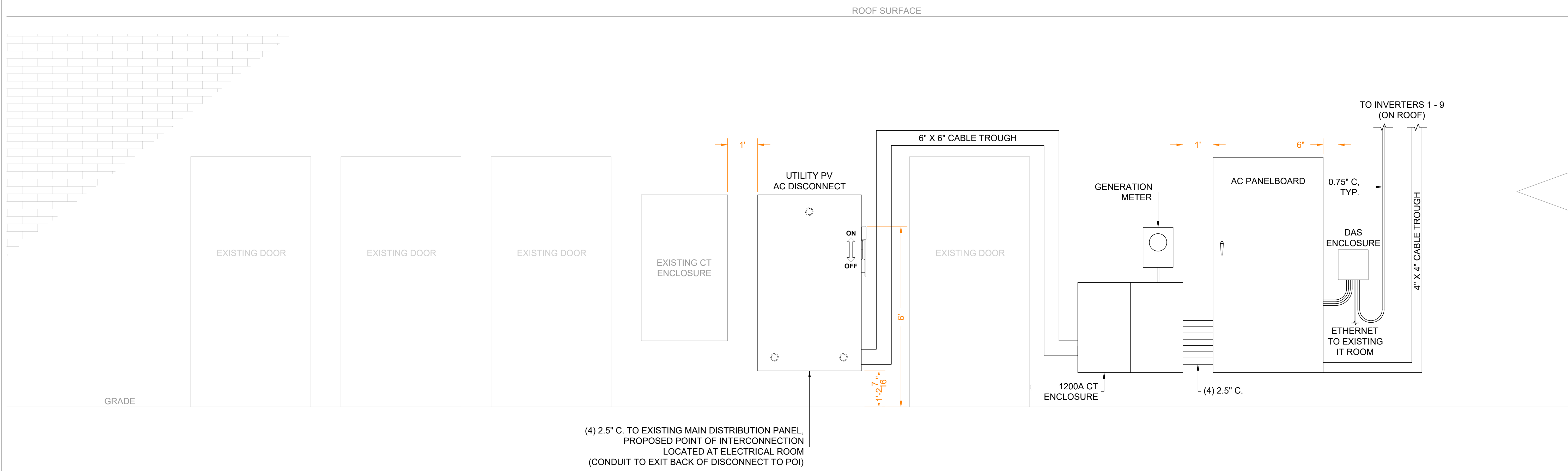
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AS NOTED

SHEET TITLE

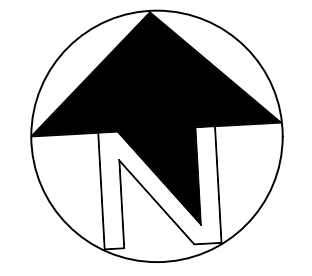
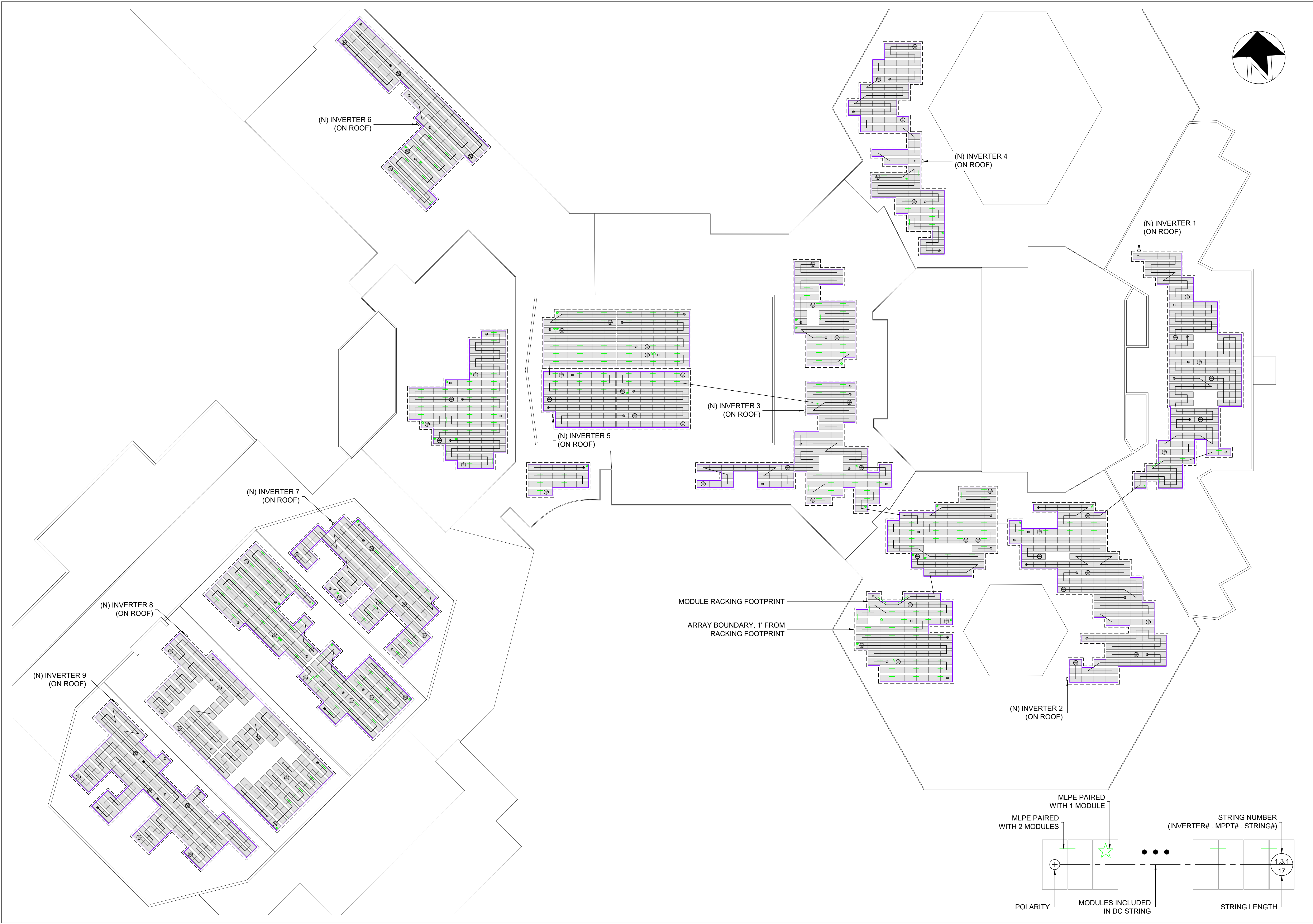
E11
EQUIPMENT PLAN
/ ELEVATION

NOTES:

- EQUIPMENT DIMENSIONS ARE APPROXIMATE. DIMENSIONS TO BE CONFIRMED PRIOR TO CONSTRUCTION.
- THE CENTER OF THE OPERATING HANDLE OF THE AC DISCONNECT SWITCH, WHEN IN ITS HIGHEST POSITION, SHALL NOT BE MORE THAN 6'-7" ABOVE GRADE AS PER NEC 404.8(A).
- MAXIMUM NUMBER OF CURRENT-CARRYING CONDUCTORS IN A WIRE TROUGH AT ANY GIVEN CROSS-SECTION SHALL NOT EXCEED 30 AS PER NEC 376.22(B). OTHERWISE FILL FACTOR DERATES MUST BE APPLIED.
- TROUGHS CAN BE SPLIT INTO MULTIPLE SECTIONS USING CONDUIT NIPPLES TO CONNECT THEM. CONDUIT NIPPLES SHALL NOT EXCEED A LENGTH OF 24".

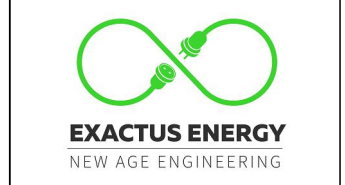


SCALE: 1:20



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ELECTRICAL
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7190 N MAPLE RD
SALINE, MI 48176

DRAWN BY
JM

CHECKED BY
RB

DATE
19-Apr-2024

DRAWING LEVEL
ISSUED FOR CONSTRUCTION

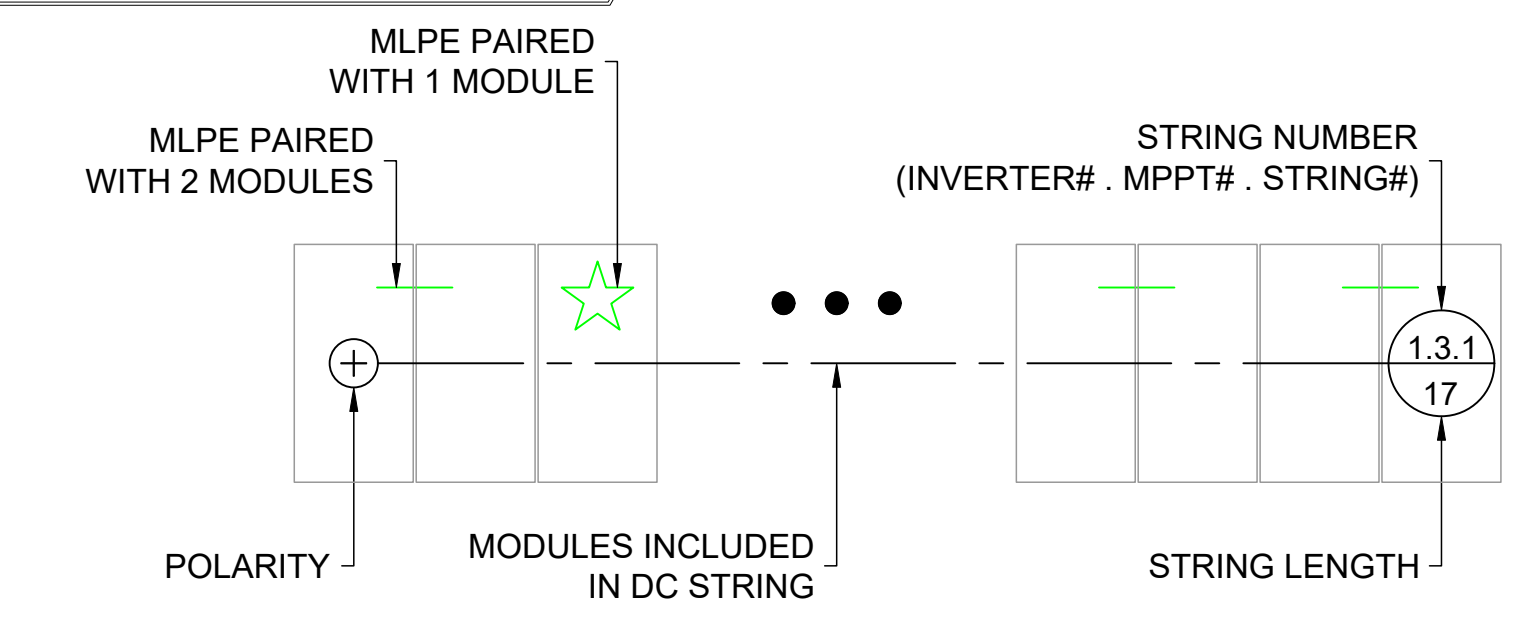
| REV. | DATE | DRAWING LEVEL |
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| A | 19-APR-2024 | ISSUED FOR CONSTRUCTION |
| B | | |
| C | | |
| D | | |
| E | | |

SHEET SIZE
36X24 SHOULD
MEASURE 1":

SCALE
1:300

SHEET TITLE

E20
DC STRINGING
PLAN



MAX STRING LENGTH CALCULATION:

INVERTER MAKE: CPS
 INVERTER MODEL: SCA60KTL-DO/US-480

INVERTER MAX DC VOLTAGE: 1000VDC

CALCULATION: INVERTER MAX DC / MODULE VOC @ MIN T
 1000 / 58.79 = 17.01 = 17 MODULES

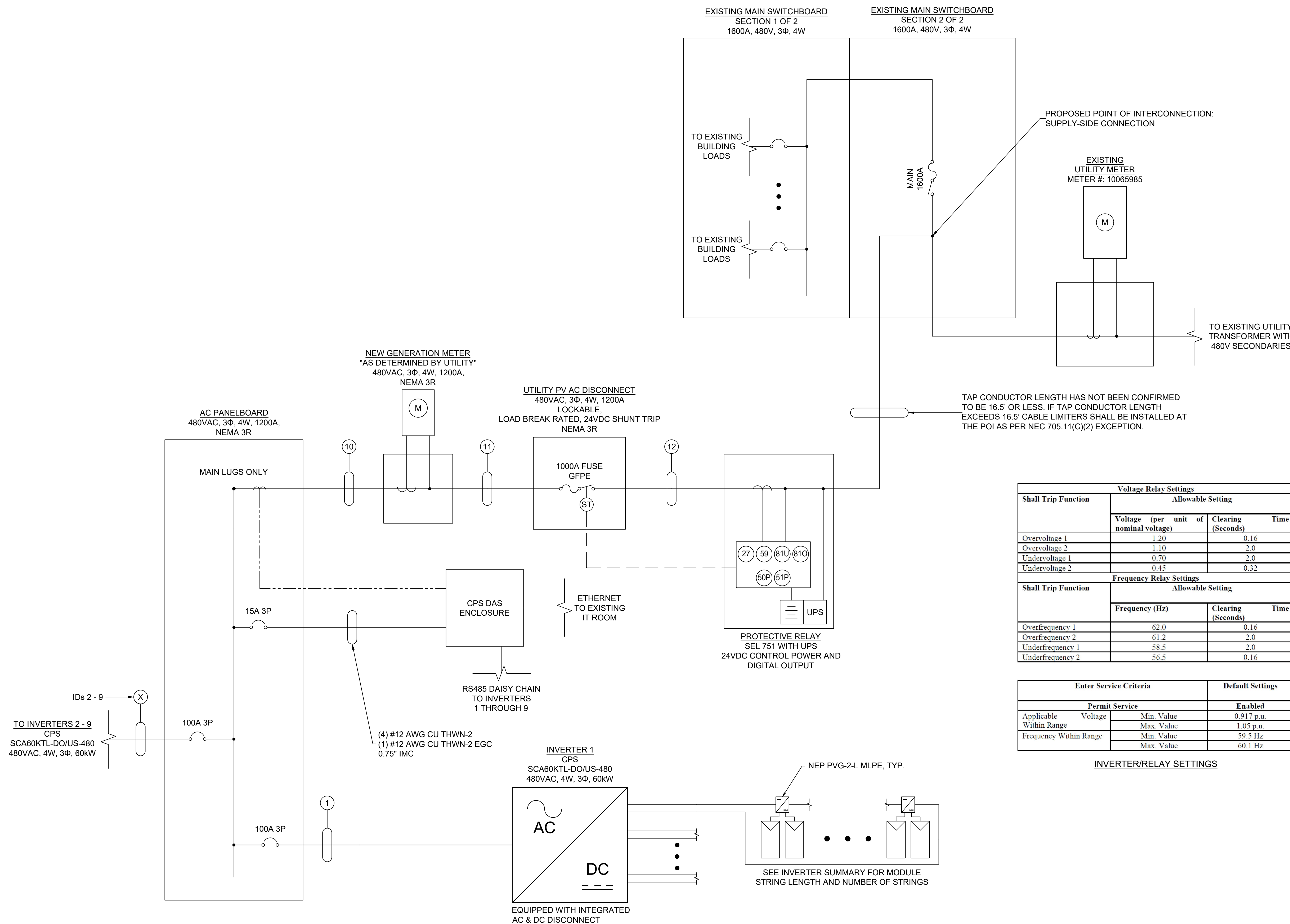
POINT OF INTERCONNECTION NOTES:

- PRIOR TO COMMENCEMENT OF INSTALLATION, THE ELECTRICAL CONTRACTOR SHALL OPEN AND VISUALLY INSPECT THE ELECTRICAL EQUIPMENT WHERE THE POI HAS BEEN PROPOSED. IF ANY ISSUES OR DISCREPANCIES ARE OBSERVED WITH RESPECT TO WHAT IS SHOWN ON THE DRAWINGS AND THE DESIGN INTENT, THE ELECTRICAL CONTRACTOR SHALL PROVIDE DETAIL ON THE POTENTIAL ISSUE AND INDICATE AN ALTERNATIVE APPROACH / SUGGESTIONS FOR THE POI.
- THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE BEST METHOD TO TERMINATE THE CONDUCTORS AT THE PROPOSED POI. IF THE PROPOSED CONNECTION WILL VOID THE UL (UNDERWRITERS LABORATORY) LISTING OF THE EQUIPMENT (E.G. DRILLING BUSBARS), THE ELECTRICAL CONTRACTOR SHALL ARRANGE FOR THE SERVICES OF A UL TECHNICIAN TO APPROVE THE CONNECTION METHOD PRIOR TO COMMENCING WORK, TO WITNESS THE INSTALLATION, AND TO CERTIFY THE MODIFICATIONS ARE ACCEPTABLE BY APPLYING A UL LABEL TO THE MODIFIED EQUIPMENT.

AC CONDUCTOR SCHEDULE

| ID | From | To | Phase | AC Voltage | Circuit Current | 80% or 100% Rated OCPD? | Circuit Current x 125% | OCPD (If Present) | Parallel Conduit Runs | Material | Conductor Type | # of CCCs | Fill Factor | Ambient Temp. | Temp. Factor | Conductor Size | Ampacity @ 75°C | Max Ampacity | Derated Ampacity | # of Neutrals | Neutral Size | Ground | Ground Material | Ground Type | Ground Size | Conduit Type | Conduit Size | 1-Way Length | Voltage Drop |
|----|--------------------------|--------------------------|-------|------------|-----------------|-------------------------|------------------------|-------------------|-----------------------|----------|----------------|-----------|-------------|---------------|--------------|----------------|-----------------|--------------|------------------|---------------|--------------|--------|-----------------|-------------|-------------|--------------|--------------|--------------|--------------|
| 1 | String Inverter 1 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1/0 AWG | 120 (A) | 135 (A) | 135.0 (A) | 1 | 1/0 AWG | EGC | CU | THWN-2 | 6 AWG | EMT | 1.50 (in.) | 530 (ft) | 2.78% |
| 2 | String Inverter 2 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 2/0 AWG | 135 (A) | 150 (A) | 150.0 (A) | 1 | 2/0 AWG | EGC | CU | THWN-2 | 6 AWG | EMT | 2.00 (in.) | 730 (ft) | 3.02% |
| 3 | String Inverter 3 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 400 (ft) | 2.64% |
| 4 | String Inverter 4 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 395 (ft) | 2.60% |
| 5 | String Inverter 5 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 245 (ft) | 1.61% |
| 6 | String Inverter 6 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 125 (ft) | 0.82% |
| 7 | String Inverter 7 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 240 (ft) | 1.58% |
| 8 | String Inverter 8 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 400 (ft) | 2.64% |
| 9 | String Inverter 9 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1/0 AWG | 120 (A) | 135 (A) | 135.0 (A) | 1 | 1/0 AWG | EGC | CU | THWN-2 | 6 AWG | EMT | 1.50 (in.) | 490 (ft) | 2.57% |
| 10 | Solar AC Panelboard | New Generation Meter | 3Φ | 480 (V) | 649.8 (A) | 80% | 812.3 (A) | 1000 (A) | 4 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 350 kcmil | 1000 (A) | 1120 (A) | 1120.0 (A) | 1 | 350 kcmil | EGC | CU | THWN-2 | 2/0 AWG | EMT | 2.50 (in.) | 5 (ft) | 0.02% |
| 11 | New Generation Meter | Utility PV AC Disconnect | 3Φ | 480 (V) | 649.8 (A) | 80% | 812.3 (A) | 1000 (A) | 4 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 350 kcmil | 1000 (A) | 1120 (A) | 1120.0 (A) | 1 | 350 kcmil | EGC | CU | THWN-2 | 2/0 AWG | EMT | 2.50 (in.) | 12 (ft) | 0.04% |
| 12 | Utility PV AC Disconnect | POI | 3Φ | 480 (V) | 649.8 (A) | 80% | 812.3 (A) | 1000 (A) | 4 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 350 kcmil | 1000 (A) | 1120 (A) | 1120.0 (A) | 1 | 350 kcmil | GEC | CU | THWN-2 | 2/0 AWG | EMT | 2.50 (in.) | 10 (ft) | 0.04% |

| SYSTEM CHARACTERISTICS | |
|---------------------------------------|--------------------|
| DC SIZE (kW DC) | 757.35 |
| AC SIZE (kW AC) | 540.00 |
| DOA RATIO | 1.40 |
| MODULE INFORMATION | |
| MANUFACTURER | ZN SHINE SOLAR |
| MODEL NUMBER(S) | ZXM7-SHDB144-550 |
| P _{MAX} @ STC (W) | 550 |
| ISC (A) | 13.89 |
| IMP (A) | 13.13 |
| VOC (V) | 50.2 |
| VMP (V) | 41.9 |
| TEMP COEFF OF VOC (%/°C) | -0.29 |
| TEMP COEFF OF P _{MAX} (%/°C) | -0.35 |
| VOC @ MIN TEMP. | 58.79 |
| VMP @ MAX TEMP. | 36.2 |
| NUMBER OF MODULES | 1377 |
| INVERTER INFORMATION | |
| MANUFACTURER | CPS |
| MODEL NUMBER(S) | SCA60KTL-DO/US-480 |
| MAXIMUM DC INPUT VOLTAGE (V) | 1000 |
| MAXIMUM DC INPUT POWER (W) | 90000 |
| NOMINAL AC OUTPUT VOLTAGE (V) | 480 |
| MPPT OPERATING VOLTAGE RANGE (V) | 200 - 950 |
| NOMINAL AC POWER (W) | 60000 |
| MAX CONTINUOUS OUTPUT CURRENT (A) | 72.2 |
| NUMBER OF INVERTERS | 9 |
| MLPE INFORMATION | |
| MANUFACTURER | NEP |
| MODEL NUMBER(S) | PV2-L |
| MODULES PER MLPE | 2 |
| MAXIMUM SYSTEM VOLTAGE (V) | 1500 |
| RATED DC INPUT POWER (W) | N/A |
| MAX VOLTAGE PER INPUT (V) | 90 |
| RSD INTEGRATED? | Yes |
| NUMBER OF MLPES | 378 |



| Shall Trip Function | Voltage Relay Settings | | |
|---------------------|--------------------------|--------------------|------|
| | Allowable Setting | Clearing (Seconds) | Time |
| Overvoltage 1 | 1.20 | 0.16 | |
| Overvoltage 2 | 1.10 | 2.0 | |
| Undervoltage 1 | 0.70 | 2.0 | |
| Undervoltage 2 | 0.45 | 0.32 | |
| Shall Trip Function | Frequency Relay Settings | | |
| | Allowable Setting | Clearing (Seconds) | Time |
| Overfrequency 1 | 62.0 | 0.16 | |
| Overfrequency 2 | 61.2 | 2.0 | |
| Underfrequency 1 | 58.5 | 2.0 | |
| Underfrequency 2 | 56.5 | 0.16 | |

| Enter Service Criteria | | Default Settings |
|------------------------|------------|------------------|
| Permit Service | | Enabled |
| Applicable Voltage | Min. Value | 0.917 p.u. |
| Within Range | Max. Value | 1.05 p.u. |
| Frequency | Min. Value | 59.5 Hz |
| Within Range | Max. Value | 60.1 Hz |

INVERTER/RELAY SETTINGS

AMERESCO
 Senior Project Manager: SCOTT ROMAN (419-262-9966)
 Project Manager: JOSE PEREZ (401-692-5069)

EXACTUS ENERGY
 NEW AGE ENGINEERING
 ELECTRICAL CERTIFICATION

SALINE MIDDLE SCHOOL
 7190 N MAPLE RD
 SALINE, MI 48176

Drawn by: JM
 Checked by: RB
 Date: 19-Apr-2024
 Drawing Level: ISSUED FOR CONSTRUCTION

| REV. | DATE | DESCRIPTION |
|------|-------------|-------------------------|
| A | 19-APR-2024 | ISSUED FOR CONSTRUCTION |
| B | | |
| C | | |
| D | | |
| E | | |

SHEET SIZE: 36X24 SHOULD MEASURE 1"
 SCALE: NTS
 SHEET TITLE: E30 ONE LINE DIAGRAM

MAX STRING LENGTH CALCULATION:

INVERTER MAKE: CPS
 INVERTER MODEL: SCA60KTL-DO/US-480

INVERTER MAX DC VOLTAGE: 1000VDC

CALCULATION: INVERTER MAX DC / MODULE VOC @ MIN T
 1000 / 58.79 = 17.01 = 17 MODULES

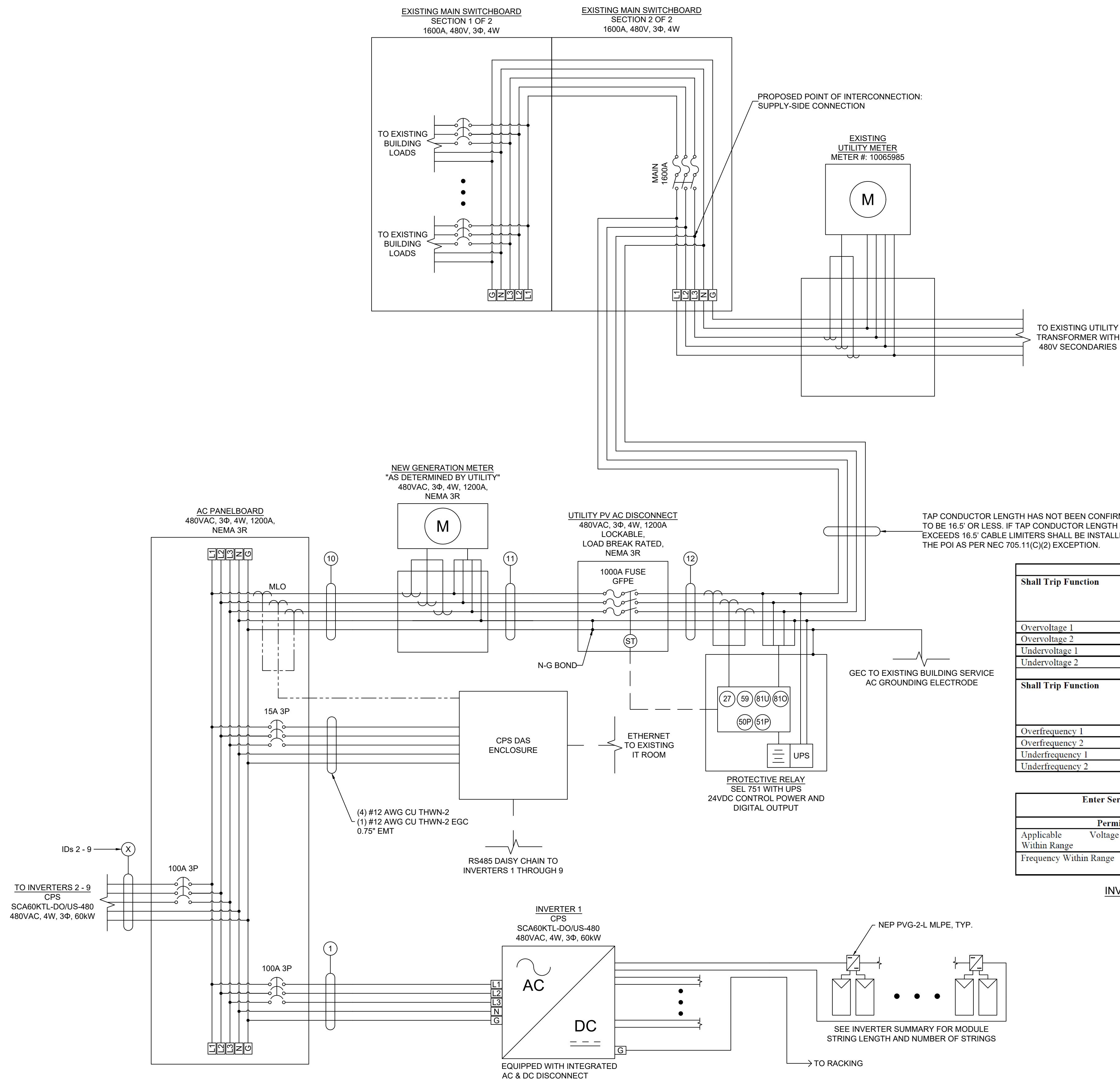
POINT OF INTERCONNECTION NOTES:

- PRIOR TO COMMENCEMENT OF INSTALLATION, THE ELECTRICAL CONTRACTOR SHALL OPEN AND VISUALLY INSPECT THE ELECTRICAL EQUIPMENT WHERE THE POI HAS BEEN PROPOSED. IF ANY ISSUES OR DISCREPANCIES ARE OBSERVED WITH RESPECT TO WHAT IS SHOWN ON THE DRAWINGS AND THE DESIGN INTENT, THE ELECTRICAL CONTRACTOR SHALL PROVIDE DETAIL ON THE POTENTIAL ISSUE AND INDICATE AN ALTERNATIVE APPROACH / SUGGESTIONS FOR THE POI.
- THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE BEST METHOD TO TERMINATE THE CONDUCTORS AT THE PROPOSED POI. IF THE PROPOSED CONNECTION WILL VOID THE UL (UNDERWRITERS LABORATORY) LISTING OF THE EQUIPMENT (E.G. DRILLING BUSBARS), THE ELECTRICAL CONTRACTOR SHALL ARRANGE FOR THE SERVICES OF A UL TECHNICIAN TO APPROVE THE CONNECTION METHOD PRIOR TO COMMENCING WORK, TO WITNESS THE INSTALLATION, AND TO CERTIFY THE MODIFICATIONS ARE ACCEPTABLE BY APPLYING A UL LABEL TO THE MODIFIED EQUIPMENT.

AC CONDUCTOR SCHEDULE

| ID | From | To | Phase | AC Voltage | Circuit Current | 80% or 100% Rated OCPD? | Circuit Current x 125% | OCPD (If Present) | Parallel Conduit Runs | Material | Conductor Type | # of CCCs | Fill Factor | Ambient Temp. | Temp. Factor | Conductor Size | Ampacity @ 75°C | Max Ampacity | Derated Ampacity | # of Neutrals | Neutral Size | Ground | Ground Material | Ground Type | Ground Size | Conduit Type | Conduit Size | 1-Way Length | Voltage Drop |
|----|--------------------------|--------------------------|-------|------------|-----------------|-------------------------|------------------------|-------------------|-----------------------|----------|----------------|-----------|-------------|---------------|--------------|----------------|-----------------|--------------|------------------|---------------|--------------|--------|-----------------|-------------|-------------|--------------|--------------|--------------|--------------|
| 1 | String Inverter 1 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1/0 AWG | 120 (A) | 135 (A) | 135.0 (A) | 1 | 1/0 AWG | EGC | CU | THWN-2 | 6 AWG | EMT | 1.50 (in.) | 530 (ft) | 2.78% |
| 2 | String Inverter 2 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 2/0 AWG | 135 (A) | 150 (A) | 150.0 (A) | 1 | 2/0 AWG | EGC | CU | THWN-2 | 6 AWG | EMT | 2.00 (in.) | 730 (ft) | 3.02% |
| 3 | String Inverter 3 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 400 (ft) | 2.64% |
| 4 | String Inverter 4 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 395 (ft) | 2.60% |
| 5 | String Inverter 5 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 245 (ft) | 1.61% |
| 6 | String Inverter 6 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 125 (ft) | 0.82% |
| 7 | String Inverter 7 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 240 (ft) | 1.58% |
| 8 | String Inverter 8 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 400 (ft) | 2.64% |
| 9 | String Inverter 9 | Solar AC Panelboard | 3Φ | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1/0 AWG | 120 (A) | 135 (A) | 135.0 (A) | 1 | 1/0 AWG | EGC | CU | THWN-2 | 6 AWG | EMT | 1.50 (in.) | 490 (ft) | 2.57% |
| 10 | Solar AC Panelboard | New Generation Meter | 3Φ | 480 (V) | 649.8 (A) | 80% | 812.3 (A) | 1000 (A) | 4 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 350 kcmil | 1000 (A) | 1120 (A) | 1120.0 (A) | 1 | 350 kcmil | EGC | CU | THWN-2 | 2/0 AWG | EMT | 2.50 (in.) | 5 (ft) | 0.02% |
| 11 | New Generation Meter | Utility PV AC Disconnect | 3Φ | 480 (V) | 649.8 (A) | 80% | 812.3 (A) | 1000 (A) | 4 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 350 kcmil | 1000 (A) | 1120 (A) | 1120.0 (A) | 1 | 350 kcmil | EGC | CU | THWN-2 | 2/0 AWG | EMT | 2.50 (in.) | 12 (ft) | 0.04% |
| 12 | Utility PV AC Disconnect | POI | 3Φ | 480 (V) | 649.8 (A) | 80% | 812.3 (A) | 1000 (A) | 4 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 350 kcmil | 1000 (A) | 1120 (A) | 1120.0 (A) | 1 | 350 kcmil | GEC | CU | THWN-2 | 2/0 AWG | EMT | 2.50 (in.) | 10 (ft) | 0.04% |

| SYSTEM CHARACTERISTICS | |
|---------------------------------------|--------------------|
| DC SIZE (KW DC) | 757.35 |
| AC SIZE (KW AC) | 540.00 |
| DOA RATIO | 1.40 |
| MODULE INFORMATION | |
| MANUFACTURER | ZN SHINE SOLAR |
| MODEL NUMBER(S) | ZXM7-SHDB144-550 |
| P _{MAX} @ STC (W) | 550 |
| ISC (A) | 13.89 |
| IMP (A) | 13.13 |
| VOC (V) | 50.2 |
| VMP (V) | 41.9 |
| TEMP COEFF OF VOC (%/°C) | -0.29 |
| TEMP COEFF OF P _{MAX} (%/°C) | -0.35 |
| VOC @ MIN TEMP. | 58.79 |
| VMP @ MAX TEMP. | 36.2 |
| NUMBER OF MODULES | 1377 |
| INVERTER INFORMATION | |
| MANUFACTURER | CPS |
| MODEL NUMBER(S) | SCA60KTL-DO/US-480 |
| MAXIMUM DC INPUT VOLTAGE (V) | 1000 |
| MAXIMUM DC INPUT POWER (W) | 90000 |
| NOMINAL AC OUTPUT VOLTAGE (V) | 480 |
| MPPT OPERATING VOLTAGE RANGE (V) | 200 - 950 |
| NOMINAL AC POWER (W) | 60000 |
| MAX CONTINUOUS OUTPUT CURRENT (A) | 72.2 |
| NUMBER OF INVERTERS | 9 |
| MLPE INFORMATION | |
| MANUFACTURER | NEP |
| MODEL NUMBER(S) | PV-G-2-L |
| MODULES PER MLPE | 2 |
| MAXIMUM SYSTEM VOLTAGE (V) | 1500 |
| RATED DC INPUT POWER (W) | NA |
| MAX VOLTAGE PER INPUT (V) | 90 |
| RSD INTEGRATED? | Yes |
| NUMBER OF MLPEs | 378 |



| Voltage Relay Settings | | | |
|--------------------------|---------------------------------------|--------------------|------|
| Shall Trip Function | Allowable Setting | | |
| | Voltage (per unit of nominal voltage) | Clearing (Seconds) | Time |
| Overvoltage 1 | 1.20 | 0.16 | |
| Overvoltage 2 | 1.10 | 2.0 | |
| Undervoltage 1 | 0.70 | 2.0 | |
| Undervoltage 2 | 0.45 | 0.32 | |
| Frequency Relay Settings | | | |
| Shall Trip Function | Allowable Setting | | |
| | Frequency (Hz) | Clearing (Seconds) | Time |
| Overfrequency 1 | 62.0 | 0.16 | |
| Overfrequency 2 | 61.2 | 2.0 | |
| Underfrequency 1 | 58.5 | 2.0 | |
| Underfrequency 2 | 56.5 | 0.16 | |

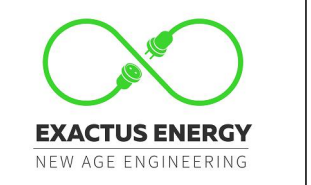
| Enter Service Criteria | | | Default Settings |
|------------------------|------------|--|------------------|
| Permit Service | | | Enabled |
| Applicable Voltage | Min. Value | | 0.917 p.u. |
| Within Range | Max. Value | | 1.05 p.u. |
| Frequency Within Range | Min. Value | | 59.5 Hz |
| | Max. Value | | 60.1 Hz |

INVERTER/RELAY SETTINGS



SCOTT ROMAN
 SENIOR PROJECT MANAGER
 419-262-9966

JOSE PEREZ
 PROJECT MANAGER
 401-692-5069



ELECTRICAL
 CERTIFICATION

SALINE MIDDLE SCHOOL
 7190 N MAPLE RD
 SALINE, MI 48176

DRAWN BY
 JM

CHECKED BY
 RB

DATE
 19-Apr-2024

DRAWING LEVEL
 ISSUED FOR CONSTRUCTION

| REV. | DATE | ISSUED FOR CONSTRUCTION | A | B | C | D | E |
|------|-------------|-------------------------|---|---|---|---|---|
| A | 19-APR-2024 | | | | | | |

SHEET SIZE
 36X24 SHOULD
 MEASURE 1":

SCALE
 NTS

SHEET TITLE

E31
 THREE LINE
 DIAGRAM

STRING INVERTER SUMMARY

| Inverter ID | Inverter Manufacturer | Inverter Model | MPPT | Strings Per MPPT | Module Manufacturer | Module Model | MLPE Manufacturer | MLPE Model | String Length | # of MLPEs | ISC x 125% Per MPPT | ISC x 125% Total | Modules Per MPPT | MLPEs Per MPPT | DC Power Per MPPT | DC Power Total | AC Power | DC:AC Ratio |
|-------------------|-----------------------|--------------------|------|------------------|---------------------|------------------|-------------------|------------|---------------|------------|---------------------|------------------|------------------|----------------|-------------------|----------------|----------|-------------|
| String Inverter 1 | CPS | SCA60KTL-DO/US-480 | 1 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | .N/A | N/A | 17 | - | 52.09A | 156.26A | 51 | 0 | 28,050W | 84,150W | 60,000W | 1.40 |
| | | | 2 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | .N/A | N/A | 17 | - | 52.09A | | 51 | 0 | 28,050W | | | |
| | | | 3 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | | 51 | 27 | 28,050W | | | |
| String Inverter 2 | CPS | SCA60KTL-DO/US-480 | 1 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | .N/A | N/A | 17 | - | 52.09A | 156.26A | 51 | 0 | 28,050W | 84,150W | 60,000W | 1.40 |
| | | | 2 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | .N/A | N/A | 17 | - | 52.09A | | 51 | 0 | 28,050W | | | |
| | | | 3 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | | 51 | 27 | 28,050W | | | |
| String Inverter 3 | CPS | SCA60KTL-DO/US-480 | 1 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | 156.26A | 51 | 27 | 28,050W | 84,150W | 60,000W | 1.40 |
| | | | 2 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | | 51 | 27 | 28,050W | | | |
| | | | 3 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | .N/A | N/A | 17 | - | 52.09A | | 51 | 0 | 28,050W | | | |
| String Inverter 4 | CPS | SCA60KTL-DO/US-480 | 1 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | 156.26A | 51 | 27 | 28,050W | 84,150W | 60,000W | 1.40 |
| | | | 2 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | | 51 | 27 | 28,050W | | | |
| | | | 3 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | .N/A | N/A | 17 | - | 52.09A | | 51 | 0 | 28,050W | | | |
| String Inverter 5 | CPS | SCA60KTL-DO/US-480 | 1 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | 156.26A | 51 | 27 | 28,050W | 84,150W | 60,000W | 1.40 |
| | | | 2 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | | 51 | 27 | 28,050W | | | |
| | | | 3 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | .N/A | N/A | 17 | - | 52.09A | | 51 | 0 | 28,050W | | | |
| String Inverter 6 | CPS | SCA60KTL-DO/US-480 | 1 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | .N/A | N/A | 17 | - | 52.09A | 156.26A | 51 | 0 | 28,050W | 84,150W | 60,000W | 1.40 |
| | | | 2 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | | 51 | 27 | 28,050W | | | |
| | | | 3 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | | 51 | 27 | 28,050W | | | |
| String Inverter 7 | CPS | SCA60KTL-DO/US-480 | 1 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | 156.26A | 51 | 27 | 28,050W | 84,150W | 60,000W | 1.40 |
| | | | 2 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | .N/A | N/A | 17 | - | 52.09A | | 51 | 0 | 28,050W | | | |
| | | | 3 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | | 51 | 27 | 28,050W | | | |
| String Inverter 8 | CPS | SCA60KTL-DO/US-480 | 1 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | .N/A | N/A | 17 | - | 52.09A | 156.26A | 51 | 0 | 28,050W | 84,150W | 60,000W | 1.40 |
| | | | 2 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | .N/A | N/A | 17 | - | 52.09A | | 51 | 0 | 28,050W | | | |
| | | | 3 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | | 51 | 27 | 28,050W | | | |
| String Inverter 9 | CPS | SCA60KTL-DO/US-480 | 1 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | NEP | PVG-2-L | 17 | 9 | 52.09A | 156.26A | 51 | 27 | 28,050W | 84,150W | 60,000W | 1.40 |
| | | | 2 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | .N/A | N/A | 17 | - | 52.09A | | 51 | 0 | 28,050W | | | |
| | | | 3 | 3 | ZN SHINE SOLAR | ZXM7-SHDB144-550 | .N/A | N/A | 17 | - | 52.09A | | 51 | 0 | 28,050W | | | |

SCOTT ROMAN
SENIOR PROJECT MANAGER
419-262-9966



ELECTRICAL
CERTIFICATION

SALINE MIDDLE SCHOOL
7190 N MAPLE RD
SALINE, MI 48176

DRAWN BY
JM

CHECKED BY
RB

DATE
19-Apr-2024

DRAWING LEVEL
ISSUED FOR
CONSTRUCTION

DRAWING LEVEL
ISSUED FOR CONSTRUCTION

DATE
19-APR-2024

REV. A B C D E

SHEET SIZE
36X24 SHOULD
MEASURE 1":

SCALE
NTS

SHEET TITLE

E32
AC & DC
CALCULATIONS

STRING INVERTER DC CONDUCTOR SCHEDULE

(A) FREE AIR

*TEMPERATURE FACTOR IS BASED ON 2% DRY BULB HIGH TEMPERATURE OF 28.9°C WITH A 0°C TEMPERATURE ADDER THEREFORE RACEWAYS MUST BE AT LEAST 0.875 INCHES ABOVE ROOF AS PER NEC 310.15(B)(3)(C)

| Number of Strings | Conductor Material | Conductor Type | Conductor Size | Base Ampacity @ 90°C | *Temperature Factor | Fill Factor | Derated Ampacity | Circuit Current | Min. OCPD (If Required) | EGC Material | EGC Type | EGC Size | Conduit |
|-------------------|--------------------|----------------|----------------|----------------------|---------------------|-------------|------------------|-----------------|-------------------------|--------------|----------|----------|----------------|
| No Limit | CU | PV Wire | 10 AWG | 40A | 1.00 | 1.00 | 40.00A | 17.36A | 25A | CU | BARE | 6 AWG | N/A - Free Air |

(B) IN CONDUIT

*TEMPERATURE FACTOR IS BASED ON 2% DRY BULB HIGH TEMPERATURE OF 28.9°C WITH A 0°C TEMPERATURE ADDER THEREFORE RACEWAYS MUST BE AT LEAST 0.875 INCHES ABOVE ROOF AS PER NEC 310.15(B)(3)(C)

**CALCULATIONS ARE BASED ON THE LARGEST CIRCUIT CURRENT (WORST CASE SCENARIO).

***TABLE ASSUMES ONE EGC PER CONDUIT. MINIMUM ONE EGC IS REQUIRED PER INVERTER PER CONDUIT.

| Number of Strings | Conductor Material | Conductor Type | Conductor Size | Base Ampacity @ 90°C | *Temperature Factor | Fill Factor | Derated Ampacity | **Circuit Current | Min. OCPD (If Required) | EGC Material | EGC Type | EGC Size | Min. EMT Size |
|-------------------|--------------------|----------------|----------------|----------------------|---------------------|-------------|------------------|-------------------|-------------------------|--------------|----------|----------|---------------|
| 1 | CU | PV Wire | 10 AWG | 40A | 1.00 | 1.00 | 40.00A | 17.36A | 25A | CU | PV Wire | 10 AWG | 0.75 in. |
| 2 | CU | PV Wire | 10 AWG | 40A | 1.00 | 0.80 | 32.00A | 17.36A | 25A | CU | PV Wire | 10 AWG | 1.00 in. |
| 3 | CU | PV Wire | 10 AWG | 40A | 1.00 | 0.80 | 32.00A | 17.36A | 25A | CU | PV Wire | 10 AWG | 1.25 in. |
| 4 | CU | PV Wire | 10 AWG | 40A | 1.00 | 0.70 | 28.00A | 17.36A | 25A | CU | PV Wire | 10 AWG | 1.25 in. |
| 5 | CU | PV Wire | 10 AWG | 40A | 1.00 | 0.50 | 20.00A | 17.36A | 25A | CU | PV Wire | 10 AWG | 1.50 in. |
| 6 | CU | PV Wire | 10 AWG | 40A | 1.00 | 0.50 | 20.00A | 17.36A | 25A | CU | PV Wire | 10 AWG | 1.50 in. |
| 7 | CU | PV Wire | 10 AWG | 40A | 1.00 | 0.50 | 20.00A | 17.36A | 25A | CU | PV Wire | 10 AWG | 2.00 in. |
| 8 | CU | PV Wire | 10 AWG | 40A | 1.00 | 0.50 | 20.00A | 17.36A | 25A | CU | PV Wire | 10 AWG | 2.00 in. |
| 9 | CU | PV Wire | 10 AWG | 40A | 1.00 | 0.50 | 20.00A | 17.36A | 25A | CU | PV Wire | 10 AWG | 2.00 in. |

| REV. | DATE | DRAWING LEVEL |
|------|-------------|-------------------------|
| A | 19-APR-2024 | ISSUED FOR CONSTRUCTION |
| B | | |
| C | | |
| D | | |
| E | | |

STRING INVERTER DC STRING SUMMARY

| Inverter Number | MPPT Number | String Number | Number of Modules | One Way Run Length (ft) | Conductor Material | Conductor Type | Conductor Size | String Operating Voltage | String Operating Current | ISC x 156% | Overcurrent Protection | Voltage Drop |
|-----------------|-------------|---------------|-------------------|-------------------------|--------------------|----------------|----------------|--------------------------|--------------------------|------------|------------------------|--------------|
| 1 | 1 | 1 | 17 | 40 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.19% |
| | 1 | 2 | 17 | 75 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.36% |
| | 1 | 3 | 17 | 100 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.48% |
| | 2 | 1 | 17 | 120 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.57% |
| | 2 | 2 | 17 | 125 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.59% |
| | 2 | 3 | 17 | 140 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.67% |
| | 3 | 1 | 17 | 200 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.95% |
| | 3 | 2 | 17 | 250 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 1.19% |
| | 3 | 3 | 17 | 280 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 1.33% |
| 2 | 1 | 1 | 17 | 110 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.52% |
| | 1 | 2 | 17 | 95 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.45% |
| | 1 | 3 | 17 | 75 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.36% |
| | 2 | 1 | 17 | 95 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.45% |
| | 2 | 2 | 17 | 55 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.26% |
| | 2 | 3 | 17 | 40 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.19% |
| | 3 | 1 | 17 | 110 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.52% |
| | 3 | 2 | 17 | 150 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.71% |
| | 3 | 3 | 17 | 115 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.55% |
| 3 | 1 | 1 | 17 | 200 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.95% |
| | 1 | 2 | 17 | 170 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.81% |
| | 1 | 3 | 17 | 205 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.97% |
| | 2 | 1 | 17 | 190 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.90% |
| | 2 | 2 | 17 | 115 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.55% |
| | 2 | 3 | 17 | 90 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.43% |
| | 3 | 1 | 17 | 90 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.43% |
| | 3 | 2 | 17 | 65 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.31% |
| | 3 | 3 | 17 | 35 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.17% |
| 4 | 1 | 1 | 17 | 255 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 1.21% |
| | 1 | 2 | 17 | 185 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.88% |
| | 1 | 3 | 17 | 175 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.83% |
| | 2 | 1 | 17 | 160 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.76% |
| | 2 | 2 | 17 | 55 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.26% |
| | 2 | 3 | 17 | 40 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.19% |
| | 3 | 1 | 17 | 30 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.14% |
| | 3 | 2 | 17 | 85 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.40% |
| | 3 | 3 | 17 | 80 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.38% |
| 5 | 1 | 1 | 17 | 125 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.59% |
| | 1 | 2 | 17 | 90 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.43% |
| | 1 | 3 | 17 | 85 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.40% |
| | 2 | 1 | 17 | 100 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.48% |
| | 2 | 2 | 17 | 75 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.36% |
| | 2 | 3 | 17 | 55 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.26% |
| | 3 | 1 | 17 | 45 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.21% |
| | 3 | 2 | 17 | 40 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.19% |
| | 3 | 3 | 17 | 75 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.36% |

| Inverter Number | MPPT Number | String Number | Number of Modules | One Way Run Length (ft) | Conductor Material | Conductor Type | Conductor Size | String Operating Voltage | String Operating Current | ISC x 156% | Overcurrent Protection | Voltage Drop |
|-----------------|-------------|---------------|-------------------|-------------------------|--------------------|----------------|----------------|--------------------------|--------------------------|------------|------------------------|--------------|
| 6 | 1 | 1 | 17 | 80 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.38% |
| | 1 | 2 | 17 | 40 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.19% |
| | 1 | 3 | 17 | 80 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.38% |
| | 2 | 1 | 17 | 25 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.12% |
| | 2 | 2 | 17 | 45 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.21% |
| | 2 | 3 | 17 | 195 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.93% |
| | 3 | 1 | 17 | 195 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.93% |
| | 3 | 2 | 17 | 205 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.97% |
| | 3 | 3 | 17 | 230 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 1.09% |
| 7 | 1 | 1 | 17 | 140 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.67% |
| | 1 | 2 | 17 | 190 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.90% |
| | 1 | 3 | 17 | 35 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.17% |
| | 2 | 1 | 17 | 70 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.33% |
| | 2 | 2 | 17 | 70 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.33% |
| | 2 | 3 | 17 | 95 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.45% |
| | 3 | 1 | 17 | 90 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.43% |
| | 3 | 2 | 17 | 80 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.38% |
| | 3 | 3 | 17 | 100 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.48% |
| 8 | 1 | 1 | 17 | 160 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.76% |
| | 1 | 2 | 17 | 130 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.62% |
| | 1 | 3 | 17 | 90 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.43% |
| | 2 | 1 | 17 | 75 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.36% |
| | 2 | 2 | 17 | 60 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.29% |
| | 2 | 3 | 17 | 35 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.17% |
| | 3 | 1 | 17 | 80 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.38% |
| | 3 | 2 | 17 | 80 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.38% |
| | 3 | 3 | 17 | 150 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.71% |
| 9 | 1 | 1 | 17 | 160 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.76% |
| | 1 | 2 | 17 | 180 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.86% |
| | 1 | 3 | 17 | 180 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.86% |
| | 2 | 1 | 17 | 115 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.55% |
| | 2 | 2 | 17 | 60 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.29% |
| | 2 | 3 | 17 | 100 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.48% |
| | 3 | 1 | 17 | 85 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.40% |
| | 3 | 2 | 17 | 85 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.40% |
| | 3 | 3 | 17 | 95 | CU | PV Wire | 10 AWG | 712.3V | 13.13A | 21.70A | 25A | 0.45% |

Average DC
Voltage Drop
0.53%

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

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

3 PHOTOVOLTAIC POWER SOURCE

OR

3 SOLAR PV DC CIRCUIT

4 PHOTOVOLTAIC DC DISCONNECT

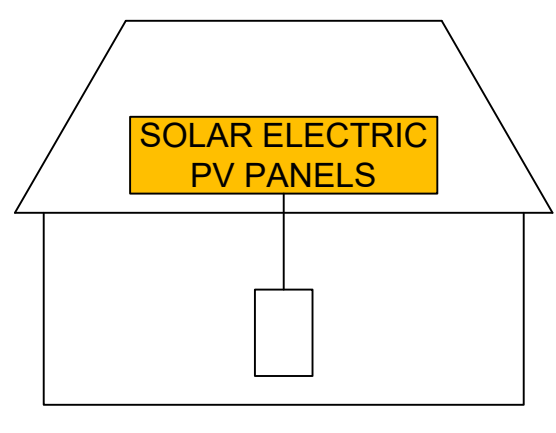
5 PHOTOVOLTAIC AC DISCONNECT

6 WARNING: DO NOT DISCONNECT UNDER LOAD

7 RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

8 SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



9 **CAUTION**
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED.

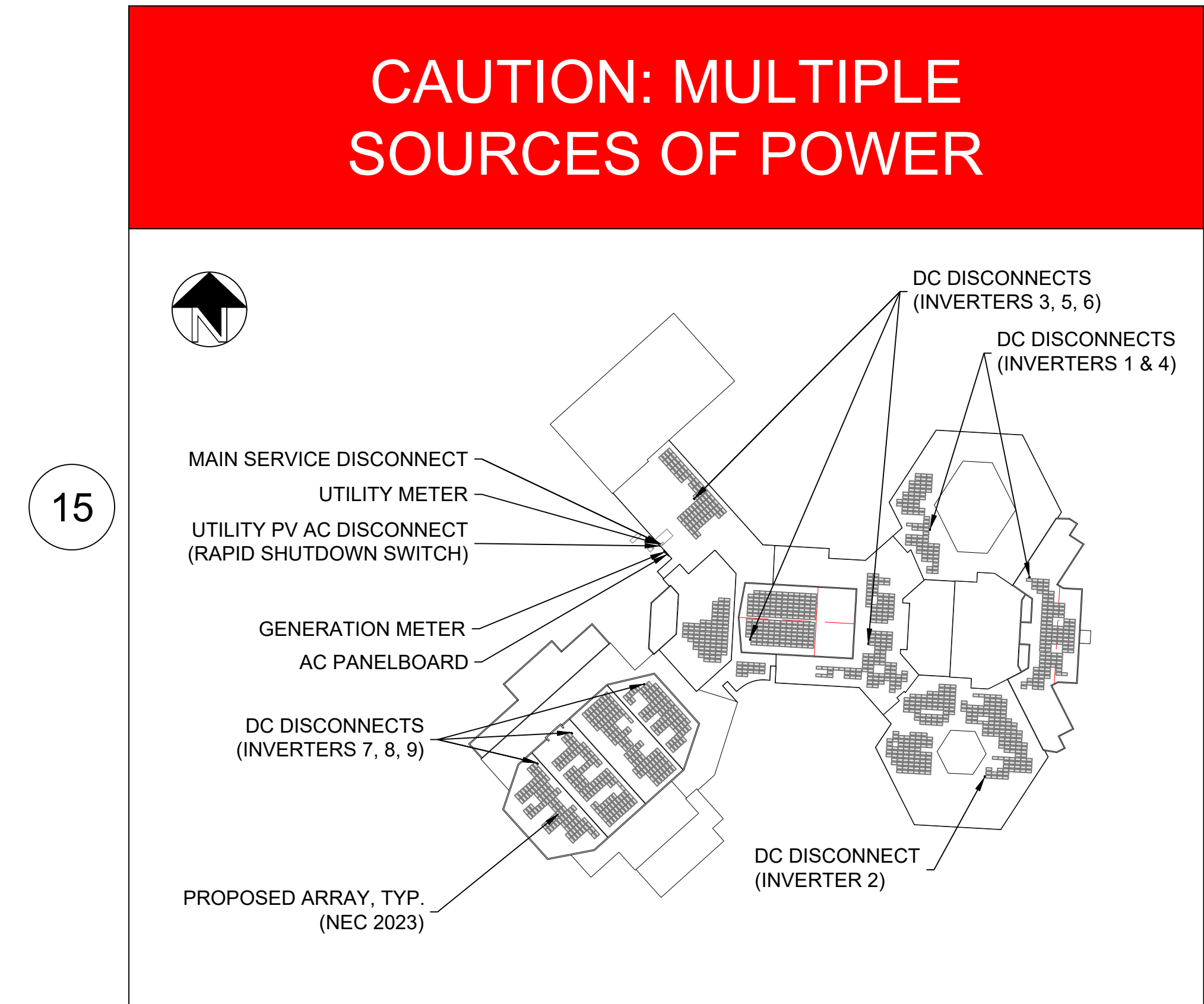
10 **WARNING**
POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.

11 **WARNING**
THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR.

12 WARNING: DUAL POWER SOURCE SECOND SOURCE IS PV SYSTEM

13 **MAXIMUM DC VOLTAGE**
999.4V
OF PV SYSTEM
PLACE AT INVERTERS 1 TO 9

14 **PHOTOVOLTAIC AC DISCONNECT**
RATED AC OUTPUT CURRENT: 649.8A
NOMINAL OPERATING AC VOLTAGE: 480V
PLACE AT UTILITY PV AC DISCONNECT



PLACE PLAQUE/DIRECTORY AT EACH ELECTRIC POWER SOURCE DISCONNECTING MEANS. IF MULTIPLE POWER SOURCE DISCONNECTING MEANS ARE WITHIN SIGHT OF EACH OTHER, THEY CAN BE CONSIDERED A GROUP AND ONE DIRECTORY PER GROUP IS SUFFICIENT.

| WARNING LABELS SCHEDULE | | |
|--------------------------|-------------|-----------|
| EQUIPMENT | LABEL NO. | QTY. |
| CONDUIT / RACEWAY | 3 | EVERY 10' |
| DC COMBINER | 1, 2, 6 | N/A |
| DC DISCONNECT | 1, 4, 13 | 9 |
| AC COMBINER | 1, 2, 6, 12 | 1 |
| AC DISCONNECT | 1, 5, 14 | 1 |
| MAIN SERVICE DISCONNECT | 1, 2, 8, 12 | 1 |
| RAPID SHUTDOWN SWITCH | 7, 8 | 1 |
| POWER SOURCE DISCONNECTS | 15 | 2 |

NOTES:

- LABELING PROVIDED IS A GUIDE ONLY. CONTRACTOR IS RESPONSIBLE TO ENSURE ALL SYSTEM LABELING AND WORDING IS PER NEC 2023 REQUIREMENTS.
- ALL LABELING USED OUTDOORS MUST BE ENGRAVED METAL, UV STABILIZED ENGRAVED PLASTIC OR OF A MATERIAL SUFFICIENTLY DURABLE TO WITHSTAND THE ENVIRONMENT INVOLVED. VALUES HAND WRITTEN OR IN WRITTEN MARKER ARE NOT ACCEPTABLE PER NEC 2023.
- LABELS USED INDOORS MAY BE MADE OF DURABLE VINYL OR PAPER.
- DO NOT COVER ANY EXISTING MANUFACTURER APPLIED LABELS WITH INSTALLATION SPECIFIC LABELS.
- LABEL COLORS CHOSEN PER NFPA 70 2023 DIRECTION THAT ANSI Z535-2011 BE USED.
- ALL WARNING SIGNS OR LABELS SHALL COMPLY WITH NEC 110.21(B)
- LABELS ON THIS SHEET REPRESENT THE MINIMUM REQUIREMENTS AS PER NEC 2023. ADDITIONAL LABELS MAY BE REQUIRED BY THE AHJ AND/OR THE SYSTEM/BUILDING OWNER.

FORMAT

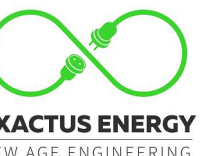
- WHITE LETTERING ON A RED BACKGROUND (UNLESS SHOWN OTHERWISE)
- MINIMUM 3/8 INCHES LETTER HEIGHT
- ALL LETTERS SHALL BE CAPITALIZED
- ARIAL OR SIMILAR FONT (NON-BOLD)

MATERIAL

REFLECTIVE, WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT (USE UL-969 AS STANDARD FOR WEATHER RATING). USE DURABLE ADHESIVE MATERIALS.



SCOTT ROMAN
SENIOR PROJECT MANAGER
419-262-9966
JOSE PEREZ
PROJECT MANAGER
401-692-5069



ELECTRICAL
CERTIFICATION

SALINE MIDDLE SCHOOL
7190 N MAPLE RD
SALINE, MI 48176

DRAWN BY
JM

CHECKED BY
RB

DATE
19-Apr-2024

DRAWING LEVEL
ISSUED FOR CONSTRUCTION

| REV. | DATE | DRAWING LEVEL |
|------|-------------|-------------------------|
| A | 19-APR-2024 | ISSUED FOR CONSTRUCTION |
| B | | |
| C | | |
| D | | |
| E | | |

SHEET SIZE
36X24 SHOULD
MEASURE 1":

SCALE
NTS

SHEET TITLE

E50

LABELING

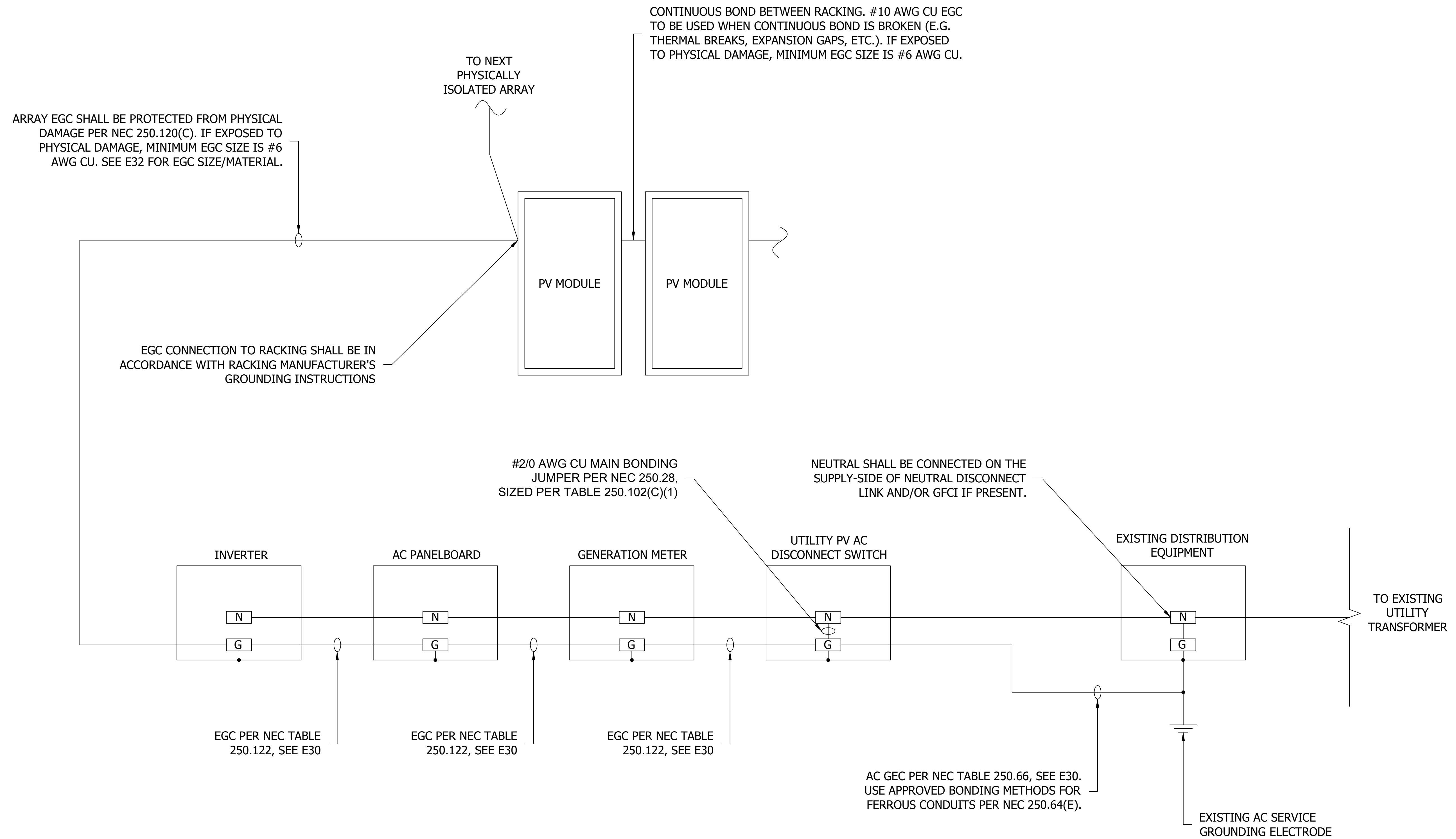
| | | | | | |
|---------------|-------------------------|--|--|--|--|
| DRAWING LEVEL | ISSUED FOR CONSTRUCTION | | | | |
|---------------|-------------------------|--|--|--|--|

| | | | | | |
|------|-------------|---|---|---|---|
| DATE | 19-APR-2024 | | | | |
| REV. | A | B | C | D | E |

SHEET SIZE
36X24 SHOULD
MEASURE 1":

SCALE
NTS

SHEET TITLE
E60
GROUNDING
DETAILS



- NOTES**
- RACKING COMPONENTS WITHIN THE ARRAY ARE REQUIRED TO BE ELECTRICALLY BONDED TO OTHER DC GROUNDING PATHS VIA THE USE OF APPROPRIATELY SIZED COPPER WIRE.
 - RACKING SHALL BE BONDED ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
 - IF EQUIPMENT GROUNDING CONDUCTORS ARE NOT PROTECTED FROM PHYSICAL DAMAGE BY AN IDENTIFIED RACEWAY OR CABLE ARMOR THEY SHALL NOT BE SMALLER THAN 6 AWG AS PER NEC 250.120(C).
 - A PERIODIC REINSPECTION OF THE SYSTEM SHALL BE PERFORMED FOR LOOSE COMPONENTS, LOOSE FASTENERS, AND ANY CORROSION. IF FOUND, THEY SHOULD BE IMMEDIATELY REPLACED OR REMIDIED IN ACCORDANCE WITH THE SYSTEM INSTALLATION INSTRUCTIONS.
 - OPTIMIZERS AND MODULE LEVEL POWER ELECTRONICS (IF USED) SHALL BE BONDED TO MODULES IN ACCORDANCE WITH THE REQUIREMENTS OF NEC 690.43.

ASSEMBLED IN USA

ZSHINESOLAR

ZXM7-SHDB144 Series

10BB HALF-CELL Bifacial Monocrystalline PERC PV Module

530-560W
POWER RANGE

21.68%
MAXIMUM EFFICIENCY

0.55%
YEARLY DEGRADATION

12 YEARS PRODUCT WARRANTY 25 YEARS OUTPUT GUARANTEE

EC 61215/REC 61730/REC 61701/REC 62714/036 1730
ISO 14001: Environmental Management System
ISO 9001: Quality Management System
ISO 45001: Occupational Health and Safety Management System

*Please check the valid version of Limited Product Warranty which is officially released by ZSHINESOLAR PV TECH US, LLC.

Key Features

Excellent Cells Efficiency
MBB technology reduce the distance between busbars and finger grid line which is benefit to power increase.

Anti PID
Ensured PID resistance through the quality control of cell manufacturing process and raw materials.

TIER 1
Global Tier 1 bankable brand with independently certified advanced automated manufacturing.

Bifacial Technology
Up to 25% additional power gain from back side depending on albedo.

Better Weak Illumination Response
More power output in weak light condition, such as haze, cloudy, and early morning.

Adapt To Harsh Outdoor Environment
Resistant to harsh environments such as salt, ammonia, sand, high temperature and high humidity environment.

Excellent Quality Management System
Warranted reliability and stringent quality assurances well beyond certified requirements.

Founded in 1988, Zshinesolar is a world's leading high-tech PV module manufacturer. With the advanced production lines, the company boasts module capacity of 10GW. Bloomberg has listed Zshinesolar as a global Tier 1 PV module maker. Today Zshinesolar has distributed its sales to more than 60 countries around the globe. www.zshinesolar.com

ZSHINESOLAR

ZXM7-SHDB144 Series | Zshinesolar 10BB HALF-CELL Bifacial Monocrystalline PERC PV Module

DIMENSIONS OF PV MODULE(mm)

*Remarks: customized frame color and cable length available upon request

I-V CURVES OF PV MODULE(530W)

P-V CURVES OF PV MODULE(530W)

| ELECTRICAL CHARACTERISTICS STC* | | | | | | MECHANICAL DATA | | | |
|------------------------------------|-------|-------|-------|-------|-------|-----------------|-------|-------------------|--|
| Nominal Power Pmax(W) ¹ | 530 | 535 | 540 | 545 | 550 | 555 | 560 | Solar cells | Mono PERC |
| Maximum Power Voltage Vmp(V) | 41.10 | 41.30 | 41.50 | 41.70 | 41.90 | 42.10 | 42.30 | Cells orientation | 144 (6x24) |
| Maximum Power Current Imp(A) | 12.91 | 12.96 | 13.02 | 13.07 | 13.13 | 13.19 | 13.24 | Module dimension | 2278*1134*35mm (With Frame) |
| Open Circuit Voltage Voc(V) | 49.40 | 49.60 | 49.80 | 50.00 | 50.20 | 50.40 | 50.60 | Weight | 28±1.0 kg |
| Short Circuit Current Isc(A) | 13.65 | 13.71 | 13.77 | 13.83 | 13.89 | 13.95 | 14.01 | Glass | 3.2mm, High Transmission, AR Coated Tempered Glass |
| Module Efficiency (%) | 20.52 | 20.71 | 20.90 | 21.10 | 21.29 | 21.48 | 21.68 | Junction box | IP 68, 3 diodes |

*The data above is for reference only and the actual data is in accordance with the product drawing.
STC: (Standard Test Conditions: Irradiance 1000W/m², Module Temperature 25°C, AM 1.5
Measuring uncertainty: ±0.5% for the electrical characteristics such as Power, Voc, Vmp and Imp and ±0.5% for the mechanical data.

| ELECTRICAL CHARACTERISTICS NMOT* | | | | | | TEMPERATURE RATINGS | | WORKING CONDITIONS | | | |
|------------------------------------|--------|--------|--------|--------|--------|---------------------|--------|---------------------------------|-----------|-----------------------------------|--------------|
| Maximum Power Pmax(W) ¹ | 396.40 | 399.90 | 403.60 | 406.80 | 410.80 | 414.60 | 418.10 | NMOT | 44°C ±2°C | Maximum system voltage | 1500 V DC |
| Maximum Power Voltage Vmp(V) | 38.20 | 38.40 | 38.50 | 38.80 | 39.10 | 39.30 | 39.30 | Temperature coefficient of Pmax | -0.35%/°C | Operating temperature | -40°C~+85°C |
| Maximum Power Current Imp(A) | 10.38 | 10.42 | 10.47 | 10.49 | 10.56 | 10.61 | 10.64 | Temperature coefficient of Voc | -0.29%/°C | Maximum series fuse | 30 A |
| Open Circuit Voltage Voc(V) | 46.20 | 46.30 | 46.50 | 46.70 | 46.90 | 47.10 | 47.20 | Temperature coefficient of Isc | 0.05%/°C | Front Side Maximum Static Loading | Up to 5400Pa |
| Short Circuit Current Isc(A) | 11.02 | 11.07 | 11.12 | 11.17 | 11.22 | 11.27 | 11.31 | Refer Bifacial Factor | 70±10% | Rear Side Maximum Static Loading | Up to 2400Pa |

*The data above is for reference only and the actual data is in accordance with the product drawing.
NMOT: (Nominal Module Operating Temperature: 20°C, AM 1.5, Wind Speed 1m/s)
*Remarks: Do not connect fuse in Combiner Box unless you have more design in parallel connection.

| ELECTRICAL CHARACTERISTICS WITH 25% REAR SIDE POWER GAIN* | | PACKAGING CONFIGURATION* | | | | | | | |
|---|-------|--------------------------|-------|-------|-------|-------|-------|--|-----|
| Front power Pmax/W | 530 | 535 | 540 | 545 | 550 | 555 | 560 | Piece/Box | 31 |
| Total power Pmax/W | 663 | 669 | 675 | 681 | 688 | 694 | 700 | Piece/Container(40HQ) | 620 |
| Vmp(V)(Total) | 41.20 | 41.40 | 41.60 | 41.80 | 42.00 | 42.20 | 42.30 | <small>*Customized packaging available upon request.</small> | |
| Imp(A)(Total) | 16.08 | 16.15 | 16.23 | 16.30 | 16.37 | 16.44 | 16.51 | <small>*Remark: Electrical data in the catalog is reference to a single module and they are not part of the offer. They only serve for comparison among different modules types.</small> | |
| Voc(V)(Total) | 49.50 | 49.70 | 49.90 | 50.10 | 50.30 | 50.50 | 50.70 | <small>*Caution: Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using any PV modules.</small> | |
| Isc(A)(Total) | 17.02 | 17.10 | 17.17 | 17.25 | 17.32 | 17.39 | 17.47 | | |

*Additional Caution: The additional gain from the back side compared to the power of the front side at the standard test conditions. It is based on measuring the average back-side power of the module.

Add: 1#, Zhuhai Industrial Zone, Jintanjiangou 21251, P.R. China Tel: +86 519 6822 0233 E-mail: info@zshinesolar.com

Note: Specifications included in this datasheet are subject to change without notice. ZSHINESOLAR reserves the right of final interpretation © ZSHINESOLAR 2023 | Version: ZXM7-SHDB144 2303.E
No special undertaking or warranty for the suitability of special purpose or being installed in extraordinary surroundings is granted unless as otherwise specifically committed by manufacturer in contract document.

PV-Guard Module-Level Rapid Shutdown and Monitoring

NORthern ELECTRIC
PV - GUARD

Features

- Module level rapid shutdown
- Module level monitoring for service (option)
- IV curve trace operating mode
- Over temperature protection (auto RSD function)
- Optional enclosure for controller and data logger
- Certified for PVRSS with multiple inverters and for stand-alone independent RSD system

Auto shut-down whole PV site BEFORE fire or smoke

Compatible with SunSpec control signaling

Cable harness options to comply with NEC-2020

Suitable for all commercial or residential applications

Multiple US patents pending

PVG-2

RECOMMENDED COMPONENT
UL 1741
5001153

PVG-2-L

2.2M(86.61in)

0.2M(7.9in)

* Contact NEP for other cable lengths and connector configurations

PANEL LEVEL RECEIVER DEVICES PVG-2

| INPUT(DC) | Max DC Open Circuit Voltage per Input (Vdc) | 90 |
|--------------------------------|---|--|
| Max DC Current per Input (Adc) | 15 | |
| OUTPUT(DC) | Maximum Output Voltage (Vdc) | Voc*2 |
| SYSTEM | Maximum System Voltage (Vdc) | 1500 |
| MECHANICS | PV Cable | 12AWG |
| | PV Connectors | M4 (Contact NEP for other connectors options) |
| | Size (not including PV cable) | 5.90" x 5.71" x 1.00" (PVG-2) |
| | Protection Degree | NEMA 6 |
| OPERATING | Operating Ambient Temperature | -40°C~+85°C |
| | Mounting Method | Rail, Frame (option) |
| SIGNAL | Communications | DC Power Line Compatible with SunSpec signaling |
| CERTIFICATION | Product Safety Compliance | UL 1741 CSA C22.2 NO. 107.1 NEC 2014/2017 690.12 Canada CEC 2015 64-218 |

50/60kW, 1000Vdc String Inverters for North America

CPS Datasheet

The 50 & 60kW (55 & 66kVA) medium power CPS three phase string inverters are designed for ground mount, large rooftop and carport applications. The units are high performance, advanced and reliable inverters designed specifically for the North American environment and grid. High efficiency at 98.8% peak and 98.5% CEC, wide operating voltages, broad temperature ranges and a NEMA Type 4X enclosure enable this inverter platform to operate at high performance across many applications. The CPS 50/60KTL products ship with either the Standard wire-box or the Rapid Shutdown wire-box, each fully integrated and separable with touch safe fusing, monitoring, and AC and DC disconnect switches. The integrated PLC transmitter in the Rapid Shutdown wire-box enables PVRSS certified module-level rapid shutdown when used with the Tigo TS4-F/TS4-A-F/TS4-A-2F products, APS RSD-S-PLC-A products, and NEP PVG-4 products. The CPS FlexOM Gateway enables monitoring, controls and remote product upgrades.

Key Features

- NEC 2017/2020 PVRSS Certified Rapid Shutdown
- 55 & 66kVA rating allows max rated Active Power @±0.91PF
- Selectable Max AC Apparent Power of 50/55kVA and 60/66kVA
- NEC 2014/17 compliant & UL listed Arc-Fault circuit protection
- 15-90° Mounting orientation for low profile roof installs
- Optional FlexOM Gateway enables remote FW upgrades
- Integrated AC & DC disconnect switches
- 3 MPPT's with 5 inputs each for maximum flexibility
- NEMA Type 4X outdoor rated, tough tested enclosure
- UL1741 SA Certified to CA Rule 21, including SA8 through SA18
- Separable wire-box design for fast service
- Standard 10 year warranty with extensions to 20 years

50/60KTL Standard Wire-box

50/60KTL Rapid Shutdown Wire-box

© CHINT POWER SYSTEMS AMERICA 2021/04-MKT NA Chint Power Systems America
6800 Kull Center Parkway, Suite 235 Pleasanton, CA 94566
Tel: 855-584-7168 Mail: AmericaSales@chintpower.com Web: www.chintpower.com

CPS Technical Data

| Model Name | CPS SCA50KTL-DO/US-480 | CPS SCA60KTL-DO/US-480 |
|---|---|------------------------|
| DC Input | | |
| Max. PV Power | 90kW (33kW per MPPT) | |
| Max. DC Input Voltage | 1000Vdc | |
| Operating DC Input Voltage Range | 200-950Vdc | |
| Start-up DC Input Voltage / Power | 330V / 80W | |
| Number of MPPT Trackers | 3 | |
| MPPT Voltage Range @ PF>0.99 | 480-850Vdc | 540-850Vdc |
| Max. PV Short-Circuit Current (Isc x 1.25) | 204A (68A per MPPT) | |
| Number of DC Inputs | 15 inputs, 5 per MPPT | |
| DC Disconnection Type | Load-rated DC switch | |
| DC Surge Protection | Type II MOV, 2800Vdc, 20kA I _{tu} (8/20.5) | |
| AC Output | | |
| Rated AC Output Power @ PF=0.99 to ±0.91 ¹ | 50kW | 60kW |
| Max. AC Apparent Power (Selectable) | 50/55kVA | 60/66kVA |
| Rated Output Voltage | 480Vac | |
| Output Voltage Range ² | 422 - 528Vac | |
| Grid Connection Type | 3Φ / PE / N (Neutral optional) | |
| Max. AC Output Current @480Vac | 60.2/66.2A | 72.2/79.4A |
| Rated Output Frequency | 60Hz | |
| Output Frequency Range ² | 57 - 63Hz | |
| Power Factor | >0.99 (±0.8 adjustable) | |
| Current THD @ Rated Load | <3% | |
| Max. Fault Current Contribution (1 Cycle RMS) | 64.1A (1.06/0.88 PU) | |
| Max. OCPD Rating | 110A | 125A |
| AC Disconnection Type | Load-break rated AC switch | |
| AC Surge Protection | Type II MOV, 1240Vdc, 15kA I _{tu} (8/20.5) | |
| System and Performance | | |
| Topology | Transformerless | |
| Max. Efficiency | 98.8% | |
| CEC Efficiency | 98.5% | |
| Stand-by / Night Consumption | <1W | |
| Environment | | |
| Enclosure Protection Degree | NEMA Type 4X | |
| Cooling Method | Variable speed cooling fans | |
| Operating Temperature Range ³ | -22°F to +140°F / -30°C to +60°C | |
| Non-Operating Temperature Range ⁴ | No low temp minimum to +158°F / +70°C maximum | |
| Operating Humidity | 0 to 100% | |
| Operating Altitude | 13,123.4ft / 4000m (derating from 9842.5ft / 3000m) | |
| Audible Noise | <80dBA @ 1m and 25°C | |
| Display and Communication | | |
| User Interface and Display | LCD+LED | |
| Inverter Monitoring | SunSpec, Modbus RS485 | |
| Site Level Monitoring | CPS FlexOM Gateway (1 per 32 inverters) | |
| Modbus Data Mapping | CPS | |
| Remote Diagnostics / FW Upgrade Functions | Standard / (with FlexOM Gateway) | |
| Mechanical | | |
| Dimensions (HxWxD) | 39.4 x 23.6 x 10.24in. (1000 x 600 x 260mm) | |
| Weight | Inverter: 123.5lbs/56kg; Wire-box: 33lbs/15kg | |
| Mounting / Installation Angle ⁵ | 15 to 90 degrees from horizontal (vertical or angled) | |
| AC Termination | M8 Stud Type Terminal Block (Wire range: #6 - 30AWG CU/AL, Lugs not supplied) | |
| DC Termination ⁶ | Screw Clamp, Neg. Busbar (RSD version ⁷) Wire range: #14 - #6AWG CU | |
| Fused String Inputs (5 per MPPT) ⁷ | RSD ⁸ and Standard Wire-box: 20A fuses provided (Fuse values up to 30A acceptable) | |
| Safety | | |
| Certifications and Standards | UL1741SA-2016, UL1699B, CSA-C22.2 NO.107.1-01, IEEE1547a-2014, FCC PART15 | |
| Selectable Grid Standard | IEEE 1547a-2014, CA Rule 21, ISO-NE | |
| Smart-Grid Features | Volt-Ride Thru, Freq-Ride Thru, Ramp-Rate, Specified-PF, Volt-VAr, Freq-Watt, Volt-Watt | |
| Warranty | | |
| Standard | 10 years | |
| Extended Terms | 15 and 20 years | |

1) Active Power Derating begins at PF=±0.91 to ±0.8 when Max AC Apparent Power is set to 55 or 66kVA.
2) The "Output Voltage Range" and "Output Frequency Range" may differ according to the specific grid standard.
3) Active Power Derating begins at 40°C when PF=±0.8 and MPPT 50Vrms, at 45°C when PF=±1 and MPPT 50Vrms, and at 50°C when PF=±1 and MPPT 70Vrms.
4) See user manual for further requirements regarding non-operating conditions.
5) Shade Cover accessory required for installation angles of 75 degrees or less.
6) RSD wire-box only includes disconnect switches on the positive polarity, compliant with NEC 2017, 480 V (C).
7) Fuse values above 20A have additional spacing requirements or require the use of the V-Conn Terminal Block. See user manual for details.
8) RSD wire-box only includes disconnect switches on the positive polarity, compliant with NEC 2017, 480 V (C).

SCOTT ROMAN
SENIOR PROJECT MANAGER
419-262-9966

JOSE PEREZ
PROJECT MANAGER
401-692-5069

ELECTRICAL
CERTIFICATION

SALINE MIDDLE SCHOOL
7190 N MAPLE RD
SALINE, MI 48176

DRAWN BY
JM

CHECKED BY
RB

DATE
19-Apr-2024

DRAWING LEVEL
ISSUED FOR CONSTRUCTION

| DRAWING LEVEL | ISSUED FOR CONSTRUCTION | REV. | A | B | C | D | U |
|---------------|-------------------------|------|---|---|---|---|---|
| DATE | 19-APR-2024 | | | | | | |

SHEET SIZE
36X24 SHOULD
MEASURE 1":

SCALE
NTS

SHEET TITLE
E70
EQUIPMENT
SPECS

ATTACHMENT F

ALTERNATE COPPER CONDUCTOR SCHEDULE

The base bid assumes aluminum AC Conductors as shown in the conductor Schedule in Attachment E above, Reprinted Here:

AC CONDUCTOR SCHEDULE

| ID | From | To | Phase | AC Voltage | Circuit Current | 80% or 100% Rated OCPD? | Circuit Current x 125% (If Present) | OCPD (If Present) | Parallel Conduit Runs | Material | Conductor Type | # of CCCs | Fill Factor | Ambient Temp. | Temp. Factor | Conductor Size | Ampacity @ 75°C | Max Ampacity | Derated Ampacity | # of Neutrals | Neutral Size | Ground | Ground Material | Ground Type | Ground Size | Conduit Type | Conduit Size | 1-Way Length | Voltage Drop |
|----|--------------------------|--------------------------|-------|------------|-----------------|-------------------------|-------------------------------------|-------------------|-----------------------|----------|----------------|-----------|-------------|---------------|--------------|----------------|-----------------|--------------|------------------|---------------|--------------|--------|-----------------|-------------|-------------|--------------|--------------|--------------|--------------|
| 1 | String Inverter 1 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1/0 AWG | 120 (A) | 135 (A) | 135.0 (A) | 1 | 1/0 AWG | EGC | CU | THWN-2 | 6 AWG | EMT | 1.50 (in.) | 530 (ft) | 2.78% |
| 2 | String Inverter 2 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 2/0 AWG | 135 (A) | 150 (A) | 150.0 (A) | 1 | 2/0 AWG | EGC | CU | THWN-2 | 6 AWG | EMT | 2.00 (in.) | 730 (ft) | 3.02% |
| 3 | String Inverter 3 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 400 (ft) | 2.64% |
| 4 | String Inverter 4 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 395 (ft) | 2.60% |
| 5 | String Inverter 5 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 245 (ft) | 1.61% |
| 6 | String Inverter 6 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 125 (ft) | 0.82% |
| 7 | String Inverter 7 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 240 (ft) | 1.58% |
| 8 | String Inverter 8 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.50 (in.) | 400 (ft) | 2.64% |
| 9 | String Inverter 9 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1/0 AWG | 120 (A) | 135 (A) | 135.0 (A) | 1 | 1/0 AWG | EGC | CU | THWN-2 | 6 AWG | EMT | 1.50 (in.) | 490 (ft) | 2.57% |
| 10 | Solar AC Panelboard | New Generation Meter | 3Ø | 480 (V) | 649.8 (A) | 80% | 812.3 (A) | 1000 (A) | 4 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 350 kcmil | 1000 (A) | 1120 (A) | 1120.0 (A) | 1 | 350 kcmil | EGC | CU | THWN-2 | 2/0 AWG | EMT | 2.50 (in.) | 5 (ft) | 0.02% |
| 11 | New Generation Meter | Utility PV AC Disconnect | 3Ø | 480 (V) | 649.8 (A) | 80% | 812.3 (A) | 1000 (A) | 4 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 350 kcmil | 1000 (A) | 1120 (A) | 1120.0 (A) | 1 | 350 kcmil | EGC | CU | THWN-2 | 2/0 AWG | EMT | 2.50 (in.) | 12 (ft) | 0.04% |
| 12 | Utility PV AC Disconnect | POI | 3Ø | 480 (V) | 649.8 (A) | 80% | 812.3 (A) | 1000 (A) | 4 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 350 kcmil | 1000 (A) | 1120 (A) | 1120.0 (A) | 1 | 350 kcmil | GEC | CU | THWN-2 | 2/0 AWG | EMT | 2.50 (in.) | 10 (ft) | 0.04% |

Contractor may elect to utilize Copper AC Conductors if they believe doing so is in the best interest of the District and in the interest of reducing project budget.

Alternate (Copper) Conductor Schedule shown below.

AC CONDUCTOR SCHEDULE

| ID | From | To | Phase | AC Voltage | Circuit Current | 80% or 100% Rated OCPD? | Circuit Current x 125% (If Present) | OCPD (If Present) | Parallel Conduit Runs | Material | Conductor Type | # of CCCs | Fill Factor | Ambient Temp. | Temp. Factor | Conductor Size | Ampacity @ 75°C | Max Ampacity | Derated Ampacity | # of Neutrals | Neutral Size | Ground | Ground Material | Ground Type | Ground Size | Conduit Type | Conduit Size | 1-Way Length | Voltage Drop |
|----|--------------------------|--------------------------|-------|------------|-----------------|-------------------------|-------------------------------------|-------------------|-----------------------|----------|----------------|-----------|-------------|---------------|--------------|----------------|-----------------|--------------|------------------|---------------|--------------|--------|-----------------|-------------|-------------|--------------|--------------|--------------|--------------|
| 1 | String Inverter 1 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | CU | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1/0 AWG | 150 (A) | 170 (A) | 170.0 (A) | 1 | 1/0 AWG | EGC | CU | THWN-2 | 4 AWG | EMT | 2.00 (in.) | 530 (ft) | 1.75% |
| 2 | String Inverter 2 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | CU | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 2/0 AWG | 175 (A) | 195 (A) | 195.0 (A) | 1 | 2/0 AWG | EGC | CU | THWN-2 | 4 AWG | EMT | 2.00 (in.) | 730 (ft) | 1.92% |
| 3 | String Inverter 3 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | CU | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 130 (A) | 145 (A) | 145.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 6 AWG | EMT | 1.50 (in.) | 400 (ft) | 1.67% |
| 4 | String Inverter 4 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | CU | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 130 (A) | 145 (A) | 145.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 6 AWG | EMT | 1.50 (in.) | 395 (ft) | 1.65% |
| 5 | String Inverter 5 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | CU | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 3 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 3 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.25 (in.) | 245 (ft) | 1.62% |
| 6 | String Inverter 6 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | CU | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 3 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 3 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.25 (in.) | 125 (ft) | 0.83% |
| 7 | String Inverter 7 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | CU | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 3 AWG | 100 (A) | 115 (A) | 115.0 (A) | 1 | 3 AWG | EGC | CU | THWN-2 | 8 AWG | EMT | 1.25 (in.) | 240 (ft) | 1.59% |
| 8 | String Inverter 8 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | CU | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1 AWG | 130 (A) | 145 (A) | 145.0 (A) | 1 | 1 AWG | EGC | CU | THWN-2 | 6 AWG | EMT | 1.50 (in.) | 490 (ft) | 1.67% |
| 9 | String Inverter 9 | Solar AC Panelboard | 3Ø | 480 (V) | 72.2 (A) | 80% | 90.3 (A) | 100 (A) | 1 | CU | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 1/0 AWG | 150 (A) | 170 (A) | 170.0 (A) | 1 | 1/0 AWG | EGC | CU | THWN-2 | 4 AWG | EMT | 2.00 (in.) | 490 (ft) | 1.62% |
| 10 | Solar AC Panelboard | New Generation Meter | 3Ø | 480 (V) | 649.8 (A) | 80% | 812.3 (A) | 1000 (A) | 4 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 350 kcmil | 1000 (A) | 1120 (A) | 1120.0 (A) | 1 | 350 kcmil | EGC | CU | THWN-2 | 2/0 AWG | EMT | 2.50 (in.) | 5 (ft) | 0.02% |
| 11 | New Generation Meter | Utility PV AC Disconnect | 3Ø | 480 (V) | 649.8 (A) | 80% | 812.3 (A) | 1000 (A) | 4 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 350 kcmil | 1000 (A) | 1120 (A) | 1120.0 (A) | 1 | 350 kcmil | EGC | CU | THWN-2 | 2/0 AWG | EMT | 2.50 (in.) | 12 (ft) | 0.04% |
| 12 | Utility PV AC Disconnect | POI | 3Ø | 480 (V) | 649.8 (A) | 80% | 812.3 (A) | 1000 (A) | 4 | AL | THWN-2 | 3 | 1.00 | 28.9 (°C) | 1.00 | 350 kcmil | 1000 (A) | 1120 (A) | 1120.0 (A) | 1 | 350 kcmil | GEC | CU | THWN-2 | 2/0 AWG | EMT | 2.50 (in.) | 10 (ft) | 0.04% |



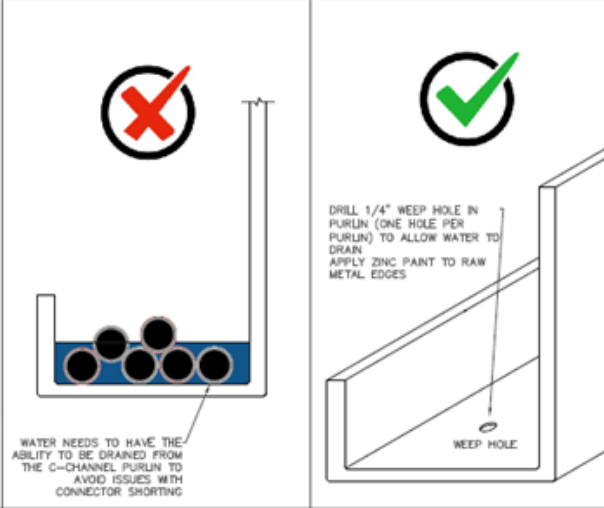
Both options are listed in the Attachment A Bid Response Form to allow District to make selection it deems to be in its best interest.

ATTACHMENT G

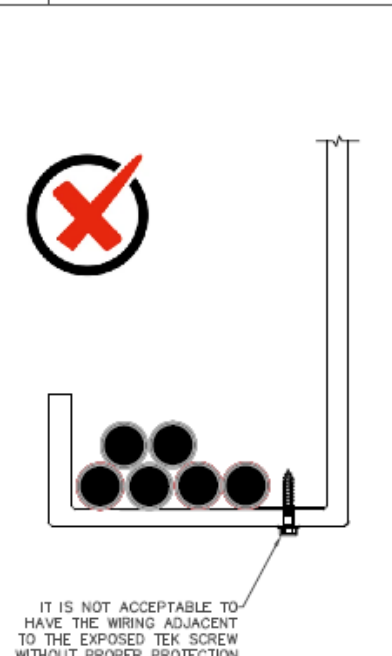
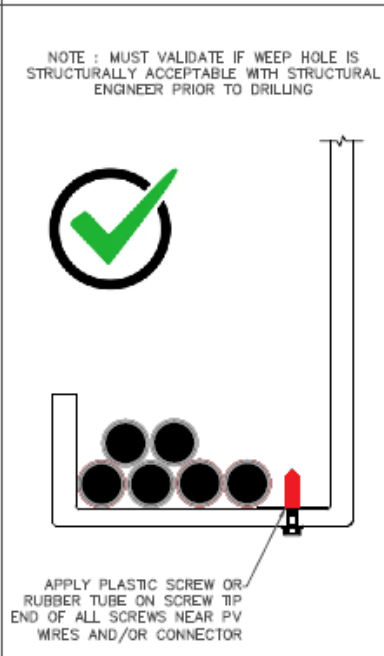
WIRE MANAGEMENT BEST PRACTICES & REQUIREMENTS

Contractor shall abide by and all work complete must adhere to the best practices described below.

Issue 1: Do not allow PV wire to be submerged in Z or C channel purlins. Wire may be suspended with rated, stainless steel, pvc coated wire bundlers or weep holes should be drilled per instruction below

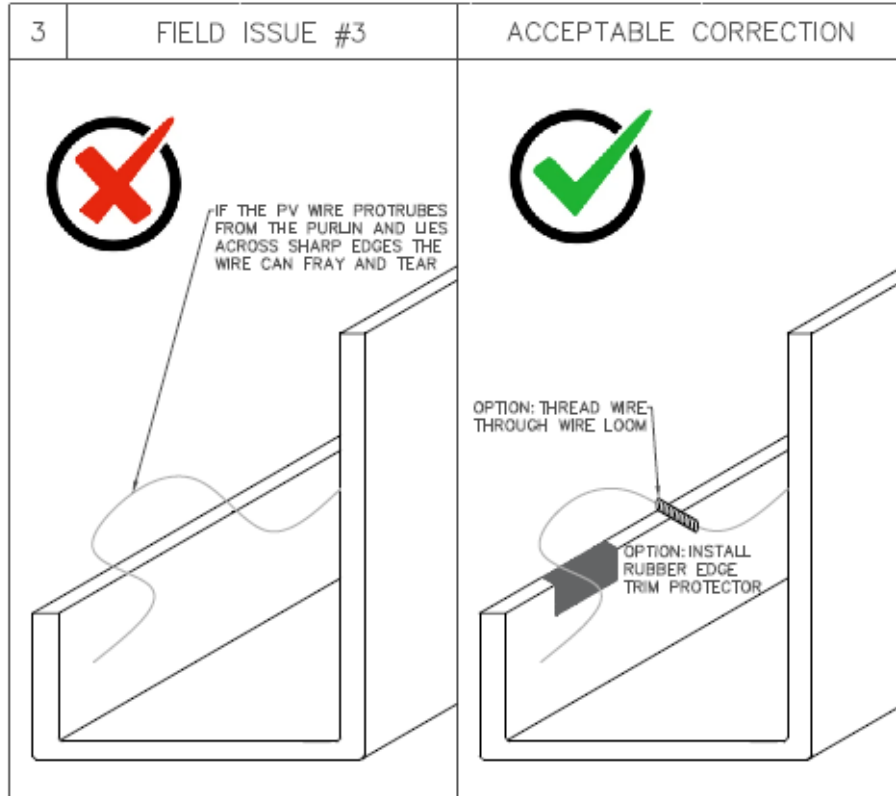
| 1 | FIELD ISSUE #1 | A ACCEPTABLE CORRECTION | B ACCEPTABLE CORRECTION |
|---|--|---|---|
| |  <p>DO NOT LAY CABLES OR DC CONNECTORS DIRECTLY IN THE CHANNEL OF C-PURLINS WITHOUT THE FOLLOWING CORRECTIONS</p> |  <p>BUNDLE WIRES AND/OR CONNECTORS AND MOVE FROM THE BOTTOM OF THE PURLIN AND/OR CABLE TRAY TO THE WALL</p> <p>DRILL 5/16" HOLE AND INSERT PLASTIC BUTTON MOUNT WITH CABLE TIE</p> |  <p>DRILL 1/4" WEEP HOLE IN PURLIN (ONE HOLE PER PURLIN) TO ALLOW WATER TO DRAIN APPLY ZINC PAINT TO RAW METAL EDGES</p> <p>WATER NEEDS TO HAVE THE ABILITY TO BE DRAINED FROM THE C-CHANNEL PURLIN TO AVOID ISSUES WITH CONNECTOR SHORTING</p> |
| | WIRE CABLES IN PURLINS BECOME SUBMERGED IN WATER | BUNDLE WIRES AND MOUNT TO THE PURLIN / TRAY WALL | NOTE: MUST VALIDATE IF WEEP HOLE IS STRUCTURALLY ACCEPTABLE WITH STRUCTURAL ENGINEER PRIOR TO DRILLING |

Issue 2: Do not allow any unprotected screw threads to be near or in contact with PV wire. Condition usually exists on Carport canopies when attaching lighting or security conduits to purlins. Best practice is to NOT screw into any C or Z purlin being used to manage PV wire. Plan your conduit runs accordingly.

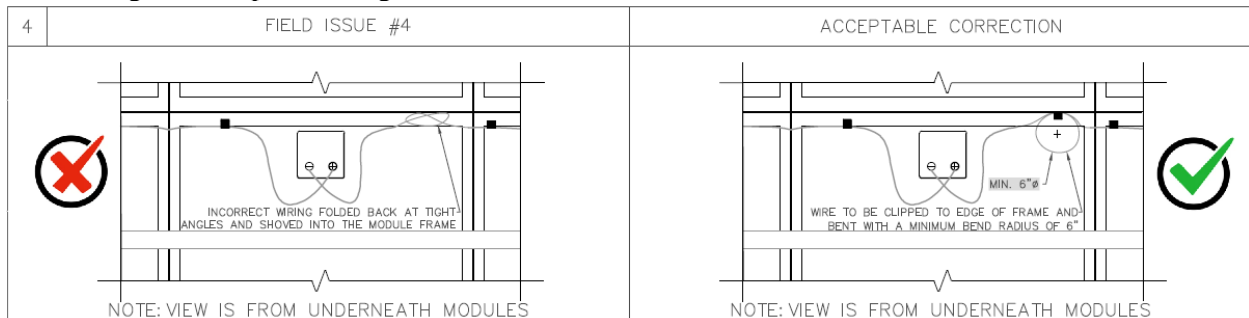
| 2 | FIELD ISSUE #2 | ACCEPTABLE CORRECTION |
|---|--|---|
| |  <p>IT IS NOT ACCEPTABLE TO HAVE THE WIRING ADJACENT TO THE EXPOSED TEK SCREW WITHOUT PROPER PROTECTION</p> |  <p>APPLY PLASTIC SCREW OR RUBBER TUBE ON SCREW TIP END OF ALL SCREWS NEAR PV WIRES AND/OR CONNECTOR</p> <p>NOTE : MUST VALIDATE IF WEEP HOLE IS STRUCTURALLY ACCEPTABLE WITH STRUCTURAL ENGINEER PRIOR TO DRILLING</p> |

Wire Management Requirements (cont.)

Issue 3: Do not allow any wire to come into contact with any sharp edges. Condition usually occurs when transitioning wire in or out of purlin channels or when wires transition through grommets. Use products such as Trim Lok Inc Edge Guard or similar to cover straight edges and Panduit Grommet Edging for hole protection (both available via Grainger Supply). UV stabilized split loom is also an acceptable means of wire protection.

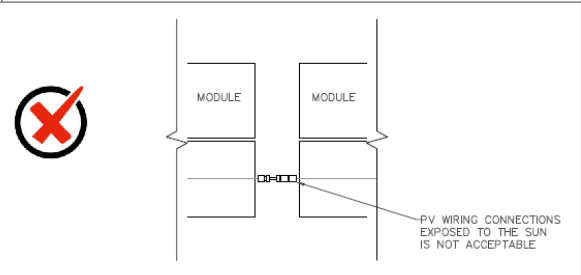
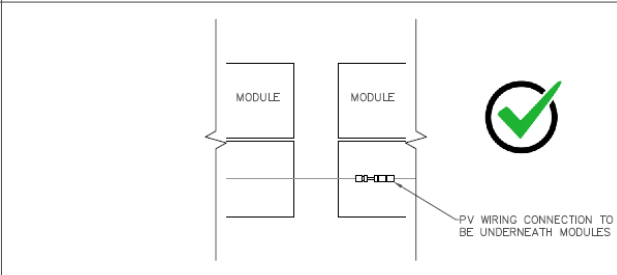


Issue 4: Do not bend PV wire at an unacceptable radius. Condition usually arises from poor wire management practice, attempting to force wires into areas they don't fit, and by not providing enough PV wire management clips to manage the wire. The minimum bend radius should be = or > 6 inches.



Wire Management Requirements (cont.)

Issue 5: Do not expose PV wire connectors (MC-4 or other), to Sun and Weather when possible. Condition usually occurs when shortcuts are taken and Module mounting holes are utilized for wire management in lieu of bespoke wire management clips.

| 5 | FIELD ISSUE #5 | ACCEPTABLE CORRECTION |
|---|---|---|
| |  <p>PV WIRING CONNECTIONS EXPOSED TO THE SUN IS NOT ACCEPTABLE</p> |  <p>PV WIRING CONNECTION TO BE UNDERNEATH MODULES</p> |

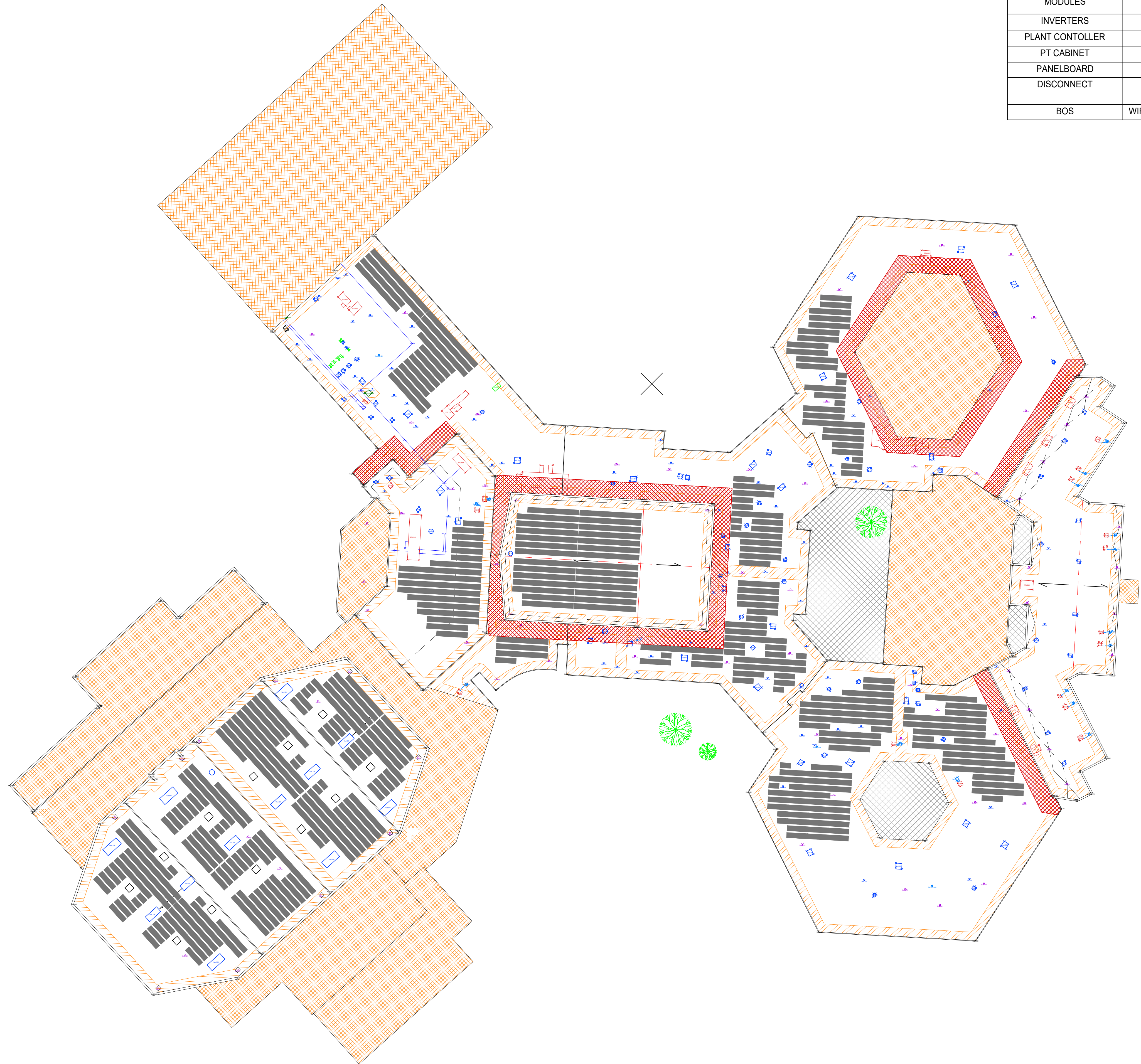
Poor example shown below

- Connector exposed to UV and weather 😞
- Bend radius in wire loop is < 6" 😞
- Module frame mounting holes are being used for wire management (wire management clips allow for more flexibility in wire management) 😞



ATTACHMENT H

ALTERNATE 2: PRELIMINARY NON-EXPORT SITE PLAN & SLD



| EQUIPMENT LIST | | |
|------------------|--|----------|
| ITEM | MAKE/MODEL/SPEC | QUANTITY |
| MODULES | ZNSHINE ZXM7-SHDB144-550 | 1224 |
| INVERTERS | CPS SCA60KTL | 8 |
| PLANT CONTROLLER | COMP-AP | 1 |
| PT CABINET | AS NEEDED BY COMP-AP SPECS | 1 |
| PANELBOARD | (1) 800A 480/277V MLO 3P, 4W W/ (8) 100A CBs | 1 |
| DISCONNECT | 480/277V 3Ø 4W, 800 AF, 800AT NEMA 3R .22kA | 1 |
| BOS | WIRE, CONDUIT, TERMINATIONS, GROUNDING MATERIALS | -- |

| SITE DETAILS | |
|-----------------------------|----------|
| AC RATING (kW) | 480kW |
| DC RATING (kW) | 673.2kW |
| STRING QUANTITY | 72 |
| POWER FACTOR | 1.00 |
| INTERCONNECT VOLTAGE | 480V |
| UTILITY | DTE |
| SERVICE NUMBER | |
| ACCOUNT NUMBER | |
| METER NUMBER | |
| CODE EDITION | NEC 2023 |
| ESTIMATED ANNUAL PRODUCTION | |

DEVELOPED BY:
AMERESCO

PROJECT
SALINE MIDDLE SCHOOL

CUSTOMER
SALINE SCHOOLS

LOCATION
7190 N MAPLE RD,
SALINE, MI 48176

SEAL AND SIGNATURE:

EOR:

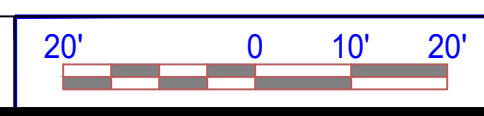
DRAWN BY:
COLE MCKENZIE
DATE:
2024-03-15
SHEET SIZE:
ARCH Expand D (36.00 X 24.00 Inches)

| REVISIONS | | |
|--------------------|------------|-----|
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| PRELIMINARY DESIGN | 10/26/2023 | 0 |
| | | |
| | | |
| | | |
| | | |

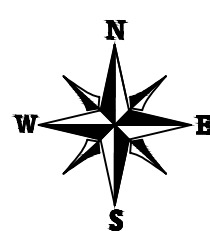
SHEET NAME
ALT 1 SITE PLAN

SHEET NUMBER
E-102

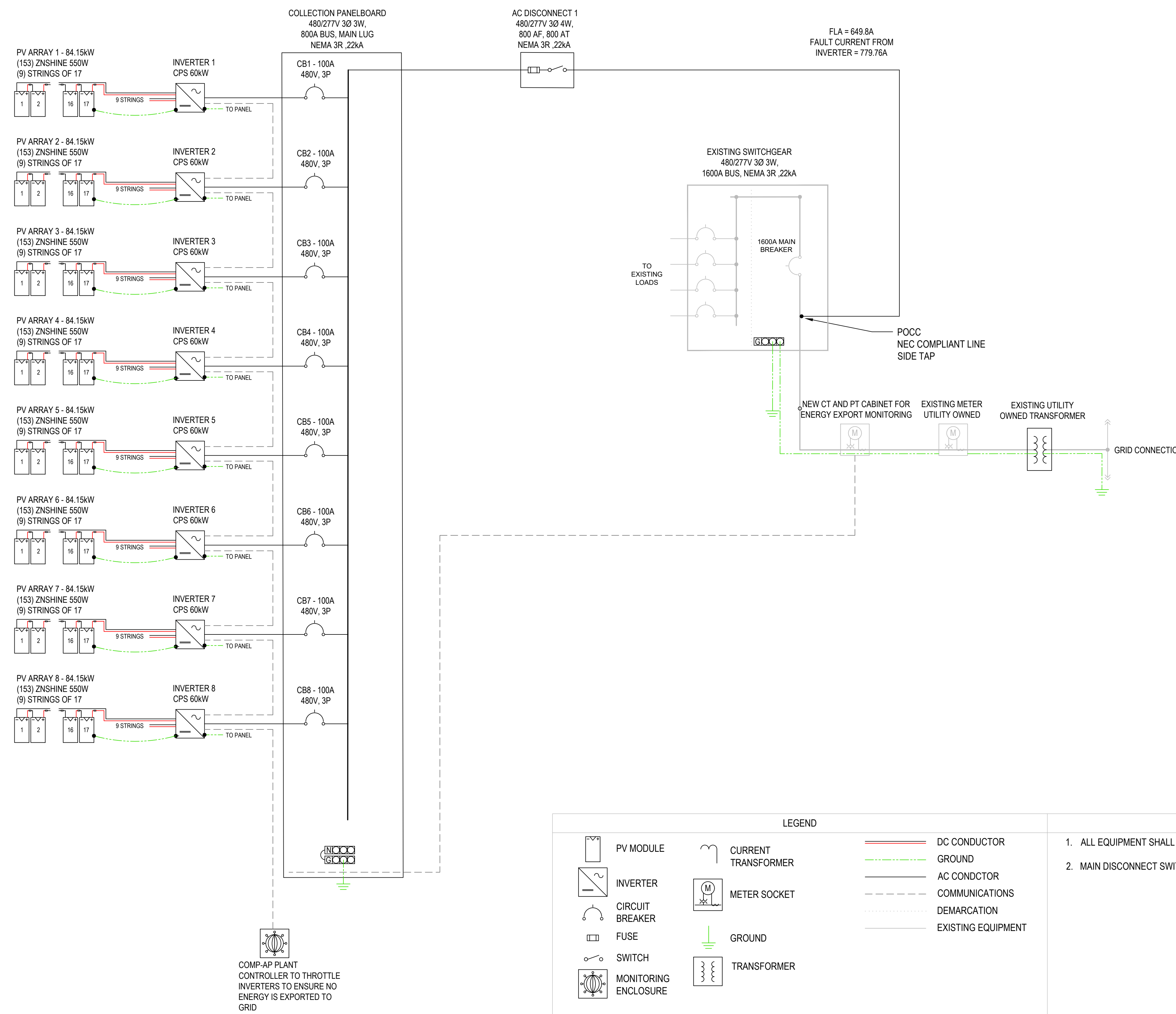
SCOPE OF WORK



SCALE: 1"=20'-0"
(OR) 1"=40'-0"



#



COMP-AP PLANT CONTROLLER TO THROTTLE INVERTERS TO ENSURE NO ENERGY IS EXPORTED TO GRID

| LEGEND | |
|--------|----------------------|
| | PV MODULE |
| | INVERTER |
| | CIRCUIT BREAKER |
| | FUSE |
| | SWITCH |
| | MONITORING ENCLOSURE |
| | CURRENT TRANSFORMER |
| | METER SOCKET |
| | GROUND |
| | TRANSFORMER |
| | DC CONDUCTOR |
| | GROUND |
| | AC CONDUCTOR |
| | COMMUNICATIONS |
| | DEMARCATIION |
| | EXISTING EQUIPMENT |

- NOTES**
- ALL EQUIPMENT SHALL BE PROPERLY BONDED AND GROUNDED AS REQUIRED BY NEC AND MANUFACTURER SPECIFICATIONS.
 - MAIN DISCONNECT SWITCH SHALL BE 24/7 UTILITY ACCESSIBLE.

| SITE DETAILS | |
|-----------------------------|----------|
| AC RATING (kW) | 480kW |
| DC RATING (kW) | 673.2kW |
| STRING QUANTITY | 72 |
| POWER FACTOR | 1.00 |
| INTERCONNECT VOLTAGE | 480V |
| UTILITY | DTE |
| SERVICE NUMBER | |
| ACCOUNT NUMBER | |
| METER NUMBER | |
| CODE EDITION | NEC 2023 |
| ESTIMATED ANNUAL PRODUCTION | |

| EQUIPMENT LIST | | |
|-----------------|--|----------|
| ITEM | MAKE/MODEL/SPEC | QUANTITY |
| MODULES | ZN SHINE ZXM7-SHDB144-550 | 1224 |
| INVERTERS | CPS SCA60KTL | 8 |
| PLANT CONTOLLER | COMP-AP | 1 |
| PT CABINET | AS NEEDED BY COMP-AP SPECS | 1 |
| PANELBOARD | (1) 800A 480/277V MLO 3P, 4W W/ (8) 100A CBs | 1 |
| DISCONNECT | 480/277V 3Ø 4W, 800 AF, 800AT NEMA 3R .22kA | 1 |
| BOS | WIRE, CONDUIT, TERMINATIONS, GROUNDING MATERIALS | -- |

| INVERTER TRIP SETTINGS (IEEE1547) | | | |
|-----------------------------------|--------|----------------------|---------|
| DEVICE | PICKUP | DESCRIPTION | NOTE(S) |
| 27-1 | 139V | UNDERVOLTAGE RELAY | |
| 27-2 | 244V | | |
| 59-1 | 304V | OVERVOLTAGE RELAY | |
| 59-2 | 332V | | |
| 81U-1 | 56.5HZ | OVER/UNDER FREQUENCY | |
| 81U-2 | 58.5HZ | | |
| 810-1 | 61.0HZ | | |
| 810 | 62.0HZ | | |

DEVELOPED BY:
AMERESCO

PROJECT
SALINE MIDDLE SCHOOL

CUSTOMER
SALINE SCHOOLS

LOCATION
7190 N MAPLE RD, SALINE, MI 48176

SEAL AND SIGNATURE:

EOR:

DRAWN BY:
COLE MCKENZIE

DATE:
2024-03-15

SHEET SIZE:
ARCH Expand D (36.00 X 24.00 Inches)

| REVISIONS | | |
|--------------------|------------|-----|
| DESCRIPTION | DATE | REV |
| PRELIMINARY DESIGN | 10/26/2023 | 0 |

SHEET NAME
ALT 1 SINGLE LINE DIAGRAM

SHEET NUMBER
E-602

ATTACHMENT I

RACKING DETAILS

| Site Design Criteria - Flat Roof PV System Basis of Design | |
|--|--------------------|
| Roof Live Load (psf) | 20(see footnote 1) |
| Ground Snow Pg (psf) | 20 |
| Flat Roof Snow Pf (psf) | 18.48 |
| Snow Importance Factor (Is) | 1.1 |
| Wind Design Data | |
| Basic Wind Speed (mph) | 120 |
| Risk Category | III |
| Design Life (years) | 50 Years |
| MRI Adjustment Factor | 1 |
| Wind Exposure | C |
| Earthquake Design Data | |
| Risk Category | III |
| Importance Factor (Ie) | 1.25 |
| Component Importance Factor (Ip) | 1.0 |
| Mapped Acceleration Parameter (Ss) | 0.097 |
| Mapped Acceleration Parameter(S1) | 0.049 |
| Seismic Site Class | D |
| Design Spectral Acceleration Parameter (Sds) | 0.103 |
| Design Spectral Acceleration Parameter (Sd1) | 0.078 |
| Seismic Design Category (SDC) | B |
| Basic seismic-force-resisting system(s) | (see footnote 2) |
| Base Design Shear = Fp x W | 0.05 W |
| Response Modification Factor (R) | 2.5 |
| Analysis Procedure | (see footnote 2) |
| Design Code (with local amendments) | IBC 2015 |
| - | ASCE 7 - 10 |
| ALTERNATE DESIGN METHOD | SEAOC PV1 |
| - | SEAOC PV2 |
| 1. Roof Live Load only applicable to areas not covered by PV modules. Reference SEAOC Design Guidelines | |
| 2. Analysis procedure per ASCE 7 "Seismic Design Requirements for Non Structural Components" and SEAOC PV1 | |

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- ALL SITE, PROJECT, AND BUILDING DETAILS ARE PROVIDED BY CUSTOMER OR GENERATED VIA SATELLITE IMAGERY FROM INFORMATION PROVIDED BY CUSTOMER. PANELCLAW IS NOT RESPONSIBLE FOR SITE INACCURACIES THAT COULD LEAD TO CHANGES TO THESE DRAWING DETAILS AND ARRAY LAYOUT CONFIGURATIONS. ALL INFORMATION CONTAINED WITHIN THESE DOCUMENTS ARE TO BE FIELD VERIFIED BY CUSTOMER AND INSTALLER. ANY CHANGES OR MODIFICATIONS TO THESE DOCUMENTS, CONTAINED INFORMATION, OR FINAL ARRAY AND MOUNTING SYSTEM INSTALLATIONS MUST BE SUBMITTED TO PANELCLAW AND OTHER PROJECT AUTHORITIES FOR APPROVAL.
- REFER TO AND FOLLOW THE APPROPRIATE PANELCLAW INSTALLATION MANUALS AND PROCEDURES DURING THE INSTALLATION PROCESS. NOT FOLLOWING SUCH PROCEDURES AND METHODS COULD RESULT IN DAMAGE TO THE COMPONENTS OR MAY VOID THE PRODUCT WARRANTY.
- ARRAY SETBACKS: ALL ARRAYS ARE REQUIRED TO BE SETBACK 4-FEET FROM ALL ROOF EDGES UNLESS OTHERWISE SPECIFIED AND CALLED OUT ON THE ARRAY DIAGRAMS ON THIS PAGE OR ON ADDITIONAL ARRAY BALLAST PAGES
- REFER TO THE SPECIFIC ARRAY BALLAST SHEETS FOR BALLASTING REQUIREMENTS BASED ON THE PROVIDED SITE INFORMATION
- SYSTEM PSF INCLUDES ALL PANELCLAW RACKING COMPONENTS, MECHANICAL ATTACHMENTS (IF APPLICABLE), PV MODULE AND BALLAST BLOCKS. FOR MAXIMUM SYSTEM POINT LOAD SUMMARY (PLS), REFER TO CALCULATIONS.
- PANELCLAW AND/OR PANELCLAW CONSULTING ENGINEERS ARE NOT RESPONSIBLE FOR DETERMINING THE ADEQUACY OF THE STRUCTURE TO SUPPORT LOADS IMPOSED BY THE ARRAY AND MOUNTING SYSTEM. SUPPORT STRUCTURE TO BE CHECKED BY OTHERS
- ALWAYS ALLOW 6" CLEARANCE BETWEEN NEIGHBORING SUBARRAYS, 6" BETWEEN SUBARRAYS AND ALL FIXED ROOF OBJECTS AND 4" BETWEEN SUBARRAYS AND ROOF EDGES. REFER TO LOCAL FIRE CODES AND ELECTRICAL CODES FOR ADDITIONAL REQUIREMENTS WHICH MAY GOVERN DESIGN. SUBARRAYS THAT USE A SEISMIC ANALYSIS METHOD OF DELTA MPV PER SEAOC OR ASCE 7-16 HAVE THEIR OWN CLEARANCE REQUIREMENTS. REFER TO THE BALLAST LAYOUT SHEETS WITHIN THIS DOCUMENT FOR DETAILS.
- BALLAST BLOCK DIMENSIONS MUST CONFORM TO THE FOLLOWING SPECIFICATIONS: 3-3/4" THICK MAX., 7-5/8" ± 1/8" WIDTH, 15-5/8" ± 1/8" LENGTH.
- IF AN ARRAY CLEARANCES TABLE APPEARS BELOW ON THIS PAGE, THE DESIGN UTILIZES THIRD PARTY SEISMIC NON-LINEAR RESPONSE ANALYSIS TO ESTIMATE MAXIMUM ARRAY SEISMIC DISPLACEMENT. THE PREDICTED MOVEMENT IS ONLY AN ESTIMATE. PANELCLAW IS NOT RESPONSIBLE OR LIABLE FOR ANY DAMAGES OR COSTS ASSOCIATED WITH PV ARRAY MOVEMENT INCLUDING MOVEMENT IN EXCESS OF THE CLEARANCES NOTED IN THIS DOCUMENT OR ANY REQUIREMENT TO REPOSITION THE ARRAYS IF MOVEMENT OCCURS.
- DEFLECTORS MUST BE INSTALLED WHEN WINDS ARE EXPECTED TO EXCEED APPROX. 25% OF WIND SPEED DOCUMENTED IN SITE DESIGN CRITERIA TABLE. DEFLECTORS ARE REQUIRED ON ALL MODULES UNLESS OTHERWISE NOTED ON BALLAST LAYOUT PAGES.

DRIFTED SNOW LOAD POTENTIAL!


PANELCLAW HAS IDENTIFIED THIS PROJECT AS POTENTIALLY HAVING SIGNIFICANT ROOFTOP DRIFTED SNOW LOADS. PLEASE HAVE THE SE REVIEWING THE ROOF STRUCTURE FOR POTENTIAL SOLAR APPLICATIONS CONSIDER DRIFTED SNOW LOADS IN THEIR ANALYSES. IF DRIFTED SNOW LOADS ARE PRESENT WITHIN THE PROPOSED ARRAY FOOTPRINT(S), PROVIDE PANELCLAW A DRIFTED SNOW LOAD PLAN SO WE CAN AVOID THESE AREAS OR PLAN FOR ADDITIONAL LOADS ACCORDINGLY. IN GENERAL, DRIFTED SNOW LOADS CAN AFFECT MODULE SELECTION (I.E. MAX PSF) AND POINT LOADING FROM PANELCLAW RACKING TO THE ROOF STRUCTURE.

| REQUIRED ARRAY CLEARANCES PER SEAOC PV1-2012 | | |
|--|---|--------------------|
| CONDITION | DESCRIPTION | MINIMUM SEPARATION |
| 1 | BETWEEN SEPARATE SOLAR ARRAYS OF SIMILAR CONSTRUCTION | (0.5) (Ip) (Mpv) |
| 2 | BETWEEN A SOLAR ARRAY AND A FIXED OBJECT ON THE ROOF OR SOLAR ARRAY OF DIFFERENT CONSTRUCTION | (Ip) (Mpv) |
| 3 | BETWEEN A SOLAR ARRAY AND A ROOF EDGE WITH A QUALIFYING PARAPET | (Ie) (Mpv) |
| 4 | BETWEEN A SOLAR ARRAY AND A ROOF EDGE WITHOUT A QUALIFYING PARAPET | (1.5) (Ie) (Mpv) |

NOTE: SUFFICIENT SLACK IN ARRAY ELECTRICAL WIRING MUST BE PROVIDED TO ACCOMMODATE ALL POTENTIAL ARRAY MOVEMENT.

| SHEET INDEX | |
|----------------|------------------------------|
| NO. | DESCRIPTION |
| PC-1 | COVER SHEET |
| PC-2 | PROJECT SUMMARY |
| PC-3 TO PC-5 | ARRAY SITE MAP |
| PC-6 | TYPICAL ARRAY DIMENSIONS |
| PC-7 | ASSEMBLIES |
| PC-8 | RACKING COMPONENTS |
| PC-9 | BALLAST LEGEND |
| PC-10 TO PC-31 | BALLAST LAYOUT - 1 TO 22 |
| PC-32 | MECHANICAL ATTACHMENT DETAIL |

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PANELCLAW[®]

RACKING CONSTRUCTION SET
 1600 OSGOOD ST. SUITE 2023
 NORTH ANDOVER, MA 01845
 TEL: 978.688.4900
 www.panelclaw.com

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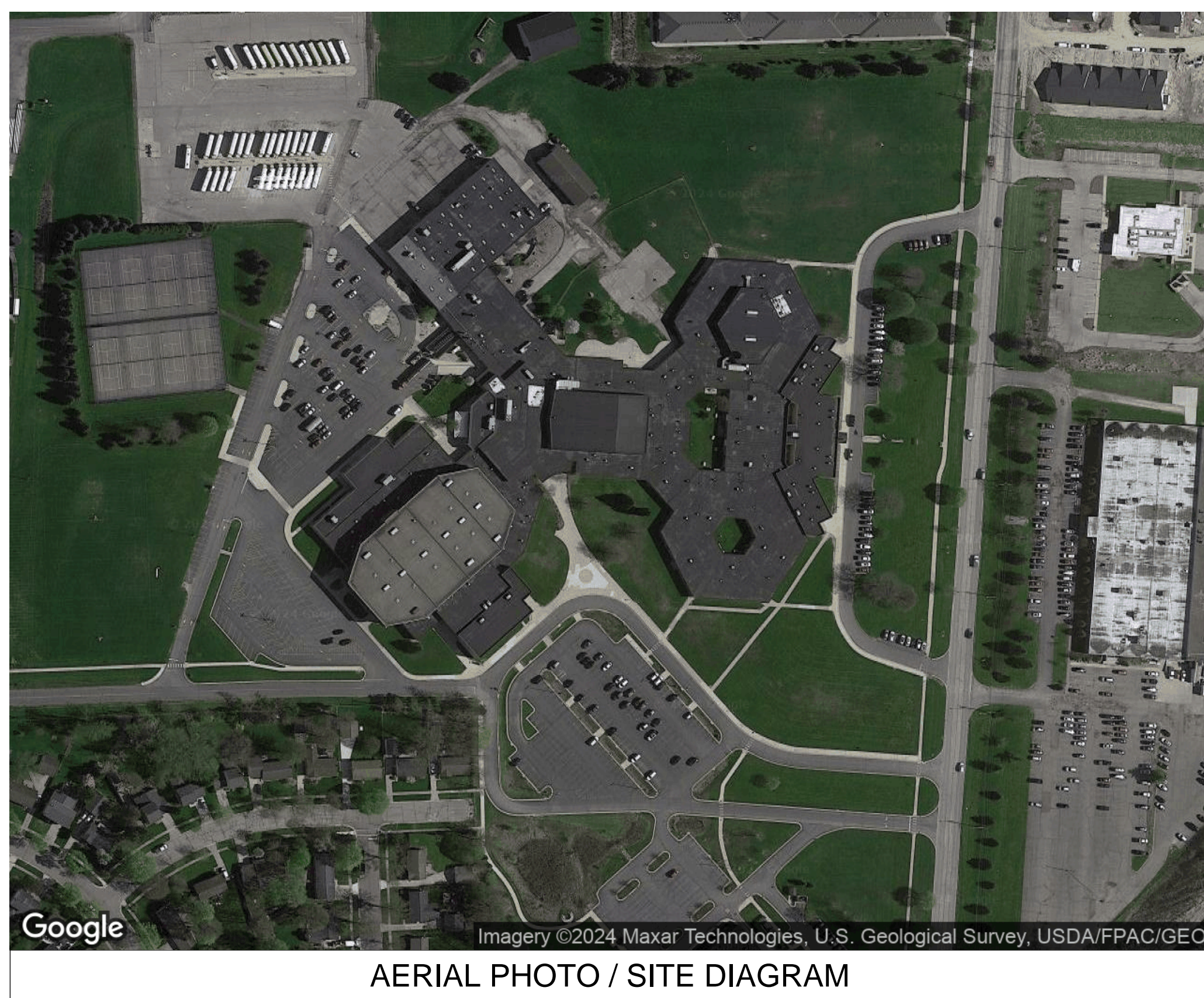
PREPARED FOR:

PROJECT:
 Saline Middle

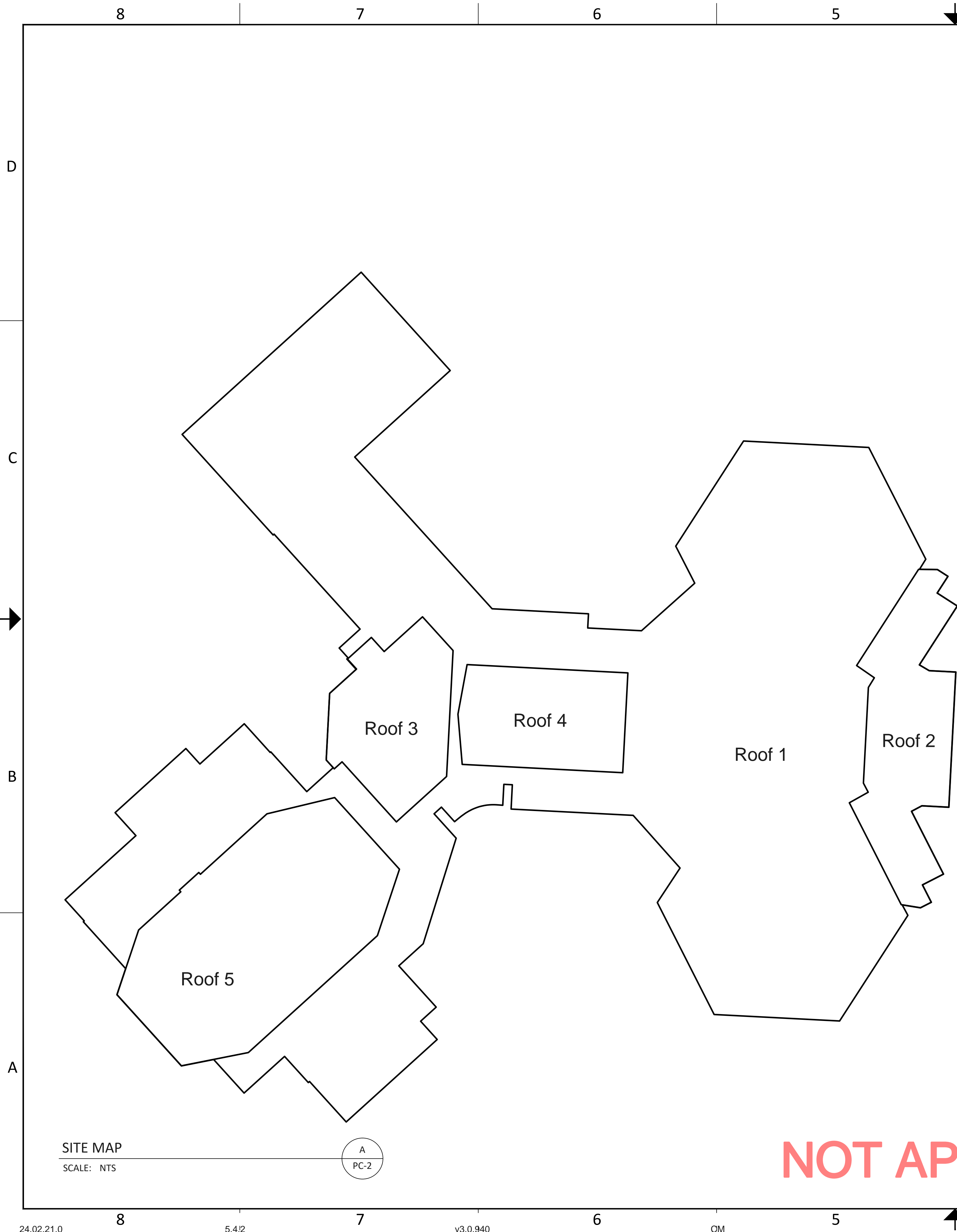
LOCATION:
 7190 N Maple Rd, Saline, MI 48176, USA

SHEET TITLE:
 COVER SHEET

REVISION: 0 SHEET: PC-1



NOT APPROVED FOR CONSTRUCTION



SITE MAP
SCALE: NTS

NOT APPROVED FOR CONSTRUCTION

| PROJECT SUMMARY | |
|-----------------------------|----------------------------------|
| MODULE TYPE | ZNSHINE SOLAR ZXM7-SHDB144-550/M |
| MODULE DIMENSIONS (IN.) | 89.69 X 44.65 X 1.38 |
| NUMBER OF MODULES | 1377 |
| MODULE WATTAGE (W STC) | 550 |
| SYSTEM SIZE (kW STC) | 757.35 |
| SYSTEM WEIGHT (LB) | 269948 |
| SYSTEM AREA (SQ FT.) | 52039 |
| AGGREGATE SYSTEM LOAD (PSF) | 5.19 |
| NUMBER OF ARRAYS | 22 |
| ARRAY TILT (DEG) | 8.98 |

| PROJECT PART QUANTITY | | |
|--|-------------|-------|
| ITEM | PART NUMBER | QTY |
| Base | 500050203 | 3230 |
| BASE, 03, CFR | | |
| Module Connector | 500050704 | 2754 |
| MODULE CONNECTOR, 1150, 10D, CFR | | |
| Rail | 2000895 | 4450 |
| RAIL, 2500, CFR | | |
| Cam | 5000500 | 2754 |
| CAM, 10D, CFR | | |
| Cam Claw | 2000673 | 2754 |
| CAM CLAW, CFR | | |
| Deflector | 200088705 | 1377 |
| DEFLECTOR, 10D, 2300, CFR | | |
| Bolt | 2000697 | 15013 |
| BLT, HEX FLG, TRI, M6X16, GR8.8, PATCH | | |
| Base Pad | 2000678 | 0 |
| PAD, BASE, CFR | | |
| CONCRETE MASONRY UNIT | N/A | 4926 |
| BLOCK, CONCRETE, 32.6 LB - Xln x 8in x 16in NOMINAL, PARTNER SUPPLIED, SEE INSTALLATION MANUAL | | |

| MECHANICAL ATTACHMENT PART QUANTITY | | |
|-------------------------------------|-------------|-----|
| ITEM | PART NUMBER | QTY |
| MA Hardware Kit | 5000423 | 15 |
| HW KIT, MA STRUT, 2500, CFR | | |
| MA Strut | 2000930 | 142 |
| MA STRUT, 2500, CFR | | |
| Mechanical Attachment | TBD | 142 |
| To Be Determined (U-Anchor 2400) | | |
| TOTAL MECHANICAL ATTACHMENT COUNT | | 142 |

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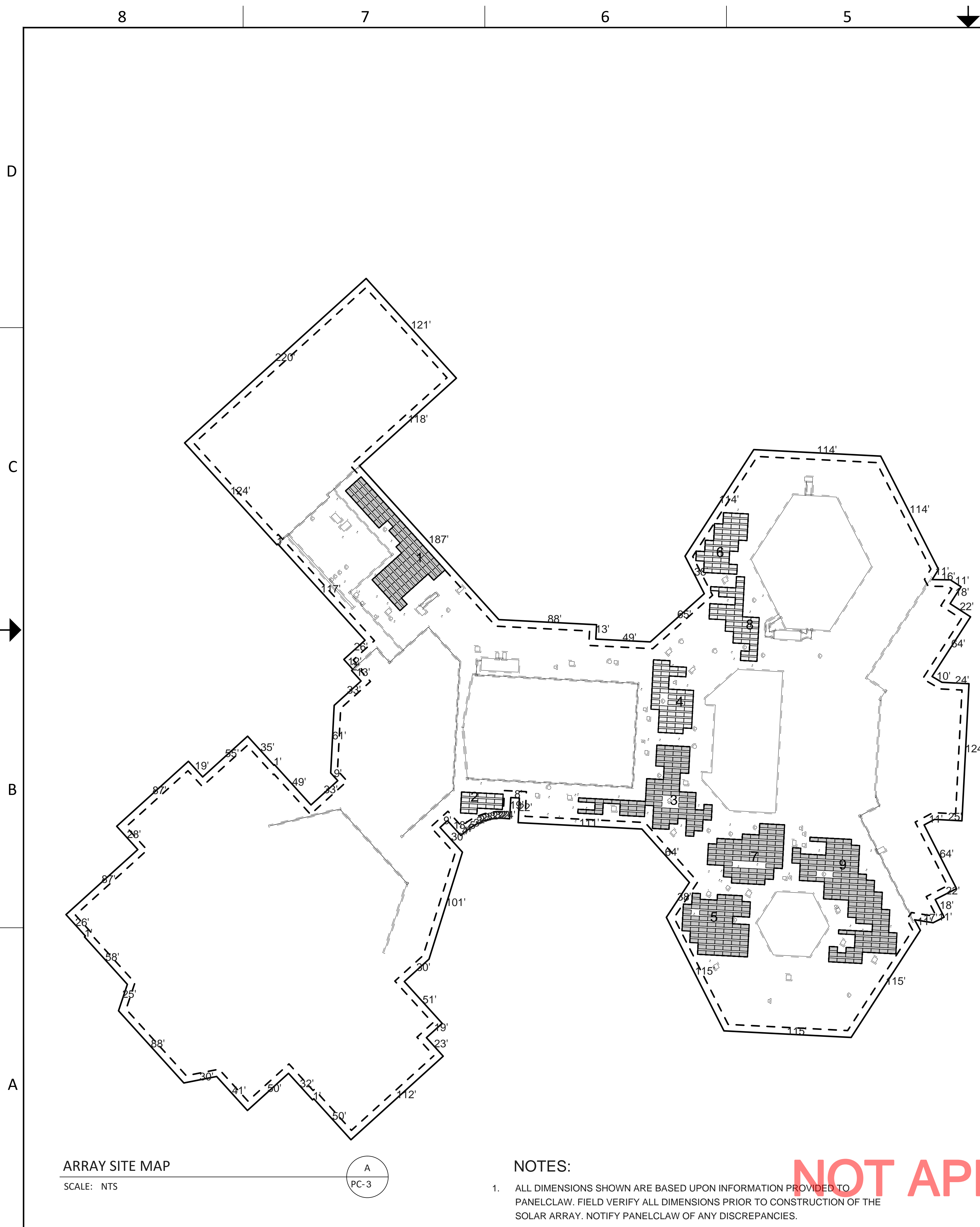
PREPARED FOR:

PROJECT:
Saline Middle

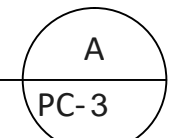
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REVISION: 0 SHEET: PC-2

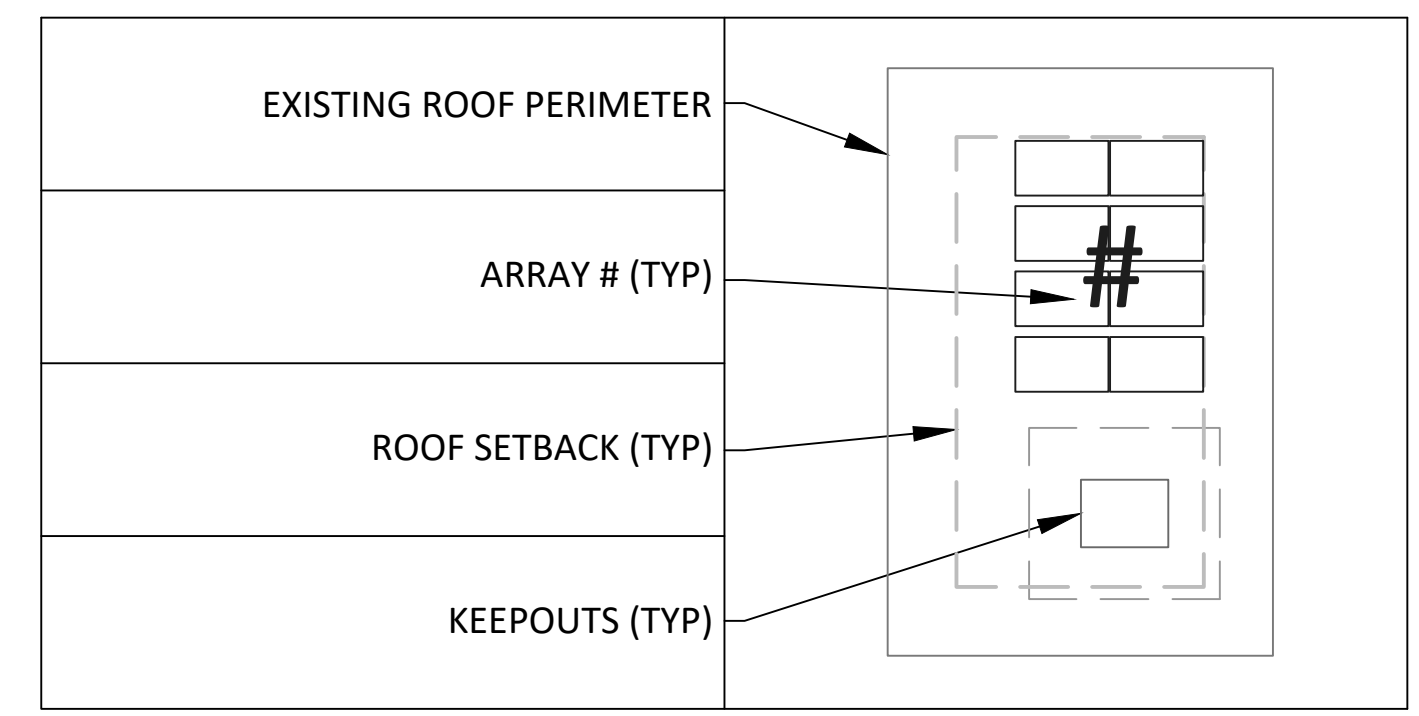


ARRAY SITE MAP
SCALE: NTS



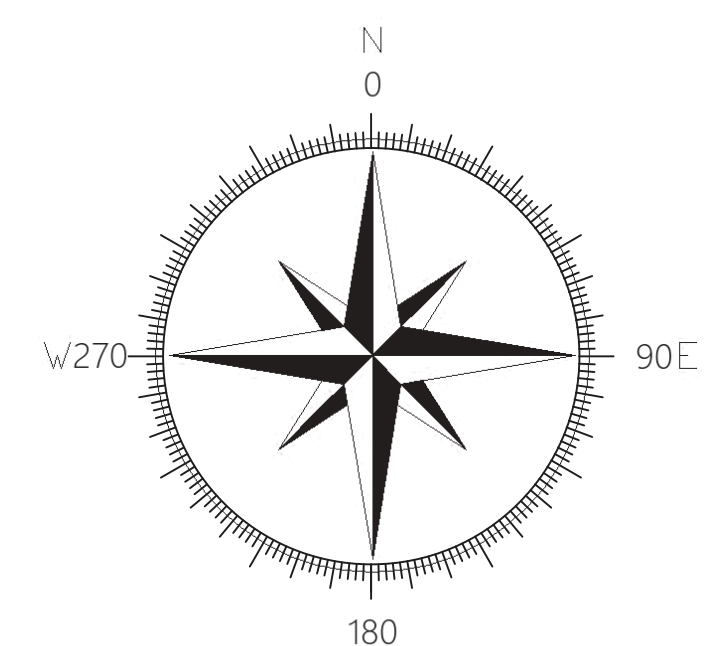
NOTES:
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| ROOF NAME | ROOF SETBACK (FT.) | ROOF HEIGHT (FT) | PARAPET HEIGHT (FT) | ROOF TILT (DEG) |
|-----------|--------------------|------------------|---------------------|-----------------|
| Roof 1 | 6.00 | 13.00 | 0.0 | 1 |

| KEEPOUT NAME | KEEPOUT CLEARANCE (FT.) | KEEPOUT HEIGHT (IN.) |
|--------------|-------------------------|----------------------|
| Group 1 | 1 | 12 |
| Group 2 | 1 | 36 |
| Group 3 | 1 | 24 |
| Group 4 | 1 | 72 |
| Group 5 | 1 | 240 |
| Group 6 | 1 | 144 |
| Group 7 | 1 | 48 |
| Group 8 | 1 | 0 |
| Group 9 | 1 | 108 |



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ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

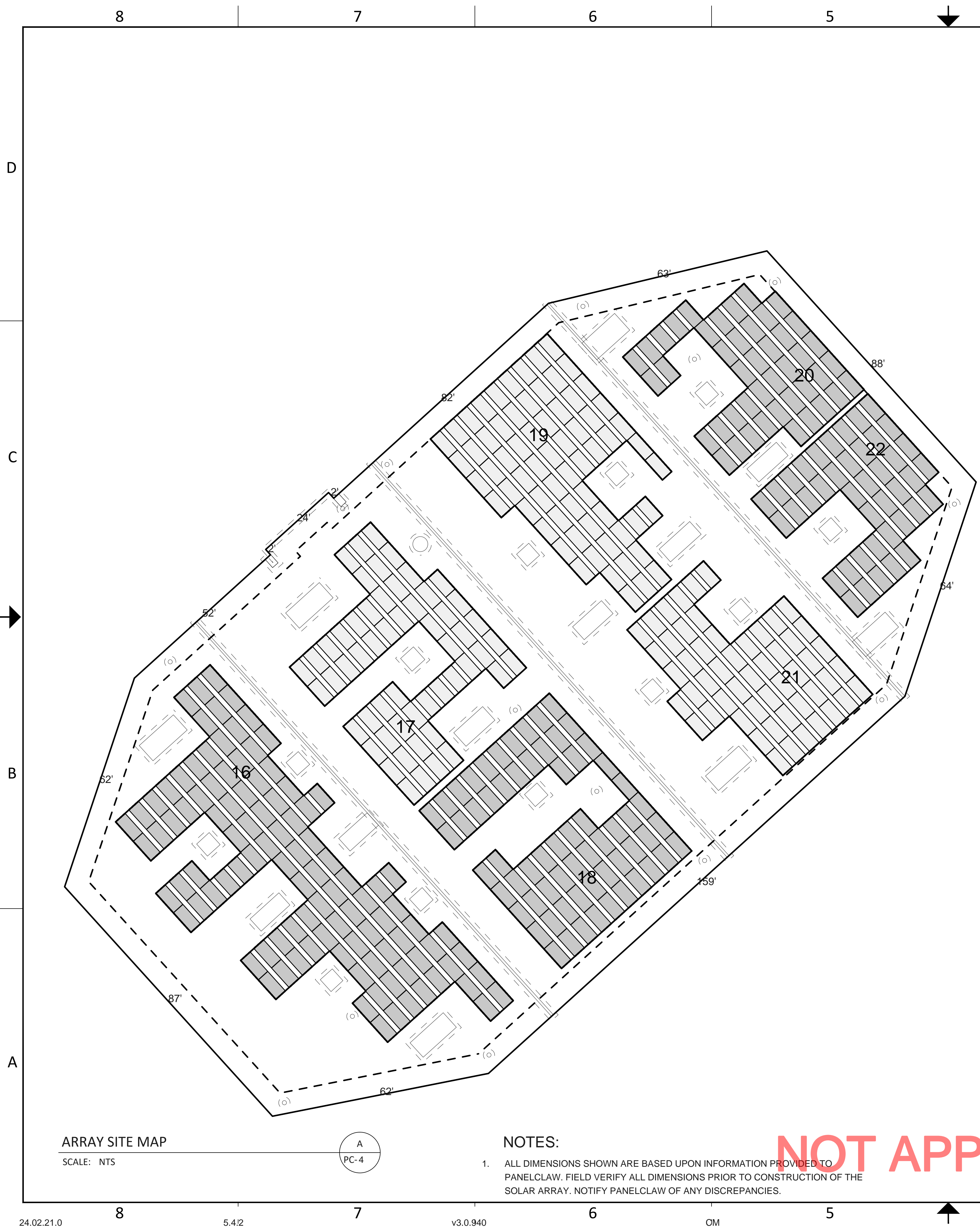
PREPARED FOR:

PROJECT:
Saline Middle

LOCATION:
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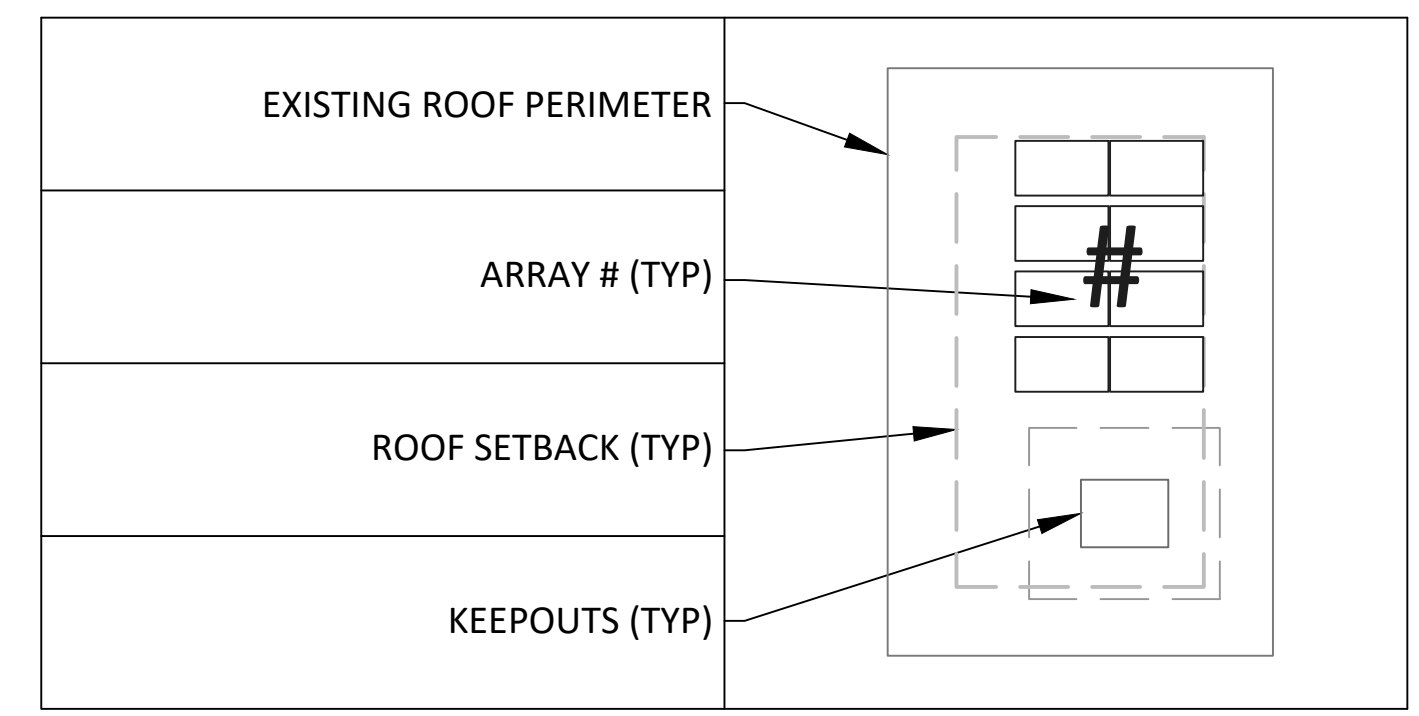
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ARRAY SITE MAP

REVISION: 0 SHEET: PC-3



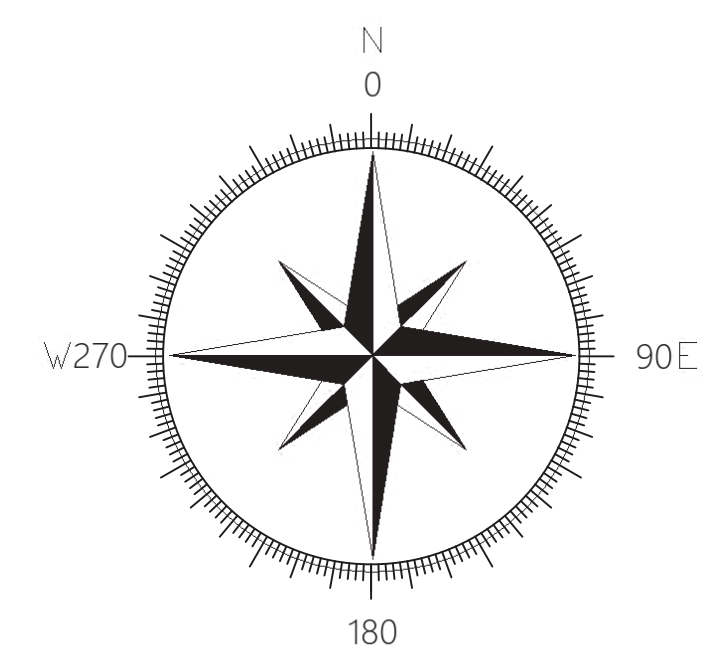
ARRAY SITE MAP
SCALE: NTS

NOTES:
1. ALL DIMENSIONS SHOWN ARE BASED UPON INFORMATION PROVIDED TO PANELCLAW. FIELD VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION OF THE SOLAR ARRAY. NOTIFY PANELCLAW OF ANY DISCREPANCIES.



| ROOF NAME | ROOF SETBACK (FT.) | ROOF HEIGHT (FT) | PARAPET HEIGHT (FT) | ROOF TILT (DEG) |
|-----------|--------------------|------------------|---------------------|-----------------|
| Roof 5 | 6.00 | 34.00 | 1.0 | 1 |

| KEEPOUT NAME | KEEPOUT CLEARANCE (FT.) | KEEPOUT HEIGHT (IN.) |
|--------------|-------------------------|----------------------|
| Group 1 | 1 | 24 |
| Group 2 | 1 | 36 |
| Group 3 | 1 | 12 |



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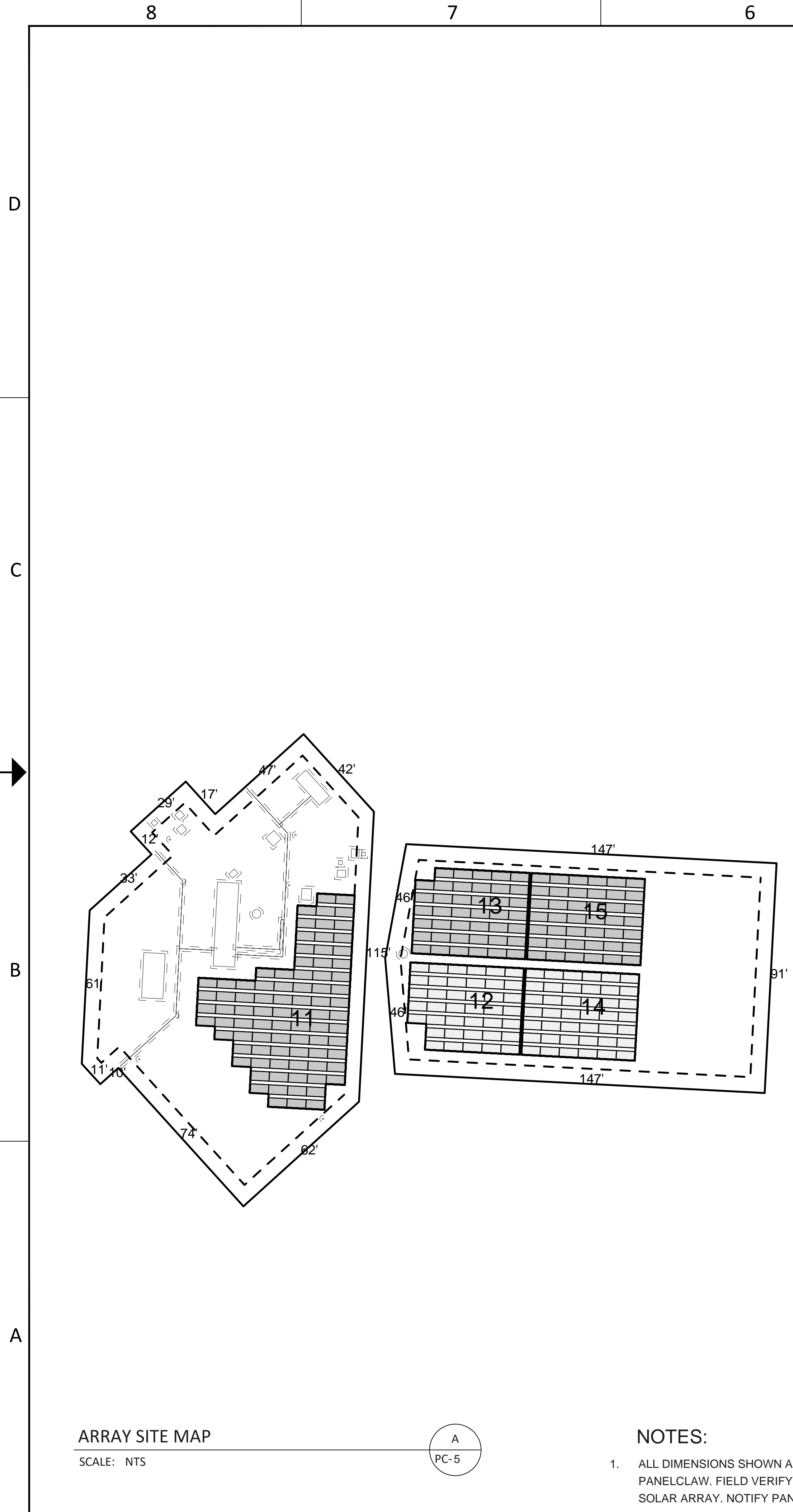
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Saline Middle

LOCATION:
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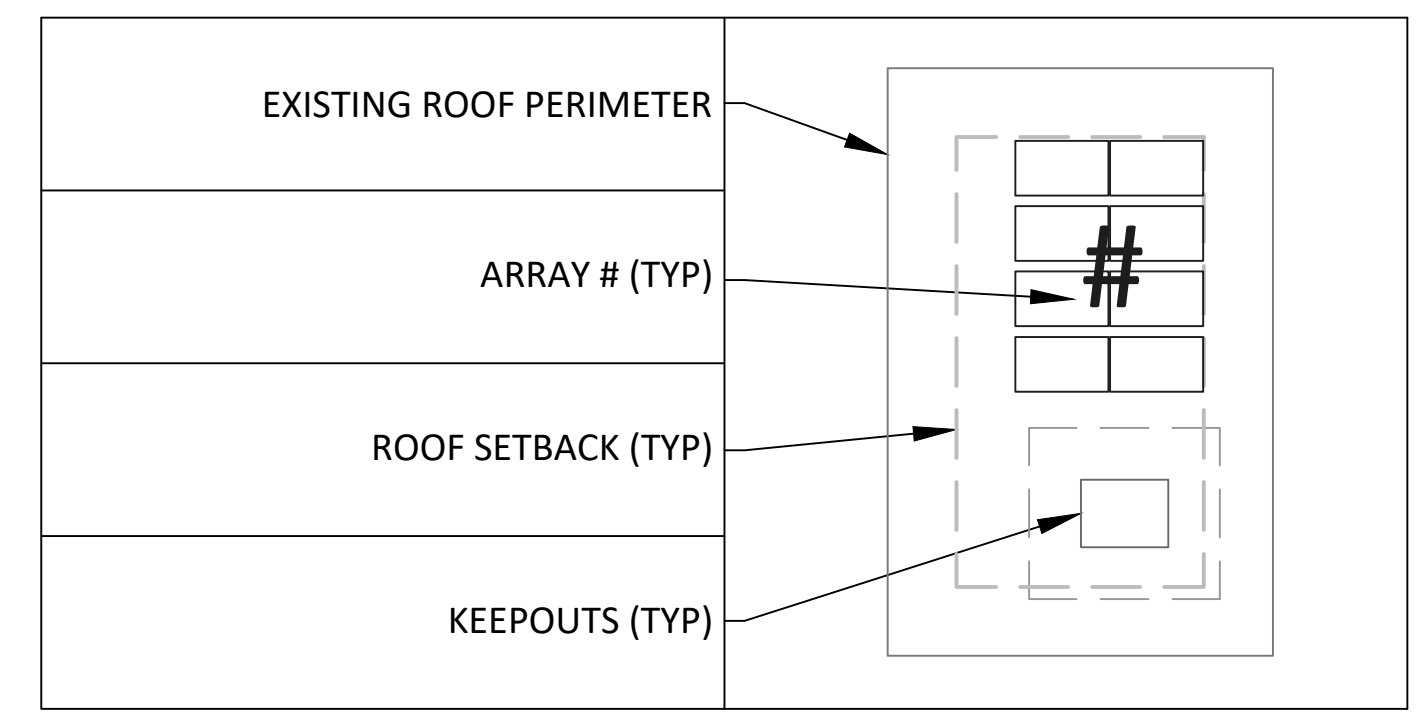
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REVISION: 0 SHEET: PC-4

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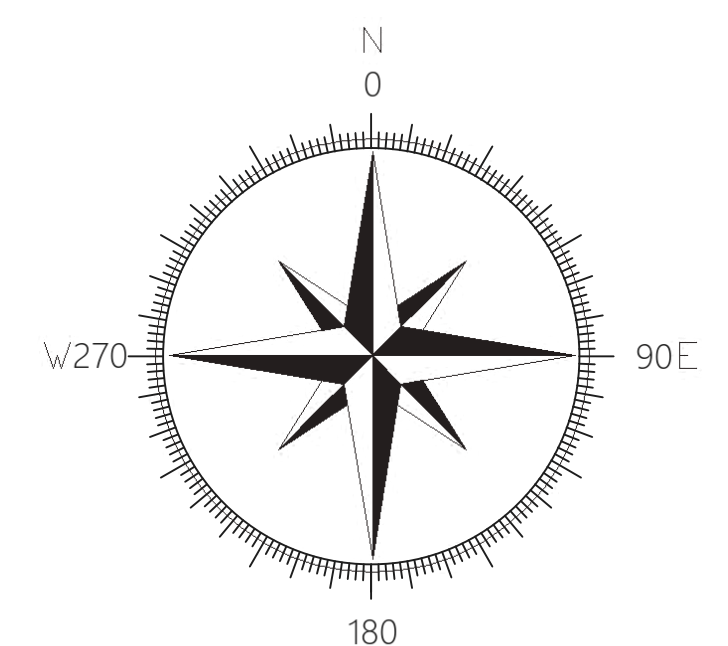
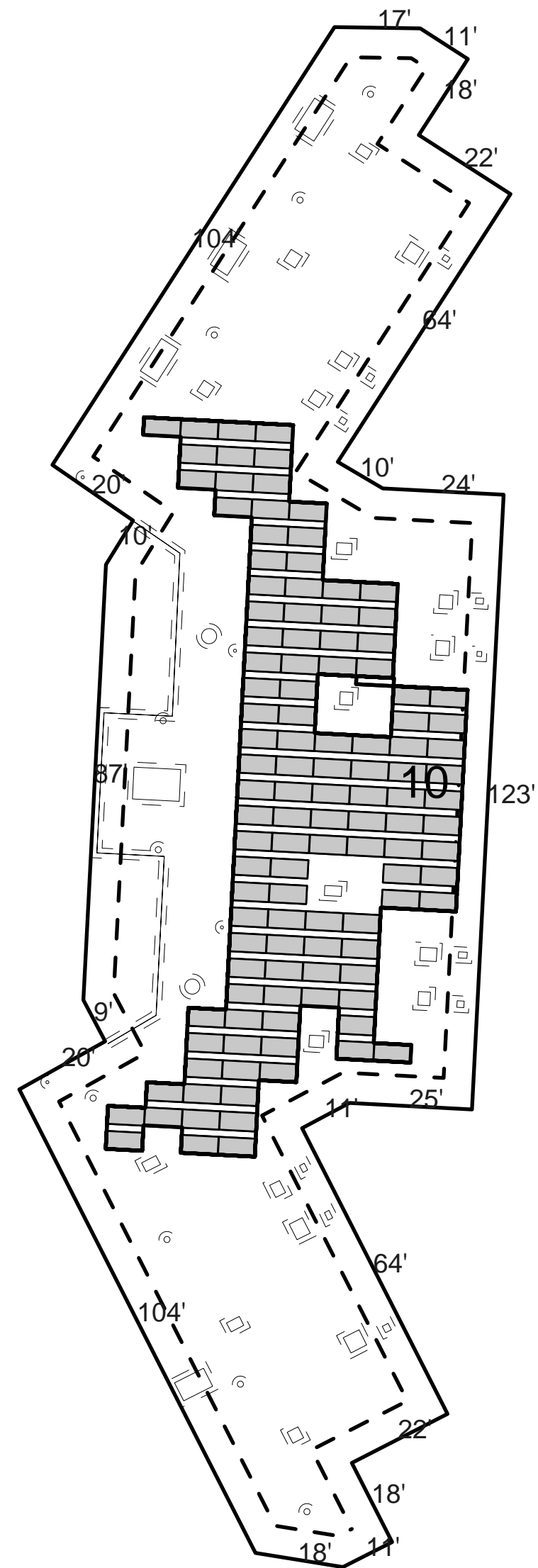


NOTES:
1. ALL DIMENSIONS SHOWN ARE BASED UPON INFORMATION PROVIDED TO PANELCLAW. FIELD VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION OF THE SOLAR ARRAY. NOTIFY PANELCLAW OF ANY DISCREPANCIES.



| ROOF NAME | ROOF SETBACK (FT.) | ROOF HEIGHT (FT) | PARAPET HEIGHT (FT) | ROOF TILT (DEG) |
|-----------|--------------------|------------------|---------------------|-----------------|
| Roof 2 | 6.00 | 15.00 | 1.0 | 1 |
| Roof 3 | 6.00 | 19.00 | 1.0 | 1 |
| Roof 4 | 6.00 | 25.00 | 0.0 | 5 |

| KEEPOUT NAME | KEEPOUT CLEARANCE (FT.) | KEEPOUT HEIGHT (IN.) |
|--------------|-------------------------|----------------------|
| Group 1 | 1 | 36 |
| Group 2 | 1 | 12 |
| Group 3 | 1 | 24 |
| Group 4 | 1 | 72 |



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| REV | DESCRIPTION | DATE | CHECK |
|-----|----------------|------------|-------|
| 0 | Initial Layout | 2024-03-20 | DH |

SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

PREPARED FOR:

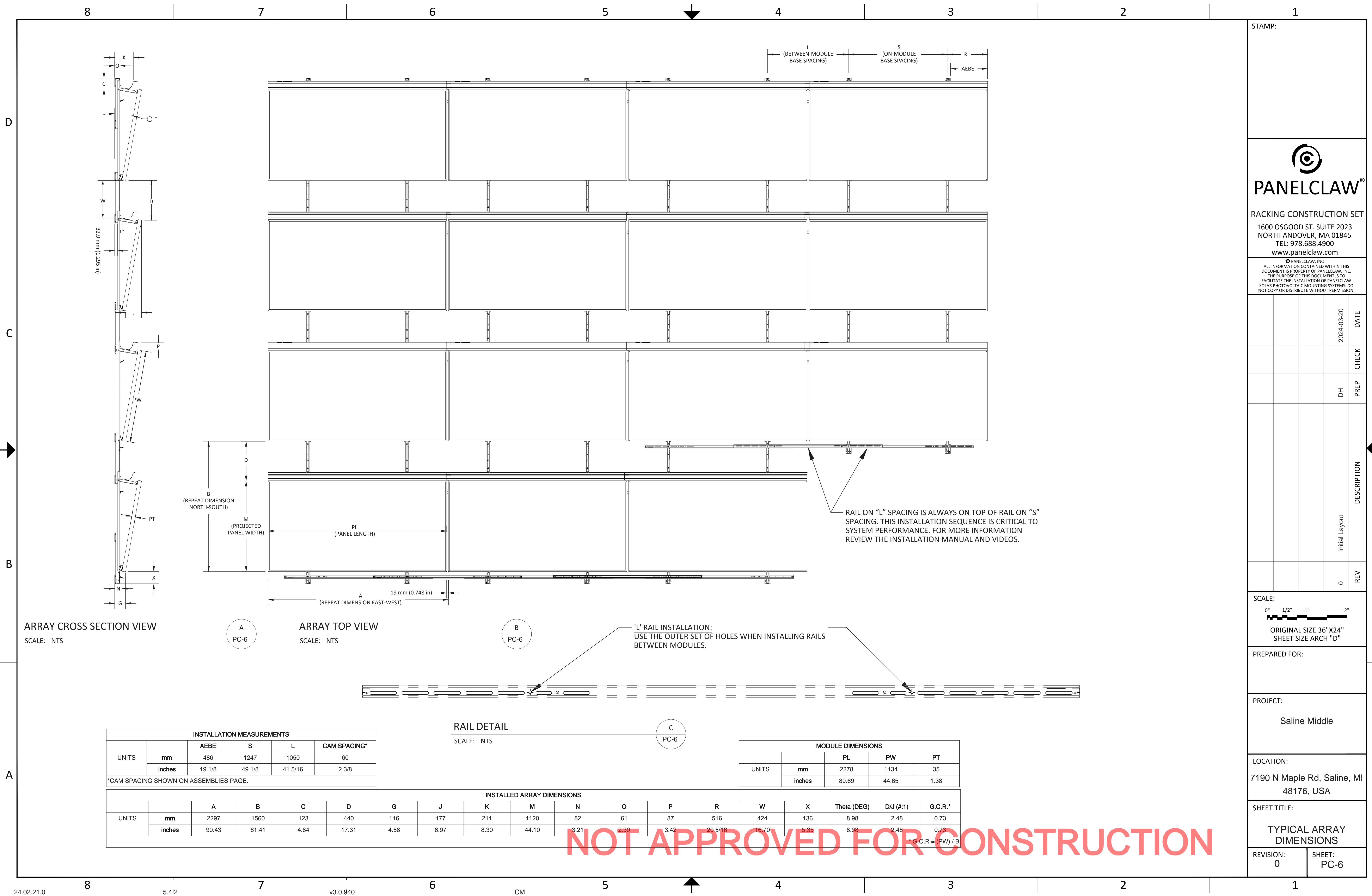
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI 48176, USA

SHEET TITLE:
ARRAY SITE MAP

REVISION: 0 SHEET: PC-5

NOT APPROVED FOR CONSTRUCTION



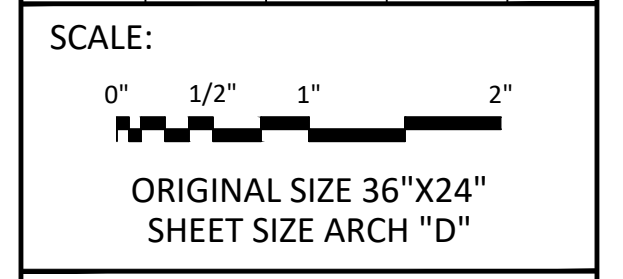
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|-----|----------------|------|-------|------------|
| 0 | Initial Layout | DH | | 2024-03-20 |



PREPARED FOR:

PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

SHEET TITLE:
TYPICAL ARRAY DIMENSIONS

REVISION:
0

SHEET:
PC-6

| INSTALLATION MEASUREMENTS | | | | |
|---------------------------|--------|--------|---------|--------------|
| UNITS | AEBE | S | L | CAM SPACING* |
| mm | 486 | 1247 | 1050 | 60 |
| inches | 19 1/8 | 49 1/8 | 41 5/16 | 2 3/8 |

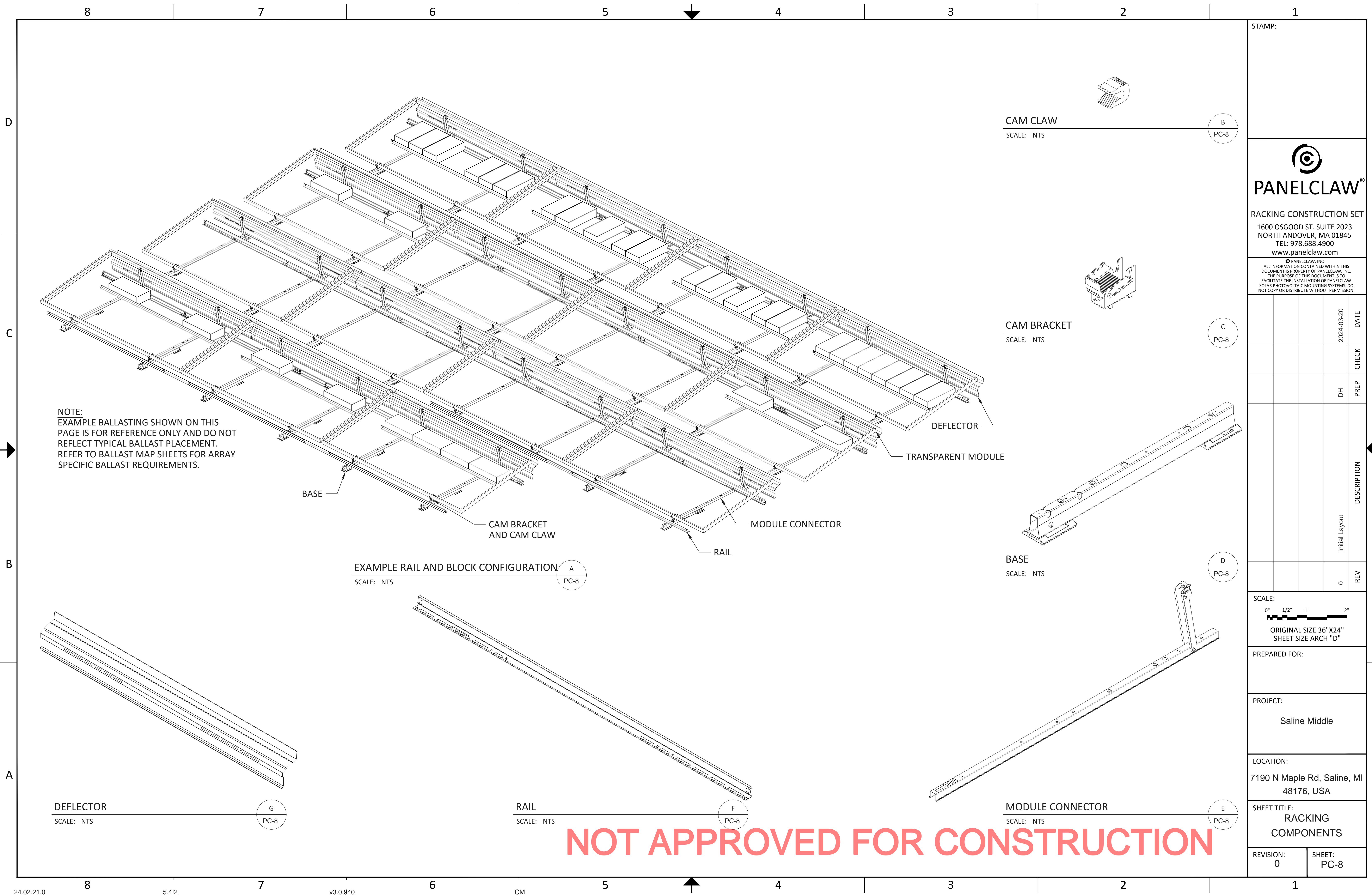
*CAM SPACING SHOWN ON ASSEMBLIES PAGE.

| MODULE DIMENSIONS | | | |
|-------------------|-------|-------|------|
| UNITS | PL | PW | PT |
| mm | 2278 | 1134 | 35 |
| inches | 89.69 | 44.65 | 1.38 |

| INSTALLED ARRAY DIMENSIONS | | | | | | | | | | | | | | | | | |
|----------------------------|-------|-------|------|-------|------|------|------|-------|------|------|------|---------|-------|------|-------------|-----------|---------|
| UNITS | A | B | C | D | G | J | K | M | N | O | P | R | W | X | Theta (DEG) | D/J (#:1) | G.C.R.* |
| mm | 2297 | 1560 | 123 | 440 | 116 | 177 | 211 | 1120 | 82 | 61 | 87 | 516 | 424 | 136 | 8.98 | 2.48 | 0.73 |
| inches | 90.43 | 61.41 | 4.84 | 17.31 | 4.58 | 6.97 | 8.30 | 44.10 | 3.21 | 2.39 | 3.42 | 20.5/16 | 16.70 | 5.35 | 8.98 | 2.48 | 0.73 |

*G.C.R. = (PW) / B

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SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

PREPARED FOR:

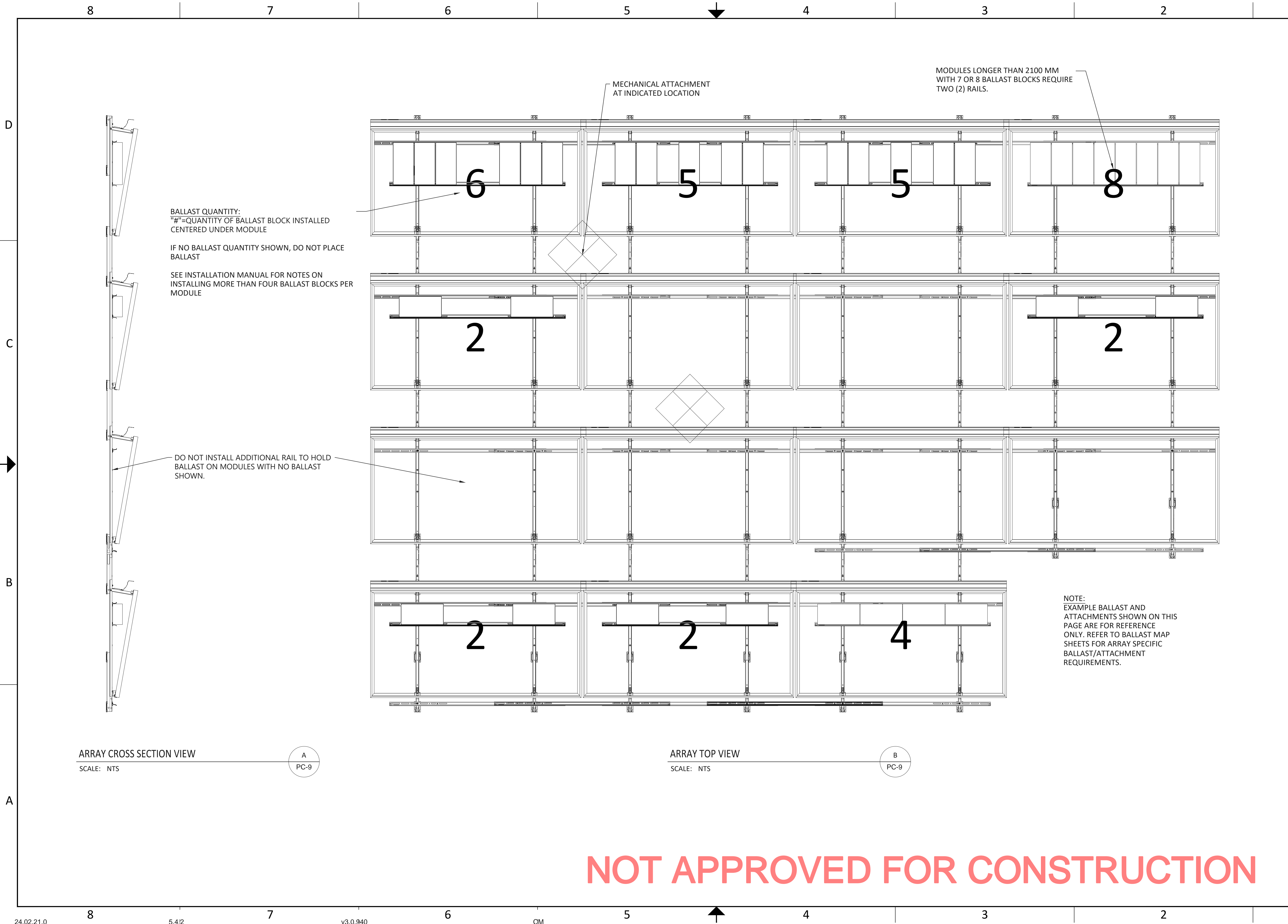
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI 48176, USA

SHEET TITLE:
RACKING COMPONENTS

REVISION: 0 SHEET: PC-8

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BALLAST QUANTITY:
 "#"-QUANTITY OF BALLAST BLOCK INSTALLED
 CENTERED UNDER MODULE
 IF NO BALLAST QUANTITY SHOWN, DO NOT PLACE
 BALLAST
 SEE INSTALLATION MANUAL FOR NOTES ON
 INSTALLING MORE THAN FOUR BALLAST BLOCKS PER
 MODULE

DO NOT INSTALL ADDITIONAL RAIL TO HOLD
 BALLAST ON MODULES WITH NO BALLAST
 SHOWN.

ARRAY CROSS SECTION VIEW
 SCALE: NTS

ARRAY TOP VIEW
 SCALE: NTS

NOTE:
 EXAMPLE BALLAST AND
 ATTACHMENTS SHOWN ON THIS
 PAGE ARE FOR REFERENCE
 ONLY. REFER TO BALLAST MAP
 SHEETS FOR ARRAY SPECIFIC
 BALLAST/ATTACHMENT
 REQUIREMENTS.

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| 0 | Initial Layout | DH | | 2024-03-20 |

SCALE:
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 ORIGINAL SIZE 36"X24"
 SHEET SIZE ARCH "D"

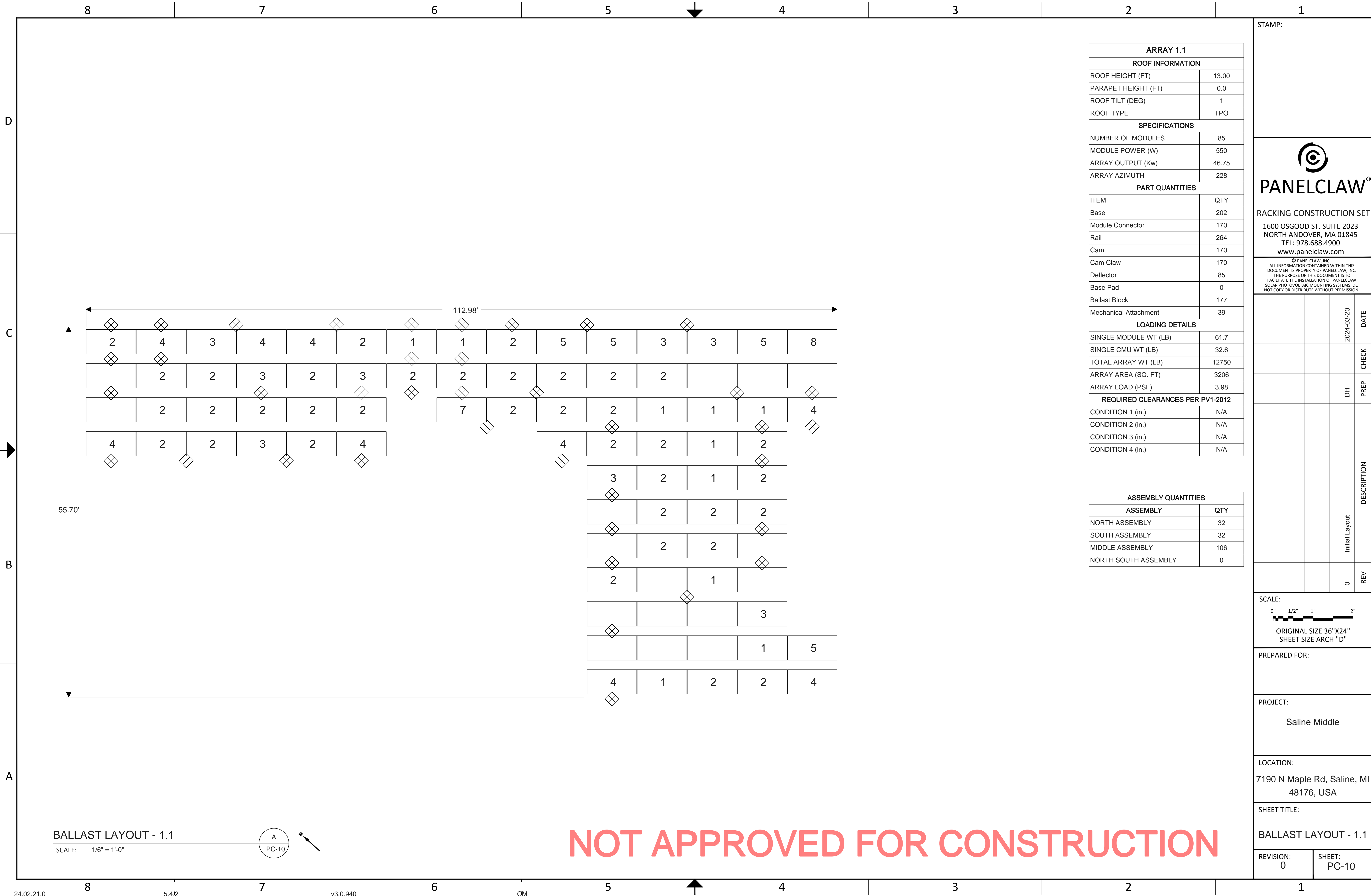
PREPARED FOR:

PROJECT:
 Saline Middle

LOCATION:
 7190 N Maple Rd, Saline, MI
 48176, USA

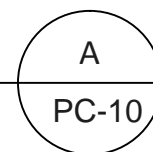
SHEET TITLE:
 BALLAST LEGEND

REVISION: 0 SHEET: PC-9



BALLAST LAYOUT - 1.1

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



A
PC-10

NOT APPROVED FOR CONSTRUCTION

| ARRAY 1.1 | |
|---|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 13.00 |
| PARAPET HEIGHT (FT) | 0.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 85 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 46.75 |
| ARRAY AZIMUTH | 228 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 202 |
| Module Connector | 170 |
| Rail | 264 |
| Cam | 170 |
| Cam Claw | 170 |
| Deflector | 85 |
| Base Pad | 0 |
| Ballast Block | 177 |
| Mechanical Attachment | 39 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 12750 |
| ARRAY AREA (SQ. FT) | 3206 |
| ARRAY LOAD (PSF) | 3.98 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | N/A |
| CONDITION 2 (in.) | N/A |
| CONDITION 3 (in.) | N/A |
| CONDITION 4 (in.) | N/A |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 32 |
| SOUTH ASSEMBLY | 32 |
| MIDDLE ASSEMBLY | 106 |
| NORTH SOUTH ASSEMBLY | 0 |

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| 2024-03-20 | | DH | Initial Layout | 0 |

SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

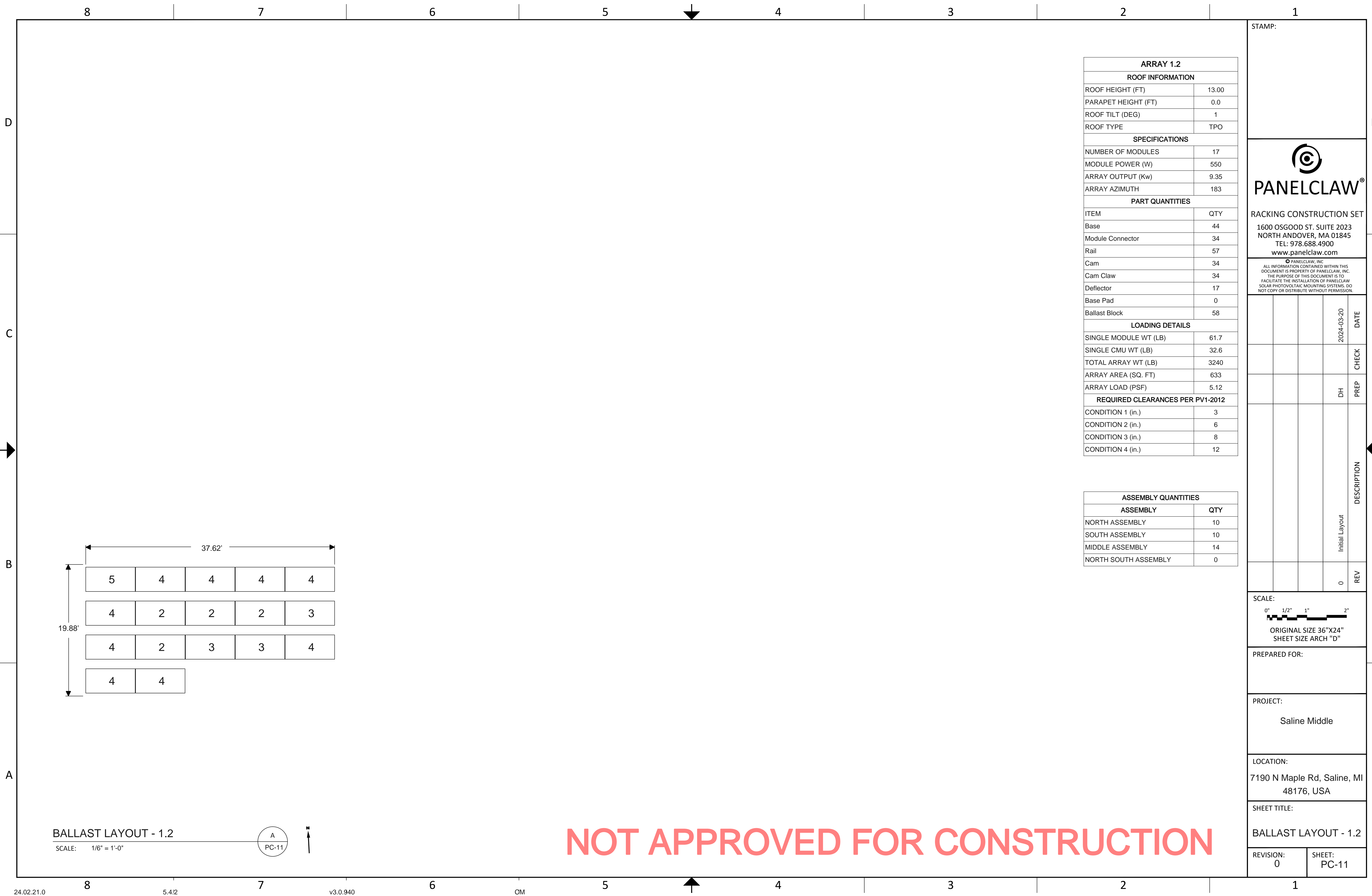
PREPARED FOR:

PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

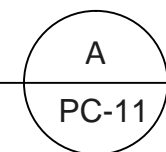
SHEET TITLE:
BALLAST LAYOUT - 1.1

REVISION: 0 SHEET: PC-10



BALLAST LAYOUT - 1.2

SCALE: 1/6" = 1'-0"



| ARRAY 1.2 | |
|----------------------------------|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 13.00 |
| PARAPET HEIGHT (FT) | 0.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 17 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 9.35 |
| ARRAY AZIMUTH | 183 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 44 |
| Module Connector | 34 |
| Rail | 57 |
| Cam | 34 |
| Cam Claw | 34 |
| Deflector | 17 |
| Base Pad | 0 |
| Ballast Block | 58 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 3240 |
| ARRAY AREA (SQ. FT) | 633 |
| ARRAY LOAD (PSF) | 5.12 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | 3 |
| CONDITION 2 (in.) | 6 |
| CONDITION 3 (in.) | 8 |
| CONDITION 4 (in.) | 12 |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 10 |
| SOUTH ASSEMBLY | 10 |
| MIDDLE ASSEMBLY | 14 |
| NORTH SOUTH ASSEMBLY | 0 |

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| 2024-03-20 | | DH | Initial Layout | 0 |

SCALE:
 0" 1/2" 1" 2"
 ORIGINAL SIZE 36"X24"
 SHEET SIZE ARCH "D"

PREPARED FOR:

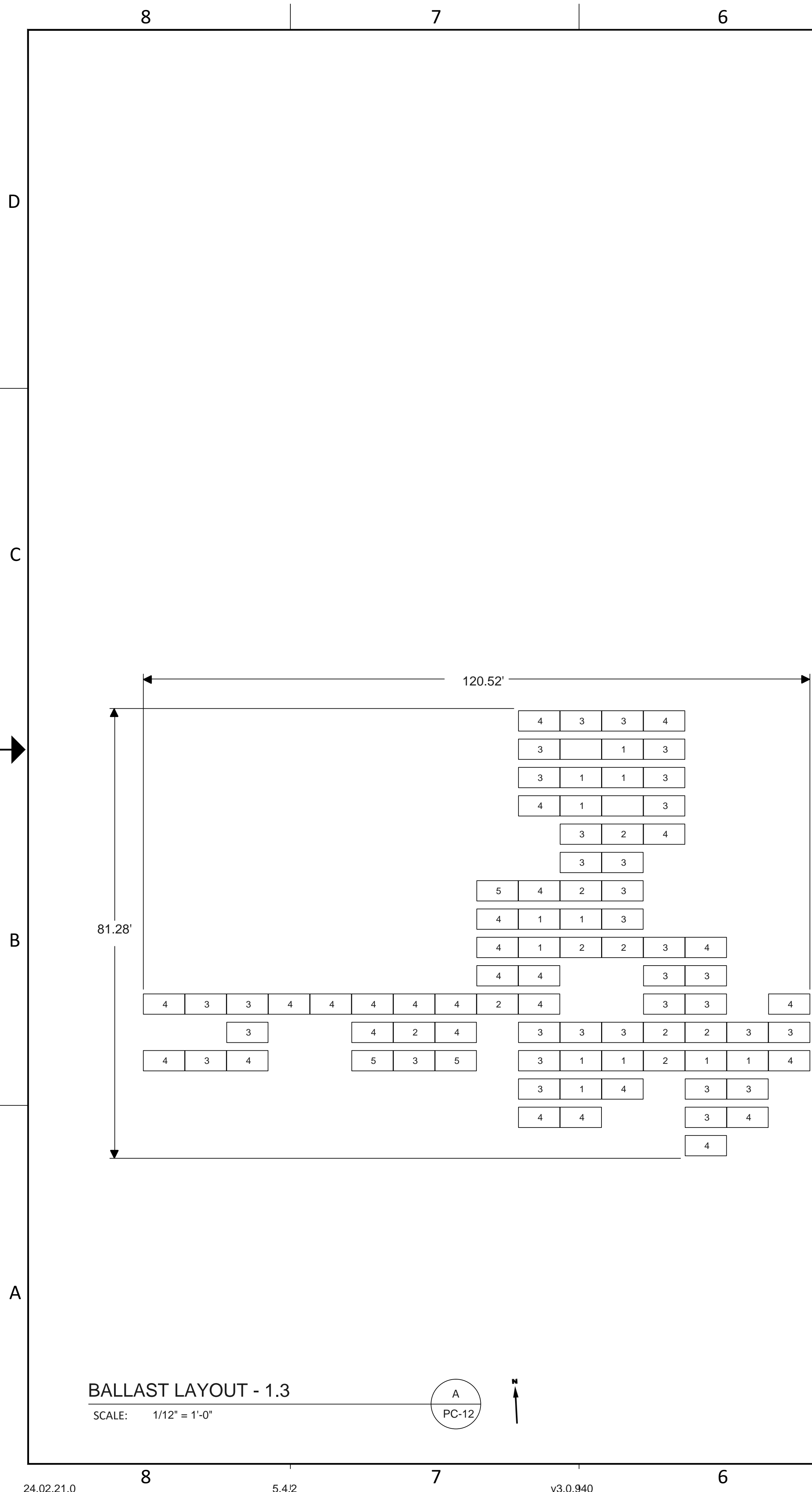
PROJECT:
 Saline Middle

LOCATION:
 7190 N Maple Rd, Saline, MI
 48176, USA

SHEET TITLE:
 BALLAST LAYOUT - 1.2

REVISION: 0 SHEET: PC-11

NOT APPROVED FOR CONSTRUCTION



BALLAST LAYOUT - 1.3
SCALE: 1/12" = 1'-0"

A
PC-12

NOT APPROVED FOR CONSTRUCTION

| ARRAY 1.3 | |
|----------------------------------|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 13.00 |
| PARAPET HEIGHT (FT) | 0.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 86 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 47.3 |
| ARRAY AZIMUTH | 183 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 216 |
| Module Connector | 172 |
| Rail | 291 |
| Cam | 172 |
| Cam Claw | 172 |
| Deflector | 86 |
| Base Pad | 0 |
| Ballast Block | 253 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 15070 |
| ARRAY AREA (SQ. FT) | 3218 |
| ARRAY LOAD (PSF) | 4.68 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | 3 |
| CONDITION 2 (in.) | 6 |
| CONDITION 3 (in.) | 8 |
| CONDITION 4 (in.) | 12 |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 32 |
| SOUTH ASSEMBLY | 32 |
| MIDDLE ASSEMBLY | 96 |
| NORTH SOUTH ASSEMBLY | 12 |

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| 2024-03-20 | | DH | |
| | | Initial Layout | |
| 0 | | REV | |

SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

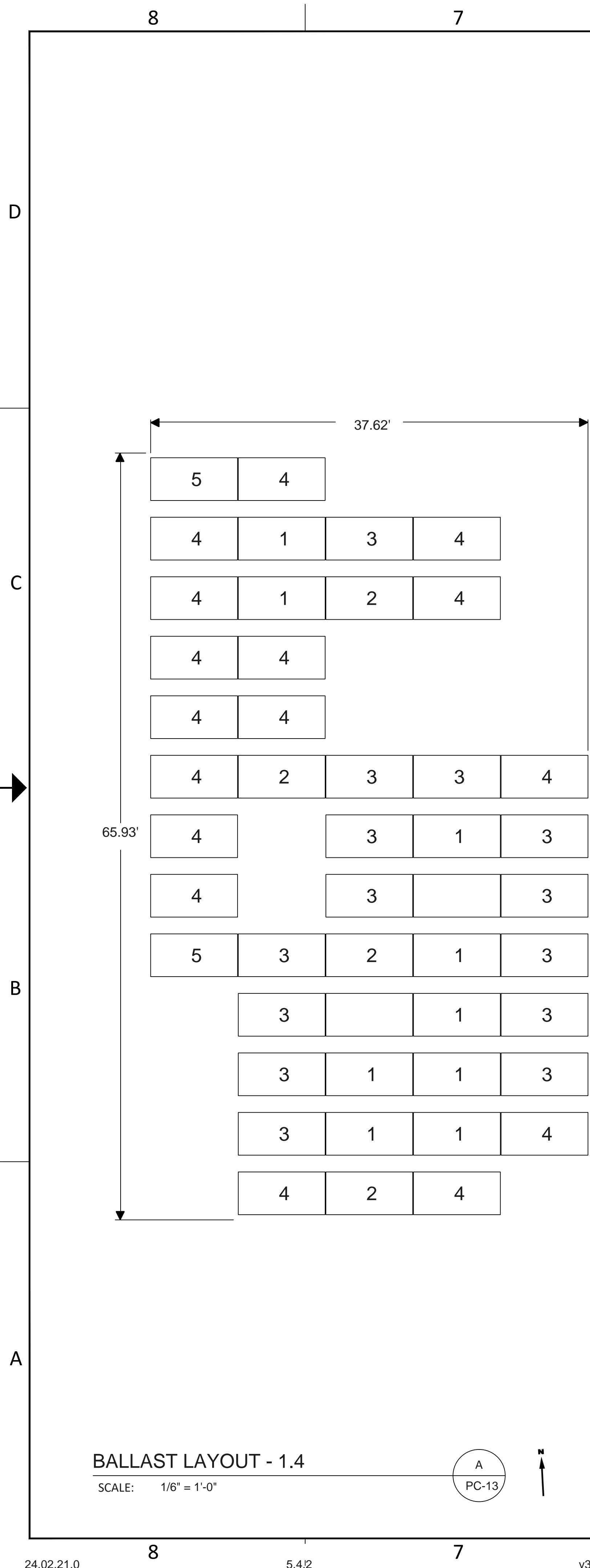
PREPARED FOR:

PROJECT:
Saline Middle

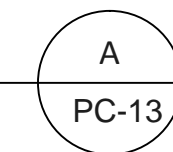
LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

SHEET TITLE:
BALLAST LAYOUT - 1.3

REVISION: 0 SHEET: PC-12



BALLAST LAYOUT - 1.4
SCALE: 1/8" = 1'-0"



| ARRAY 1.4 | |
|----------------------------------|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 13.00 |
| PARAPET HEIGHT (FT) | 0.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 47 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 25.85 |
| ARRAY AZIMUTH | 183 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 110 |
| Module Connector | 94 |
| Rail | 147 |
| Cam | 94 |
| Cam Claw | 94 |
| Deflector | 47 |
| Base Pad | 0 |
| Ballast Block | 133 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 8029 |
| ARRAY AREA (SQ. FT) | 1777 |
| ARRAY LOAD (PSF) | 4.52 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | 3 |
| CONDITION 2 (in.) | 6 |
| CONDITION 3 (in.) | 8 |
| CONDITION 4 (in.) | 12 |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 16 |
| SOUTH ASSEMBLY | 16 |
| MIDDLE ASSEMBLY | 62 |
| NORTH SOUTH ASSEMBLY | 0 |

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| 2024-03-20 | | DH | |
| | | Initial Layout | |
| 0 | | REV | |

SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

PREPARED FOR:

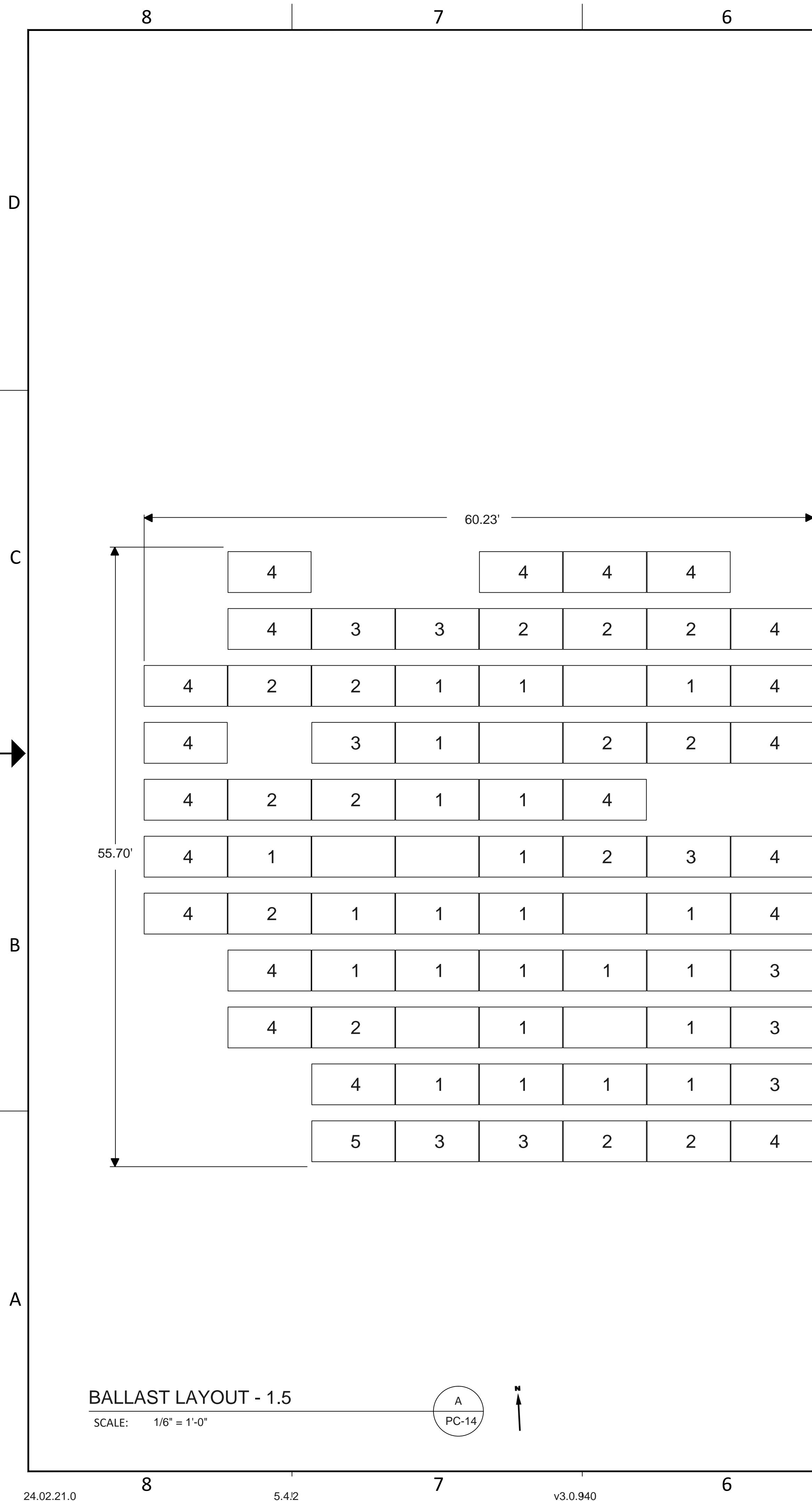
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

SHEET TITLE:
BALLAST LAYOUT - 1.4

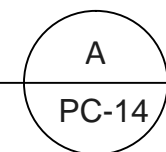
REVISION: 0 SHEET: PC-13

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BALLAST LAYOUT - 1.5

SCALE: 1/6" = 1'-0"



| ARRAY 1.5 | |
|----------------------------------|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 13.00 |
| PARAPET HEIGHT (FT) | 0.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 74 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 40.7 |
| ARRAY AZIMUTH | 183 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 170 |
| Module Connector | 148 |
| Rail | 231 |
| Cam | 148 |
| Cam Claw | 148 |
| Deflector | 74 |
| Base Pad | 0 |
| Ballast Block | 163 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 11124 |
| ARRAY AREA (SQ. FT) | 2805 |
| ARRAY LOAD (PSF) | 3.97 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | 3 |
| CONDITION 2 (in.) | 6 |
| CONDITION 3 (in.) | 8 |
| CONDITION 4 (in.) | 12 |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 22 |
| SOUTH ASSEMBLY | 22 |
| MIDDLE ASSEMBLY | 104 |
| NORTH SOUTH ASSEMBLY | 0 |

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SCALE:
 0" 1/2" 1" 2"
 ORIGINAL SIZE 36"X24"
 SHEET SIZE ARCH "D"

PREPARED FOR:

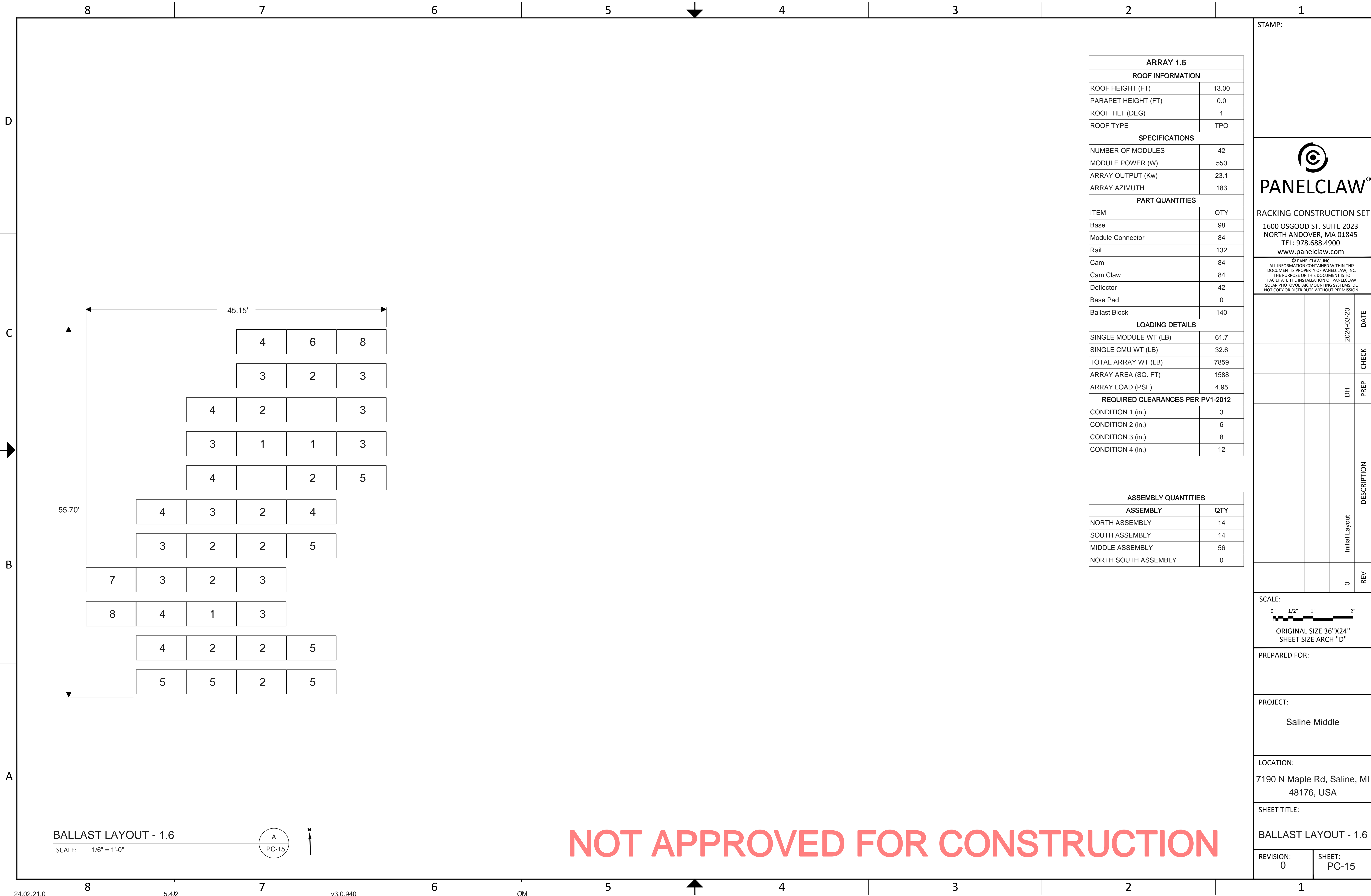
PROJECT:
 Saline Middle

LOCATION:
 7190 N Maple Rd, Saline, MI
 48176, USA

SHEET TITLE:
 BALLAST LAYOUT - 1.5

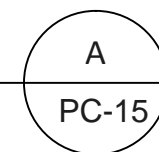
REVISION: 0 SHEET: PC-14

NOT APPROVED FOR CONSTRUCTION



BALLAST LAYOUT - 1.6

SCALE: 1/6" = 1'-0"



| ARRAY 1.6 | |
|----------------------------------|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 13.00 |
| PARAPET HEIGHT (FT) | 0.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 42 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 23.1 |
| ARRAY AZIMUTH | 183 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 98 |
| Module Connector | 84 |
| Rail | 132 |
| Cam | 84 |
| Cam Claw | 84 |
| Deflector | 42 |
| Base Pad | 0 |
| Ballast Block | 140 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 7859 |
| ARRAY AREA (SQ. FT) | 1588 |
| ARRAY LOAD (PSF) | 4.95 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | 3 |
| CONDITION 2 (in.) | 6 |
| CONDITION 3 (in.) | 8 |
| CONDITION 4 (in.) | 12 |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 14 |
| SOUTH ASSEMBLY | 14 |
| MIDDLE ASSEMBLY | 56 |
| NORTH SOUTH ASSEMBLY | 0 |

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| DATE | CHECK | PREP | DESCRIPTION | REV |
|------------|-------|------|----------------|-----|
| 2024-03-20 | | DH | Initial Layout | 0 |

SCALE:
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 ORIGINAL SIZE 36"X24"
 SHEET SIZE ARCH "D"

PREPARED FOR:

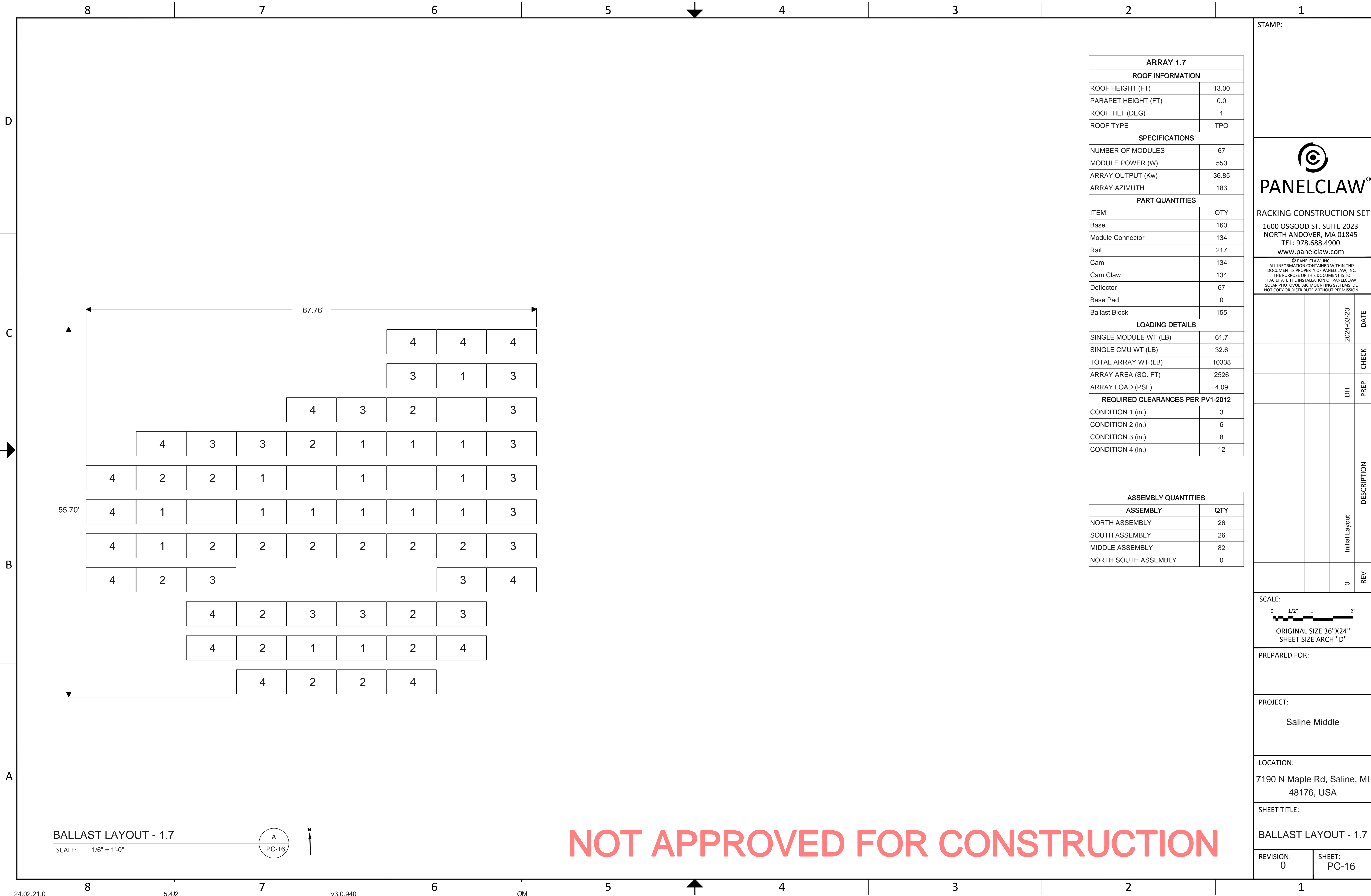
PROJECT:
 Saline Middle

LOCATION:
 7190 N Maple Rd, Saline, MI
 48176, USA

SHEET TITLE:
 BALLAST LAYOUT - 1.6

REVISION: 0 SHEET: PC-15

NOT APPROVED FOR CONSTRUCTION



| ARRAY 1.7 | |
|---------------------|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 13.00 |
| PARAPET HEIGHT (FT) | 0.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |

| SPECIFICATIONS | |
|-------------------|-------|
| NUMBER OF MODULES | 67 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 36.85 |
| ARRAY AZIMUTH | 183 |

| PART QUANTITIES | |
|------------------|-----|
| ITEM | QTY |
| Base | 160 |
| Module Connector | 134 |
| Rail | 217 |
| Cam | 134 |
| Cam Claw | 134 |
| Deflector | 67 |
| Base Pad | 0 |
| Ballast Block | 155 |

| LOADING DETAILS | |
|-----------------------|-------|
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 10338 |
| ARRAY AREA (SQ. FT) | 2526 |
| ARRAY LOAD (PSF) | 4.09 |

| REQUIRED CLEARANCES PER PV1-2012 | |
|----------------------------------|----|
| CONDITION 1 (in.) | 3 |
| CONDITION 2 (in.) | 6 |
| CONDITION 3 (in.) | 8 |
| CONDITION 4 (in.) | 12 |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 26 |
| SOUTH ASSEMBLY | 26 |
| MIDDLE ASSEMBLY | 82 |
| NORTH SOUTH ASSEMBLY | 0 |

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SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

PREPARED FOR:

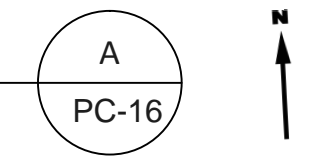
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

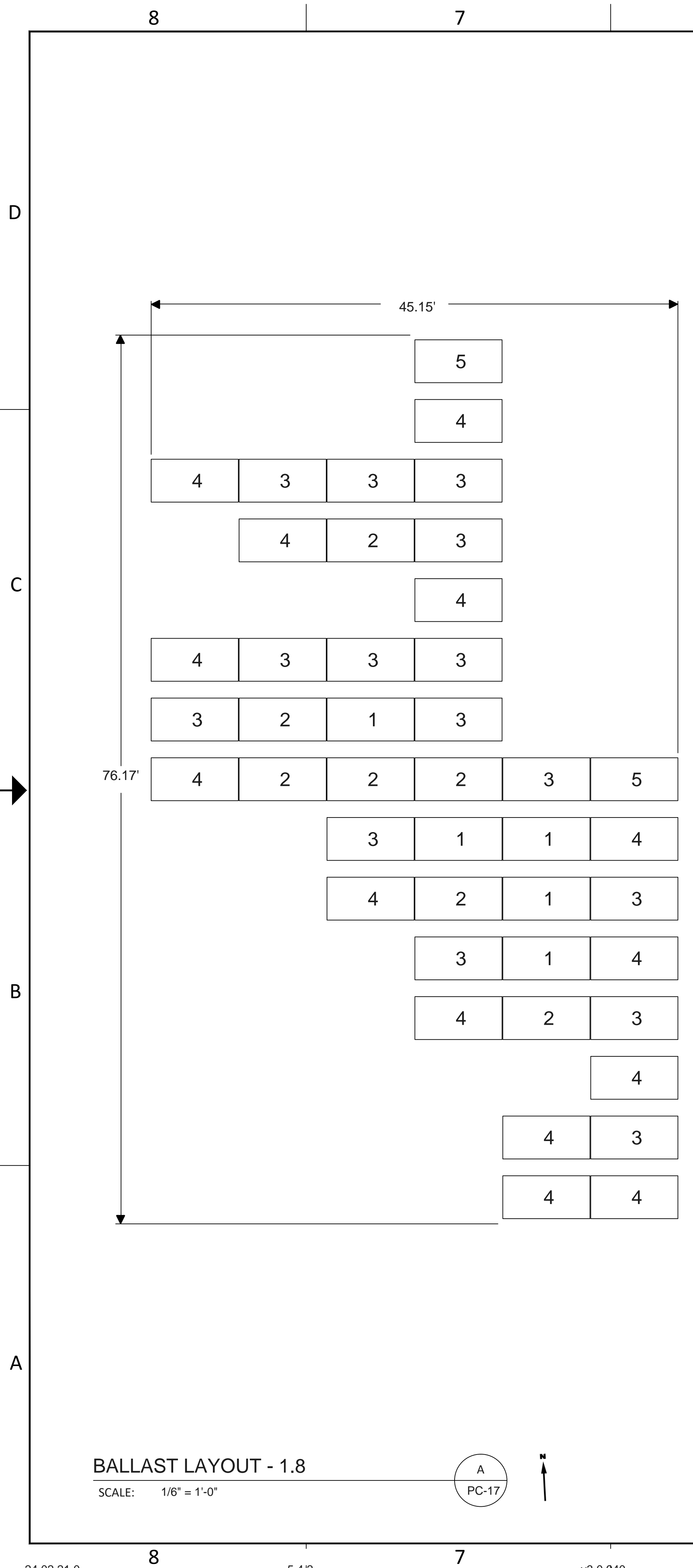
SHEET TITLE:
BALLAST LAYOUT - 1.7

REVISION: 0 SHEET: PC-16

BALLAST LAYOUT - 1.7
SCALE: 1/6" = 1'-0"

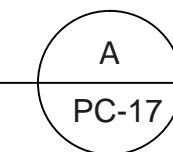


NOT APPROVED FOR CONSTRUCTION



BALLAST LAYOUT - 1.8

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



| ARRAY 1.8 | |
|----------------------------------|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 13.00 |
| PARAPET HEIGHT (FT) | 0.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 43 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 23.65 |
| ARRAY AZIMUTH | 183 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 106 |
| Module Connector | 86 |
| Rail | 142 |
| Cam | 86 |
| Cam Claw | 86 |
| Deflector | 43 |
| Base Pad | 0 |
| Ballast Block | 130 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 7639 |
| ARRAY AREA (SQ. FT) | 1614 |
| ARRAY LOAD (PSF) | 4.73 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | 3 |
| CONDITION 2 (in.) | 6 |
| CONDITION 3 (in.) | 8 |
| CONDITION 4 (in.) | 12 |

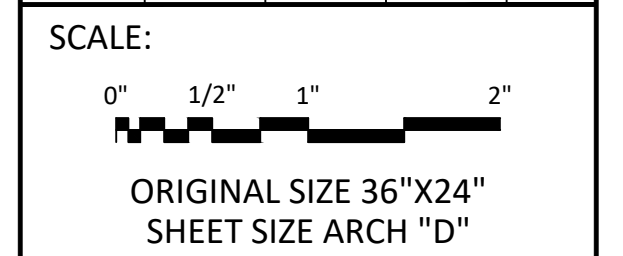
| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 18 |
| SOUTH ASSEMBLY | 18 |
| MIDDLE ASSEMBLY | 48 |
| NORTH SOUTH ASSEMBLY | 2 |

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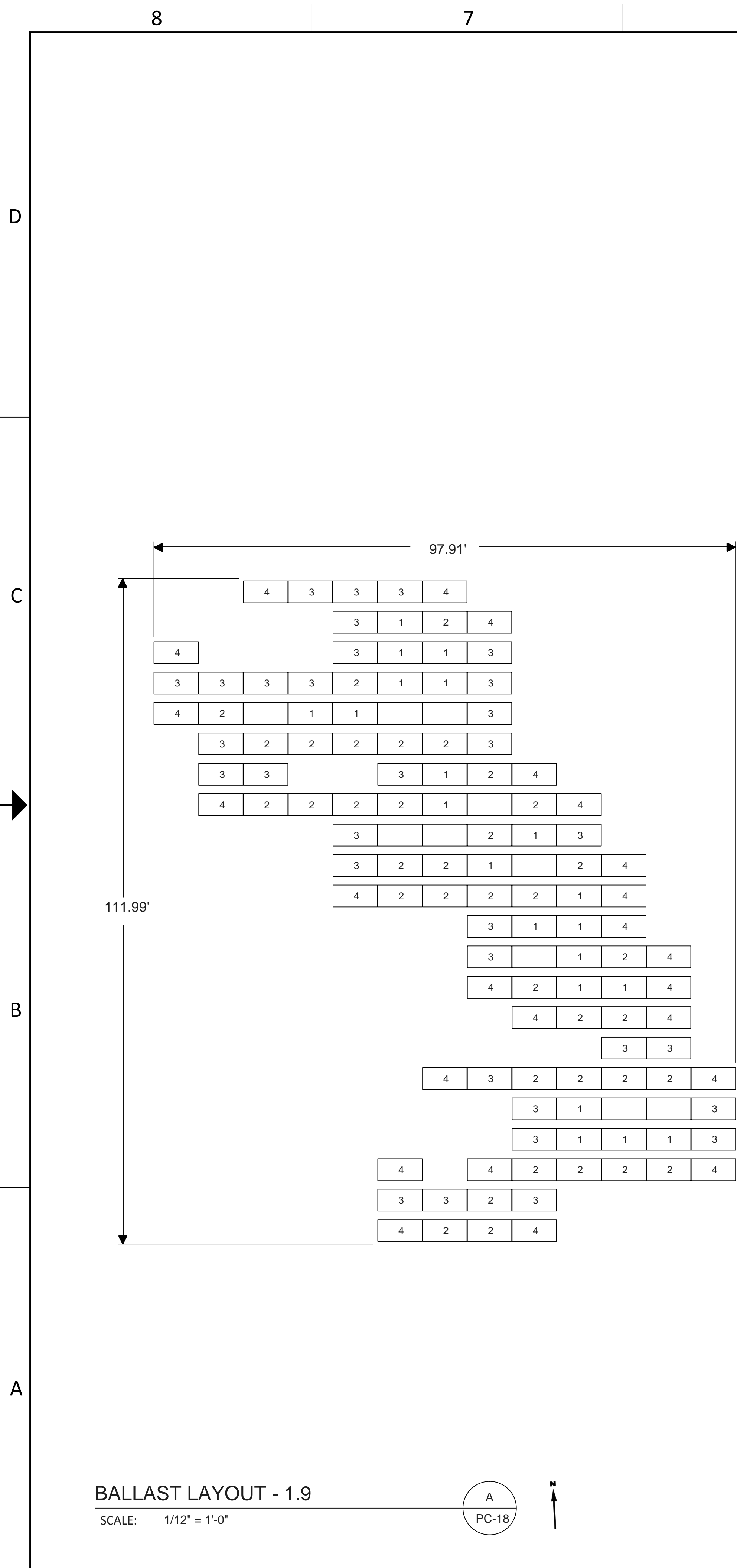
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

SHEET TITLE:
BALLAST LAYOUT - 1.8

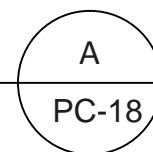
REVISION: 0 SHEET: PC-17

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BALLAST LAYOUT - 1.9

SCALE: 1/12" = 1'-0"



| ARRAY 1.9 | |
|---------------------|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 13.00 |
| PARAPET HEIGHT (FT) | 0.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |

| SPECIFICATIONS | |
|-------------------|------|
| NUMBER OF MODULES | 124 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 68.2 |
| ARRAY AZIMUTH | 183 |

| PART QUANTITIES | |
|------------------|-----|
| ITEM | QTY |
| Base | 296 |
| Module Connector | 248 |
| Rail | 397 |
| Cam | 248 |
| Cam Claw | 248 |
| Deflector | 124 |
| Base Pad | 0 |
| Ballast Block | 287 |

| LOADING DETAILS | |
|-----------------------|-------|
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 19127 |
| ARRAY AREA (SQ. FT) | 4675 |
| ARRAY LOAD (PSF) | 4.09 |

| REQUIRED CLEARANCES PER PV1-2012 | |
|----------------------------------|----|
| CONDITION 1 (in.) | 3 |
| CONDITION 2 (in.) | 6 |
| CONDITION 3 (in.) | 8 |
| CONDITION 4 (in.) | 12 |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 38 |
| SOUTH ASSEMBLY | 38 |
| MIDDLE ASSEMBLY | 162 |
| NORTH SOUTH ASSEMBLY | 10 |

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SCALE:
 0" 1/2" 1" 2"
 ORIGINAL SIZE 36"X24"
 SHEET SIZE ARCH "D"

PREPARED FOR:

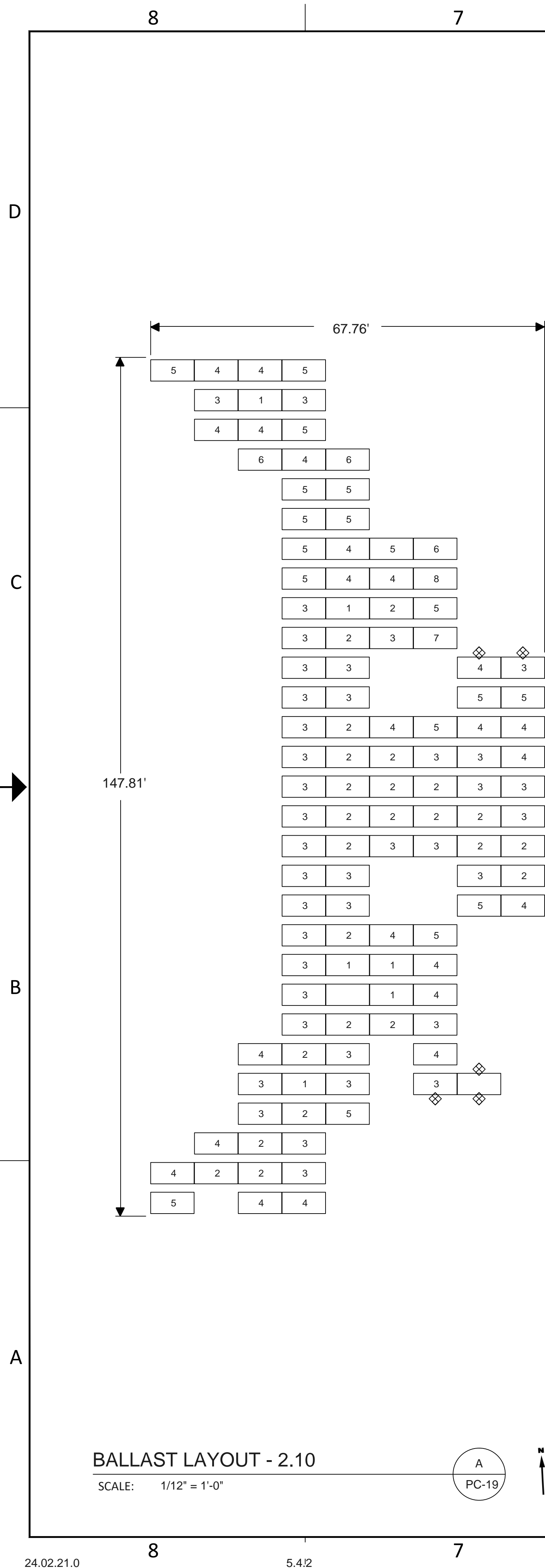
PROJECT:
 Saline Middle

LOCATION:
 7190 N Maple Rd, Saline, MI
 48176, USA

SHEET TITLE:
 BALLAST LAYOUT - 1.9

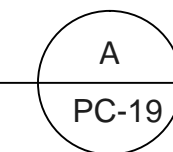
REVISION: 0 SHEET: PC-18

NOT APPROVED FOR CONSTRUCTION



BALLAST LAYOUT - 2.10

SCALE: 1/12" = 1'-0"



| ARRAY 2.10 | |
|---|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 15.00 |
| PARAPET HEIGHT (FT) | 1.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 117 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 64.35 |
| ARRAY AZIMUTH | 183 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 268 |
| Module Connector | 234 |
| Rail | 361 |
| Cam | 234 |
| Cam Claw | 234 |
| Deflector | 117 |
| Base Pad | 0 |
| Ballast Block | 386 |
| Mechanical Attachment | 5 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 21796 |
| ARRAY AREA (SQ. FT) | 4436 |
| ARRAY LOAD (PSF) | 4.91 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | N/A |
| CONDITION 2 (in.) | N/A |
| CONDITION 3 (in.) | N/A |
| CONDITION 4 (in.) | N/A |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 30 |
| SOUTH ASSEMBLY | 30 |
| MIDDLE ASSEMBLY | 170 |
| NORTH SOUTH ASSEMBLY | 4 |

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| 2024-03-20 | | DH | Initial Layout | 0 |

SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

PREPARED FOR:

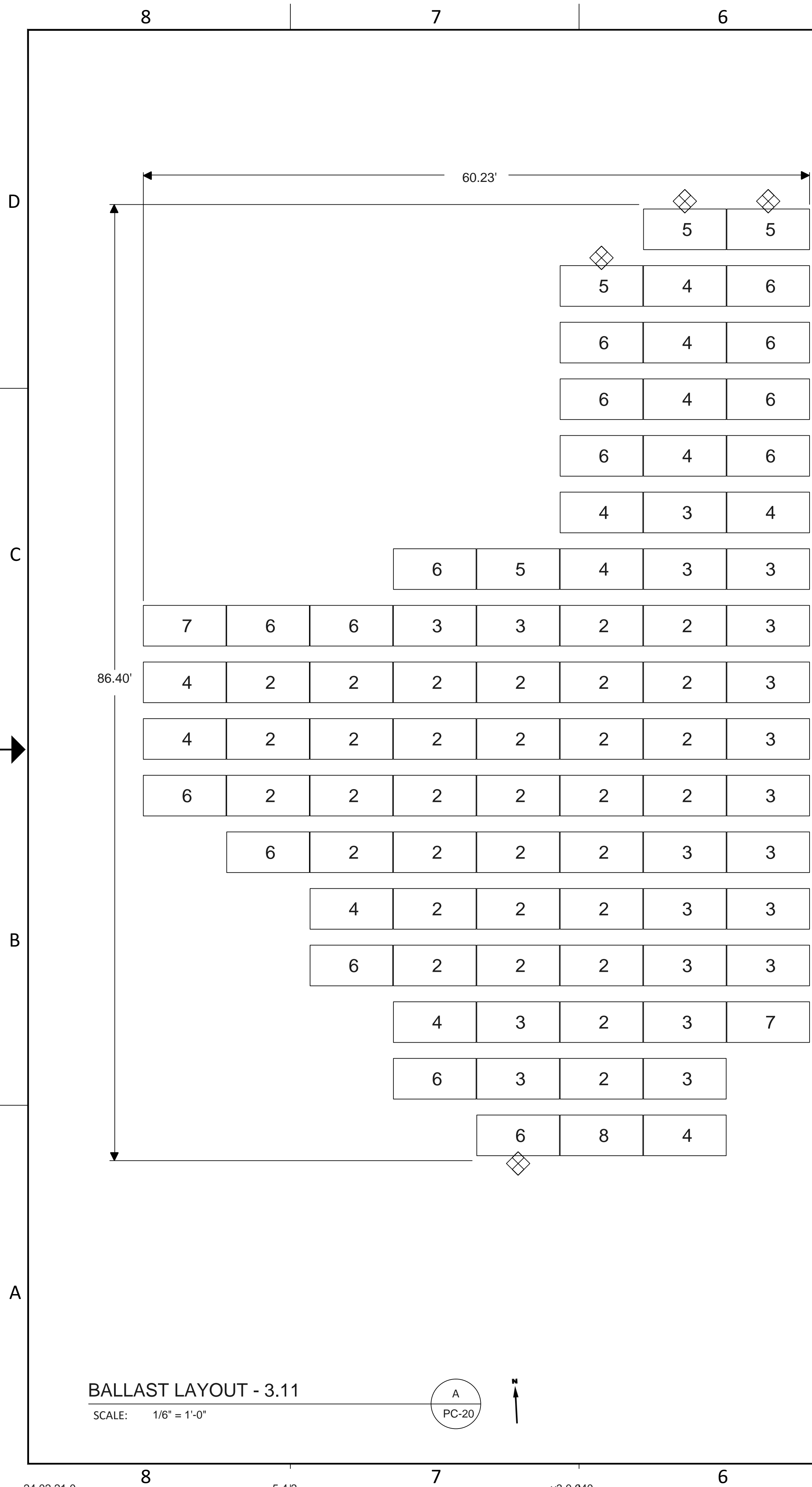
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

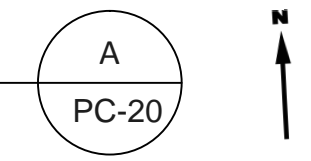
SHEET TITLE:
BALLAST LAYOUT - 2.10

REVISION: 0 SHEET: PC-19

NOT APPROVED FOR CONSTRUCTION



BALLAST LAYOUT - 3.11
SCALE: 1/8" = 1'-0"



| ARRAY 3.11 | |
|---|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 19.00 |
| PARAPET HEIGHT (FT) | 1.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 85 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 46.75 |
| ARRAY AZIMUTH | 183 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 186 |
| Module Connector | 170 |
| Rail | 261 |
| Cam | 170 |
| Cam Claw | 170 |
| Deflector | 85 |
| Base Pad | 0 |
| Ballast Block | 301 |
| Mechanical Attachment | 4 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 16492 |
| ARRAY AREA (SQ. FT) | 3242 |
| ARRAY LOAD (PSF) | 5.09 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | N/A |
| CONDITION 2 (in.) | N/A |
| CONDITION 3 (in.) | N/A |
| CONDITION 4 (in.) | N/A |

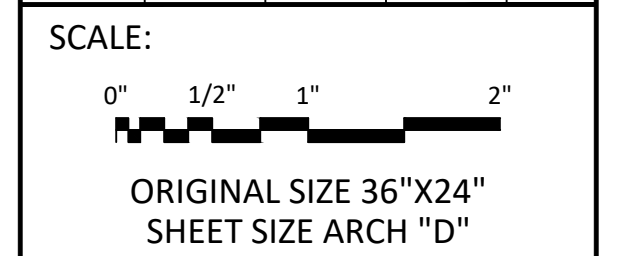
| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 16 |
| SOUTH ASSEMBLY | 16 |
| MIDDLE ASSEMBLY | 138 |
| NORTH SOUTH ASSEMBLY | 0 |

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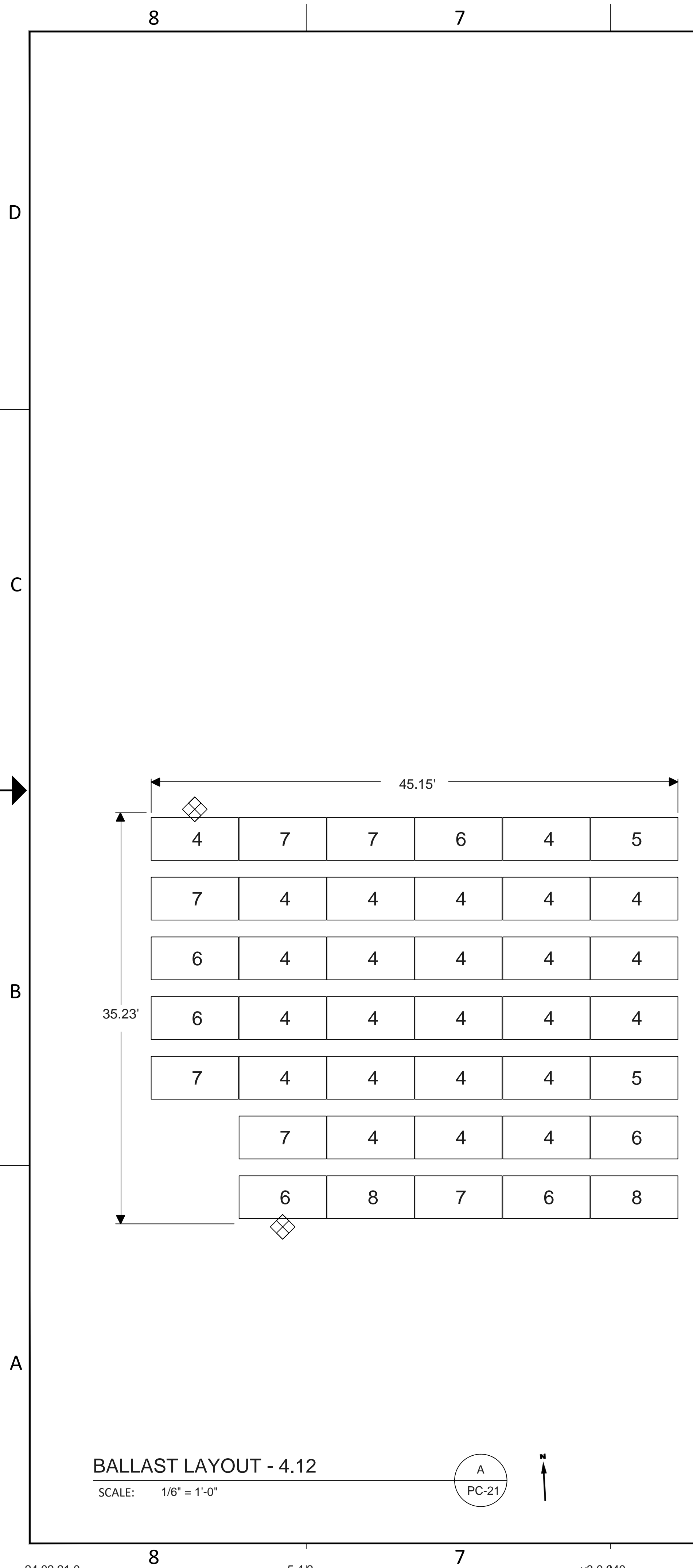
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

SHEET TITLE:
BALLAST LAYOUT - 3.11

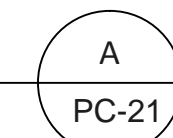
REVISION: 0 SHEET: PC-20

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BALLAST LAYOUT - 4.12

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



| ARRAY 4.12 | |
|---|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 25.00 |
| PARAPET HEIGHT (FT) | 0.0 |
| ROOF TILT (DEG) | 5 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 40 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 22 |
| ARRAY AZIMUTH | 183 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 92 |
| Module Connector | 80 |
| Rail | 133 |
| Cam | 80 |
| Cam Claw | 80 |
| Deflector | 40 |
| Base Pad | 0 |
| Ballast Block | 200 |
| Mechanical Attachment | 2 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 9677 |
| ARRAY AREA (SQ. FT) | 1516 |
| ARRAY LOAD (PSF) | 6.38 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | N/A |
| CONDITION 2 (in.) | N/A |
| CONDITION 3 (in.) | N/A |
| CONDITION 4 (in.) | N/A |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 12 |
| SOUTH ASSEMBLY | 12 |
| MIDDLE ASSEMBLY | 56 |
| NORTH SOUTH ASSEMBLY | 0 |

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SCALE:
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 ORIGINAL SIZE 36"X24"
 SHEET SIZE ARCH "D"

PREPARED FOR:

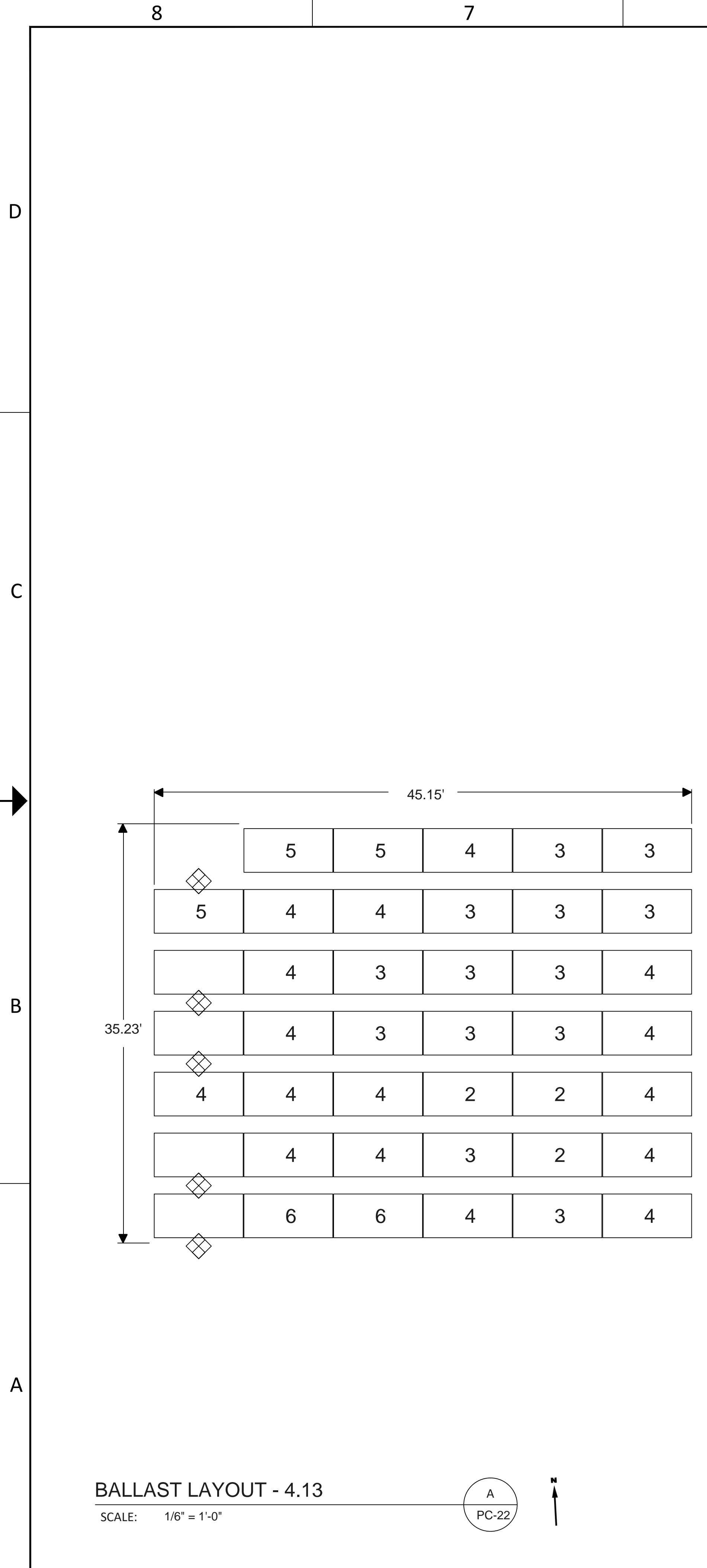
PROJECT:
 Saline Middle

LOCATION:
 7190 N Maple Rd, Saline, MI
 48176, USA

SHEET TITLE:
 BALLAST LAYOUT - 4.12

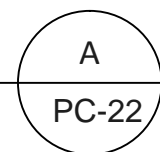
REVISION: 0 SHEET: PC-21

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BALLAST LAYOUT - 4.13

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



| ARRAY 4.13 | |
|---|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 25.00 |
| PARAPET HEIGHT (FT) | 0.0 |
| ROOF TILT (DEG) | 5 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 41 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 22.55 |
| ARRAY AZIMUTH | 183 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 94 |
| Module Connector | 82 |
| Rail | 123 |
| Cam | 82 |
| Cam Claw | 82 |
| Deflector | 41 |
| Base Pad | 0 |
| Ballast Block | 136 |
| Mechanical Attachment | 5 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 7681 |
| ARRAY AREA (SQ. FT) | 1554 |
| ARRAY LOAD (PSF) | 4.94 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | N/A |
| CONDITION 2 (in.) | N/A |
| CONDITION 3 (in.) | N/A |
| CONDITION 4 (in.) | N/A |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 12 |
| SOUTH ASSEMBLY | 12 |
| MIDDLE ASSEMBLY | 58 |
| NORTH SOUTH ASSEMBLY | 0 |

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SCALE:
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ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

PREPARED FOR:

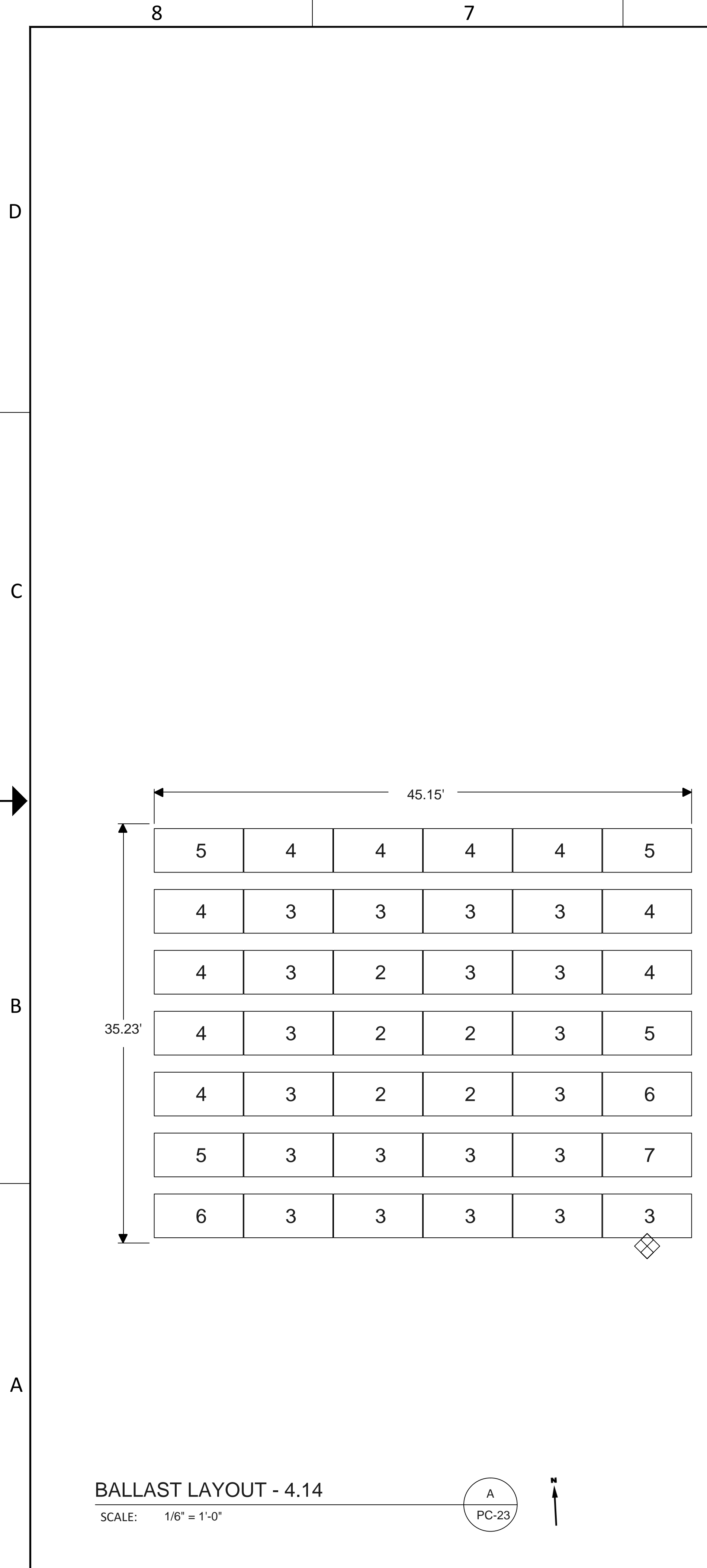
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

SHEET TITLE:
BALLAST LAYOUT - 4.13

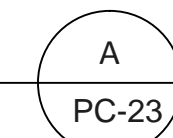
REVISION: 0 SHEET: PC-22

NOT APPROVED FOR CONSTRUCTION



BALLAST LAYOUT - 4.14

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



| ARRAY 4.14 | |
|---|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 25.00 |
| PARAPET HEIGHT (FT) | 0.0 |
| ROOF TILT (DEG) | 5 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 42 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 23.1 |
| ARRAY AZIMUTH | 183 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 96 |
| Module Connector | 84 |
| Rail | 131 |
| Cam | 84 |
| Cam Claw | 84 |
| Deflector | 42 |
| Base Pad | 0 |
| Ballast Block | 149 |
| Mechanical Attachment | 1 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 8160 |
| ARRAY AREA (SQ. FT) | 1593 |
| ARRAY LOAD (PSF) | 5.12 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | N/A |
| CONDITION 2 (in.) | N/A |
| CONDITION 3 (in.) | N/A |
| CONDITION 4 (in.) | N/A |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 12 |
| SOUTH ASSEMBLY | 12 |
| MIDDLE ASSEMBLY | 60 |
| NORTH SOUTH ASSEMBLY | 0 |

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| 2024-03-20 | | DH | Initial Layout | 0 |

SCALE:
 0" 1/2" 1" 2"
 ORIGINAL SIZE 36"X24"
 SHEET SIZE ARCH "D"

PREPARED FOR:

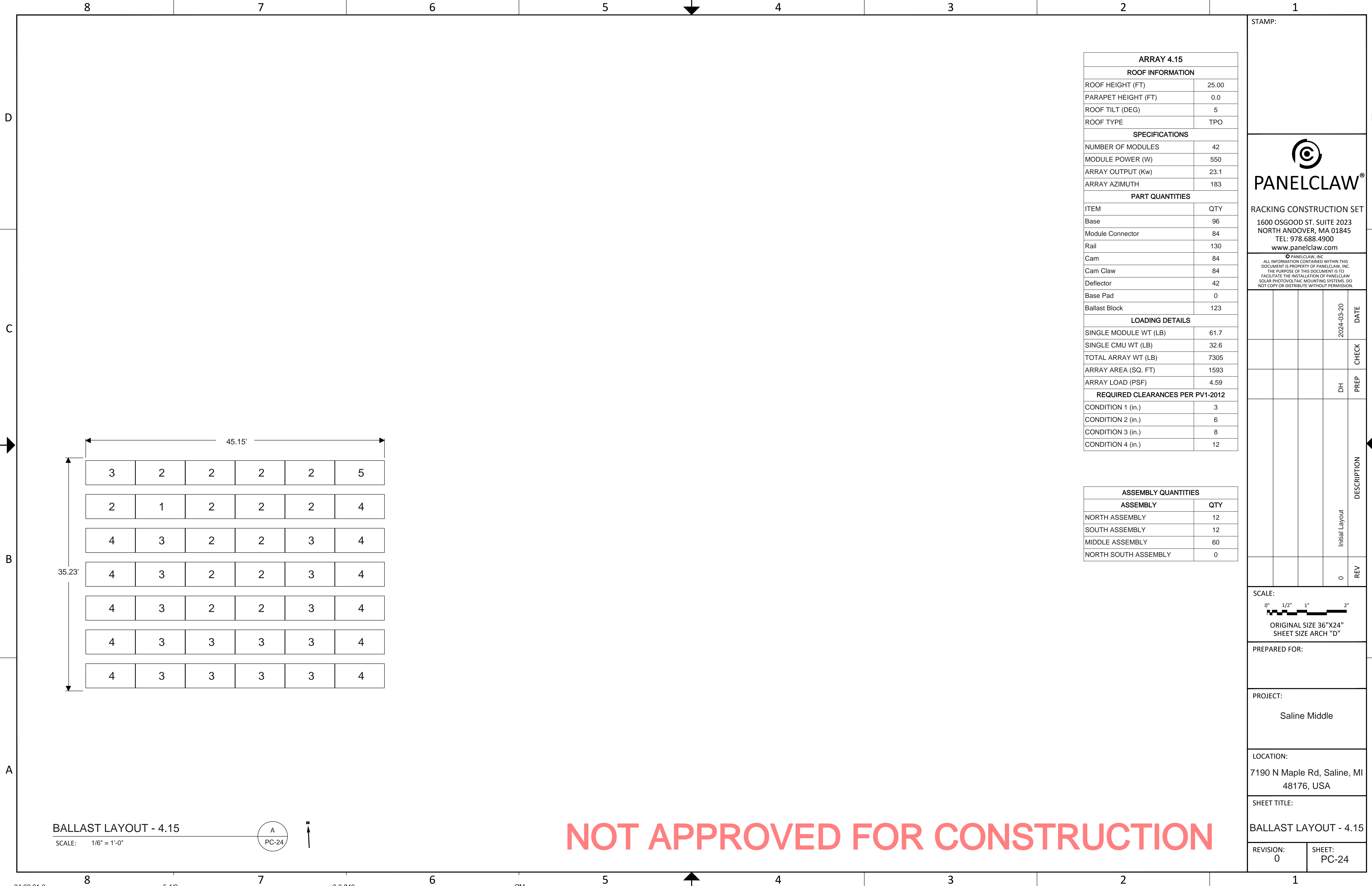
PROJECT:
 Saline Middle

LOCATION:
 7190 N Maple Rd, Saline, MI
 48176, USA

SHEET TITLE:
 BALLAST LAYOUT - 4.14

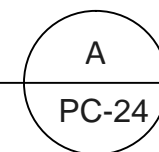
REVISION: 0 SHEET: PC-23

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BALLAST LAYOUT - 4.15

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



| ARRAY 4.15 | |
|----------------------------------|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 25.00 |
| PARAPET HEIGHT (FT) | 0.0 |
| ROOF TILT (DEG) | 5 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 42 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 23.1 |
| ARRAY AZIMUTH | 183 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 96 |
| Module Connector | 84 |
| Rail | 130 |
| Cam | 84 |
| Cam Claw | 84 |
| Deflector | 42 |
| Base Pad | 0 |
| Ballast Block | 123 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 7305 |
| ARRAY AREA (SQ. FT) | 1593 |
| ARRAY LOAD (PSF) | 4.59 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | 3 |
| CONDITION 2 (in.) | 6 |
| CONDITION 3 (in.) | 8 |
| CONDITION 4 (in.) | 12 |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 12 |
| SOUTH ASSEMBLY | 12 |
| MIDDLE ASSEMBLY | 60 |
| NORTH SOUTH ASSEMBLY | 0 |

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|------------|-------|------|----------------|-----|
| 2024-03-20 | | DH | Initial Layout | 0 |

SCALE:
 0" 1/2" 1" 2"
 ORIGINAL SIZE 36"X24"
 SHEET SIZE ARCH "D"

PREPARED FOR:

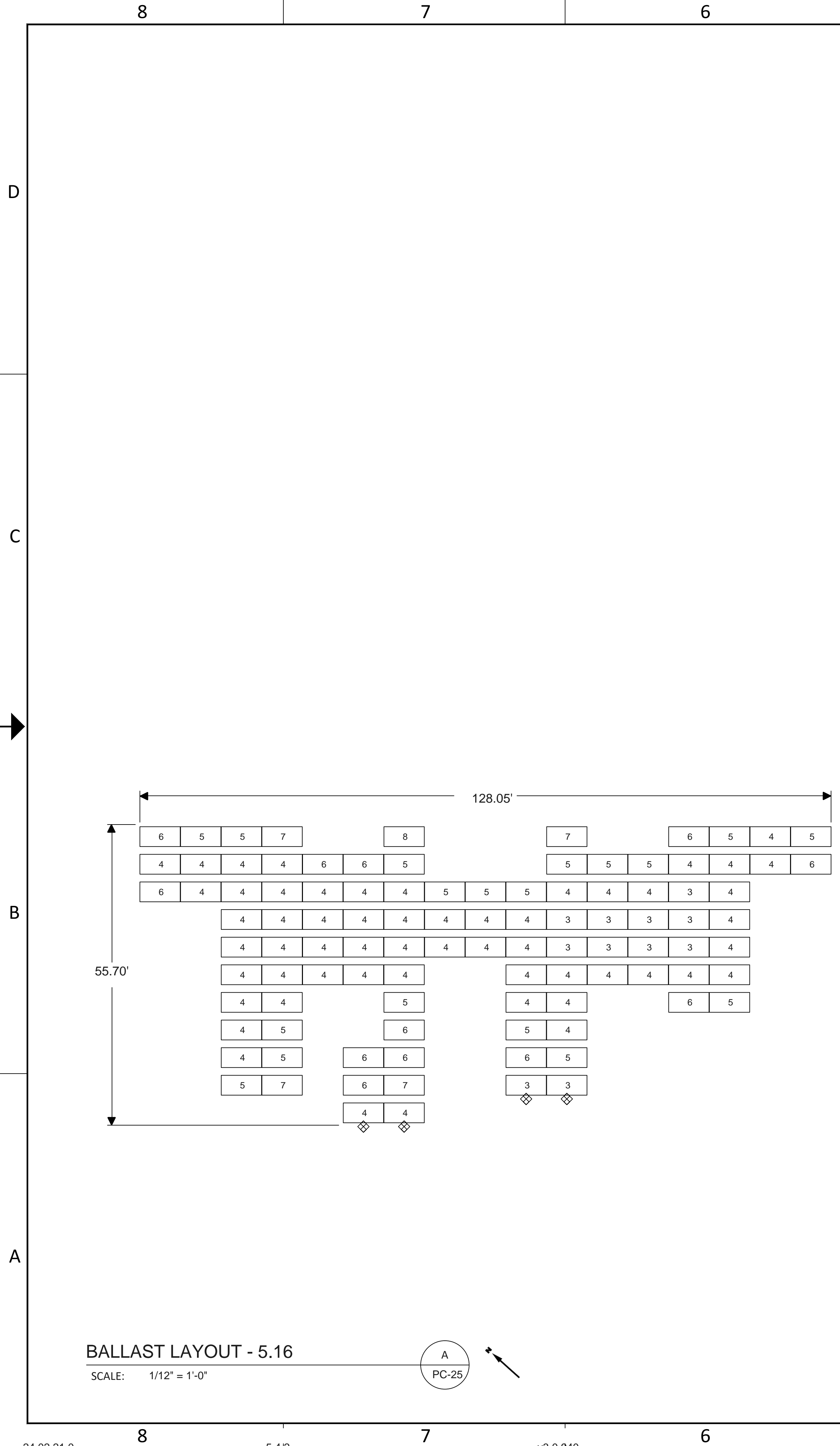
PROJECT:
 Saline Middle

LOCATION:
 7190 N Maple Rd, Saline, MI
 48176, USA

SHEET TITLE:
 BALLAST LAYOUT - 4.15

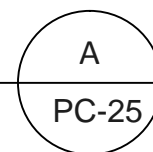
REVISION: 0 SHEET: PC-24

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BALLAST LAYOUT - 5.16

SCALE: 1/12" = 1'-0"



| ARRAY 5.16 | |
|---|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 34.00 |
| PARAPET HEIGHT (FT) | 1.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 102 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 56.1 |
| ARRAY AZIMUTH | 228 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 240 |
| Module Connector | 204 |
| Rail | 333 |
| Cam | 204 |
| Cam Claw | 204 |
| Deflector | 102 |
| Base Pad | 0 |
| Ballast Block | 455 |
| Mechanical Attachment | 4 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 22900 |
| ARRAY AREA (SQ. FT) | 3853 |
| ARRAY LOAD (PSF) | 5.94 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | N/A |
| CONDITION 2 (in.) | N/A |
| CONDITION 3 (in.) | N/A |
| CONDITION 4 (in.) | N/A |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 36 |
| SOUTH ASSEMBLY | 36 |
| MIDDLE ASSEMBLY | 132 |
| NORTH SOUTH ASSEMBLY | 0 |

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| | | Initial Layout | |
| 0 | | REV | |

SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"x24"
SHEET SIZE ARCH "D"

PREPARED FOR:

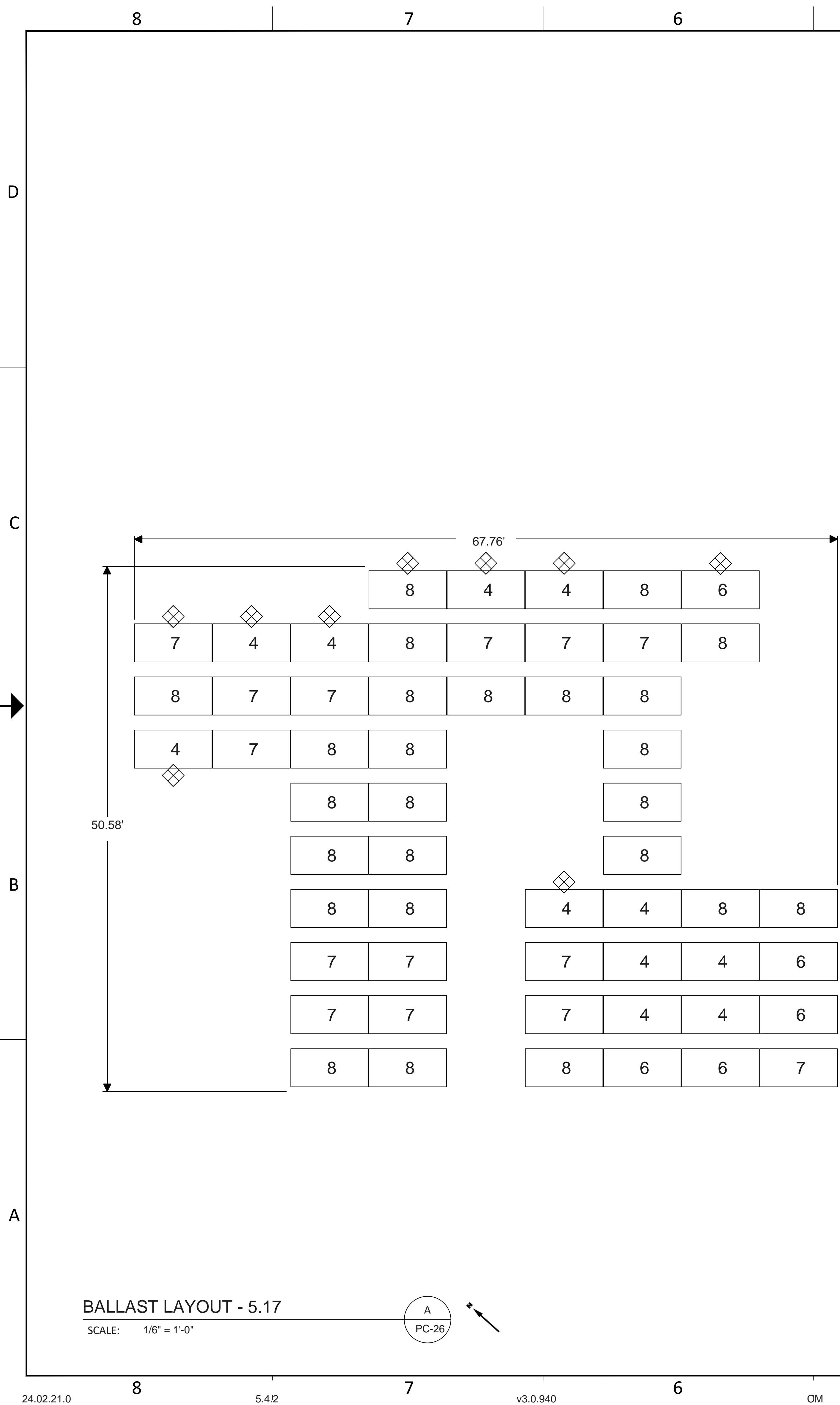
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

SHEET TITLE:
BALLAST LAYOUT - 5.16

REVISION: 0 SHEET: PC-25

NOT APPROVED FOR CONSTRUCTION



BALLAST LAYOUT - 5.17

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



| ARRAY 5.17 | |
|---|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 34.00 |
| PARAPET HEIGHT (FT) | 1.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 55 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 30.25 |
| ARRAY AZIMUTH | 228 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 132 |
| Module Connector | 110 |
| Rail | 215 |
| Cam | 110 |
| Cam Claw | 110 |
| Deflector | 55 |
| Base Pad | 0 |
| Ballast Block | 372 |
| Mechanical Attachment | 9 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 16532 |
| ARRAY AREA (SQ. FT) | 2072 |
| ARRAY LOAD (PSF) | 7.98 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | N/A |
| CONDITION 2 (in.) | N/A |
| CONDITION 3 (in.) | N/A |
| CONDITION 4 (in.) | N/A |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 22 |
| SOUTH ASSEMBLY | 22 |
| MIDDLE ASSEMBLY | 66 |
| NORTH SOUTH ASSEMBLY | 0 |

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| | | Initial Layout | |
| | | 0 | REV |

SCALE:
 0" 1/2" 1" 2"
 ORIGINAL SIZE 36"X24"
 SHEET SIZE ARCH "D"

PREPARED FOR:

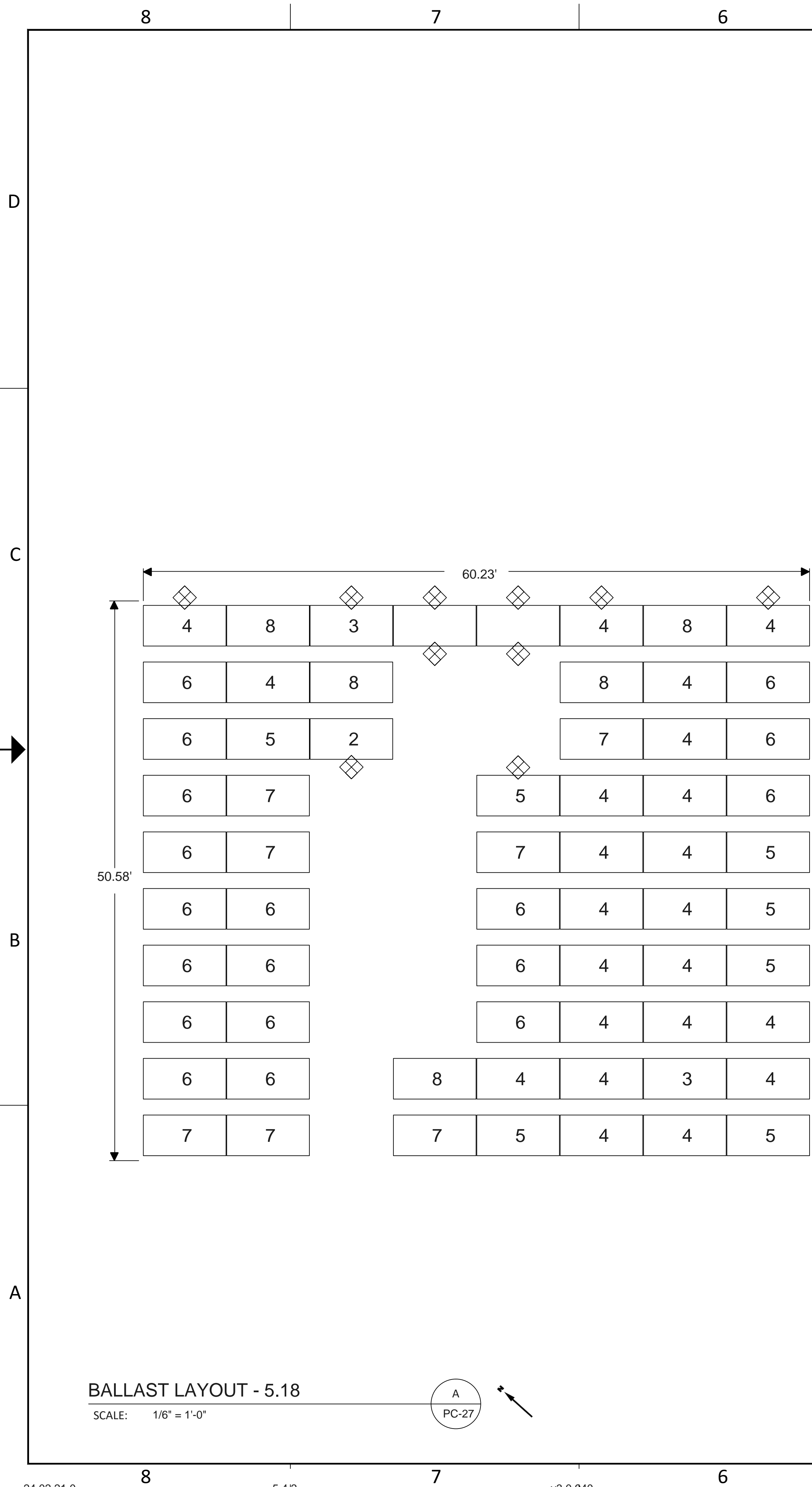
PROJECT:
 Saline Middle

LOCATION:
 7190 N Maple Rd, Saline, MI 48176, USA

SHEET TITLE:
 BALLAST LAYOUT - 5.17

REVISION: 0 SHEET: PC-26

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| ARRAY 5.18 | |
|---|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 34.00 |
| PARAPET HEIGHT (FT) | 1.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 64 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 35.2 |
| ARRAY AZIMUTH | 228 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 148 |
| Module Connector | 128 |
| Rail | 205 |
| Cam | 128 |
| Cam Claw | 128 |
| Deflector | 64 |
| Base Pad | 0 |
| Ballast Block | 328 |
| Mechanical Attachment | 10 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 15783 |
| ARRAY AREA (SQ. FT) | 2423 |
| ARRAY LOAD (PSF) | 6.51 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | N/A |
| CONDITION 2 (in.) | N/A |
| CONDITION 3 (in.) | N/A |
| CONDITION 4 (in.) | N/A |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 16 |
| SOUTH ASSEMBLY | 16 |
| MIDDLE ASSEMBLY | 92 |
| NORTH SOUTH ASSEMBLY | 4 |

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| | | Initial Layout | |
| 0 | | REV | |

SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

PREPARED FOR:

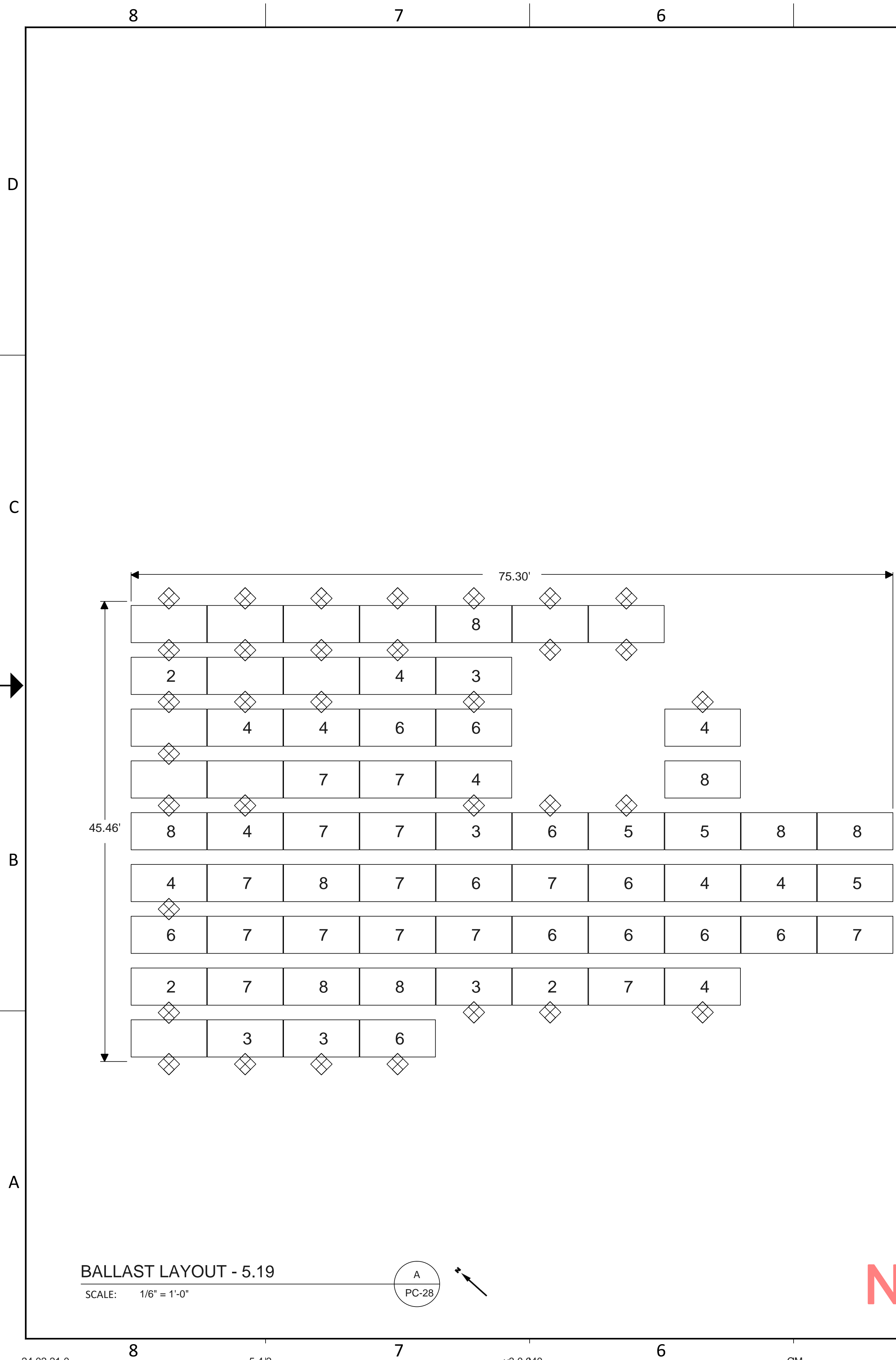
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

SHEET TITLE:
BALLAST LAYOUT - 5.18

REVISION: 0 SHEET: PC-27

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| ARRAY 5.19 | |
|---|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 34.00 |
| PARAPET HEIGHT (FT) | 1.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 66 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 36.3 |
| ARRAY AZIMUTH | 228 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 156 |
| Module Connector | 132 |
| Rail | 225 |
| Cam | 132 |
| Cam Claw | 132 |
| Deflector | 66 |
| Base Pad | 0 |
| Ballast Block | 304 |
| Mechanical Attachment | 33 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 15349 |
| ARRAY AREA (SQ. FT) | 2492 |
| ARRAY LOAD (PSF) | 6.16 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | N/A |
| CONDITION 2 (in.) | N/A |
| CONDITION 3 (in.) | N/A |
| CONDITION 4 (in.) | N/A |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 20 |
| SOUTH ASSEMBLY | 20 |
| MIDDLE ASSEMBLY | 88 |
| NORTH SOUTH ASSEMBLY | 4 |

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| 2024-03-20 | | DH | | 0 |
| | | Initial Layout | | |

SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

PREPARED FOR:

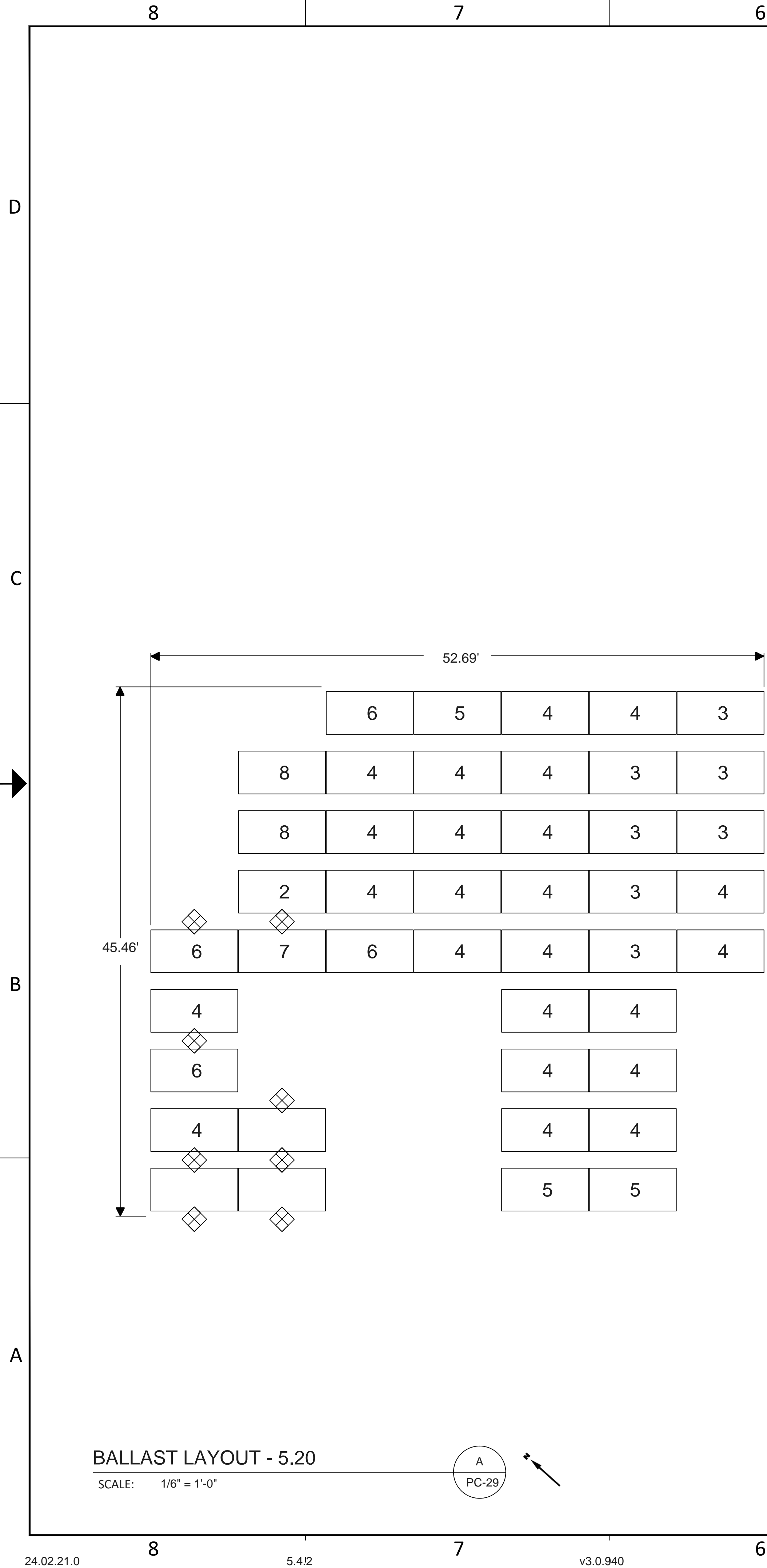
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

SHEET TITLE:
BALLAST LAYOUT - 5.19

REVISION: 0 SHEET: PC-28

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| ARRAY 5.20 | |
|---|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 34.00 |
| PARAPET HEIGHT (FT) | 1.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 44 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 24.2 |
| ARRAY AZIMUTH | 228 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 104 |
| Module Connector | 88 |
| Rail | 139 |
| Cam | 88 |
| Cam Claw | 88 |
| Deflector | 44 |
| Base Pad | 0 |
| Ballast Block | 177 |
| Mechanical Attachment | 8 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 9288 |
| ARRAY AREA (SQ. FT) | 1661 |
| ARRAY LOAD (PSF) | 5.59 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | N/A |
| CONDITION 2 (in.) | N/A |
| CONDITION 3 (in.) | N/A |
| CONDITION 4 (in.) | N/A |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 16 |
| SOUTH ASSEMBLY | 16 |
| MIDDLE ASSEMBLY | 56 |
| NORTH SOUTH ASSEMBLY | 0 |

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SCALE:
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ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

PREPARED FOR:

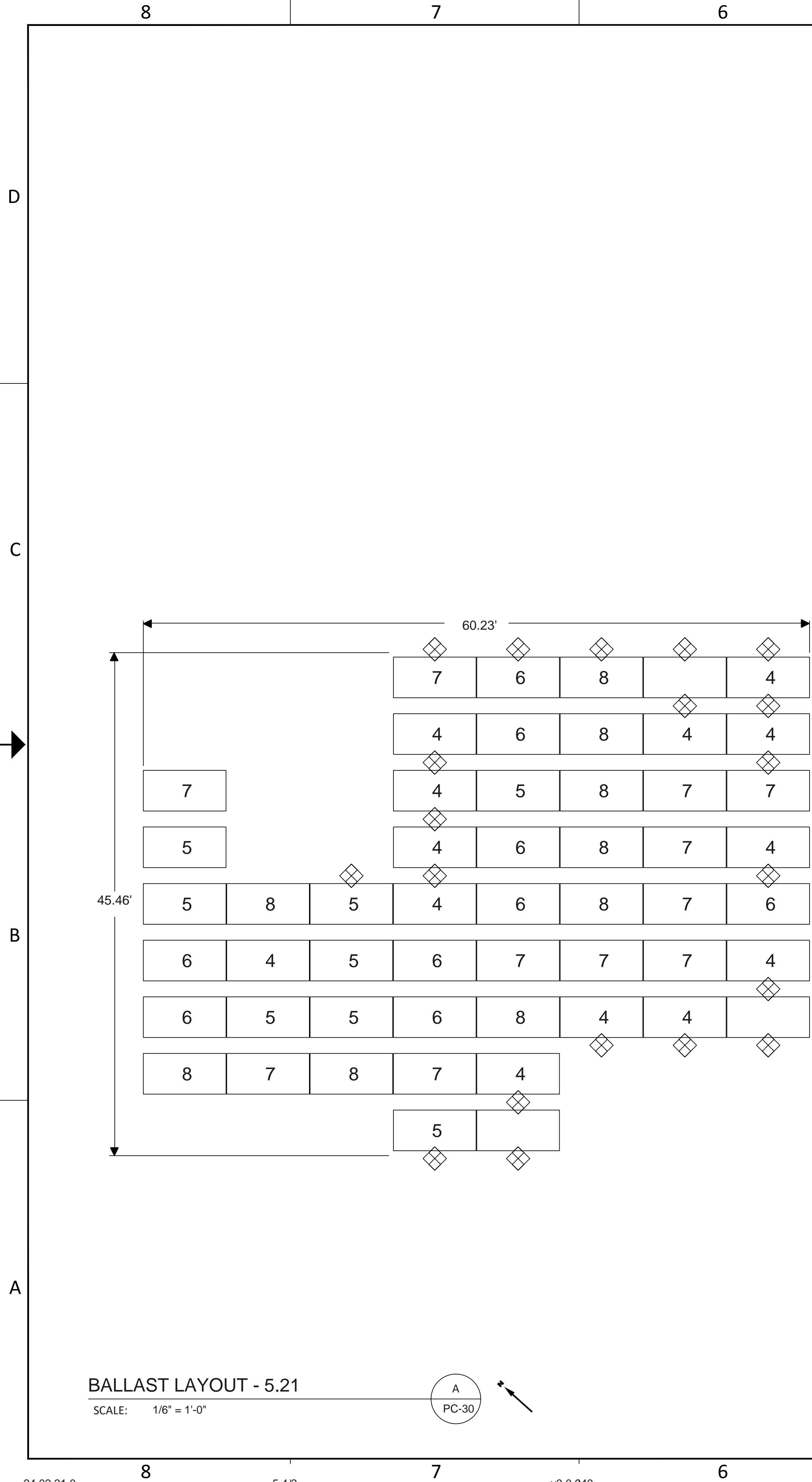
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

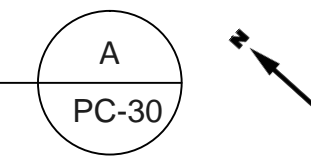
SHEET TITLE:
BALLAST LAYOUT - 5.20

REVISION: 0 SHEET: PC-29

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BALLAST LAYOUT - 5.21
SCALE: 1/6" = 1'-0"



| ARRAY 5.21 | |
|---|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 34.00 |
| PARAPET HEIGHT (FT) | 1.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 53 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 29.15 |
| ARRAY AZIMUTH | 228 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 122 |
| Module Connector | 106 |
| Rail | 184 |
| Cam | 106 |
| Cam Claw | 106 |
| Deflector | 53 |
| Base Pad | 0 |
| Ballast Block | 295 |
| Mechanical Attachment | 20 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 13932 |
| ARRAY AREA (SQ. FT) | 2008 |
| ARRAY LOAD (PSF) | 6.94 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | N/A |
| CONDITION 2 (in.) | N/A |
| CONDITION 3 (in.) | N/A |
| CONDITION 4 (in.) | N/A |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 16 |
| SOUTH ASSEMBLY | 16 |
| MIDDLE ASSEMBLY | 74 |
| NORTH SOUTH ASSEMBLY | 0 |

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| | | Initial Layout | |
| 0 | | REV | |

SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

PREPARED FOR:

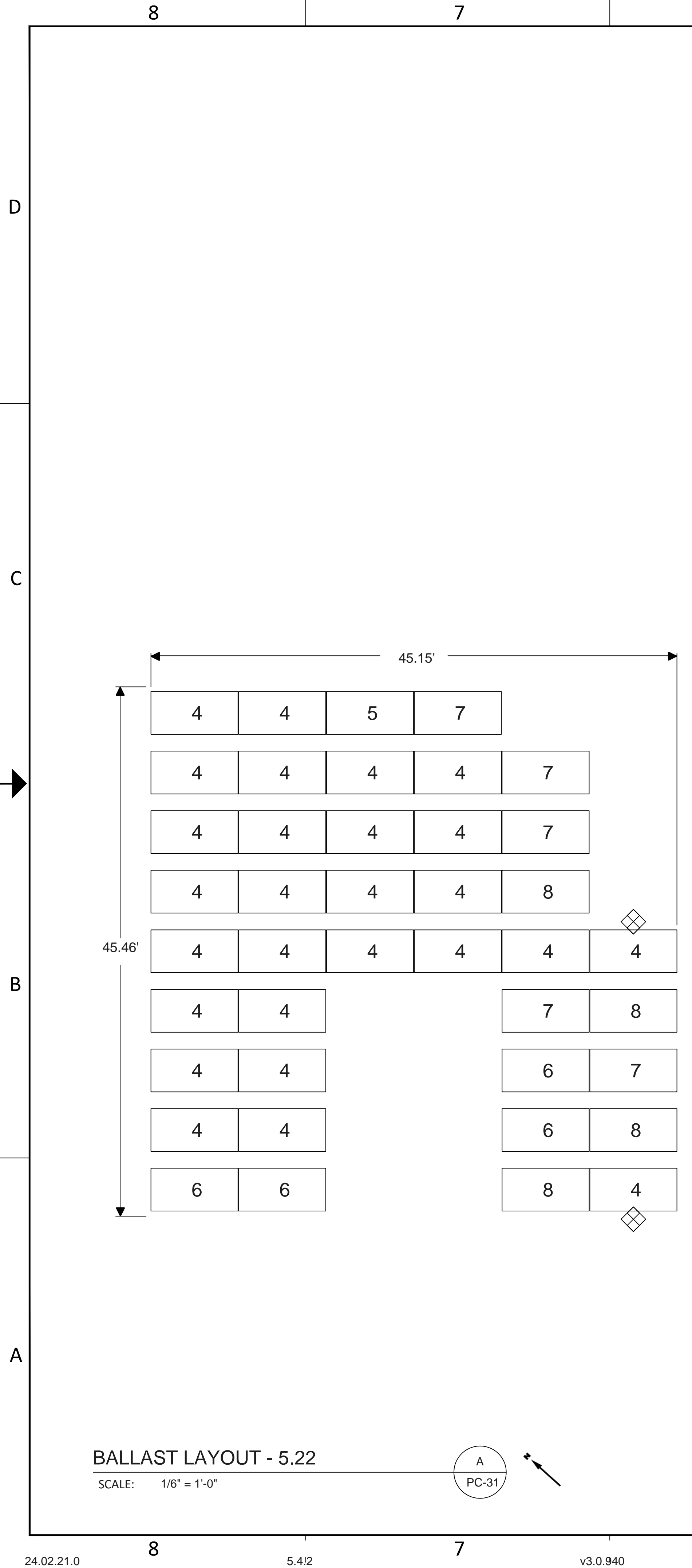
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

SHEET TITLE:
BALLAST LAYOUT - 5.21

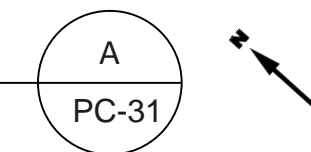
REVISION: 0 SHEET: PC-30

NOT APPROVED FOR CONSTRUCTION



BALLAST LAYOUT - 5.22

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



| ARRAY 5.22 | |
|---|-------|
| ROOF INFORMATION | |
| ROOF HEIGHT (FT) | 34.00 |
| PARAPET HEIGHT (FT) | 1.0 |
| ROOF TILT (DEG) | 1 |
| ROOF TYPE | TPO |
| SPECIFICATIONS | |
| NUMBER OF MODULES | 41 |
| MODULE POWER (W) | 550 |
| ARRAY OUTPUT (Kw) | 22.55 |
| ARRAY AZIMUTH | 228 |
| PART QUANTITIES | |
| ITEM | QTY |
| Base | 94 |
| Module Connector | 82 |
| Rail | 132 |
| Cam | 82 |
| Cam Claw | 82 |
| Deflector | 41 |
| Base Pad | 0 |
| Ballast Block | 204 |
| Mechanical Attachment | 2 |
| LOADING DETAILS | |
| SINGLE MODULE WT (LB) | 61.7 |
| SINGLE CMU WT (LB) | 32.6 |
| TOTAL ARRAY WT (LB) | 9875 |
| ARRAY AREA (SQ. FT) | 1554 |
| ARRAY LOAD (PSF) | 6.35 |
| REQUIRED CLEARANCES PER PV1-2012 | |
| CONDITION 1 (in.) | N/A |
| CONDITION 2 (in.) | N/A |
| CONDITION 3 (in.) | N/A |
| CONDITION 4 (in.) | N/A |

| ASSEMBLY QUANTITIES | |
|----------------------|-----|
| ASSEMBLY | QTY |
| NORTH ASSEMBLY | 12 |
| SOUTH ASSEMBLY | 12 |
| MIDDLE ASSEMBLY | 58 |
| NORTH SOUTH ASSEMBLY | 0 |

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| 2024-03-20 | | DH | | 0 |
| | | | Initial Layout | |

SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

PREPARED FOR:

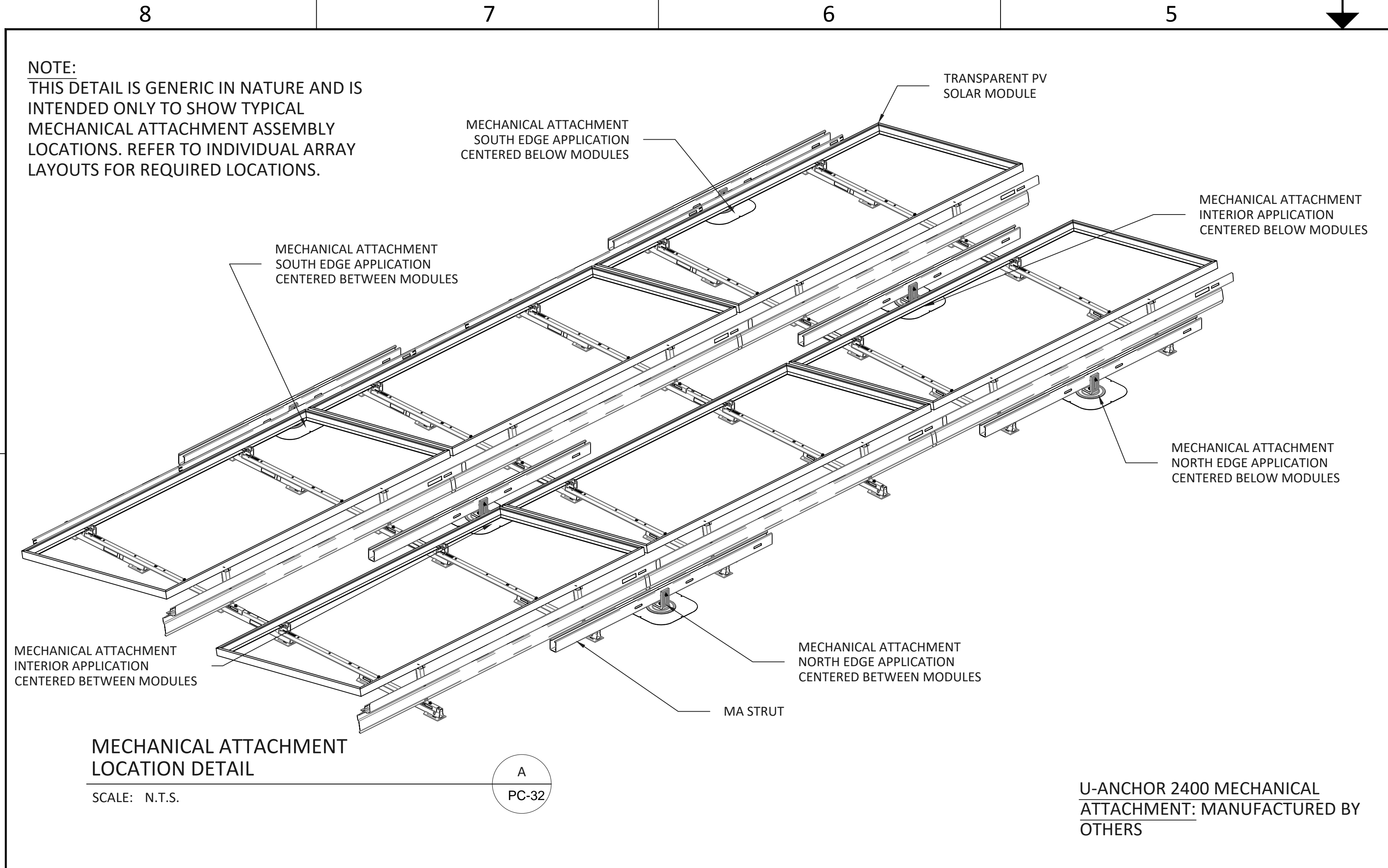
PROJECT:
Saline Middle

LOCATION:
7190 N Maple Rd, Saline, MI
48176, USA

SHEET TITLE:
BALLAST LAYOUT - 5.22

REVISION: 0 SHEET: PC-31

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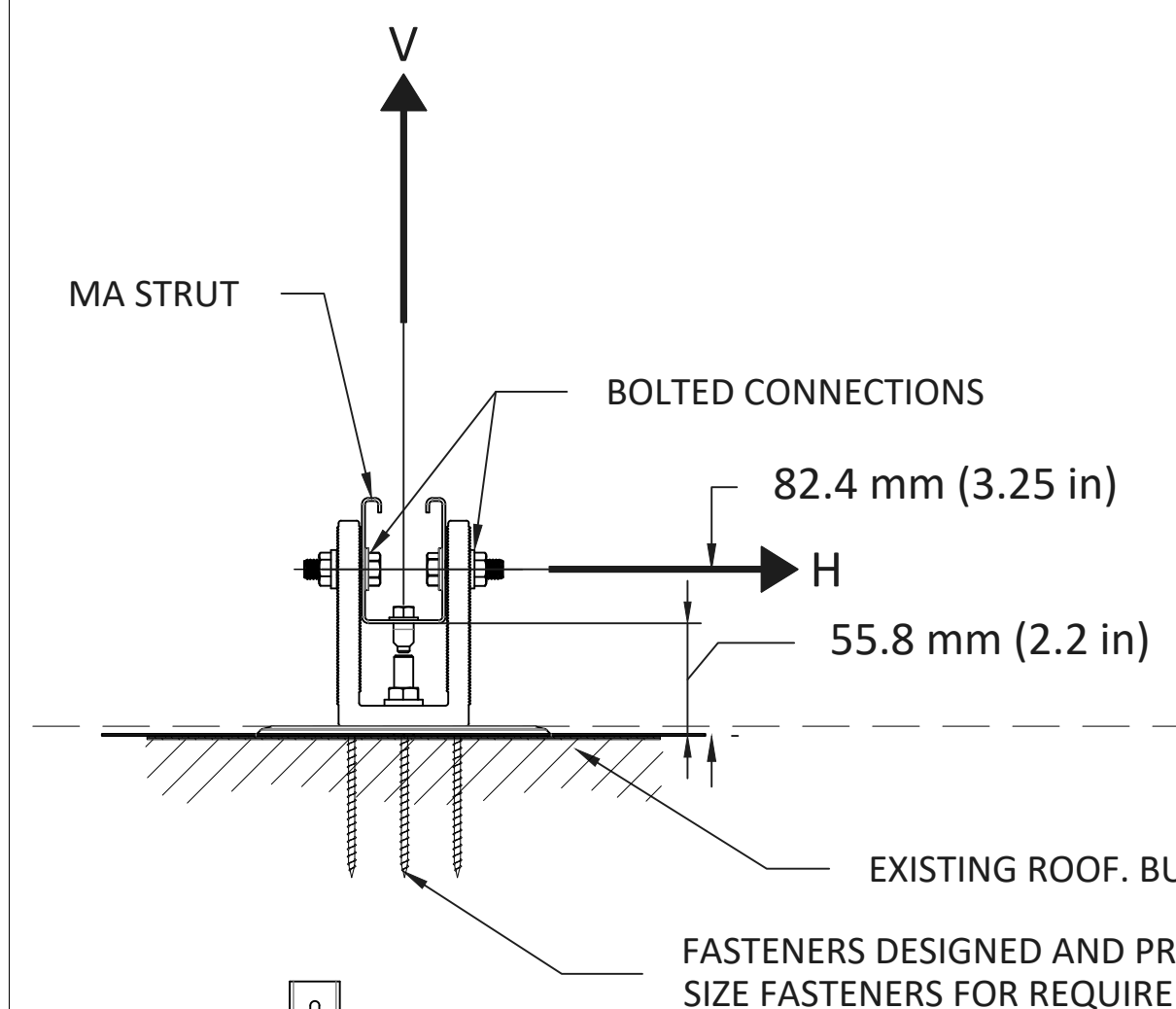


MECHANICAL ATTACHMENT LOCATION DETAIL

SCALE: N.T.S.

A
PC-32

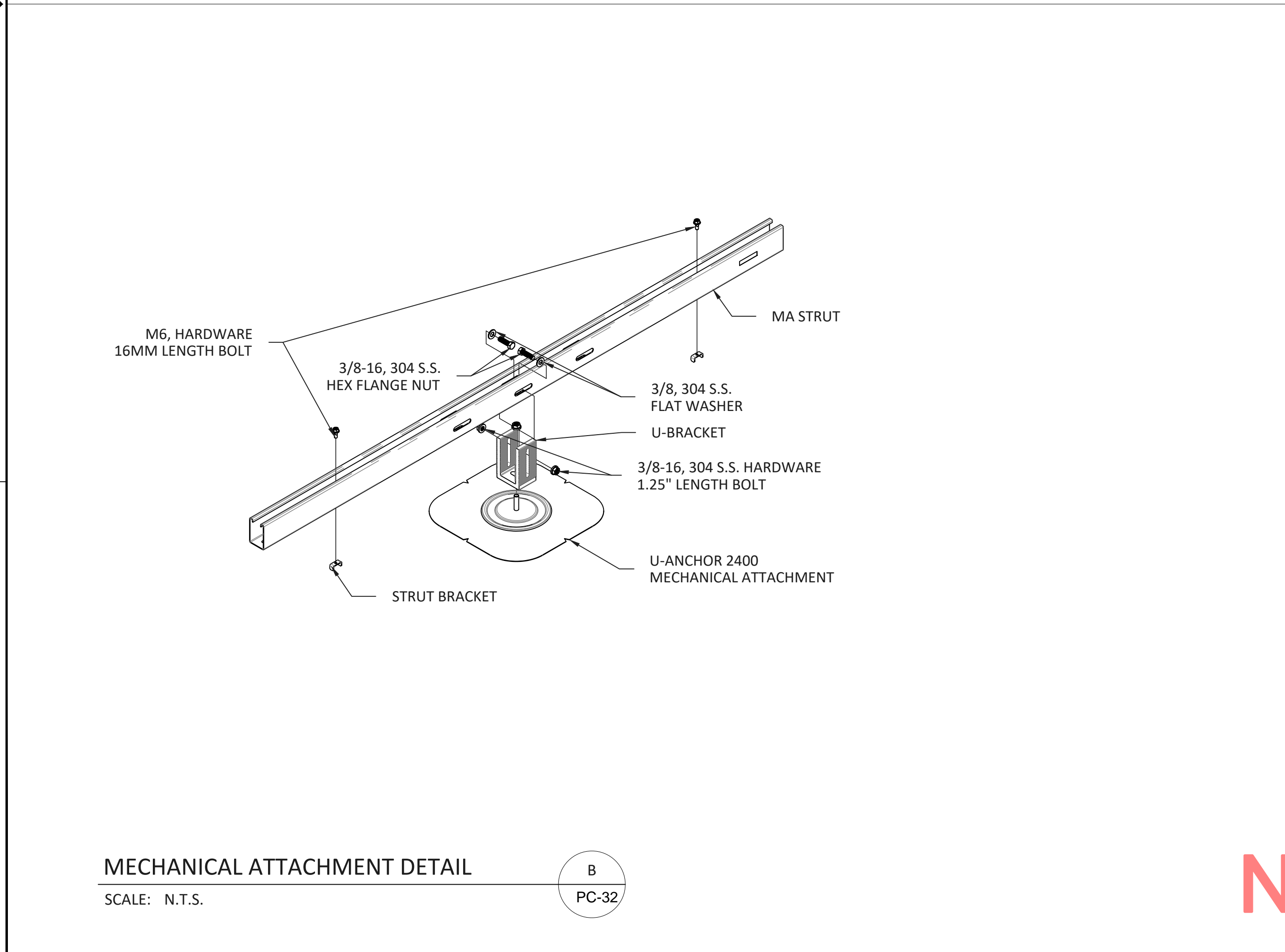
U-ANCHOR 2400 MECHANICAL ATTACHMENT: MANUFACTURED BY OTHERS



PANELCLAW MANUFACTURED COMPONENTS
COMPONENTS MANUFACTURED BY OTHERS

| MECHANICAL ATTACHMENT | | |
|------------------------------|---------|--------------|
| WORST-CASE SERVICE LOAD (LB) | | |
| HORIZONTAL (H) | | VERTICAL (V) |
| WIND | SEISMIC | WIND |
| 102 | 0 | 525 |
| MAXIMUM ALLOWABLE LOAD (LB) | | |
| HORIZONTAL (H) | | VERTICAL (V) |
| 650 | | 525 |

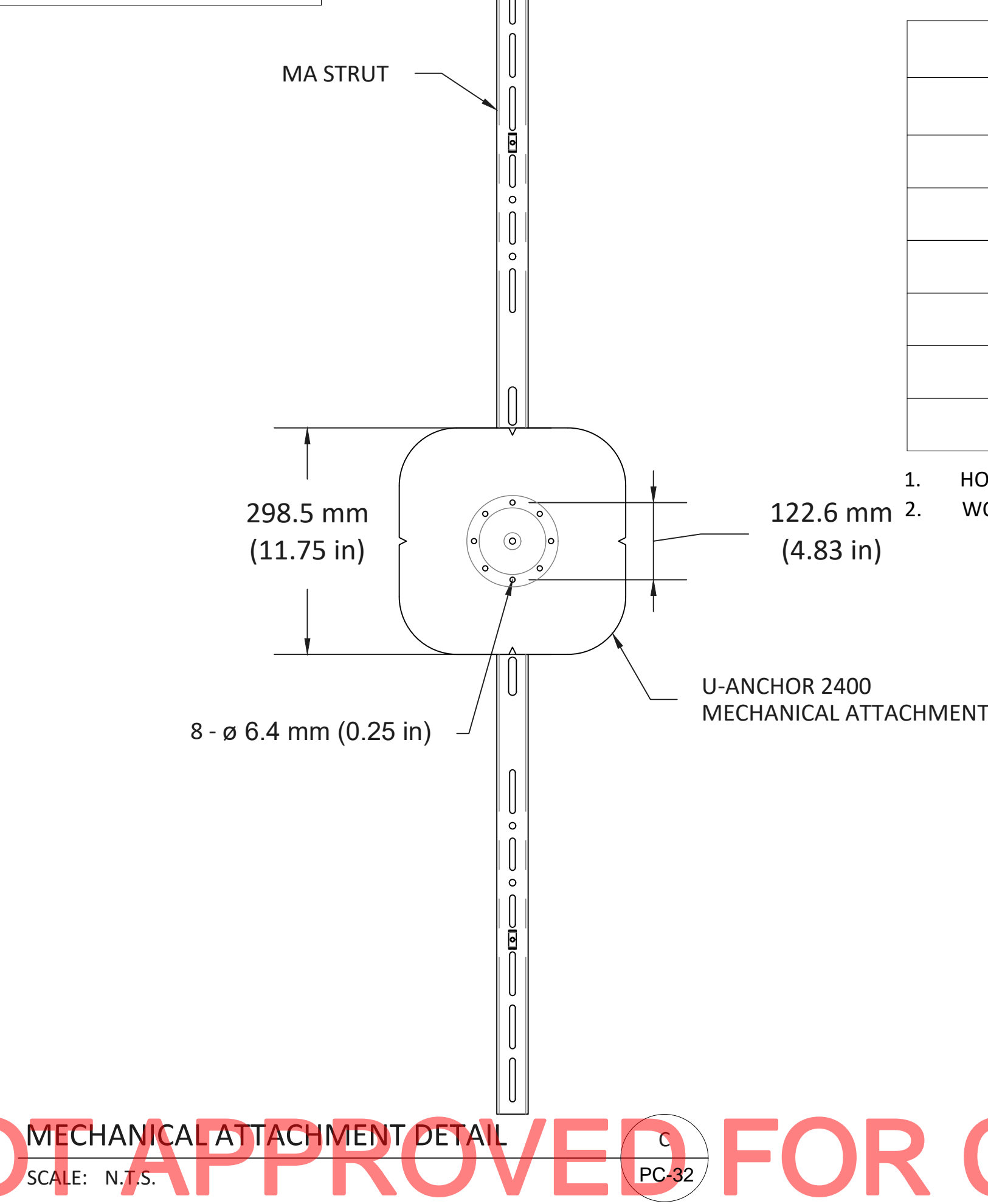
- HORIZONTAL LOAD H MAY ACT IN ANY DIRECTION
- WORKING LOADS = ALLOWABLE LOADS (i.e. NON-FACTORED)



MECHANICAL ATTACHMENT DETAIL

SCALE: N.T.S.

B
PC-32



MECHANICAL ATTACHMENT DETAIL

SCALE: N.T.S.

C
PC-32

NOTE: MECHANICAL ATTACHMENT COMPONENT DIMENSIONS ARE PROVIDED FOR REFERENCE ONLY AND SHOULD BE VERIFIED WITH ATTACHMENT MANUFACTURER PRIOR TO FASTENER DESIGN.

NOT APPROVED FOR CONSTRUCTION

STAMP:

PANELCLAW®

RACKING CONSTRUCTION SET
1600 OSGOOD ST. SUITE 2023
NORTH ANDOVER, MA 01845
TEL: 978.688.4900
www.panelclaw.com

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| DATE | CHECK | PREP | DESCRIPTION |
|------------|-------|------|----------------|
| 2024-03-20 | | DH | Initial Layout |
| 0 | | REV | |

SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

PREPARED FOR:

PROJECT:
Saline Middle

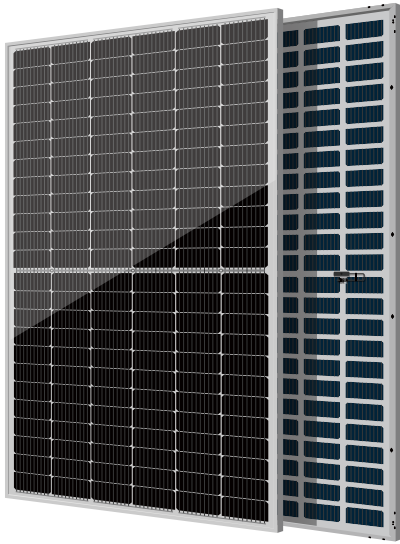
LOCATION:
7190 N Maple Rd, Saline, MI 48176, USA

SHEET TITLE:
MECHANICAL ATTACHMENT DETAIL

REVISION: 0 SHEET: PC-32

ZXM7-SHDB144 Series

10BB HALF-CELL Bifacial Monocrystalline PERC PV Module



530-560W

POWER RANGE

21.68%

MAXIMUM EFFICIENCY

0.55%

YEARLY DEGRADATION



12 YEARS PRODUCT WARRANTY



25 YEARS OUTPUT GUARANTEE



CALIFORNIA ENERGY COMMISSION

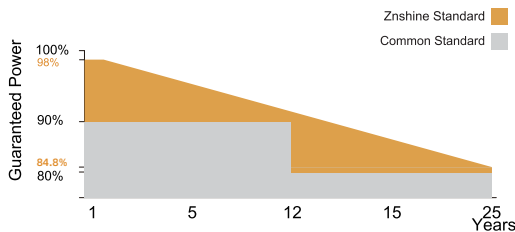
IEC 61215/IEC 61730/IEC 61701/IEC 62716/UL6 1730

ISO 14001: Environmental Management System

ISO 9001: Quality Management System

ISO45001: Occupational Health and Safety Management System

*As there are different certification requirements in different markets, please contact your local znshine sales representative for the specific certificates applicable to the products in the region in which the products are to be used.



*Please check the valid version of Limited Product Warranty which is officially released by ZNSHINE PV-TECH Co.,Ltd.

Key Features



Excellent Cells Efficiency

MBB technology reduce the distance between busbars and finger grid line which is benefit to power increase.



Better Weak Illumination Response

More power output in weak light condition, such as haze, cloudy, and early morning.



Anti PID

Ensured PID resistance through the quality control of cell manufacturing process and raw materials.



Adapt To Harsh Outdoor Environment

Resistant to harsh environments such as salt, ammonia, sand, high temperature and high humidity environment.



TIER 1

Global, Tier 1 bankable brand, with independently certified advanced automated manufacturing.



Excellent Quality Management System

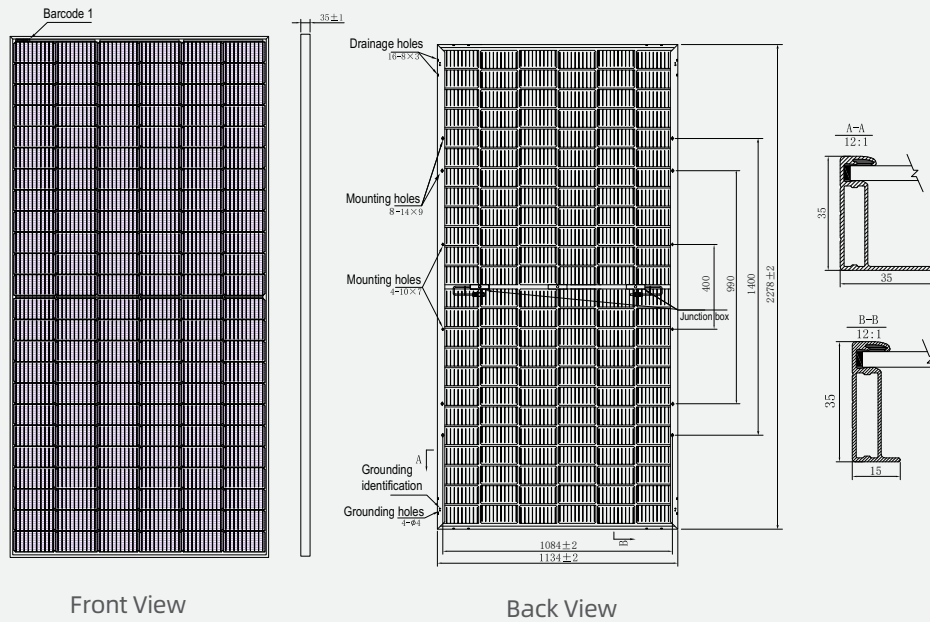
Warranted reliability and stringent quality assurances well beyond certified requirements.



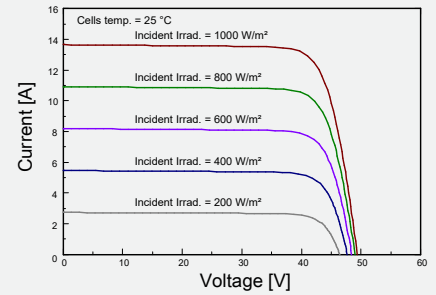
Bifacial Technology

Up to 25% additional power gain from back side depending on albedo.

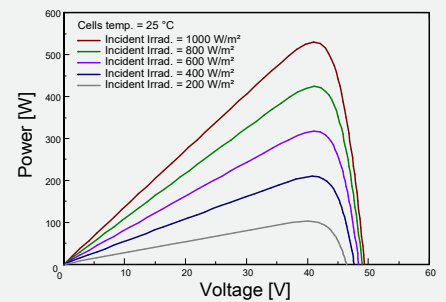
DIMENSIONS OF PV MODULE(mm)



I-V CURVES OF PV MODULE(530W)



P-V CURVES OF PV MODULE(530W)



*Remark: customized frame color and cable length available upon request

ELECTRICAL CHARACTERISTICS | STC*

| | | | | | | | |
|------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Nominal Power Watt Pmax(W)* | 530 | 535 | 540 | 545 | 550 | 555 | 560 |
| Maximum Power Voltage Vmp(V) | 41.10 | 41.30 | 41.50 | 41.70 | 41.90 | 42.10 | 42.30 |
| Maximum Power Current Imp(A) | 12.91 | 12.96 | 13.02 | 13.07 | 13.13 | 13.19 | 13.24 |
| Open Circuit Voltage Voc(V) | 49.40 | 49.60 | 49.80 | 50.00 | 50.20 | 50.40 | 50.60 |
| Short Circuit Current Isc(A) | 13.65 | 13.71 | 13.77 | 13.83 | 13.89 | 13.95 | 14.01 |
| Module Efficiency (%) | 20.52 | 20.71 | 20.90 | 21.10 | 21.29 | 21.48 | 21.68 |

*The data above is for reference only and the actual data is in accordance with the practical testing
 *STC (Standard Test Condition): Irradiance 1000W/m², Module Temperature 25±2°C, AM 1.5
 *Measuring uncertainty: ±3%, all the electrical characteristics such as Power, Im, Vm and FF are within ±3% tolerance.

MECHANICAL DATA

| | |
|-------------------|--|
| Solar cells | Mono PERC |
| Cells orientation | 144 (6×24) |
| Module dimension | 2278×1134×35mm (With Frame) |
| Weight | 28±1.0 kg |
| Glass | 3.2mm, High Transmission, AR Coated Tempered Glass |
| Junction box | IP 68, 3 diodes |
| Cables | 4 mm² ,1200 mm (With Connectors) |
| Connectors* | MC4 (PV-KST4/6II-UR,PV-KBT4/6II-UR) |

*Please refer to regional datasheet for specified connector

ELECTRICAL CHARACTERISTICS | NMOT*

| | | | | | | | |
|------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Maximum Power Pmax(Wp) | 396.40 | 399.90 | 403.60 | 406.80 | 410.80 | 414.60 | 418.10 |
| Maximum Power Voltage Vmp(V) | 38.20 | 38.40 | 38.50 | 38.80 | 38.90 | 39.10 | 39.30 |
| Maximum Power Current Imp(A) | 10.38 | 10.42 | 10.47 | 10.49 | 10.56 | 10.61 | 10.64 |
| Open Circuit Voltage Voc(V) | 46.20 | 46.30 | 46.50 | 46.70 | 46.90 | 47.10 | 47.20 |
| Short Circuit Current Isc(A) | 11.02 | 11.07 | 11.12 | 11.17 | 11.22 | 11.27 | 11.31 |

*NMOT: Irradiance 800W/m², Ambient Temperature 20°C, AM 1.5, Wind Speed 1m/s

TEMPERATURE RATINGS

| | | | |
|---------------------------------|-----------|-----------------------------------|--------------|
| NMOT | 44°C ±2°C | Maximum system voltage | 1500 V DC |
| Temperature coefficient of Pmax | -0.35%/°C | Operating temperature | -40°C~+85°C |
| Temperature coefficient of Voc | -0.29%/°C | Maximum series fuse | 30 A |
| Temperature coefficient of Isc | 0.05%/°C | Front Side Maximum Static Loading | Up to 5400Pa |
| Refer. Bifacial Factor | 70±10% | Rear Side Maximum Static Loading | Up to 2400Pa |

*Remark: Do not connect Fuse in Combiner Box with two or more strings in parallel connection

ELECTRICAL CHARACTERISTICS WITH 25% REAR SIDE POWER GAIN*

| | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|
| Front power Pmax/W | 530 | 535 | 540 | 545 | 550 | 555 | 560 |
| Total power Pmax/W | 663 | 669 | 675 | 681 | 688 | 694 | 700 |
| Vmp/V(Total) | 41.20 | 41.40 | 41.60 | 41.80 | 42.00 | 42.20 | 42.20 |
| Imp/A(Total) | 16.08 | 16.15 | 16.23 | 16.30 | 16.37 | 16.44 | 16.51 |
| Voc/V(Total) | 49.50 | 49.70 | 49.90 | 50.10 | 50.30 | 50.50 | 50.70 |
| Isc/A(Total) | 17.02 | 17.10 | 17.17 | 17.25 | 17.32 | 17.39 | 17.47 |

*Bifacial Gain: The additional gain from the back side compared to the power of the front side at the standard test condition. It depends on mounting (structure, height, tilt angle etc.) and albedo of the ground.

PACKAGING CONFIGURATION *

| | |
|------------------------|-----|
| Piece/Box | 31 |
| Piece/Container(40'HQ) | 620 |

*Customized packaging is available upon request.
 *Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.
 *Caution: Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

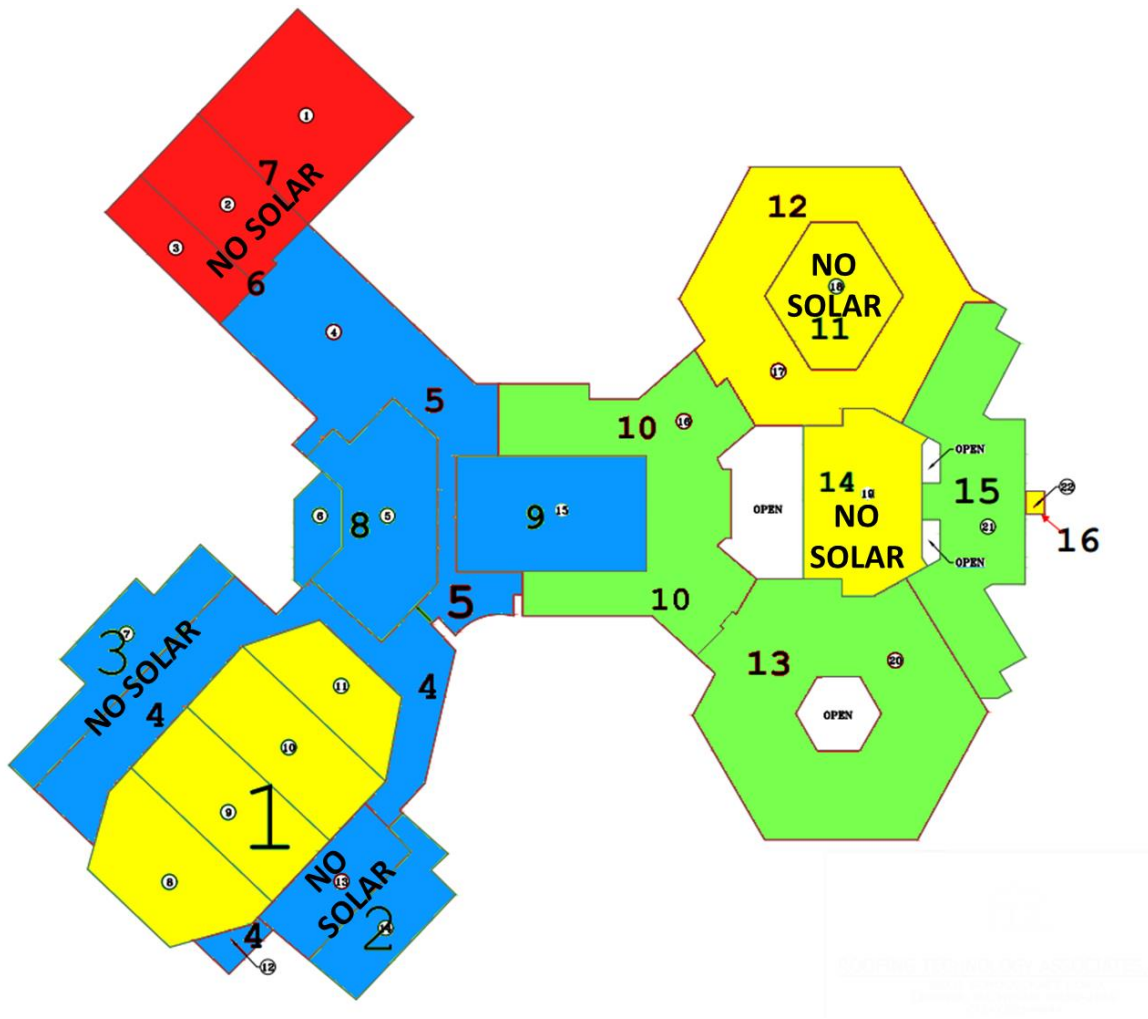
EXHIBIT A

WRITTEN CLARIFICATIONS

EXHIBIT B

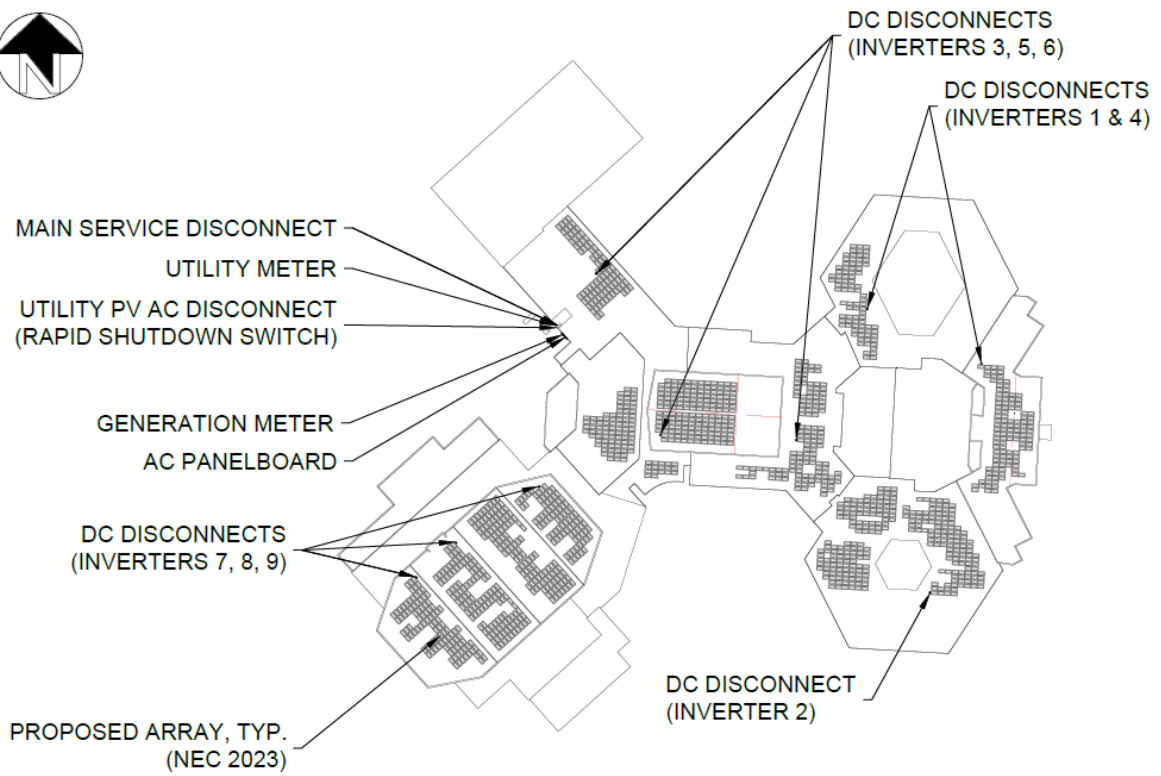
PROJECT SCHEDULE

The following diagram indicates the dates by which each roof area will be completed by the roofer and ready for solar installation teams. It is the District's intent that all major elevations other than the gymnasium would be ready for solar material staging and mobilization by 7/15 and that the Gymnasium would be ready for solar installation by 8/6. (See note on (3) District provided periods of use for onsite lift in sections above).



Roof Complete & Ready for Solar By:

- Ready for Solar Install by 7/1
- Ready for Solar Install by 7/15
- Ready for Solar Install by 8/6 (Where Applicable)
- Roofing Completed Last but Not in Solar Scope of Work
Students Return 8/26



Solar Footprint for Reference