



ELECTRICAL PLAN - PHOTOVOLTAIC SYSTEM

SCALE: (SEE SITE PLAN GENERAL NOTE C)

# SITE PLAN GENERAL NOTES

- WARNING TAPE AT 12". EXISTING CONDITIONS AND ACTUAL LENGTHS.

- FOR INTERCONNECTION.
- REQUIREMENTS OUTLINED IN NEC 690.12.
- AS OUTLINED IN NEC 690 PART IV.
- D. PROVIDE ALL MARKINGS, IDENTIFICATION, PLAQUES, ETC. FOR

- A. VERIFY THE EXACT LOCATION OF ALL UNDERGROUND UTILITIES BEFORE DIGGING, EXCAVATING, OR DIRECTIONAL BORING, REPAIR EXISTING UTILITIES DAMAGED DURING CONSTRUCTION. B. ALL UNDERGROUND CONDUIT SHALL BE 1" MINIMUM AND INSTALLED 24" BELOW FINISHED GRADE UNLESS NOTED OTHERWISE, WITH RED
- C. SCALE IS APPROXIMATELY 1" = 20'-0". UNIT MEASURES ARE TAKEN FROM INTERNET AERIAL VIEWS. CONTRACTOR SHALL FIELD VERIFY ALL
- PHOTOVOLTAIC SYSTEM GENERAL NOTES
- A. COORDINATE WITH THE LOCAL UTILITY COMPANY ON ALL INTERCONNECTION REQUIREMENTS. THE CONTRACTOR SHALL COMPLETE AND SUBMIT ALL FORMS AND PROCEDURES AS REQUIRED
- B. THE PHOTOVOLTAIC SYSTEM SHALL COMPLY WITH RAPID SHUTDOWN
- C. PROVIDE ALL IDENTIFICATION AND MARKING REQUIREMENTS FOR ALL WIRING AND DEVICES ASSOCIATED WITH THE PHOTOVOLTAIC SYSTEM
  - PHOTOVOLTAIC SYSTEMS AS OUTLINED IN NEC 690 PART IV.

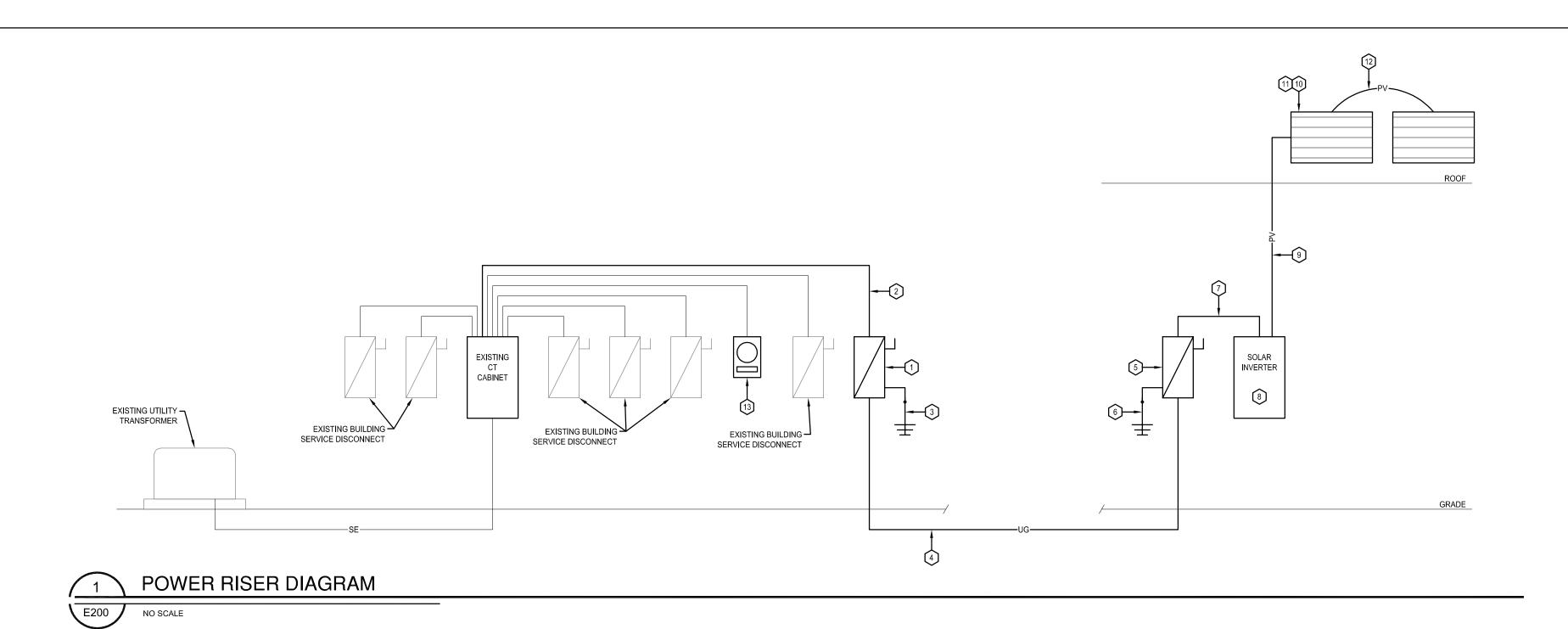
# (#) <u>SHEET NOTES</u>

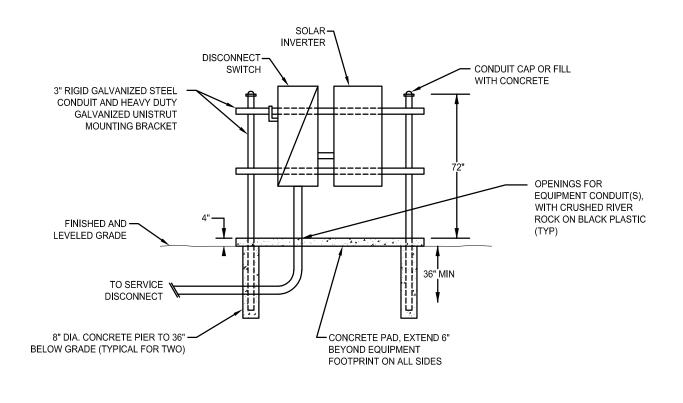
- PROVIDE A 63kWdc / 60kWac PHOTOVOLTAIC SYSTEM. A PORTION OF THE SYSTEM SHALL BE MOUNTED TO THE ROOF OF THE EXISTING HORSE STABLE STRUCTURE AND THE OTHER PORTION SHALL BE MOUNTED TO A NEW HORSE STABLE STRUCTURE. NEW STRUCTURE IS DESIGNED BY OTHERS, COORDINATE WITH OWNER.
- 2. ROOF-MOUNTED SOLAR MODULE. (TYPICAL).

FOR FURTHER REQUIREMENTS.

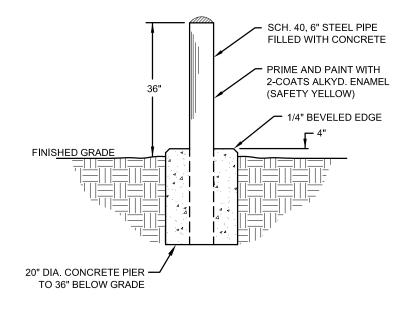
- 3. SOLAR INVERTER AND SOLAR DISCONNECT MOUNTED ON UNISTRUT RACKING SYSTEM, SEE POWER RISER DIAGRAM AND ASSOCIATED DETAIL FOR FURTHER REQUIREMENTS.
- PROVIDE VEHICLE PROTECTIVE BOLLARDS IN FRONT OF EQUIPMENT, SEE ASSOCIATED DETAIL. (TYPICAL).
- 5. INSTALL FEEDER FOR PHOTOVOLTAIC SYSTEM A MINIMUM OF 36" BELOW FINISHED GRADE, WITH DETECTABLE RED WARNING TAPE AT 12". 6. INSTALL NEW SERVICE DISCONNECT FOR PHOTOVOLTAIC SYSTEM ADJACENT TO EXISTING BUILDING'S SERVICE DISCONNECTS. SEE POWER RISER DIAGRAM













PROTECTIVE BOLLARD DETAIL

NO SCALE

# PHOTOVOLTAIC SYSTEM GENERAL NOTES

- A. COORDINATE WITH THE LOCAL UTILITY COMPANY ON ALL INTERCONNECTION REQUIREMENTS. THE CONTRACTOR SHALL COMPLETE AND SUBMIT ALL FORMS AND PROCEDURES AS REQUIRED FOR INTERCONNECTION.
- B. THE PHOTOVOLTAIC SYSTEM SHALL COMPLY WITH RAPID SHUTDOWN REQUIREMENTS OUTLINED IN NEC 690.12.
- C. PROVIDE ALL IDENTIFICATION AND MARKING REQUIREMENTS FOR ALL WIRING AND DEVICES ASSOCIATED WITH THE PHOTOVOLTAIC SYSTEM AS OUTLINED IN NEC 690 PART IV.
- D. PROVIDE ALL MARKINGS, IDENTIFICATION, PLAQUES, ETC. FOR PHOTOVOLTAIC SYSTEMS AS OUTLINED IN NEC 690 PART IV.

# (#) <u>SHEET NOTES</u>

- PROVIDE A SERVICE-ENTRANCE RATED, 600V, 200-AMP, FUSIBLE, NEMA 3R DISCONNECT SWITCH. FUSE AT 125-AMPS. LABEL PER NEC 690 REQUIREMENTS.
- PROVIDE 4 #1 AWG IN A 1.5" RIGID-STEEL CONDUIT. PROVIDE BONDING GROUND CONDUCTOR FROM CT CABINET TO DISCONNECT PER NEC REQUIREMENTS.
- BOND NEW PV SERVICE DISCONNECT TO EXISTING BUILDING / SERVICE GROUNDING SYSTEM PER NEC REQUIREMENTS. FIELD VERIFY EXISTING CONDITIONS.
- PROVIDE 4 1/0 AWG, #4 GND IN A 2" CONDUIT. WHERE CONDUIT IS EXPOSED, IT SHALL BE RIGID-STEEL TYPE.
- PROVIDE A 600V, 200-AMP, FUSIBLE, NEMA 3R DISCONNECT SWITCH. FUSE AT 125-AMPS. LABEL PER NEC 690 REQUIREMENTS. DO NOT BOND NEUTRAL AND GROUND BUS.
- GROUND AND BOND ELECTRICAL SYSTEM IN ACCORDANCE WITH THE NEC. PROVIDE (3) 5/8" x 10'-0" COPPER GROUND RODS SPACED EQUILATERALLY ON 10'-0" CENTERS. BOND TO STEEL STRUCTURE WITH A MINIMUM OF #6 AWG.
- PROVIDE 4 #1 AWG, #6 GND IN A 1.5" CONDUIT. CONDUIT SHALL BE RIGID-STEEL TYPE.
- PROVIDE A 60KWac, 480V, 3-PHASE SOLAR INVERTER. YASKAWA MODEL PVI 60TL-480 OR EQUAL.
   PROVIDE PHOTOVOLTAIC WIRING AS REQUIRED FROM PHOTOVOLTAIC SYSTEM
- TO SOLAR INVERTER. QUANTITY AND SIZE AS REQUIRED FOR A COMPLETE AND OPERABLE SYSTEM. WIRING SHALL BE INSTALLED IN RIGID-STEEL CONDUIT. (TYPICAL).
- PROVIDE SOLAR MODULES, QUANTITY AS REQUIRED FOR PHOTOVOLTAIC SYSTEM SIZE SPECIFIED. CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL SOLAR MODULE LAYOUT, QUANTITY, STRING SIZING, ETC. FOR A COMPLETE AND OPERABLE SYSTEM. BASIS OF DESIGN IS JINKO SOLAR US EAGLE G5 SERIES 525-WATT SOLAR MODULE.
- 11. PROVIDE SOLAR MODULE RACKING SYSTEM, SECURE TO ROOF AND INSTALL SOLAR MODULE PER MANUFACTURER'S INSTRUCTIONS. RACKING SYSTEM BY UNIRAC OR EQUAL.
- 12. PROVIDE PHOTOVOLTAIC WIRING BETWEEN SOLAR MODULES AS REQUIRED, SIZED AS REQUIRED. WHERE INSTALLED OUTSIDE OF THE ARRAY, WIRING SHALL BE INSTALLED IN RIGID-STEEL CONDUIT. WHERE INSTALLED INSIDE ARRAY AND ALLOWABLE BY THE NEC, WIRING CAN BE INSTALLED FREE-AIR. WHERE PLASTIC TIES ARE USED TO SECURE WIRING, PLASTICS TIES SHALL BE UV / OUTDOOR RATED. (TYPICAL).
- 13. UPGRADE METERING SERVICES PER LOCAL UTILITY COMPANY'S REQUIREMENTS. COORDINATE WITH UTILITY COMPANY.



#### DIVISION 26 - ELECTRICAL SECTION 260101 - COMMON ELECTRICAL WORK

- PART 1 GENERAL 1.1 SCOPE
- A. This Section shall apply to all Contractors and Subcontractors that are responsible for Division 26, 27, and
- B. The work covered by this Section of the Specifications consists of furnishing all labor and materials (unless otherwise specified) and in performing all operations necessary for the installation of the complete electronic and electrical system as required by terms and conditions of the Contract. The work shall also include the completion of such details of electrical work not mentioned or shown which are necessary for the successful operation of all electrical and electronic systems described on the drawings or required by these Specifications.
- C. The work in this Contract involves the installation of new work as well as work on the Site and may include demolition and renovation work. It shall be this Contractor's responsibility to visit the site so that he may ascertain all existing conditions which may affect the work under his Contract. No additional compensation will be granted for additional work required by this Contractor for his failure to visit the jobsite and determine existing conditions. This Contractor shall provide all labor and materials required to complete the work described in the Plans and Specifications and as may be required for a ready to operate installation
- D. Generally the removal and repairing of existing floors, walls, ceilings, etc., in the remodeled areas where required for the installation of conduit, lights, panels, etc., shall be provided by the General Contractor under the direction of this Contractor. Holes required through floors, walls, and roof of the building shall be provided by this Contractor. If specifically shown to be done by this Contractor, this Contractor shall include in his Contract price the removal and replacement of general construction materials as required. 1.2 DRAWINGS
- A. The drawings which constitute a part of this Contract indicate the general arrangement of circuits and outlets, locations of switches, panelboards, and other work. The Drawings and Specifications are complimentary each to the other, and what is called for by one shall be binding as if called for by both. Data presented on these drawings are as accurate as planning can determine, but accuracy is not guaranteed and field verification of all dimensions. locations, levels, etc., to suit field conditions is required. Review all Design Teamural. Structural, and Mechanical Plans and adjust all work to conform to all conditions shown therein. The Design Teamural Drawings shall take precedence over all other drawings as to dimensions.

### 1.3 CONFLICTS

- A. Any conflict noted between (1) the Drawings; (2) Specifications; or (3) Drawings and Specifications; or (4) between Plans and Codes or Ordinances or (5) between the Plans or Specifications and Manufacturer's installation recommendations shall be immediately brought to the attention of the Design Team for clarification. If conflicts are discovered prior to bidding and there is not sufficient time to obtain a clarification from the Design Team prior to bidding, the Contractor shall bid the larger quantity or better quality of work. All conflicts shall be brought to the attention of the Design Team when discovered and
- B. Contractor shall be responsible to field measure and confirm mounting heights and locations of electrical equipment with respect to counters, radiation, etc. Do not scale distances off the Electrical Plans. Use actual building dimensions from the Design Teamural Drawings.
- 1.4 WORK IN EXISTING BUILDINGS
- A. All work in existing buildings, indicated on the drawings or specified herein, shall be executed with a minimum amount of interference with the normal activities of the occupants of the building. No services or utilities shall be interrupted without previous scheduling time of the same with the Owner and receipt of his approval. Changing of the electrical system, telephone system, and other major events shall be arranged and be agreeable with the Owner to length and time of downtime. All work shall be scheduled in advance with the Owner and shall not proceed without the Owner's written approval.
- B. The Owner shall be notified before starting to weld or cut. Fire extinguishers shall be immediately accessible when welding or cutting with an open flame or arc. Welding or cutting with an open flame or
- arc must be stopped in a timely fashion before leaving premises. C. Noisy operations such as those involving use of air hammers, etc., in demolition, or cutting of openings shall be scheduled with the Owner
- D. Typically, the Owner will continue to occupy the building and carry on normal activity. Each Contractor shall protect the occupied areas from dust, smoke, etc., by a method approved by the Owner/Design
- 1.5 EXAMINATION OF SITE
- A. Prior to submitting a bid, this Contractor shall visit the site of the job and ascertain all conditions affecting the proposed electrical installation and make provisions as to the cost thereof. No additional compensation will be granted for additional work required by this Contractor for failure to visit jobsite and determine existing conditions. The Contractor shall verify location and size of existing systems that are to be connected to, routed around, or extended from
- B. The Contractor shall verify with the City and Utility Companies, and Owner, etc., the location of any existing overhead or buried utilities on or near the site. The Contractor shall verify requirements for connecting into existing utilities with the City and Utility Company. and Owner and connect into as required. Failure to determine existing conditions or the nature of new connections will not be considered a basis for the granting of additional compensation.
- 1.6 PRIOR APPROVAL
- A. The Contractors attention is directed to the requirement of "prior approval" for materials to be supplied in this project if they are not specifically designated as a specified manufacturer or approved equal. B. Prior approval requires that literature be submitted to the Design Team a minimum of ten (10) days prior to the hidding date. This submitted material shall be informative enough to allow the Engineer to give approval. This approval is a tentative approval and does not imply anything but approval to bid.
- .7 SHOP DR
- A. The Contractor shall submit five (5) copies of Shop Drawings and Product Data to the Design Team/Engineer for approval or submit digital information on Submittal Exchange or other approved digital documenting system. Stamp. Date, and Sign each submittal to indicate submittal is in conformance with requirements of the Contract Documents. Shop Drawings shall be submitted for the following items: 1. Enclosed Switches
- 2. Photovoltaic System
- 1.8 USE OF OTHER THAN SPECIFIED EQUIPMENT
- A. All equipment shown on the drawing shall be specified equipment. If the Contractor uses different approved equipment than what was specified, all additional work or components required to make an operable system shall be made without additional cost to the Owner. The Contractor shall be held responsible for selecting different approved equipment so that equipment will fit into the available space provided for the specified equipment.
- 1.9 PERMITS AND LICENSES
- A. Obtain and pay all permits and licenses required and furnish the Design Team for the Owner a certificate of final inspection and approval from the Local Authority having jurisdiction over this electrical installation. 1.10 WARRANTY
- A. The entire electrical system installed under this Contract shall be left in proper working order. Replace, without additional charge, any work or material (except materials not furnished by the Electrical Contractor) which develops defects from ordinary wear and tear within one (1) year from the date of acceptance, or provide extended warranty, as specified. All new material and equipment shall be warranted against defects in composition, design, or workmanship. Lamps shall be warranted for their published life. Warranty certificates shall be furnished on special equipment.
- 1.11 PROGRESS OF WORK AND DOWNTIME
- A. Order the progress of the electrical work so as to conform to the progress of the work as scheduled in the Specifications and complete the entire installation as soon as the condition of the building will permit. Any cost resulting from defective or ill-timed work performed under this Section shall be borne by this Contracto
- B. As much of this building may be occupied when construction is ongoing it will be of prime importance to coordinate downtime of electrical systems with the Owner. Changing of the electrical entrance and other major events shall be arranged and be agreeable with the Owner to length and time of downtime.
- 1.12 COORDINATION
- A. The Contractor shall confirm dimensions noted and locations of General and Mechanical Contractor's equipment as well as equipment to be furnished by the Owner. Verify all equipment and motor sizes, voltage and connection requirements for equipment furnished by others and wired under this Contract before roughing-in, and provide proper branch circuits and connections as recommended by equipment manufacturers. Coordinate with the other contractors to avoid interference with ductwork, structural members, grilles, cabinetwork, etc. Motors shall not be connected to until verification has been made that motor running protection exists.
- B. Where the drawings indicate fixtures and equipment which are to be furnished by others (or Owner) and which require connections to the electrical systems, the Electrical Contractor shall furnish and install all rough-in of conduit, boxes, conductors, disconnect switches, plugs with pigtails, receptacles etc., which are required for the final connections. Rough-in locations and required connections shall be determined from the equipment itself or from the equipment manufacturer's shop drawings. Final connections to the equipment shall be made by this Contractor.
- 1.13 CUTTING AND PATCHING
- A. Each Contractor shall be responsible for all cutting and patching required for his work. Carefully lay out all work in advance and where cutting, channeling, chasing, or drilling of building surfaces is necessary for the proper installation of electrical equipment, carefully perform this work in a manner approved by the Design Team. Patching shall be done in a neat workmanlike manner by craftsmen skilled in the trade involved and shall be prepared to receive paint. Damaged surfaces shall be repaired at no cost to the Owner. Concrete walls shall be cut only with rotary type drilling tools. Openings through floors and walls may be drilled up to 1" but shall be cored over 1". Electrical equipment shall not be cut with torches, and shall be joined only by bolting (i.e., do not weld wireways to panels, etc.).
- 1.14 INDUSTRY STANDARDS AND CODES
- A. The complete installation shall comply with the applicable Local and State wiring ordinances, with the regulations of the latest edition of the National Electrical Code of the National Fire Protection Association (supplements and official interpretations included) and with the requirements of the Power, Television, and Telephone Companies furnishing service to this installation. The drawings and specifications take precedence when they are more stringent than codes, ordinances, or statutes in effect, and vice versa.
- B. All work shall be in accordance with State and Local Codes and requirements of Local Utilities. Where the applicable Building Codes and the drawings or specifications do not agree, the code shall take precedence, but only in cases where what is shown on the drawings or required by the specifications violates the code. Where there is a Code or Utility Company requirement and drawing or specification discrepancy the Code shall have precedence only when it is more stringent than the item specified or shown on the drawings. Items that are allowable by the Local Building Codes, which are less stringent than that required by the specifications or the drawings the less stringent work, shall not be substituted. 1.15 RESPONSIBILITY OF THE CONTRACTOR
- A. The Contractor and his journeymen shall have Electrical Licenses, as required by the City and State in which work is being performed, and shall provide journeymen to work as superintendents and/or foremen on the project. All workmen shall be skilled in their trade or working under someone who is skilled in the

- trade and responsible for the work involved.
- B. The Contractor shall be totally responsible for his portion of the work from the date final acceptance of the building by the Owner, and must repair all damage sustaine Owner regardless of cause. The Contractor shall use proper care and diligence in all parts of the work against the elements and shall, in all cases, judge as to the amo
- required. Proper storage of material shall be maintained at all times. 1.16 TEMPORARY POWER AND LIGHTING
- A. The Electrical Contractor shall provide electrical wiring and light fixtures for tempora lighting in construction areas. 1 17 FIRE AND SMOKE STOPPAGE
- A. It shall be the responsibility of this Contractor to maintain the fire and smoke integrit floors etc., through which his work passes through or into. Fire and smoke barriers
- and around as required by Codes. B. Where holes are required to be patched, or conduit, piping, ducts, etc., are required it shall be filled with a material that is UL Classified Standard 1479 for this use and F
- approved. 1.18 ACCESS TO EQUIPMENT
- A. All control devices, specialties, pull boxes, disconnect switches, and similar equipme as to provide for easy access for operation, repair and maintenance. Access shall Electric Codes. Access doors shall be provided if devices are concealed.
- 1.19 TESTS A. At the completion of his work, the Contractor shall perform the following tests in the
- Design Team. 1. Test for short circuits and grounds.
- . Test to prove correct operation of all equipment, including lighting control system 3. Check for balance of load on phases, and connect load to balance as closely as Power Company disclose any unfavorable conditions or reactions on the service, make changes as may be suggested to properly balance the load.
- 1.20 CLEAN-UP
- A. The Contractor shall remove all rubbish and debris resulting from his work daily and equipment that he installed clean and ready for operation. 1 21 OUALITY ASSURANCE
- A. Provide products listed, classified, and labeled as suitable for the purpose intended. B. Unless specifically indicated to be excluded, provide all required conduit, wiring, cor components, accessories, etc. as recommended by the manufacturer(s) and as requ
- and operating system(s).
- C. Install products in accordance with manufacturer's instructions. D. Perform work in accordance with NECA 1 (general workmanship).
- E. Clean exposed surfaces to remove dirt, paint, or other foreign materials. Restore fac applicable.
- F. Correct wiring deficiencies and replace damaged or defective items as a result of de
- G. Comply with requirements of NFPA 70. H. Product Listing Organization Qualifications: An organization recognized by OSHA as
- Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdic I. Receive, inspect, handle, and store products in accordance with manufacturer's inst
- J. Handle products carefully to avoid damage to finish.
- K. Install devices and equipment plumb and level.
- 1.22 RECORD DRAWINGS
- A. Maintain a clean, undamaged set of whiteprints of Contract Drawings. Mark the set installation where the installation varies from the work as originally shown. Mark where the installation varies from the work as originally shown. most capable of showing conditions fully and accurately; where Shop Drawings are reference at the corresponding location on the Contract Drawings. Give particular a elements that would be difficult to measure and record at a later date.
- 1. Mark record sets with red erasable pencil; use other colors to distinguish betwee separate categories of the work.
- 2. Mark new information that is important to the Owner, but was not shown on Con Shop Drawings.
- 3. Note related Change Order numbers where applicable.
- 4. Organize record drawing sheets into manageable sets, bind with durable paper of print suitable titles, dated and other identification on the cover of each set. 5. Turn Record Drawings over to the Owner with the Operation and Maintenance M

# END OF SECTION 260101

- SECTION 260519 CONDUCTORS AND CABLES PART 1 GENERAL
- 1.1 ADMINISTRATIVE REQUIREMENTS
- A. Coordination
- 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under the actual conductors to be installed, including adjustments for conductor sizes i
- 2. Coordinate with electrical equipment installed under other sections to provide ter
- use with the conductors to be installed.
- PART 2 PRODUCTS
- 2.1 CONDUCTOR AND CABLE APPLICATIONS A. Provide single conductor building wire installed in suitable raceway unless otherwise or reauired.
- B. Nonmetallic-sheathed cable is not permitted.
- C. Underground feeder and branch-circuit cable is not permitted.
- D. Service entrance cable is not permitted
- E. Armored cable is not permitted.
- F. Metal-clad cable is not permitted.
- 2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS A. Unless specifically indicated to be excluded, provide all required conduit, boxes, wir
- as required for a complete operating system
- B. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (or permitted): Plenum rated, listed and labeled as suitable for use in return air plenum
- C. Conductor Material: 1. Provide copper conductors only. Aluminum conductors are not acceptable for the
- sizes indicated are based on copper.
- D. Minimum Conductor Size 1. Branch Circuits: 12 AWG.
- a. Exceptions: 1) 20 A. 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
- 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop. 3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
- 2. Control Circuits: 14 AWG. E. Where conductor size is not indicated, size to comply with NFPA 70 but not less that
- size requirements specified.
- F. Conductor Color Coding: 1. Color code conductors as indicated unless otherwise required by the authority ha
- Maintain consistent color coding throughout project. 2. Color Coding Method: Integrally colored insulation.
- a. Conductors size 4 AWG and larger may have black insulation color coded u electrical tape.
- Color Code:

2.3 SINGLE CONDUCTOR BUILDING WIRE

B. Insulation Voltage Rating: 600 V.

accordance with NFPA 70.

B. Conductor Stranding: Stranded.

B. Wiring Connectors for Splices and Taps:

C. Wiring Connectors for Terminations:

terminal lugs.

A. Conductor Stranding:

C. Insulatior

2.4 PHOTOVOLTAIC WIRE

2.5 WIRING CONNECTORS

C. Insulation Voltage Rating: As required for photovoltaic power system voltage.

trade and responsible for the work involved. The Contractor shall be totally responsible for his portion of the work from the date of his Contract until	<ol><li>Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.</li></ol>	E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
final acceptance of the building by the Owner, and must repair all damage sustained without cost to the Owner regardless of cause. The Contractor shall use proper care and diligence in bracing and securing	<ol><li>Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.</li></ol>	<ul><li>F. Anchors and Fasteners:</li><li>1. Unless otherwise indicated and where not otherwise restricted, use the anchor and faste</li></ul>
all parts of the work against the elements and shall, in all cases, judge as to the amount of protection required. Proper storage of material shall be maintained at all times.	4. Conductors for Control Circuits: Use crimped terminals for all connections.	indicated for the specified applications. 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
EMPORARY POWER AND LIGHTING	D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.	<ol> <li>Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.</li> <li>Hollow Masonry: Use toggle bolts.</li> </ol>
. The Electrical Contractor shall provide electrical wiring and light fixtures for temporary power, heating, and	E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.	<ol> <li>Hollow Stud Walls: Use toggle bolts.</li> <li>Steel: Use beam clamps, machine bolts, or welded threaded studs.</li> </ol>
lighting in construction areas. IRE AND SMOKE STOPPAGE	F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D	7. Sheet Metal: Use sheet metal screws.
It shall be the responsibility of this Contractor to maintain the fire and smoke integrity of all walls, ceilings, floors etc., through which his work passes through or into. Fire and smoke barriers shall be provided in	for damp and wet locations. G. Mechanical Connectors: Provide bolted type or set-screw type.	<ol> <li>Wood: Use wood screws.</li> <li>Plastic and lead anchors are not permitted.</li> </ol>
and around as required by Codes.	H. Compression Connectors: Provide circumferential type or hex type crimp configuration.	<ol> <li>Powder-actuated fasteners are not permitted.</li> <li>Hammer-driven anchors and fasteners are not permitted.</li> </ol>
. Where holes are required to be patched, or conduit, piping, ducts, etc., are required to be patched around, it shall be filled with a material that is UL Classified Standard 1479 for this use and Factory Mutual System	<ol> <li>Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.</li> </ol>	<ol> <li>Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically d cast in concrete ceilings, walls, and floors.</li> </ol>
approved. CCESS TO EQUIPMENT	PART 3 EXECUTION	<ol> <li>Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evalua LLC (ICC-ES) for compliance with applicable building code.</li> </ol>
All control devices, specialties, pull boxes, disconnect switches, and similar equipment shall be so located	3.1 INSTALLATION	PART 3 EXECUTION
as to provide for easy access for operation, repair and maintenance. Access shall conform to Local Electric Codes. Access doors shall be provided if devices are concealed.	<ul><li>A. Circuiting Requirements:</li><li>1. Unless dimensioned, circuit routing indicated is diagrammatic.</li></ul>	3.1 INSTALLATION
ESTS	<ol> <li>When circuit destination is indicated without specific routing, determine exact routing required.</li> <li>Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate,</li> </ol>	A. Provide independent support from building structure. Do not provide support from piping, due other systems.
<ul> <li>At the completion of his work, the Contractor shall perform the following tests in the presence of the Design Team.</li> </ul>	combining them together in a single raceway is permitted, under the following conditions: a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral	<ul> <li>B. Equipment Support and Attachment:</li> <li>1. Use metal fabricated supports or supports assembled from metal channel (strut) to support</li> </ul>
<ol> <li>Test for short circuits and grounds.</li> <li>Test to prove correct operation of all equipment, including lighting control systems.</li> </ol>	conductors are considered current-carrying conductors. b. Increase size of conductors as required to account for ampacity derating.	as required. 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on ho
<ol> <li>Check for balance of load on phases, and connect load to balance as closely as possible. Should the Power Company disclose any unfavorable conditions or reactions on the service, the Contractor shall</li> </ol>	<ul> <li>c. Size raceways, boxes, etc. to accommodate conductors.</li> <li>4. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to</li> </ul>	<ul> <li>walls when wall strength is not sufficient to resist pull-out.</li> <li>Use metal channel (strut) to support surface-mounted equipment in wet or damp location</li> </ul>
make changes as may be suggested to properly balance the load.	three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.	<ul> <li>Service and charmer (struct) to support surface-indunted equipment in wet of damp location space between equipment and mounting surface.</li> <li>Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high</li> </ul>
LEAN-UP The Contractor shall remove all rubbish and debris resulting from his work daily and shall leave	B. Installation in Raceway:	pad constructed in accordance with Section 033000.
equipment that he installed clean and ready for operation.	<ol> <li>Pull all conductors and cables together into raceway at same time.</li> <li>Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling</li> </ol>	<ol><li>Securely fasten floor-mounted equipment. Do not install equipment such that it relies on weight for support.</li></ol>
QUALITY ASSURANCE A. Provide products listed, classified, and labeled as suitable for the purpose intended.	tension and sidewall pressure. 3. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the	END OF SECTION 260529
. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware,	manufacturer.	<u>SECTION 260533 - CONDUIT</u> PART 1 GENERAL
components, accessories, etc. as recommended by the manufacturer(s) and as required for a complete and operating system(s).	C. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building	1.1 ADMINISTRATIVE REQUIREMENTS
2. Install products in accordance with manufacturer's instructions.	structure. Do not provide support from raceways, piping, ductwork, or other systems. D. Terminate cables using suitable fittings.	<ul> <li>A. Coordination:</li> <li>1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be in the second se</li></ul>
<ol> <li>Perform work in accordance with NECA 1 (general workmanship).</li> <li>Clean exposed surfaces to remove dirt, paint, or other foreign materials. Restore factory finishes, where</li> </ol>	E. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the	including adjustments for conductor sizes increased for voltage drop. 2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipme
applicable.	application, with insulation and mechanical strength at least equivalent to unspliced conductors. F. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored	<ol> <li>Solution of the second and seco</li></ol>
<ul> <li>Correct wiring deficiencies and replace damaged or defective items as a result of demolition or new work.</li> <li>Comply with requirements of NFPA 70.</li> </ul>	insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.	roof warranty.
I. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally	G. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and	PART 2 PRODUCTS 2.1 CONDUIT APPLICATIONS
Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdication. Receive, inspect, handle, and store products in accordance with manufacturer's instructions and NEMA	methods specified in Section 078400. H. Unless specifically indicated to be excluded, provide final connections to all equipment and devices,	A. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated f
VE 2.	including those furnished by others, as required for a complete operating system.	applications. Where more than one listed application applies, comply with most restrictive re Where conduit type for particular application is not specified, use galvanized steel rigid meta
. Handle products carefully to avoid damage to finish.	END OF SECTION 260519 SECTION 260526 - GROUNDING AND BONDING	B. Underground:
. Install devices and equipment plumb and level. RECORD DRAWINGS	PART 1 GENERAL - NOT USED	<ol> <li>Under Slab on Grade: Use galvanized steel rigid metal conduit (RMC), galvanized steel metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or rigid PVC condu-</li> </ol>
Maintain a clean, undamaged set of whiteprints of Contract Drawings. Mark the set to show the actual installation where the installation varies from the work as originally shown. Mark whichever drawing is	PART 2 PRODUCTS	<ol> <li>Exterior, Direct-Buried: Use galvanized steel rigid metal conduit (RMC), galvanized stee metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), rigid PVC conduit,</li> </ol>
most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-	<ul><li>2.1 GROUNDING AND BONDING REQUIREMENTS</li><li>A. Unless specifically indicated to be excluded, provide all required components, conductors, connectors,</li></ul>	density polyethylene (HDPE) conduit. 3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal
reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.	conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding	below grade where emerging from underground. 4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, us
<ol> <li>Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the work.</li> </ol>	system. B. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum	steel rigid metal conduit elbows or PVC-coated galvanized steel rigid metal conduit elbow 5. Where galvanized rigid metal conduit (RMC), galvanized steel intermediate metal conduit
<ol> <li>Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.</li> </ol>	size requirements specified. C. Grounding Electrode System:	galvanized steel electrical metallic tubing (EMT) emerges from concrete into soil, use con protection tape, factory-applied corrosion protection coating, or field-applied corrosion pr
<ol> <li>Note related Change Order numbers where applicable.</li> <li>Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and</li> </ol>	1. Provide connection to required and supplemental grounding electrodes indicated to form grounding	compound acceptable to authorities having jurisdiction to provide supplementary corrosic for minimum of 4 inches on either side of where conduit emerges.
print suitable titles, dated and other identification on the cover of each set. 5. Turn Record Drawings over to the Owner with the Operation and Maintenance Manuals.	electrode system. a. Provide continuous grounding electrode conductors without splice or joint.	C. Embedded Within Concrete:
DF SECTION 260101	<ul> <li>Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.</li> </ul>	<ol> <li>Within Slab on Grade: Not permitted.</li> <li>D. Exposed, Exterior, Not Subject to Severe Physical Damage: Use galvanized steel rigid meta</li> </ol>
SECTION 260519 - CONDUCTORS AND CABLES	<ul> <li>D. Service-Supplied System Grounding:</li> <li>1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded)</li> </ul>	(RMC) or galvanized steel intermediate metal conduit (IMC).
1 GENERAL IDMINISTRATIVE REQUIREMENTS	service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.	E. Exposed, Exterior, Subject to Severe Physical Damage: Use galvanized steel rigid metal co or galvanized steel intermediate metal conduit (IMC).
. Coordination:	<ol> <li>For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between</li> </ol>	<ul> <li>F. Flexible Connections to Vibrating Equipment:</li> <li>Damp, Wet, or Corrosive Locations: Use liquid-tight flexible metal conduit.</li> </ul>
<ol> <li>Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage</li> </ol>	neutral (grounded) conductors and ground on load side of service disconnect.	<ol> <li>Maximum Length: 6 feet unless otherwise indicated.</li> </ol>
drop. 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for	<ol><li>All metallic meter enclosures, CT Cabinets, and metallic conduit shall be bonded to the system per the NEC, see Article 250.9.</li></ol>	<ul><li>2.2 CONDUIT - GENERAL REQUIREMENTS</li><li>A. Provide conduit, fittings, supports, and accessories required for complete raceway system.</li></ul>
use with the conductors to be installed. 2 PRODUCTS	<ul> <li>E. Separately Derived System Grounding:</li> <li>1. Provide grounding electrode conductor to connect derived system grounded conductor to nearest</li> </ul>	<ul> <li>B. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable</li> </ul>
CONDUCTOR AND CABLE APPLICATIONS	effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.	size requirements specified.
<ul> <li>Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.</li> </ul>	<ol> <li>Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already</li> </ol>	<ol> <li>2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)</li> <li>A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI</li> </ol>
8. Nonmetallic-sheathed cable is not permitted.	used as a grounding electrode for the derived system. Make connection at same location as grounding electrode connection.	listed and labeled as complying with UL 6.
2. Underground feeder and branch-circuit cable is not permitted.	3. Outdoor Source: Where the source of the separately derived system is located outside the building or	B. Fittings: 1. Material: Use steel.
<ul> <li>Service entrance cable is not permitted.</li> <li>Armored cable is not permitted.</li> </ul>	<ul><li>structure supplied, provide connection to grounding electrode at source in accordance with NFPA 70.</li><li>Provide system bonding jumper to connect system grounded conductor to equipment ground bus.</li></ul>	<ul> <li>a. Do not use die cast zinc fittings.</li> <li>2. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including</li> </ul>
. Metal-clad cable is not permitted.	Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately	and compression/gland types, are not permitted. 2.4 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)
ONDUCTOR AND CABLE GENERAL REQUIREMENTS	derived system disconnect. 5. Where the source and first disconnecting means are in separate enclosures, provide supply-side	A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with
<ul> <li>Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.</li> </ul>	bonding jumper between source and first disconnecting means. F. Bonding and Equipment Grounding:	and listed and labeled as complying with UL 1242. B. Fittings:
Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.	<ol> <li>Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, CT cabinets, meter sockets, metallic raceways and boxes, device grounding terminals,</li> </ol>	1. Material: Use steel.
c. Conductor Material:	and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.	<ul><li>a. Do not use die cast zinc fittings.</li><li>2. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including</li></ul>
<ol> <li>Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.</li> </ol>	<ol> <li>Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.</li> </ol>	and compression/gland types, are not permitted. 2.5 LIQUID-TIGHT FLEXIBLE METAL CONDUIT (LFMC)
). Minimum Conductor Size:	2.2 GROUNDING AND BONDING COMPONENTS	A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal cor
1. Branch Circuits: 12 AWG. a. Exceptions:	A. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:	and labeled as complying with UL 360. B. Fittings:
<ol> <li>20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.</li> <li>20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.</li> </ol>	<ol> <li>Use insulated copper conductors unless otherwise indicated.</li> <li>a. Exceptions:</li> </ol>	Material: Use steel.     a. Do not use die cast zinc fittings.
<ol> <li>20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.</li> <li>Control Circuits: 14 AWG.</li> </ol>	<ol> <li>Use bare copper conductors where installed underground in direct contact with earth.</li> <li>Use bare copper conductors where directly encased in concrete (not in raceway).</li> </ol>	2.6 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)
. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum	B. Connectors for Grounding and Bonding:	A. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with and listed and labeled as complying with UL 797.
size requirements specified. . Conductor Color Coding:	<ol> <li>Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.</li> </ol>	B. Fittings:
<ol> <li>Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.</li> </ol>	<ol><li>Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.</li></ol>	<ol> <li>Material: Use steel.</li> <li>a. Do not use die cast zinc fittings.</li> </ol>
<ol> <li>Color Coding Method: Integrally colored insulation.</li> <li>a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding</li> </ol>	PART 3 EXECUTION	<ol> <li>Connectors and Couplings: Use compression/gland or set-screw type.</li> <li>a. Do not use indenter type connectors and couplings.</li> </ol>
electrical tape.	<ol> <li>INSTALLATION</li> <li>A. Make grounding and bonding connections using specified connectors.</li> </ol>	3. Damp or Wet Locations, Where Permitted: Use fittings listed for use in wet locations.
<ol> <li>Color Code:</li> <li>a. 480Y/277 V, 3 Phase, 4 Wire System:</li> </ol>	<ol> <li>Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.</li> </ol>	<ul><li>2.7 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT</li><li>A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2</li></ul>
<ol> <li>Phase A: Brown.</li> <li>Phase B: Orange.</li> </ol>	<ol> <li>Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.</li> </ol>	and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 8
<ul> <li>3) Phase C: Yellow.</li> <li>4) Neutral/Grounded: Gray.</li> </ul>	3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be	subject to physical damage; rated for use with conductors rated 90 degrees C. B. Fittings:
<ul> <li>b. Equipment Ground, All Systems: Green.</li> <li>c. Travelers for 3-Way and 4-Way Switching: Purple.</li> </ul>	<ul><li>connected in accordance with manufacturer's recommendations.</li><li>4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque</li></ul>	1. Manufacturer: Same as manufacturer of conduit to be connected.
INGLE CONDUCTOR BUILDING WIRE	settings. 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.	<ul><li>2.8 HIGH-DENSITY POLYETHYLENE (HDPE) CONDUIT</li><li>A. Description: NFPA 70, Type HDPE high-density polyethylene solid-wall conduit complying v</li></ul>
<ul> <li>Conductor Stranding:</li> <li>Feeders and Branch Circuits:</li> </ul>	END OF SECTION 260526	F2160 and NEMA TC 7; list and label as complying with UL 651A; Schedule 40 unless other indicated.
a. Size 10 AWG and Smaller: Solid.	SECTION 260529 - HANGERS AND SUPPORTS PART 1 GENERAL - NOT USED	B. Joining Methods: Approved by HDPE conduit manufacturer.
<ul><li>b. Size 8 AWG and Larger: Stranded.</li><li>2. Control Circuits: Stranded.</li></ul>	PART 2 PRODUCTS	C. Mechanical Fittings: Comply with ASTM F2176; list and label as complying with UL 651A.
. Insulation Voltage Rating: 600 V.	2.1 SUPPORT AND ATTACHMENT COMPONENTS	<ol> <li>ACCESSORIES</li> <li>A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil, 0.020 inch.</li> </ol>
<ol> <li>Insulation:</li> <li>Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.</li> </ol>	<ul> <li>A. General Requirements:</li> <li>1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as</li> </ul>	B. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as co
<ul><li>a. Size 4 AWG and Larger: Type XHHW-2.</li><li>b. Installed Underground: Type XHHW-2.</li></ul>	necessary for the complete installation of electrical work. 2. Where support and attachment component types and sizes are not indicated, select in accordance	UL 2419; suitable for use with conduit to be installed. C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit
HOTOVOLTAIC WIRE	with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 1.25. Include consideration for vibration, equipment operation, and shock loads where	to be installed.
Departmentions Qualizable registered simple senductors insulated a betweekters and a Product of the Product of		D Adhesive for HDPE Conduit

- 1. Specifically designed for bonding dissimilar materials in lieu of transition fittings, including limited to polyethylene, fiberglass, PVC, aluminum, and steel; UL 746C recognized. 2. Approved by adhesive manufacturer for use with materials to be joined. E. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,25
- F. Sealing Systems for Concrete Penetrations: 1. Sleeves: Provide water stop ring or cement coating that bonds to concrete to prevent wa infiltration
- 2. Rate for minimum of 40 psig; suitable for sealing around conduits to be installed. G. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as r
- preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roo to be installed; designed to accommodate existing penetrations where applicable.
- H. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements. PART 3 EXECUTION

A. Description: Sunlight-resistant, single-conductor, insulated photovoltaic wire listed and labeled as

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be

connected, and listed as complying with UL 486A-486B or UL 486C as applicable. 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.

# 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for

complying with UL 4703; specifically designed for interconnection wiring of photovoltaic power systems in

- 3. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically
- indicated or permitted 4. Steel Components: Use corrosion resistant materials suitable for the environment where installed. a. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel or stainless steel unless
- otherwise indicated B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported. 1. Conduit Straps: One-hole or two-hole type; steel.
- 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported. D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports. 1. Channel Material:
  - a. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.

# ated steel unless otherwise indicated.

- nd where not otherwise restricted, use the anchor and faster
- te inserts, expansion anchors, or screw anchors. Use expansion anchors or screw anchors
- holts
- achine bolts, or welded threaded studs.
- not permitted. e not permitted.
- fasteners are not permitted.
- tinuous metal channel (strut) and spot inserts specifically d
- , and floors. Masonry Anchors: Evaluated and recognized by ICC Evaluation
- with applicable building code.
- n building structure. Do not provide support from piping, due
- s or supports assembled from metal channel (strut) to suppo
- ured to studs to support equipment surface-mounted on ho t sufficient to resist pull-out
- upport surface-mounted equipment in wet or damp location
- I mounting surface. nount floor-mounted equipment on properly sized 3 inch hig
- e with Section 033000 d equipment. Do not install equipment such that it relies on i
- SECTION 260533 CONDUIT
- conduits with actual type and quantity of conductors to be ductor sizes increased for voltage drop.
- onduits with structural members, ductwork, piping, equipment
- oof penetrations that preserve integrity of roofing system and
- where not otherwise restricted, use conduit types indicated for ne listed application applies, comply with most restrictive red application is not specified, use galvanized steel rigid metal
- alvanized steel rigid metal conduit (RMC), galvanized steel ed steel electrical metallic tubing (EMT), or rigid PVC condu palvanized steel rigid metal conduit (RMC), galvanized stee
- zed steel electrical metallic tubing (EMT), rigid PVC conduit,
- conduit is provided, transition to galvanized steel rigid metal from underground onduit larger than 2 inch (53 mm) trade size is provided, us
- ws or PVC-coated galvanized steel rigid metal conduit elbo conduit (RMC), galvanized steel intermediate metal conduit etallic tubing (EMT) emerges from concrete into soil, use cor d corrosion protection coating, or field-applied corrosion pro norities having jurisdiction to provide supplementary corrosic ither side of where conduit emerges.

- Severe Physical Damage: Use galvanized steel rigid meta
- ediate metal conduit (IMC). vere Physical Damage: Use galvanized steel rigid metal co
- metal conduit (IMC).
- ations: Use liquid-tight flexible metal conduit.
- ess otherwise indicated.
- ENTS
- , and accessories required for complete raceway system. d, size to comply with NFPA 70 but not less than applicabl
- CONDUIT (RMC)
- galvanized steel rigid metal conduit complying with ANSI vith UL 6.
- Use threaded type fittings only. Threadless fittings, including , are not permitted.
- ATE METAL CONDUIT (IMC) galvanized steel intermediate metal conduit complying with
- ing with UL 1242.
- Jse threaded type fittings only. Threadless fittings, including s, are not permitted.
- ONDUIT (LFMC) C polyvinyl chloride (PVC) jacketed steel flexible metal cor
- ittings METALLIC TUBING (EMT)

### galvanized steel electrical metallic tubing complying with ing with UL 797.

	3.1 INSTALLATION	
tener types	<ul> <li>A. Conduit Routing: <ol> <li>Unless dimensioned, conduit routing indicated is diagrammatic.</li> <li>Conceal conduits unless specifically indicated to be exposed.</li> <li>Conduits installed underground or embedded in concrete may be routed in shortest possible manner unless otherwise indicated. Route other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.</li> </ol></li></ul>	
	<ul> <li>B. Conduit Support:</li> <li>1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 260529.</li> <li>2. Provide independent support from building structure. Do not provide support from piping, ductwork, or</li> </ul>	
	other systems. 3. Use conduit strap to support single surface-mounted conduit. a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between	
designed to be	conduit and mounting surface. 4. Use metal channel/strut with accessory conduit clamps to support multiple parallel surface-mounted	Joseph R. Hewgley & Associates, Inc. 702 South Bailey • North Platte, Ne. 69101
luation Service,	conduits. 5. Use conduit clamp to support single conduit from beam clamp or threaded rod. C. Connections and Terminations:	Phone: 308/534-4983 • Fax: 308/534-4944
luctwork, or	<ol> <li>Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.</li> </ol>	
	<ol> <li>Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.</li> <li>D. Penetrations:</li> </ol>	RADO LICE
pport equipment	<ol> <li>Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.</li> <li>Provide suitable sealing system where conduits penetrate exterior wall below grade.</li> </ol>	O' IS A. C. ISE
ons to provide	<ol> <li>Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.</li> <li>Make penetrations for roof-mounted equipment within associated equipment openings and curbs</li> </ol>	P F 39977 → Y RO 10/03/24
igh concrete	<ul> <li>where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.</li> <li>Install firestopping to preserve fire resistance rating of partitions and other elements; see Section</li> </ul>	
n its own	078400. E. Underground Installation:	INAL CONST
	<ol> <li>Provide trenching and backfilling.</li> <li>Minimum Cover, Unless Otherwise Indicated or Required:         <ul> <li>underground, Exterior: 36 inches.</li> </ul> </li> </ol>	SEAL
	<ul> <li>F. Embedment Within Structural Concrete Slabs (only where approved by Structural Engineer):</li> <li>1. Secure conduits to prevent floating or movement during pouring of concrete.</li> </ul>	
e installed,	G. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:	
nent, and other and do not void	<ol> <li>Where conduits cross structural joints intended for expansion, contraction, or deflection.</li> <li>Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed</li> </ol>	
	<ul><li>above ground to compensate for thermal expansion and contraction.</li><li>3. Where conduits are subject to earth movement by settlement or frost.</li></ul>	
d for specified requirements. tal conduit.	<ul> <li>H. Conduit Sealing:</li> <li>1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:</li> <li>2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:</li> </ul>	Engineering Technologies Inc. Mechanical & Electrical Building Solutions
el intermediate	<ul><li>a. Where conduits pass from outdoors into conditioned interior spaces.</li><li>b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.</li></ul>	825 M Street, Suite 200   Lincoln, NE 68508 P 402-476-1273   F 402-476-1274
duit. eel intermediate it, or high-	I. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.	1111 N. 13th St, Suite 216   Omaha, NE 68102 P 402-330-2772   F 402-330-2630 ETL Braiset Net 2024 042
al conduit	J. Install no more than equivalent of four 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate bends in metal conduit larger than 1 1/4 inch size.	ETI Project No: 2024-043
use galvanized ows for bends.	<ul><li>3.2 PROTECTION</li><li>A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry</li></ul>	
luit (IMC), or corrosion protection	of moisture and foreign material and do not remove until ready for installation of conductors. END OF SECTION 260533	5
sion protection	<u>SECTION 260535 - BOXES</u> PART 1 GENERAL - NOT USED	
	PART 2 PRODUCTS 2.1 BOXES	
etal conduit conduit (RMC)	<ul> <li>A. General Requirements:</li> <li>1. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to</li> </ul>	S S S S S S S S S S S S S S S S S S S
	<ul><li>accommodate devices and equipment to be installed.</li><li>Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.</li></ul>	C SYS <sup>-</sup> AIRGROUNDS
	<ol> <li>Provide grounding terminals within boxes where equipment grounding conductors terminate.</li> <li>B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:</li> </ol>	N NO N
	<ol> <li>Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.</li> <li>Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or</li> </ol>	
ble minimum	<ul><li>exposed intermediate metal conduit (IMC) is used.</li><li>3. Use suitable concrete type boxes where flush-mounted in concrete.</li></ul>	
SI C80.1 and	<ol> <li>Use raised covers suitable for the type of wall construction and device configuration where required.</li> <li>Minimum Box Size, Unless Otherwise Indicated:         <ul> <li>Wiring Devices: 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.</li> </ul> </li> </ol>	
	<ul> <li>C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:</li> <li>1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.</li> </ul>	
ng set screw	<ol> <li>NEMA 250 Environment Type, Unless Otherwise Indicated:         <ol> <li>Outdoor Locations: Type 3R, painted steel.</li> <li>Junction and Pull Boxes Larger Than 100 cubic inches:</li> </ol> </li> </ol>	<b>OLT</b> count
vith ANSI C80.6	<ul> <li>a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.</li> <li>D. Underground Boxes/Enclosures:</li> </ul>	O Ŭ
	<ol> <li>Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.</li> <li>Provide logo on cover to indicate type of service.</li> </ol>	
ng set screw	<ol> <li>Applications:</li> <li>a. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.</li> <li>Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.</li> </ol>	
	a. Combination fiberglass/polymer concrete boxes/enclosures are acceptable. PART 3 EXECUTION	MORGAN
onduit listed	<ol> <li>INSTALLATION</li> <li>A. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.</li> </ol>	0 ≥
	<ul> <li>B. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.</li> <li>C. Box Locations:</li> </ul>	
h ANSI C80.3	<ol> <li>Unless dimensioned, box locations indicated are approximate.</li> <li>Locate boxes as required for devices installed under other sections or by others.</li> <li>Locate boxes so that wall plates do not span different building finishes.</li> </ol>	
	<ol> <li>Locate boxes so that wall plates do not cross masonry joints.</li> <li>Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different</li> </ol>	
	<ul> <li>mounting heights, install along a common vertical center line.</li> <li>Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section</li> </ul>	PROJECT #:
	260533. D. Box Supports:	DATE: $10/03/24$
C 2 and listed	<ol> <li>Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.</li> <li>E. Install boxes plumb and level.</li> </ol>	DRAWN: TMR
80 where	<ul> <li>F. Underground Boxes/Enclosures:</li> <li>1. Install enclosure on gravel base, minimum 6 inches deep.</li> </ul>	
	<ol> <li>Mount enclosures located in landscaped areas with top at 1 inch above finished grade.</li> <li>Install permanent barrier between ganged wiring devices when voltage between adjacent devices</li> </ol>	REVISIONS     DATE   DESCRIPTION
g with ASTM erwise	exceeds 300 V. H. Install firestopping to preserve fire resistance rating of partitions and other elements.	DATE DESCRIPTION
	<ol> <li>Close unused box openings.</li> <li>Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.</li> </ol>	
	END OF SECTION 260535	
complying with	SECTION 260553 - IDENTIFICATION PART 1 GENERAL - NOT USED BABT 2 DEODUCTS	
uit and fittings	PART 2 PRODUCTS 2.1 IDENTIFICATION REQUIREMENTS A Identification for Environment	
ing but not	<ul> <li>A. Identification for Equipment:</li> <li>1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.</li> </ul>	
-	<ul> <li>a. Enclosed switches and switches:</li> <li>1) Identify power source and circuit number. Include location when not within sight of equipment.</li> </ul>	
,250 lbf.	<ol> <li>Use voltage marker to identify highest voltage present for each piece of electrical equipment.</li> <li>Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.</li> </ol>	© 2024 COPYRIGHT Joseph R. Hewgley &
water	<ol> <li>Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation byNFPA 70.</li> <li>2.2. IDENTIFICATION NAMERIATES AND LABELS</li> </ol>	ASSOCIATES, Inc.
s required to oofing system	<ul> <li>2.2 IDENTIFICATION NAMEPLATES AND LABELS</li> <li>A. Identification Nameplates:         <ol> <li>Materials:</li> </ol> </li> </ul>	AMERICAN INSTITUTE
elements.	<ul> <li>a. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.</li> <li>2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.</li> </ul>	df ARCHITECTS
	man service eages, minimum anomisso or 1/10 mon, sligidved text.	SHEET

E300

- 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text. 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
- B. Format for Equipment Identification:
- 1. Minimum Size: 1 inch by 2.5 inches. 2. Text: All capitalized unless otherwise indicated.
- 3. Minimum Text Height: a. Equipment Designation: 1/2 inch.
- b. Other Information: 1/4 inch. 4. Color:
- a. Normal Power System: White text on black background. b. Emergency Power System: White text on red background.
- 2.3 UNDERGROUND WARNING TAPE
- A. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated, 3 inches wide, with minimum thickness of 5 mil, unless otherwise required for proper detection, with legend notatin type of service, continously repeated over full length of tape.
- B. Color 1. Tape for Buried Power Lines: Black text on red background.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. B. Install underground warning tape above buried lines with one tape per trench at \_\_\_\_\_ inch(es) below finished grade.
- END OF SECTION 260553
- SECTION 260583 WIRING CONNECTIONS

#### PART 1 GENERAL - NOT USED PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

- 3.1 ELECTRICAL CONNECTIONS
- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures
- encountered D. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment
- connection boxes
- E. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- F. Install terminal block jumpers to complete equipment wiring requirements.
- G. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

### END OF SECTION 260583

#### SECTION 262813 - FUSES

- PART 1 GENERAL NOT USED
- PART 2 PRODUCTS

#### 2.1 APPLICATIONS A. Feeders:

- 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
- 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
- B. General Purpose Branch Circuits: Class RK1, time-delay.
- C. Individual Motor Branch Circuits: Class RK1, time-delay.
- D. Primary Protection for Control Transformers: Class CC, time-delay.
- 2.2 FUSES
- A. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- B. Voltage Rating: Suitable for circuit voltage.
- C. Provide the following accessories where indicated or where required to complete installation:
- Fuseholders: Compatible with indicated fuses.
- 2. Fuse Reducers: For adapting indicated fuses to permit installation in switch designed for fuses with larger ampere ratings.
- PART 3 EXECUTION
- 3.1 INSTALLATION
- A. Do not install fuses until circuits are ready to be energized. B. Install fuses with label oriented such that manufacturer, type, and size are easily read. END OF SECTION 262813

### SECTION 262817 - ENCLOSED SWITCHES

#### PART 1 GENERAL - NOT USED

PART 2 PRODUCTS

## 2.1 MANUFACTURERS

- A. ABB/GE
- B. Eaton Corporation
- C. Schneider Electric; Square D Products D. Siemens Industry, Inc
- 2.2 ENCLOSED SAFETY SWITCHES
- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty, ratings, configurations, and features as indicated on the drawings.
- B. Horsepower Rating: Suitable for connected load.
- C. Voltage Rating: Suitable for circuit voltage.
- D. Provide with switch blade contact position that is visible when the cover is open. E. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
- F. Heavy Duty Switches:
- 1. Comply with NEMA KS 1.
- 2. Conductor Terminations: a. Provide mechanical lugs unless otherwise indicated.
- b. Lug Material: Copper suitable for terminating copper conductors only. 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.
- G. Provide the following features and accessories where indicated or where required to complete installation:
- 1. Hubs: As required for environment type, sized to accept conduits to be installed.

#### PART 3 EXECUTION 3.1 INSTALLATION

A. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform

#### END OF SECTION 262817

SECTION 263100 - PHOTOVOLTAIC COLLECTORS

# PART 1 GENERAL

- 1.1 ADMINISTRATIVE REQUIREMENTS A. Coordination:
  - 1. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed. 2. Roof-Mounted Arrays: Coordinate the work with other trades to provide roof penetrations that
- preserve the integrity of the roofing system and do not void the roof warranty. B. Preinstallation Meeting: Convene one week prior to commencing work of this section; require attendance of all affected installers. Include adequate instruction on the electrical hazards associated with
- photovoltaic systems and appropriate safety procedures to be followed.
- C. Rebates and Incentives: Prepare and submit documentation as required for Owner to secure funds from available federal, state, and utility company rebate and incentive programs. Notify Owner of any time constraints affecting program qualification.
- D. Utility Interconnection 1. Preinstallation Meeting: Convene one week prior to commencing work of this section to review interconnection requirements and details with Utility Company representative. 2. Coordinate with Utility Company to provide utility metering suitable for system requirements.
- 3. Arrange for inspections and secure permits necessary to obtain Utility Company approval of system. 1.2 SUBMITTALS
- A. See Section 013000 Administrative Requirements, for submittal procedures. B. Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, details, and
- description of operation. C. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.
- D. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, attachment locations and details, and proposed size, type, and routing of conduits and cables. Include system interconnection schematic diagrams showing all factory and field connections.
- E. Design Data: 1. Include structural calculations, certified by structural engineer, for equipment and mounting system upon request.
- 2. Include electrical calculations for array and associated equipment F. Installer's Qualification Statement.

- G. Operation and Maintenance Data: Include detailed information on system operation
- programming and setup, replacement parts, and recommended maintenance procedures and intervals. H. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty
- completed in Owner's name and registered with manufacturer
- I. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.
- 1.3 QUALITY ASSURANCE
- A. Comply with NFPA 70.
- B. Comply with Utility Company requirements for interconnection.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum five vears documented experience with photovoltaic systems of similar size, type, and complexity. 1. Licensed in the State in which the Project is located to install photovoltaic systems. 2. Supervisor: North American Board of Certified Energy Practitioners (NABCEP) certified PV Installer
- or three years experience supervising the installation of photovoltaic systems. Installer Personnel: At least 2 years of experience installing photovoltaic systems.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally
- Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction. 1.4 WARRANTY
- A. See Section 017800 Closeout Submittals, for additional warranty requirements.
- B. Photovoltaic Modules: 1. Provide minimum five year manufacturer warranty covering repair or replacement due to defective materials or workmanship.
- 2. Provide manufacturer warranty guaranteeing minimum 90 percent of rated power output for 10 years
- and minimum 80 percent of rated power output for 20 years. C. Photovoltaic Module Mounting System: Provide minimum 10 year manufacturer warranty covering repair
- or replacement due to defective materials or workmanship. D. Photovoltaic Inverters: Provide minimum five year manufacturer warranty covering repair or replacement
- due to defective materials or workmanship.

system components necessary for connection to facility electrical system.

3. System includes interconnection with utility grid (grid-tied system).

1. Array: Designed to fit within the area designated on the drawings.

loads, and other structural design considerations of the installed location.

Photovoltaic array is roof-mounted in location indicated on the drawings.

PART 2 PRODUCTS 2.1 MANUFACTURERS

B. System Description:

programs.

design array.

C. Capacity:

D. Size:

- A. Photovoltaic Modules: Jinko Solar US Eagle G5 Series 525-Watt or Equal.
- B. Photovoltaic Module Mounting System: Unirac or Equal.
- C. Photovoltaic Inverters: Yaskawa Solectria Solar or Equal.

2. Orientation of array is as indicated on the drawings.

obtained from a single supplier

2.2 PHOTOVOLTAIC SYSTEM REQUIREMENTS

2. Individual Modules: Size is not critical.

service conditions at the installed location.

company rebate and incentive programs.

rapid shutdown in accordance with NFPA 70.

requirements will be considered for this project.

with UL 1699B as required for compliance with NFPA 70.

L. Arrange array to minimize shading during peak production periods.

61215-1 and IEC 61215-2 and listed as complying with UL 1703.

a. Provide system compatible with the roof at the installed location.

complete operating system

2.3 PHOTOVOLTAIC MODULES

B. General Requirements:

connectors

Test Conditions (STC).

A. Photovoltaic Module Mounting System:

2.4 BALANCE OF SYSTEM COMPONENTS

Roof-Mounted Arrays:

b. LCD display.

1. Wiring Methods:

iurisdiction.

having jurisdiction.

marking.

SYSTEM DISCONNECT"

PART 3 EXECUTION

3.1 INSTALLATION

the AC system indicated.

c. Integral AC disconnect.

d. Integral DC disconnect.

a. Maximum power point tracking (MPPT).

A. Install products in accordance with manufacturer's instructions.

building) for module interconnections.

B. Provide required support and attachment in accordance with Section 260529.

does not exceed 79 inches above the floor, ground, or working platform.

D. Circuiting Requirements. in Addition to Requirements of Section 260519:

connectors for photovoltaic circuit splices and taps.

70 and requirements of authorities having jurisdiction.

energized in the open position" or approved equivalent.

conductors at all points of termination, connection, and splices.

and the nominal operating AC voltage.

F. Identification Requirements, in Addition to Those Specified in Section 260553:

B. Photovoltaic Inverters:

n, equipment	

D. Source Limitations: For each type of component, furnish products produced by a single manufacturer and

A. Provide complete photovoltaic system consisting of photovoltaic modules and associated balance of

4. Owner intends to secure funds from available federal, state, and utility company rebate and incentive

1. Total Nominal Rated Power Output of Array: Equal to or greater than the rated output of the basis of

accordance with NFPA 70.

A. Obtain Owner's approval prior to performing system startup.

Provide minimum of four hours of training.

C. Prepare and start system in accordance with manufacturer's instructions.

3.2 SYSTEM STARTUP

3.3 CLOSEOUT ACTIVITIES

END OF SECTION 263100

adjustments as directed.

materials as required.

3. Location: At project site.

8. Use voltage markers, identification labels, stenciled text, or suitable permanent marking approved by

B. Grid-Tied Systems: Obtain Utility Company's approval prior to performing system startup.

A. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make

B. Training: Train Owner's personnel on operation, adjustment, and maintenance of photovoltaic system.

1. Use operation and maintenance manual as training reference, supplemented with additional training

authority having jurisdiction to identify exposed raceways, cable trays, pull boxes, junction boxes, and

conduit bodies with the text "Warning: Photovoltaic Power Source" at maximum intervals of 10 feet in

E. Provide photovoltaic system and associated components suitable for wind loads, snow loads, seismic

F. Provide photovoltaic system and associated components suitable for continuous operation under the

G. Provide photovoltaic system and associated components that qualify for available federal, state, and utility

H. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a

I. DC Arc Fault Circuit Protection: Provide DC photovoltaic arc-fault protection devices listed as complying

J. Rapid Shutdown of Photovoltaic Systems on Buildings: Provide listed equipment arranged to provide

K. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and

A. Acceptable Module Types: Either crystalline silicon or thin film modules complying with specified

c Modules: Factory assembled; consisting of photovoltaic cells, frame, junction box, cables for series connection, and bypass diodes for shade tolerance; rated for 600 V DC; complying with IEC

2. Factory-Installed Junction Box: Weatherproof, with factory-installed terminals and bypass diodes.

3. Factory-Installed Cables: Type USE-2 or listed photovoltaic (PV) wire with polarized locking 4. Unless otherwise indicated, specified module performance characteristics are rated under Standard

1. Provide complete mounting system compatible with modules to be installed and suitable to properly install them in the location indicated, including all necessary hardware and accessories. 2. Support Structure and Associated Hardware Materials: Use aluminum, galvanized steel, or stainless

1. Provide inverter(s) as indicated or as required for connection of the photovoltaic array DC system to

2. Inverters: Suitable for the requirements of the connected array; output configuration compatible with connected system; listed as complying with UL 1741; furnished with the following features:

3. Grid-Tied Inverters: Comply with IEEE 1547, including over/under grid voltage and frequency protection, and anti-islanding protection to automatically disconnect upon loss of utility power and to

remain disconnected until utility power restoration has been maintained for five minutes.

C. Mount equipment such that the highest position of any operating handle for circuit breakers or switches

a. Unless otherwise indicated, use exposed module factory-installed cables (not routed inside

b. Unless otherwise indicated, use exposed type USE-2/RHH/RHW-2 single-conductor cable (not routed inside building) for wiring between string(s) and combiner box(es).

c. Unless otherwise indicated, use type THHN/THWN-2 single-conductor building wire in suitable raceway for wiring between combiner box(es) and point of interconnection.

d. Secure exposed cables in accordance with NFPA 70. Where possible, conceal behind array. e. Install cables in suitable raceway where readily accessible or where required by authority having

f. Use suitable twist-on insulated spring connectors, mechanical connectors, or compression

2. Maintain separation of photovoltaic and non-photovoltaic circuits in accordance with NFPA 70.

E. Grounding and Bonding Requirements, in Addition to Requirements of Section 260526: 1. Ensure that there is only one AC System bonding connection between grounding system and grounded/neutral conductor, including external connections and connections internal to equipment.

1. Use identification nameplate or means of identification acceptable to authority having jurisdiction to

identify the presence of multiple power sources and the location of main service disconnecting means and each photovoltaic system disconnecting means. Locate at main service disconnecting means and

at each photovoltaic system disconnecting means. Verify format and descriptions with authorities 2. Use identification nameplate to identify each photovoltaic system disconnecting means with text "PV

3. Use identification nameplate or identification label to identify systems equipped with rapid shutdown

and associated rapid shutdown switch(es). Format, descriptions, and locations to comply with NFPA

4. Use identification nameplate or identification label to identify the information required by NFPA 70 for marking of direct-current photovoltaic power sources. Locate at each DC disconnect means requiring

5. Use identification nameplate or identification label to identify the interactive system point of interconnection at the disconnecting means as a power source and with the rated AC output current

6. Use warning labels to identify electrical hazards for photovoltaic system disconnecting means. Include

the word message "Warning - Electric Shock Hazard; Terminals on the line and load sides may be 7. Use wire and cable markers to identify photovoltaic system source, output, and inverter circuit

Total and the series of the	
PHOTOVOLTAIC SYSTEM for Morgan county fairgrounds	
PROJECT #: DATE: 10/03/24 DRAWN: TMR REVISIONS DATE DESCRIPTION	
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