

Request for Bids

West High School PV Solar System Rebid

Madison, Wisconsin

January 27, 2020

Project Number 143_SOLAR REBID_2020

Building Services

4711 Pflaum Road

Madison, WI 53718 – 6765

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SECTION 00 01 15

LIST OF DRAWING SHEETS

THE FOLLOWING DRAWINGS PREPARED BY MMSD - BUILDING SERVICES, MMSD PROJECT NUMBER 143_SOLAR REBID_2020; ARE ATTACHED TO, AND PART OF, THE PROJECT MANUAL:

SHEET NUMBER SHEET NAME

ELECTRICAL DRAWINGS

| | |
|----|---------------------|
| E1 | ROOF PLAN & NOTES |
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END OF SECTION

SECTION 00 11 13
ADVERTISEMENT FOR BIDS

MADISON METROPOLITAN SCHOOL DISTRICT

JANUARY 27, 2020

PROJECT: WEST SOLAR 2020 - REBID

Owner's Project Number: 143_SOLAR REBID_2020

Request for Bids for installation of the West Solar 2020 - Rebid at 30 Ash St to include purchase of and installation of the Solar PV system, and minor building modifications.

Bids will be received by the Madison Metropolitan School District - Building Services Department, 4711 Pflaum Road, Madison, WI 53718-6765 until 2:00 pm, Local Time, on Thursday, February 20, 2020. Bids received will be opened publicly and read aloud.

Project documents will be available beginning Monday, January 27, 2020.

For additional details regarding project scope and to download Bid Documents, free of charge, visit the following address:

<http://oldweb.madison.k12.wi.us/doingbusiness/rfps.cgi>

The Owner reserves the right to accept or reject any or all offers.

MADISON METROPOLITAN SCHOOL DISTRICT

Jo A Anderson

Manager or Electrical Technology

PUBLISHED WSJ 1/27/20 & 2/3/20

END OF ADVERTISEMENT FOR BIDS

SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

SUMMARY

1.01 REQUEST FOR BIDS

- A. Bid Submission
- B. Intent
- C. Work Identified in the Contract Documents
- D. Contract Time
- E. Qualifications
 - 1. Evidence of Minimum Qualifications
 - 2. Optional Prequalification Procedure
 - 3. Subcontractors/Suppliers/Others
 - a. Operation Fresh Start of Madison
 - b. Community Workforce - Big Step
 - c. Wisconsin Diversity Procurement Network

INVITATION

REQUEST FOR BIDS

BID SUBMISSION

3.01 BIDS SIGNED AND UNDER SEAL, EXECUTED, AND DATED WILL BE RECEIVED BY THE MADISON METROPOLITAN SCHOOL DISTRICT AT THE LOCATION, DATE AND TIME AS SPECIFIED IN THE REQUEST FOR BIDS, SECTION 00 11 13.

- A. Offers submitted after the above time may be returned to the bidder unopened.
- B. Submit the required Security Deposit, as required herein, with the Bid.
- C. Submit required Supplements To Bid Forms as specified in Section 00 43 01.
- D. Offers will be opened publicly immediately after the time for receipt of bids.
- E. Amendments to the submitted offer will be permitted if received in writing prior to bid closing and if endorsed by the same party or parties who signed and sealed the offer.
- F. INTENT
 - 1. The intent of this Advertisement for Bids is to obtain an offer to perform work to complete the West Solar 2020 - Rebid located at 30 Ash St, Madison, Wisconsin, for a Stipulated Sum Contract, per Contract, in accordance with the Contract Documents.
- G. WORK IDENTIFIED IN THE CONTRACT DOCUMENTS
 - 1. The work, in general, is as noted in Sections 00 11 13 and 01 10 00.
- H. CONTRACT TIME
 - 1. Work can begin on April 15, 2020.
 - 2. The Work shall be Substantially Complete by June 30, 2020.
 - 3. Final Completion Date will be 30 calendar days following date of Substantial Completion.

BID DOCUMENTS AND CONTRACT DOCUMENTS

4.01 DEFINITIONS

- A. Bid Documents: Contract Documents supplemented with Instructions to Bidders, Information Available to Bidders, Bid Form Supplements To Bid Forms and Appendices identified.
- B. Contract Documents: Defined in AIA A201 Article 1 including issued Addenda.

4.02 CONTRACT DOCUMENTS IDENTIFICATION

- A. The Contract Documents are identified as 143_SOLAR REBID_2020.

4.03 AVAILABILITY

- A. Bid Document may be download from the internet, free of charge, at the following address:
<http://oldweb.madison.k12.wi.us/doingbusiness/rfps.cgi>
- B. At contractor cost, paper copies of all documents can be downloaded and printed by a local reprographer.
- C. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.

4.04 EXAMINATION

- A. Upon receipt of Bid Documents verify that documents are complete. Notify MMSD - Building Services should the documents be incomplete.

4.05 INQUIRIES/ADDENDA

- A. Direct Electrical Construction questions to Joe Anderson, MMSD, Telephone 608 204 7914, email jaanderson4@madison.k12.wi.us
- B. Addenda may be issued during the bidding period. All Addenda become part of the Contract Documents. Include resultant costs in the Bid Amount.
- C. Verbal answers are not binding on any party.
- D. Clarifications requested by bidders must be in writing not less than 7 days before date set for receipt of bids. The reply will be in the form of an Addendum, a copy of which will be forwarded to known recipients.

4.06 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS

- A. All Bidders are required to provide a Bid based on the specified products, assemblies, systems and/or materials. Substitution and pre-approvals will not be considered during the bidding of the Project.
- B. Bidders have the option of providing a voluntary bid substitution(s) for consideration as provided for in the Bid Form under Voluntary Alternate Bids.
- C. Approval to submit voluntary bid substitutions prior to submission of Bid is not required.
- D. In providing a voluntary bid substitution, Bidder shall provide the following information with the Bid:
 - 1. Applicable Specification Section Number & specified product, assembly, system and/or material to be replaced by voluntary bid substitution.
 - 2. Manufacturer Name, Trade Name, Model Number or other applicable identifying information of proposed product, assembly, system and/or material.
 - 3. Amount to be deducted from the Base Bid if substitution is accepted. Amount provided shall include all changes in the Work required to accommodate the proposed substitution, including architectural and engineering fees to review substitution. Following acceptance of voluntary bid substitutions, any additional costs incurred as a result of the acceptance of the substitution will be the responsibility of the Contractor.
- E. Voluntary bid substitutions will not be a factor in Contract Award or determining lowest responsible bidder.
- F. Prior to acceptance of the voluntary bid substitution, the Contractor shall submit information on proposed substitution to the Architect for review. Contractor shall provide product literature, samples, testing data, operation and maintenance manuals, certifications and shop drawings or other information as requested by the Architect.
- G. If voluntary bid substitution is acceptable to the Owner, the Architect will issue a Change Order to the Contract.
- H. Contractor shall be responsible for all costs associated with the acceptance of the substitution.
- I. In submission of substitutions to products specified, bidders shall include in their bid all changes required in the work and changes to Contract Time and Contract Sum to accommodate such

substitutions. A later claim by the bidder for an addition to the Contract Time or Contract Sum because of changes in work necessitated by use of substitutions shall not be considered.

- J. The submission shall provide sufficient information to determine acceptability of such products. Contractor shall include costs associated with appropriate independent testing as required by the Owner to assure the proposed substitution meets or exceeds the material or system specified.
- K. Provide complete information on required revisions to other work to accommodate each proposed substitution.
- L. Provide products as specified unless substitutions are submitted in this manner and accepted.

SITE ASSESSMENT

5.01 SITE EXAMINATION

- A. Examine the project site before submitting a bid. Visits may take place between 8:30 am and 2 pm.
- B. Bidders are to check in to the Welcome Center (lower Ash St entrance) office at the school. Ask for the custodian to assist.

QUALIFICATIONS

6.01 EVIDENCE OF MINIMUM QUALIFICATIONS

- A. To demonstrate minimum qualifications for performing the Work of this Contract, bidders may be requested to submit written evidence of financial position, previous experience, current commitments, and/or license to perform work in the State and City of Madison. Such evidence may be required as part of the bid response, and/or pursuant to the formal Prequalification Procedure described in Section 5.02.
- B. When proof of qualifications is required for a project/contract pursuant to 5.01(A), above, and/or Section 5.02, no bid shall be accepted from a prospective bidder who has not submitted the required proof. However, a prospective bidder who has once qualified to the satisfaction of the Owner and who wishes to become a bidder upon a subsequent project/contract under the Owner's jurisdiction need not separately qualify on each project/contract unless expressly required to do so by the Owner.
- C. If the Owner (or Owner's agent or designee, such as the employee charged with receiving and evaluating bids) is not satisfied with the sufficiency of the answer to any required proof of qualifications, the Owner (or Owner's agent or designee) may reject or disregard the bid.

6.02 OPTIONAL PREQUALIFICATION PROCEDURE

- A. The Owner reserves the right, at its option and discretion, to prequalify Bidders before delivering any form for bid proposals, plans, and specifications to any requester, except materialmen, suppliers, and others not intending to submit a direct bid.
 - 1. The statement required for such prequalification shall consist of information relating to financial ability, equipment, experience in the work prescribed in the contract, and other matters that the Owner requires for the protection and welfare of the public in the performance of a public contract.
 - 2. The statement shall be in writing on a standard form of a questionnaire that is adopted and furnished by the Owner.
 - 3. The complete statement shall be sworn to before an officer authorized by law to administer oaths and shall be filed in the manner and place designated by the Owner.
 - 4. The statement shall be received by the Owner not less than 5 days prior to the time set for the opening of bids.
 - 5. The contents of the statement shall be confidential and may not be disclosed except (1) where disclosure is required by law; (2) upon the written order of the Bidder furnishing the statement; (3) for necessary use by the Owner in qualifying the person, or in cases of actions against, or by, the Bidder or Owner.
 - 6. The Owner (or Owner's agent or designee) shall properly evaluate the statement and shall find the maker of the statement either qualified or unqualified.

6.03 SUBCONTRACTORS/SUPPLIERS/OTHERS

- A. Operation Fresh Start of Madison
 - 1. The Madison Metropolitan School District has a long and positive relationship with Operation Fresh Start (OFS) and strongly encourages OFS participation in the project. Operation Fresh Start provides Dane County youth a path to self-sufficiency through education and job training.
 - 2. Please contact Jeff Reed, OFS Construction Manager, at 608-244-4721 for more information about Operation Fresh Start.
 - a. <http://www.operationfreshstart.org/>
- B. Community Workforce - Big Step
 - 1. General contractors will be expected to work with the Wisconsin Regional Training Partnership/Big Step and the trades unions to promote access to the building trades for Madison residents, particularly for populations that are historically under-represented in the building trades. Big Step's mission is to help the industry develop a skilled diverse workforce.
 - 2. For more information, please contact Bill Clingan, South Central Coordinator for WRTP, at 608-255-0155.
 - a. <http://www.wrtp.org/>
- C. Wisconsin Diversity Procurement Network
 - 1. The district is a member of the Wisconsin Diversity Procurement Network and strongly encourages contractors to access the WDPN network of suppliers and service providers. The WDPN is a nonprofit organization consisting of companies and public agencies from throughout the region. Members work together (with the assistance of Network staff and Board of Directors) to increase the amount and quality of business transacted with diverse businesses. The WDPN is a freestanding entity and was created to address the means available to support diverse business development AND benefit society as a whole - to make a difference.
 - 2. For more information, please contact Dr. Floyd Rose, 608-241-5858 or Mick Howen, MMSD Dir. of Admin Services, at 608-663-5931.
 - a. <http://www.wisconsindiversityprocurement.com/index.html>
- D. Owner reserves the right to reject a proposed subcontractor for reasonable cause.
- E. Refer to General Conditions.

BID SUBMISSION

7.01 SUBMISSION PROCEDURE

- A. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.
- B. Submit one copy of the executed offer on the Bid Forms provided, signed and sealed with the required security in a closed opaque envelope, clearly identified with bidder's name, project name and Owner's name on the outside.
- C. Double Envelope: Insert the closed and sealed Bid Form envelope in a large opaque envelope and label this envelope as noted above.
- D. Do not submit Project Manual with Bid.
- E. Improperly completed information, irregularities in security deposit, may be cause to declare the bid invalid or non-responsive.
- F. An abstract summary of submitted bids will be made available to all bidders following bid opening.

7.02 BID INELIGIBILITY

- A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may at the discretion of the Owner, be declared unacceptable.

- B. Failure to provide security deposit, as required, bonding or insurance requirements may, at the discretion of Owner, may invalidate the bid.

BID ENCLOSURES/REQUIREMENTS

8.01 SECURITY DEPOSIT

- A. Bid security is required to be submitted with the Bid.
- B. Bid shall be accompanied by a security deposit as follows:
 - 1. Bid security in the amount of ten (10) percent of the Base Bid amount. Bid bond or Certified checks are acceptable.
- C. Securities will be returned to the respective bidders upon Contract Execution or expiration of Duration of Offer, specified herein, whichever is the shorter.
- D. If no contract is awarded, all security deposits will be returned.

8.02 PERFORMANCE ASSURANCE

- A. Performance and Payment bonds are required as described in Document 00 73 00 - Supplementary Conditions.
 - 1. Submit required bonds within 7 days of "Notice of Award". Bonds are required to be submitted with executed Contract.
 - 2. Bonds shall be provided in the amount of 100 percent of the Contract Award amount.
 - 3. Include the cost of required bonds in the Bid Amount.

8.03 INSURANCE

- A. Accepted Bidder: Provide a "Certificate of Insurance" within 7 days of "Notice of Award" on a standard form provided by the insurance company stating the insurance to be provided by the bidder in accordance with the insurance requirements of the Contract Documents.
- B. Certificate of Insurance shall be submitted with executed Contract.

8.04 BID FORM REQUIREMENTS

- A. Complete all requested information in the Bid Form and Supplements.

8.05 FEES FOR CHANGES IN THE WORK

- A. Include the fees for overhead and profit on own Work and Work by subcontractors, identified in Document 00 73 00 - Supplementary Conditions .

8.06 BID FORM SIGNATURE

- A. The Bid Form shall be signed by the bidder, as follows:
 - 1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Affix seal.
 - 2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Affix seal to each signature.
 - 3. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the bid is signed by officials other than the president and secretary of the company, or the president/secretary/treasurer of the company, a copy of the by-law resolution of their board of directors authorizing them to do so, must also be submitted with the Bid Form in the bid envelope.
 - 4. Joint Venture: Each party of the joint venture shall execute the Bid Form under their respective seals in a manner appropriate to such party as described above, similar to the requirements of a Partnership.

8.07 ADDITIONAL BID INFORMATION

- A. Owner Tax Exempt Status:
 - 1. Owner is a tax exempt entity per Wisconsin Statutes. Bidders shall deduct from their bid any amount for sales tax for tangible personal property to be purchased by the construction contractor and transferred to Owner as it becomes incorporated into the Work. See section 01 20 10 for additional information regard tax exempt purchases.

- a. Contractor shall include other non-exempt taxes, if applicable, in the Base Bid.
- B. Submit the following Supplements concurrent with bid submission, as required:
 - 1. Document 00 43 01 - Bid Form Supplements: Review and execute. Attached referenced Supplements as listed.

8.08 SELECTION AND AWARD OF ALTERNATES

- A. Indicate variation of bid price for alternatives listed, if any, on the Bid Form, if any. Unless otherwise indicated, indicate alternatives as a difference in bid price by adding to or deducting from the base bid price.
- B. Bids of responsible bidders will be evaluated using the combination of the base bid price and alternate bids that, in the opinion of the Owner (or Owner's agent or designee), best meets the Owner's needs before determination of the successful bidder.

OFFER ACCEPTANCE/REJECTION

9.01 DURATION OF OFFER

- A. Bids shall remain open to acceptance and shall be irrevocable for a period of thirty (30) days after the bid closing date. If a bidder makes an error, omission or mistake and discovers it after the bids are opened and prior to the point at which a contract is awarded, the bidder shall immediately and without delay give written notice and make known the fact of the mistake, omission or error which has been committed and submit to the Owner clear and satisfactory evidence of the mistake, omission or error and that it was not caused by any careless or negligent act or omission on the bidder's part in the exercise of ordinary care in examining the plans or specifications. Upon the presentation, review and acceptance of such evidence, the Owner may agree to allow the bidder to withdraw the bid containing said error, omission or mistake, although bidder may still incur any forfeiture associated therewith. In such a case, no correction of the bid shall be permitted and the Owner may proceed at its discretion to either re-advertise the contract or to award the contract based on remaining bids.

9.02 ACCEPTANCE OF OFFER

- A. Owner (or Owner's agent or designee) reserves the right to reject any or all bids or any part of each bid; to waive any irregularity in any bid; to determine the lowest cost, responsible bidder and to determine which bid, in its sole judgment, best meets the Owner's needs.
 - 1. "Responsible bidder" means a person who, in the judgment of the Owner (or Owner's agent or designee), is financially responsible and has the capacity and competence to faithfully, reliably and responsibly comply with the terms of the contract.
 - 2. An actual determination, if any, that a bidder is prequalified and/or meets any minimum qualifications generally required of all prospective bidders is not exhaustive of the factors that may be considered in determining whether a bidder is a responsible bidder. For example, a bidder's performance in connection with any prior project(s)/contract(s) under the Owner's jurisdiction is among the factors that the Owner (or Owner's agent or designee) may consider in making the discretionary determination as to whether the bidder is a responsible bidder.
- B. When a proposed Contract is for construction of an addition or a new building the Owner further reserves the right to award the Contract based to the lowest and most responsible bidder except in case in which the lowest and most responsible bidder is a non-union and non-local contractor, in such cases award will be based on the following additional criteria:
 - 1. For projects that are bid by a "general contractor," meaning that the project covers more than one trade area, the general contractor has participated in an apprenticeship program as defined in Chapter 106 of the Wisconsin State Statutes within the last two years prior to submitting a bid to the School District. For this purpose, the term "participates" shall mean the contractor has actively employed apprentices within the last two years.
 - 2. The contractor has not violated any applicable wage laws within the last two years. The preference of the BOARD shall be to select contractors that are signatory with one or more local labor organizations and/or local contractors, and encourages contractors to engage subcontractors that qualify as a historically underutilized business.

3. If low bidder is non-union and non-local award will be awarded using the following criteria:
 - a. Union and/or local bidders within five (5) percent of the low non-union, non-local bidder shall be given the opportunity to match the low bid. If the union and/or local bidder matches the low bid of the non-local, non-union bidder, the union and/or local bidder shall be awarded the bid.
 - b. If more than one union and/or local bidder matches the low bid, the contract award shall be awarded using the following priority level:
 - 1) to the bidder that is both union and local
 - 2) to the bidder that is local and non-union
 - 3) to the bidder that is union and non-local
 - c. If there is more than one bidder in the highest priority level, the award will be resolved by a lottery between those having the highest priority.
 4. Under this section, local shall mean a bidder whose main office is within the borders of the Madison Metropolitan School District and Union shall mean a bidder that is signatory with one or more local labor organizations.
- C. The procedures established herein for the receipt of bids and the award of a contract have a purpose of protecting the public by seeking to obtain the best work or supplies/materials for the most reasonable price through, for example, the prevention of fraud, collusion or arbitrary favoritism. The procedures are not intended to convey rights for the specific benefit and protection of individual bidders.

END OF SECTION

SECTION 00 31 00
AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.01 EXISTING CONDITIONS

- A. Asbestos Management Plan:
1. A copy of the District's Asbestos Management Plan developed under the Asbestos Hazard Emergency Response Act (AHERA) with respect to the condition and location of the existing asbestos-containing building materials is available for viewing at:
 - a. View at the office of the Owner, 4711 Pflaum Road, Madison, WI
 2. A inventory of materials, by room, of possible asbestos-containing building materials and whether they contain asbestos, or are assumed to contain asbestos have been identified in this plan.
 3. This inventory, by its nature, cannot reveal all materials that may exist at this facility. Should materials and/or quantities be uncovered during the Work, contact Owner and Architect. Owner will remove.

END OF SECTION

SECTION 00 41 00

BID FORM

THE PROJECT AND THE PARTIES

1.01 TO:

- A. Madison Metropolitan School District (MMSD) (Owner)
 - 1. 4711 Pflaum Road
 - 2. Madison, WI 53718

1.02 FOR:

- A. Project: West Solar 2020 - Rebid
- B. Owner's Project Number: 143_SOLAR REBID_2020
 - 30 Ash St
 - Madison, Wisconsin .

1.03 DATE: _____ (BIDDER TO ENTER DATE)

1.04 SUBMITTED BY: (BIDDER TO ENTER NAME, ADDRESS, PHONE NUMBER, FAX NUMBER, AND CONTACT INFORMATION.)

- A. Bidder's Full Name _____
 - 1. Address _____
 - 2. City, State, Zip _____
 - 3. Phone Number _____
 - 4. Fax Number _____
 - 5. Contact Person _____
 - 6. Email Address _____

1.05 OFFER - BASE BID -

- A. **Base Bid One - PV Solar System - to provide a complete and operational system as listed here.**

Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by MMSD - Building Services for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Sum of:

_____ dollars
 (\$ _____), in lawful money of the United States of America.

We have included the required security deposit as required by the Instruction to Bidders.

We have included the cost required for performance assurance bonds in the Bid Amount as required by the Instructions to Bidders.

All applicable federal taxes are included and State of WI taxes are included in the Bid Sum.

1.06 ALTERNATE BIDS

- A. **Voluntary Alternate Bids:**

Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents for the above mentioned project, we, the undersigned, hereby provide the following voluntary bid substitution proposal(s) for consideration:

- a. **Bid Substitution S1**

Specification Section Number: _____

Product to be Replaced by Proposed Substitution:

Manufacturer, Product Name & Model Number:

Amount to be Deducted from the Base Bid:

_____ dollars

(\$ _____), in lawful money of the United States of America.

- B. Bidder may attach additional sheets to Bid Form if more than two Bid Substitutions are to be offered for consideration.

1.07 ACCEPTANCE

- A. This offer shall be open to acceptance and is irrevocable for thirty days.
- B. If this bid is accepted by Owner within the time period stated above, we will:
1. Execute the Agreement within 10 days of receipt of Notice of Intent to Award.
 2. Furnish the required bonds within 10 days of receipt of Notice of Intent to Award.
 3. Commence work within seven days after written Notice to Proceed of this bid.
- C. If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Owner by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.
- D. In the event our bid is not accepted within the time stated above, the required security deposit shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

1.08 CONTRACT TIME

- A. If this Bid is accepted, we will:
1. Complete the Work per the Contract Time as specified in Section 00 2113.

1.09 ADDENDA

- A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.
1. Addendum # _____ Dated _____.
 2. Addendum # _____ Dated _____.

1.10 BID FORM SUPPLEMENTS

- A. The Supplements to the Bid Form, Section 00 4301, are attached to this Bid Form and are considered an integral part of this Bid Form. See Section 00 4301 for requirements.

1.11 BIDDER'S CERTIFICATE

- A. By signing this document, the undersigned certifies that the Bidder has closely examined the specifications and plans along with addendum/addenda issued, prior to preparing the Bid/Proposal.

1.12 BID FORM SIGNATURE(S)

The Corporate Seal of

(Bidder - print the full name of your firm)

was hereunto affixed in the presence of:

(Authorized signing officer, Title)

(Seal)

(Authorized signing officer, Title)

If the Bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

END OF SECTION

**SECTION 00 43 01
BID FORM SUPPLEMENTS COVER SHEET**

PARTICULARS

- 1.01 TO: MADISON METROPOLITAN SCHOOL DISTRICT**
- 1.02 OWNER'S PROJECT NUMBER: 143_SOLAR REBID_2020**
- 1.03 PROJECT:**
- 1.04 DATE:**
- 1.05 SUBMITTED BY: (BIDDER TO INSERT FULL NAME AND ADDRESS)**
.....
.....
.....

1.06 SUPPLEMENTS TO BID FORM

- A. Section 00 43 80 - Affirmative Action/Equal Employment Opportunity Requirements: The information requested in this Section shall be submitted with the bid, as necessary.

1.07 UNION AFFILIATION

The following information shall be provided by all bidders:
Indicate your union affiliation, if none, so state:

1.08 AFFIRMATIVE ACTION REQUIREMENTS FOR CONTRACTORS AND VENDORS (SEE SECTION 00 4380 - AA/EEO REQUIREMENT FOR REQUIRED SUBMITTALS)

The Board of Education of the Madison Metropolitan School District is committed to fair and equal employment opportunities for all persons. Equal opportunities, policies and procedures govern the hiring of District staff. By this policy, the Board requires contractors and vendors adopt and implement similar policies as a condition of doing business with the District.

Technical Assistance

If needed, assistance is available through the District including what constitutes a good faith effort. Technical assistance regarding contract compliance issues can be obtained from Eric Kestin, Contract Compliance Monitor, at (608) 663-1530 or by FAX at (608) 204-0343.

For more information on the District's Affirmative Action Requirements Contractors and Vendors are directed to: <https://operations.madison.k12.wi.us/doingbusiness/docs>

SIGNATURE(S)

2.01 THE CORPORATE SEAL OF:

- A.
- B. (Bidder please print the full name of your Proprietorship, Partnership, or Corporation)

2.02 WAS HEREUNTO AFFIXED IN THE PRESENCE OF:

- A.
- B. (Authorized signing officer & Title)
- C. (Seal)
- D.
- E. (Authorized signing officer & Title)
- F. (Seal)

END OF SECTION

SECTION 00 43 80

AFFIRMATIVE ACTION/EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS

PARTICULARS

1.01 PROJECT NAME: WEST SOLAR 2020 - REBID

1.02 OWNER'S PROJECT NUMBER: 143_SOLAR_2019

1.03 WHEN TO COMPLETE: ALL VENDORS AND CONTRACTORS, NOT EXEMPT, SHALL SUBMIT COMPLY WITH THE AA/EEO REQUIREMENTS.

1.04 THESE DOCUMENTS FOLLOW:

- A. Appendix A - Board Policy 6600 - Affirmative Action Requirements for Vendors and Contractors - 4 Pages
- B. Appendix B - Board Policy 6601 - Utilization of Historically Underutilized Business - 2 Pages1
- C. Appendix C - Affirmative Action and Equal Opportunity Policy Statement - 5 Pages
- D. Appendix D - Equal Opportunity/Affirmative Action Employer Information Report - 2 Pages
- E. Vendor/Contractor Profile Form (Substitute W9) - 2 Pages

1.05 BIDDERS SHALL COMPLETE AND SUBMIT WITH THEIR BID ITEMS C, D & E, AS APPLICABLE. DIRECT QUESTIONS TO ERIC KESTIN, 608-663-1530

END OF SUPPLEMENT

SECTION 00 50 00
CONTRACTING FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 AGREEMENT AND CONDITIONS OF THE CONTRACT

- A. See Section 00 52 00 - Agreement Form for the Agreement form to be executed.
- B. See Section 00 72 00 - General Conditions for the General Conditions.
- C. The Agreement is based on AIA A101.
- D. The General Conditions are based on AIA A201.

1.02 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the Contract Documents.
- B. Bond Forms:
 - 1. Bid Bond Form: AIA A310.
 - 2. Performance and Payment Bond Form: AIA A312.
- C. Post-Award Certificates and Other Forms:
 - 1. Certificate of Insurance Form: ACORD Certificate of Insurance 25.
 - 2. Schedule of Values Form: AIA G703.
 - 3. Application for Payment Forms: AIA G702 with AIA G703 (for Contractors).
- D. Closeout Forms:
 - 1. Certificate of Substantial Completion Form: AIA G704.

1.03 REFERENCE STANDARDS

- A. AIA A101 - Standard Form of Agreement Between Owner and Contractor where the basis of Payment is a Stipulated Sum; 2017.
- B. AIA A201 - General Conditions of the Contract for Construction; 2017.
- C. AIA A310 - Bid Bond; 2010.
- D. AIA A312 - Performance Bond and Payment Bond; 2010.
- E. AIA G702 - Application and Certificate for Payment; 1992.
- F. AIA G703 - Continuation Sheet; 1992.
- G. AIA G704 - Certificate of Substantial Completion; 2017.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 00 52 00
AGREEMENT FORM**

PART 1 GENERAL

FORM OF AGREEMENT

2.01 RELATED REQUIREMENTS

- A. Section 00 72 00 - General Conditions.
- B. Section 00 73 00 - Supplementary Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

- 4.01 AIA DOCUMENT A101, STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR - 2017 EDITION, FORMS THE BASIS OF CONTRACT BETWEEN THE OWNER AND CONTRACTOR.**

END OF SECTION

**SECTION 00 60 00
PROJECT FORMS**

PARTICULARS

1.01 PERFORMANCE ASSURANCE

- A. Performance and Payment bonds are required to be submitted with executed contracts as required following Notice of Award.
 - 1. Bond value requirements and form are per Section 00 73 00 - Supplementary Conditions, Article 11.5.

1.02 CERTIFICATES

- A. Certificate of Insurance is required to be submitted with executed contracts as required following Notice of Award.
 - 1. Certificate of Insurance form per Section 00 21 13 - Instructions to Bidders.

END OF SECTION

**SECTION 00 72 00
GENERAL CONDITIONS**

FORM OF GENERAL CONDITIONS

1.01 THE GENERAL CONDITIONS APPLICABLE TO THIS CONTRACT IS ATTACHED FOLLOWING THIS PAGE.

RELATED REQUIREMENTS

2.01 SECTION 00 73 00 - SUPPLEMENTARY CONDITIONS.

2.02 SECTION 00 50 00 - CONTRACTING FORMS AND SUPPLEMENTS.

2.03 AIA DOCUMENT A201, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION IS INCLUDED BY REFERENCE AS PART OF THIS PROJECT MANUAL. SEE SECTION 00 55 00 - CONTRACTING FORMS AND SUPPLEMENTS FOR EDITION REFERENCE.

**2.04 A SAMPLE COPY OF AIA A201 MAY BE VIEWED AT: [A201-2017 FREE SAMPLE PREVIEW](https://www.aiacontracts.org/contract-documents/25131-general-conditions-of-the-contract-for-construction)
[HTTPS://WWW.AIACONTRACTS.ORG/CONTRACT-DOCUMENTS/25131-GENERAL-CONDITIONS-OF-THE-CONTRACT-FOR-CONSTRUCTION](https://www.aiacontracts.org/contract-documents/25131-general-conditions-of-the-contract-for-construction)**

2.05 SUPPLEMENTARY CONDITIONS

A. REFER TO DOCUMENT 00 73 00 - Supplementary Conditions FOR AMENDMENTS TO THE GENERAL CONDITIONS.

END OF SECTION

**SECTION 00 73 00
SUPPLEMENTARY CONDITIONS**

PART 1 GENERAL

1.01 SUMMARY

1.02 THESE SUPPLEMENTARY CONDITIONS AMEND AND SUPPLEMENT THE GENERAL CONDITIONS DEFINED IN DOCUMENT 00 72 00 - GENERAL CONDITIONS AND OTHER PROVISIONS OF THE CONTRACT DOCUMENTS AS INDICATED BELOW. PROVISIONS THAT ARE NOT SO AMENDED OR SUPPLEMENTED REMAIN IN FULL FORCE AND EFFECT.

1.03 THE TERMS USED IN THESE SUPPLEMENTARY CONDITIONS THAT ARE DEFINED IN THE GENERAL CONDITIONS HAVE THE MEANINGS ASSIGNED TO THEM IN THE GENERAL CONDITIONS.

1.04 RELATED SECTIONS

- A. Section 00 50 00 - Contracting Forms and Supplements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

MODIFICATIONS TO AIA A201 - 2017, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

4.01 ARTICLE 1 - GENERAL PROVISIONS

A. PARAGRAPH 1.2 - Correlation and Intent of the Contract Documents

1. Supplement Paragraph 1.2 as follows:
 - a. 1.2.4 Execute work as per Contract Documents. Make no changes therefrom without prior written permission. Where detailed information is lacking, before proceeding with work, refer matter to Architect for information. (Refer to General Conditions 3.2).
 - b. 1.2.5 In the case of conflicts or discrepancies within or among the Contract Documents not clarified by Addendum, the better quality or greater quantity of work, as determined by the Architect, shall be provided.
 - c. 1.2.6 Should any work be specified under more than one section of this Specification, it will be assumed that each Contractor and Sub-Contractor has included said item of material or labor unless they shall have obtained a written decision before submission of Proposal as to who shall furnish item in question. If no such decision has been obtained, it shall be Architect's choice as to who shall furnish such item(s).
 - d. 1.2.7 References to known standard specifications shall mean and intend latest edition of such specifications adopted and published to date of Invitation to Submit Proposal.
 - e. 1.2.8 Requirements of Sections in Division 01 "General Requirements" apply to the Work of all Sections in the Specifications.

B. PARAGRAPH 1.5 - Ownership and Use of Drawings, Specifications and Other Instruments of Service

1. 1.5.1 add "Unless otherwise agreed to in writing, the Architect . . . "

C. PARAGRAPH 1.6 - Transmission of Data in Digital Form

1. add the following subparagraph:
 - a. 1.6.1 Copies of Architect's Electronic files (CAD and/or BIM) will be provided to Contractor for Contractor's use in connection with Project, subject to execution of AIA Document C106- 2013 "Digital Data Licensing Agreement" and receipt of \$350 processing fee for each discipline (Civil, Landscaping, Architectural, Structural, Plumbing, Fire Protection, HVAC, or Electrical) requested.

4.02 ARTICLE 2 - OWNER

A. PARAGRAPH 2.2 - Information and Services Required of the Owner

1. Delete subparagraph 2.2.1 in its entirety.

2. Delete subparagraph 2.2.4 in entirety and replace with the following:
 - a. Contractor shall be responsible for contacting Diggers Hot Line prior to commencement of Work per subparagraph 3.3.4.

4.03 ARTICLE 3 - CONTRACTOR

A. PARAGRAPH 3.1 - General

1. 3.1.1: Amend second sentence to remove the "if required" so that the second sentence reads: "The Contractor shall be lawfully licensed in the jurisdiction where the Project is located."

B. PARAGRAPH 3.2 - Review of Contract Documents and Field Conditions by Contractor

1. Add the following subparagraph 3.2.5:
 - a. Information and data relating to utilities owned by others shown or indicated in the Project Documents at or contiguous to the Project site are based on information and data furnished to the Owner or Architect by owners of such utilities or by others. Unless it is expressly provided in the Supplementary Conditions:
 - 1) Owner or Architect shall not be responsible for the accuracy or completeness of any such information or data; and
 - 2) Contractor shall have full responsibility for reviewing and checking all such information and data, for locating utilities owned by others, for coordination of the Work with owners of such utilities during construction, for safety and protection thereof and for repairing any damage thereto resulting from the Work, the cost of all of which shall be considered as having been included in the Contract at no additional charge to the Owner.
2. Add the following to subparagraph 3.2.6:
 - a. 3.2.6 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for evaluating and responding to the Contractor's requests for information that are not prepared in accordance with the Contract Documents or where the requested information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings or prior Project correspondence or documentation.

C. PARAGRAPH 3.3 - Supervision and Construction Procedures

1. Add the following subparagraph 3.3.4
 - a. 3.3.4 The Contractor shall be responsible for location and protection of utilities. Contractor shall contact Diggers Hot Line prior to commencement of Construction activities. Coordinate with Owner for locating of Owner owned utilities.

D. PARAGRAPH 3.4 - Labor and Materials

1. Add the following to subparagraph 3.4.2
 - a. 3.4.2.1. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for reviewing the Contractor's proposed substitutions and making agreed-upon changes in the Drawings and Specifications resulting from such substitutions.
2. Add the following subparagraph 3.4.3
 - a. 3.4.3.1 The Contractor shall enforce such rules the Owner may establish for the conduct of workers on the premises during construction.

E. PARAGRAPH 3.6 - Taxes

1. Add the following subparagraph 3.6.1
 - a. 3.6.1: The Owner is a tax exempt entity per Wisconsin Statutes and the Contractor shall not include in the Contract Amount any sales tax for tangible personal property to be purchased by the Contractor, Subcontractors or Suppliers and that will be transferred to Owner as it becomes incorporated into the Work. Contractor shall include any other (non-exempted) taxes, if applicable, in the Contract Amount.

F. PARAGRAPH 3.7 - Permits, Fees, Notices, and Compliance with Laws

1. Add the following clause 3.7.1.1:

- a. 3.7.1.1 The work is to be performed within the Madison Metropolitan School District. Contractors are responsible for required permits and fees that which are customarily secured for work within each municipality that the work is located.

G. PARAGRAPH 3.12 - Shop Drawings, Product Data and Samples

1. Add the following subparagraph 3.12:
 - a. 3.12.11 The Architect's review of Contractor's submittals will be limited to examination of an initial submittal and one re-submittal. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for evaluation of additional re-submittals.

H. PARAGRAPH 3.18 - Indemnification

1. Delete subparagraph 3.18.1 and replace with the following:
 - a. 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect and Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or injury to or destruction of tangible property, to the extent caused by the acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge or reduce other rights or obligations of indemnity that would otherwise exist as to a party described in this Section 3.18.

I. PARAGRAPH 3.19 - Safety Data Sheets

1. Add the following 3.19.1
2. 3.19 - Safety Data Sheets
 - a. 3.19.1 The Contractor shall submit to the Owner "Safety Data Sheets" (SDS), per Appendix D, 1910.1200, for any item(s) provided during the performance of the Work which may have toxic, hazardous or infectious substances as defined by the Federal Occupational, Safety and Health Standards entitled "Subpart Z - Toxic and hazardous Substances", Section 1910-1200.

4.04 ARTICLE 4 - ARCHITECT

A. PARAGRAPH 4.2 - Administration of the Contract

1. Add the following to subparagraph 4.2.2:
 - a. 4.2.2.1 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for site visits made necessary by the fault of the Contractor by defects, deficiencies or non-conforming Work.

4.05 ARTICLE 5 - SUBCONTRACTORS

A. PARAGRAPH 5.2 - Award of Subcontracts and Other Contracts for Portions of the Work

1. Delete the first sentence in subparagraph 5.2.1 and replace with the following:
 - a. 5.2.1 The Contractor shall furnish, in writing, to the Owner, the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work.
 - b. 5.2.1 Add at the end "Contractor shall provide Owner and Architect an updated list whenever changes are made thereto.
2. Delete subparagraph 5.2.4 and replace with the following:
 - a. 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected without providing to the Owner a written request for the proposed change and proposed decrease to the Contract Sum and/or Contract Time. If the proposed change to the Subcontractor, person or entity is accepted by the Owner, an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work.

4.06 ARTICLE 7 - CHANGES IN WORK

A. PARAGRAPH 7.1 - General

1. Add the following subsection 7.1.4 to Section 7.1:
 - a. 7.1.4 The combined overhead and profit included in the total cost to the Owner of a change in the Work shall be based on the following schedule:
 - 1) .1 The Contractor for work performed by the Contractor's own forces, shall be limited to Ten [10] percent overhead and profit on the net cost of their Work;
 - 2) .2 The Contractor for work performed by the Contractor's Subcontractor, shall be limited to Five [5] percent overhead and profit on the cost of Work done by any Subcontractor;
 - 3) .3 Each Subcontractor for work performed by the Contractor's own forces, shall be limited to Ten [10] percent overhead and profit on the net cost of their Work;
 - 4) .4 The Subcontractor for work performed by the Subcontractor's Subcontractor, shall be limited to Five [5] percent overhead and profit on the cost of Work done by any Subcontractor;
 - 5) .5 Cost to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 7.3.7.
 - 6) .6 In order to facilitate checking of quotations for extras or credits, all proposals shall be accompanied by a complete itemization of costs including labor, materials and Subcontracts. Where major cost items are Subcontracts, they shall be itemized also.

4.07 ARTICLE 8 - TIME

A. PARAGRAPH 8.1 - Definitions

1. Add the following subparagraph 8.1.5:
 - a. 8.1.5: Contract Time is identified in Document 00 21 13 - Instructions To Bidders.

4.08 ARTICLE 9 - PAYMENTS AND COMPLETION

A. PARAGRAPH 9.3 - Applications for Payment

1. Add the subsections to Section 9.3.1:
 - a. 9.3.1.3 Pursuant to s. 66.0901(9)(b), Wis. Stats. (Municipal Law), until the Work is 50 percent complete, the Owner will retain 5 percent of the amount due to the Contractor on account of progress payments. At the time the Work is 50 percent complete and thereafter the Owner will make remaining partial payments in full, except if the Architect certifies that the Work is not proceeding satisfactorily then the Owner will retain 10 percent of the amount due to the Contractor on account of effected partial payments.

B. PARAGRAPH 9.8 - Substantial Completion

1. Add the following to Subparagraphs 9.8.3:
 - a. 9.8.3.1 The Architect will perform no more than one inspection to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections.
2. Add the following sentence to the end of subparagraph to 9.8.5:
 - a. The deductive adjustment for Work that is incomplete or not in accordance with the requirements of the Contract Documents shall be equal to 2-1/2 times the estimated cost to complete or correct the Work as determined by the Architect.

C. PARAGRAPH 9.10 - Final Completion and Final Payment

1. Add the following to end subparagraph 9.10.1:
 - a. Upon receipt by Owner of Architect's Certification of final Application and Certificate for Payment (AIA G702) and Consent of Surety, the Owner shall make final payment, including retainage, to the Contractor.
 - b. The Architect will perform no more than one inspection to determine whether the Work or a designated portion thereof has attained Final Completion in accordance

with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections.

4.09 ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

A. PARAGRAPH 10.2 - Safety of Persons and Property

1. 10.2.1.2 (Add the following):
 - a. All materials delivered on premises for Work shall be neatly and compactly piled with such protection as may be required to prevent damage or soiling. If a Contractor's equipment or stored material interferes with work of another Contractor or with general use of the premises, Contractor shall move same to another location upon reasonable advance notice.
2. 10.2.1.3 (Add the following):
 - a. General Contractor shall provide continuous protection for Work, materials and apparatus against damage from wind, storms, rain, frost, heat, and other weather.
3. 10.2.2 (Add the following):
 - a. Comply fully with General Orders of Chapter XIII, Bureau of Labor Standards, Department of Labor, Part 1518, Safety and Health Regulations for Construction. Precaution shall be executed at all times for protection of persons and property. All scaffolds, forms and other support equipment shall be designed to support superimposed loads. Damage or injuries resulting from collapse of such scaffolds, forms or supporting equipment shall be the responsibility of the Contractor.
4. 10.2.3 (Add the following):
 - a. General Contractor shall provide and maintain, as a minimum, guard lights at street; road and sidewalk obstructions.
5. 10.2.5 (Supplement as follows):
 - a. If new or existing work is damaged, it will be repaired at expense of Contractor doing damage. If responsible party cannot be found, cost will be equally pro-rated among Contractors working on site at time damage occurred.
6. 10.2.7 (Add the following):
 - a. Storage area on the premises will be apportioned among the various Contractors as needs dictate with due regard for storage requirements of each Contractor. Each Contractor shall be responsible for safety of their materials which are stored on premises.
7. 10.2.8 Add at end: "In all other respects, notice to owner shall comply with Wis stats. section 893.80"

B. PARAGRAPH 10.3 - Hazardous Materials

1. Delete subparagraphs 10.3.2 and replace with the following:
2. 10.3.2 Terminology used in this subsection shall be as defined in Federal Register 40 CFR Part 763, Subpart E- Asbestos-Containing Materials in Schools.
 - a. .1 Contractor shall contact the Owner and Architect if asbestos-containing building materials (ACBM) or suspected ACBM are uncovered or encountered during the performance of the Work. Contractor shall not disturb ACBM or suspect ACBM and Work in the area shall be suspended, if necessary to prevent the release of asbestos fibers. The Owner authorize the Work to proceed following removal of ACBM or bulk sampling to confirm suspected ABCM does not contain asbestos.
 - b. .2 Asbestos Management plans are available in the custodial administrative office at each facility and at the Maintenance Building, Building Services, 4711 Pflaum Road, Madison, WI, that identifies the locations of asbestos-containing building materials. The Contractor, his Subcontractors, and agents shall not disturb friable ACBM, nor make nonfriable ACBM friable in the course of the work unless specified herein. Unless it is otherwise expressly provided in the Contract Documents:
3. 10.3.2.2 Unless it is otherwise expressly provided in the Contract Documents:
 - a. .1 The Owner shall arrange and pay for all costs associated with the bulk sampling of ACBM and suspect ACBM.

- b. .2 The Owner shall arrange and pay for all costs associated with removal of ACBM and air monitoring.
 - c. .3 The Contractor shall be required to review the site prior to start of Work for ACBM or suspect ACBM as it relates to the Work.
 - d. .4 The Contractor shall indemnify and hold harmless the Owner and it's Consultants against claims, damages, losses and expenses resulting from the willful or negligent damage of asbestos-containing material during the performance of the Work.
4. 10.3.2.3 All existing painted and finished surfaces associated with existing facilities scheduled for renovation, remodeling or razing as part of the Work shall be assumed to contain lead (Pb). The Contractor, his subcontractors and agents shall be responsible for the protection of workers and building occupants per OSHA Lead in Construction Standard, 29 CFR 1926.62 and other applicable rules and regulations.
5. 10.3.2.4 Unless it is otherwise expressly provided in the Contract Documents:
- a. .1 The Contractor shall remove demolished materials containing lead finishes from the site and dispose of in a WDNR approved disposal facility (sanitary landfill). Contractor shall provide a manifest indicating the chain of custody as well as the actual landfill location.
 - b. .2 The Contractor shall use a certified laboratory to perform the Toxicity Characteristic Leaching Procedure (TCLP) for lead to determine if lead containing wastes are at hazardous lead levels per Wisconsin Administrative Code, Chapters NR 600-685 for hazardous waste management and disposal.
 - c. .3 The Contractor shall provide HEPA vacuum(s) to clean up dust generated by construction activities associated with the Work. The Contractor is responsible for damp-cleaning of areas of the Work. Surfaces shall be determined clean based on current HUD standards.
 - d. .4 The Contractor shall identify assumed lead based finishes to be removed, remodeled or razed at least ten days prior to the scheduled Work. The Owner will sample identified surface(s) and have samples analyzed for lead content. The Owner will provide a report of lead content to the Contractor. Contractors shall be Lead Certified as required by law to do renovation work in schools.
6. Add the following sentence at the end of subparagraph 10.3.3:
- a. Owner, by this section, does not intend to waive any protections offered it to through Wisconsin Statutes sections 893.80; 895.46; 895.523; 895.525; 895.526 or 345.05.
7. Add the following sentence at the end of subparagraph 10.3.4:
- a. Owner, by this section, does not intend to waive any protections offered it to through Wisconsin Statutes sections 893.80; 895.46; 895.523; 895.525; 895.526 or 345.05.

4.10 ARTICLE 11 - INSURANCE AND BONDS

A. PARAGRAPH 11.1 - Contractor's Liability Insurance

- 1. Delete subparagraph 11.1.2. and replace with the following:
 - a. 11.1.2 The insurance required by Subparagraph 11.1.1 shall be written for not less than limits of liability specified herein or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from date of commencement of the Work until date of final payment and termination of any coverage required to be maintained after final payment.
 - 1) Comprehensive General Liability Insurance: Coverage to follow ISO occurrence format and must include Products/Completed Operations and Contractual Liability Endorsements.
 - (a) General Aggregate: \$3,000,000 Combined single limit.
 - (b) Products/Completed Operations Aggregate: \$1,000,000 combined single limit.
 - (c) Personal & Advertising Injury: \$2,000,000 combined single limit.
 - (d) Each Occurrence: \$1,000,000 combined single limit.
 - (e) Fire Damage (any one fire): \$50,000 combined single limit.
 - (f) Medical Expense: \$5,000 combined single limit.

- 2) Automobile Liability Insurance: covering any auto (Owned, Non-owner and Hired Vehicles):
 - (a) Bodily Injury & Property Damage: \$1,000,000 combined single limit.
 - 3) Worker's Compensation & Employers Liability Insurance:
 - (a) Coverage A: (Worker's Compensation): Statutory
 - (b) Coverage B: (Employers Liability): \$1,000,000 each Accident, \$1,000,000 disease-each employee, \$3,000,000 disease-policy limit-disease.
 - 4) Umbrella Form Excess Liability:
 - (a) General & Liability: \$5,000,000 aggregate, \$5,000,000 each occurrence.
2. Add the following Clauses 11.1.2.1 through 11.1.2.4:
 - a. 11.1.2.1 The types of insurance and the limits of liability indicated above are the minimum required and neither the Owner nor the Architect warrant the adequacy of the types of insurance or the limits of liability.
 - b. 11.1.2.2 Contractor shall require Subcontractor, not protected under Contractor's insurance, to take out and maintain Worker's Compensation Insurance and insurance of the same kind and in the amounts that the Contractor considers appropriate as specified above. Contractor shall submit evidence of such insurance coverage to the Owner upon request.
 - c. 11.1.2.3 Contractor shall carry sufficient comprehensive insurance on equipment at the site of work and on route to and from the site to fully protect Contractor. Contractor shall require Subcontractors carry same coverage. It is expressly understood and agreed that the Owner and the Architect shall have no responsibility thereof.
 3. Delete the second sentence of subparagraph 11.1.3. and add the following sentences to the end of the subparagraph:
 - a. The Contractor shall provide written notification to the Owner of the cancellation or expiration of any insurance required by Section 11.1. The Contractor shall provide such written notice within five (5) business days of the date the Contractor is first aware of the cancellation or expiration, or is first aware that the cancellation or expiration is threatened or otherwise may occur, whichever comes first.
 4. 11.1.4 amended last sentence to add at the end, continuing the last sentence:
 - a. ". . . completed operations on a primary, non-contributory basis."

B. PARAGRAPH 11.3 - Property Insurance

1. Delete subparagraphs 11.3.1 and associated clauses and replace with the following:
 - a. 11.3.1 Property insurance provided by the Owner, shall be Builders Risk Insurance coverage as written by Travelers Insurance. The coverage provided insures against all sudden and accidental direct physical loss or damage subject to limitations or exclusions contained in the policy. The Fund's major insurance policy exclusions that should be noted regarding Builders Risk coverage are:
 - 1) Loss caused by water below the surface of the ground, including water which exerts pressure on or flows, seeps or leaks through sidewalks, driveways, foundations, walls, or basements, this is commonly referred to as "hydrostatic pressure". Hydrostatic water pressure is included in Travelers definition of flood.
 - 2) Loss caused by earth movement or flood. Travelers includes flood & earth movement with sub-limits: \$1,000,000 Earth Movement outside High Hazard County of Moderate Hazard Independent City; \$1,000,000 Flood in Zone X (unshaded). Other areas are excluded from coverage.
 - 3) Loss caused by settling, cracking, shrinkage, bulging, or expansion of pavements, sidewalks, foundations, walls, floors, roofs, or ceilings. Travelers excludes loss caused by Settling, cracking, shrinking or expanding.
 - 4) Loss caused by error, omission, or deficiency in design, specifications, workmanship or materials. Travelers exclusion: Omission in, or faulty, inadequate or defective: (1) Planning, zoning, development, surveying, siting, design or specifications; or (2) Materials, workmanship or maintenance.
2. Delete subparagraph 11.3.2 Boiler and Machinery Insurance.

3. Delete the second sentence of subparagraph 11.3.6 and add the following sentences to the end of the subparagraph:
 - a. The Owner shall provide written notification to the Contractor of the cancellation or expiration of any insurance required by Sections 11.2 and 11.3. The Owner shall provide such written notice within five (5) business days of the date the Owner is first aware of the cancellation or expiration, or is first aware that the cancellation or expiration is threatened or otherwise may occur, whichever comes first.
4. Subparagraph 11.3.7, Waivers of Subrogation:
 - a. Delete subparagraph 11.3.7 and replace with the following:
 - 1) The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by any form of insurance, suretyship or policy of indemnification obtained pursuant to this Paragraph 11.3 or other insurance, suretyship or policy of indemnification applicable to the Work, except such rights as they have to proceeds of such insurance, suretyship or policy of indemnification held by the Owner as fiduciary. Notwithstanding the foregoing, Owner's waiver herein applies only to materials and property damage which are covered by a builder's risk coverage/policy.

4.11 ARTICLE 11 - INSURANCE AND BONDS

A. PARAGRAPH 11.4 - Performance Bond and Payment Bond

1. Delete subparagraph 11.4.1 and substitute with the following:
 - a. 11.4.1 The Contractor shall furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder. Bonds may be obtained through the Contractor's usual source and the cost thereof shall be included in the Contract Sum. The amount of each bond shall be equal to 100 percent of the Contract Sum.
 - b. 11.4.1.1 The Contractor shall deliver the required bonds to the Owner not later than ten days following the date the Notice of Award is issued, or if the Work is to be commenced prior thereto in response to a letter of intent, the Contractor shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be purchased.
 - c. 11.4.1.2 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

4.12 ARTICLE 13 - MISCELLANEOUS PROVISIONS

A. Add PARAGRAPH 13.6 - Tobacco Use

1. 13.6.1 Use of tobacco products on School District property is prohibited per Board of Education Policy 6470.

B. Add PARAGRAPH 13.7 - Alcohol use

1. 13.7.1 Use of alcohol products on School District property is prohibited.

C. Add PARAGRAPH 13.8 - Substance Abuse Testing Program

1. 13.8.1 Employers performing work on public works construction projects in Wisconsin for municipal government and state building projects will be required to have written substance abuse testing program in place per Section 103.503 Wisconsin Statutes.

4.13 ARTICLE 15 - CLAIMS AND DISPUTES

A. PARAGRAPH 15.1 Claims

1. Add the following to Paragraph 15.1.5:
 - a. 15.1.5.3 Claims for increase in the Contract Time shall set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of

delay ceased to affect the progress of the Work and the number of days' increase in the Contract Time claimed as a consequence of each such cause of delay. The Contractor shall provide such supporting documentation as the Owner may require, including, where appropriate, a revised construction schedule indicating all the activities affected by the circumstances forming the basis of the Claim.

- b. 15.1.5.4 The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Contractor.

B. PARAGRAPH 15.2 Initial Decisions:

1. 15.2.5 final sentence should say "The initial decision shall be final and binding on the parties, but subject to the filing of a claim under Wis. Stats. sec 893.80 with any resultant litigation, or to mediation under sections 15.2.6 et seq.
2. 15.2.6.1 Either party may, within 30 days from the date of an initial decision request in writing that the other party file for mediation within 60 days of the initial decision. If the requested party fails to agree to mediate, the parties both waive their rights to mediation or arbitration proceedings with respect thereto.

C. PARAGRAPH 15.3 Mediation:

1. 15.3.1 Claims, disputes, or other and 15.1.6 may be mediated if both parties agree thereto. . .
2. 15.3.2 If both parties agree to endeavor to resolve the Claims by mediation, unless they also agree otherwise, such mediation shall be administered

END OF SECTION

SECTION 01 04 50
CUTTING AND PATCHING

PART 1 – GENERAL

1.01 DEFINITION

- A. Cutting and Patching is defined to include the cutting and patching of nominally completed and previously existing work in order to accommodate the coordination of construction activities; or the installation of other facilities or structures; or to uncover other facilities and structures for access or inspection; or to obtain samples for testing, or for similar purposes.

1.02 REQUIREMENTS OF STRUCTURAL WORK

- A. Structural Work shall not be cut and patched in a manner that results in a reduction of load-carrying capacity or load/deflection ratio.

1.03 OPERATIONAL AND SAFETY LIMITATIONS

- A. The Contractor shall not cut and patch operational elements and safety-related components in a manner resulting in a reduction of capacities to perform in the manner intended or resulting in decreased operational life, increased maintenance or decreased safety.

1.04 VISUAL REQUIREMENTS

- A. The Contractor shall not cut and patch Work which is exposed on the exterior or exposed in occupied spaces, in a manner resulting in a reduction of visual qualities or resulting in substantial evidence of the cut and patch Work, both as judged solely by the Architect. The Contractor shall remove and replace Work judged by the Architect to have been cut and patched in a visually unsatisfactory manner.

PART 2 – PRODUCTS

2.01 MATERIALS USED IN CUTTING AND PATCHING

- A. Unless otherwise indicated, the Contractor shall provide materials for cutting and patching which will result in an equal-or-better product than the material being cut and patched, in terms of performance characteristics and including visual effects where applicable. The Contractor shall use material identical with the original materials where feasible.
- B. Materials shall comply with the requirements of the Technical Specifications wherever applicable.

PART 3 – EXECUTION

3.01 PREPARATION

- A. The Contractor shall provide adequate temporary support for Work to be cut to prevent failure.
- B. The Contractor shall provide adequate protection of other Work during cutting and patching.

3.02 INSTALLATION

- A. The Contractor shall employ skilled trades people to perform cutting and patching. Except as otherwise indicated, the Contractor shall proceed with cutting and patching at the earliest feasible time and perform the Work promptly.
- B. The Contractor shall use methods least likely to damage Work to be retained and Work adjoining.
 - 1. In general, where physical cutting action is required, the Contractor shall cut Work with sawing and grinding tools, not with hammering and chopping tools. Openings through concrete Work shall be core-drilled.
 - 2. Comply with the requirements of Technical Specifications wherever applicable.

END OF SECTION

SECTION 01 10 00
SUMMARY

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: West Solar 2020 - Rebid
- B. Owner's Name: Madison Metropolitan School District (MMSD).
- C. MMSD - Building Services
- D. In general, the Project consists of construction of West Solar 2020 - Rebid located at:
 - 1. West High 30 Ash St. (05)

1.02 CONTRACT DESCRIPTION

- A. Contract Type: Multiple prime contracts, each based on a Stipulated Price as identified on the drawings and specified herein:
 - 1. 30 Ash St
- B. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 52 00 - Agreement Form.

1.03 WORK BY OTHERS

1.04 OWNER OCCUPANCY

- A. Owner intends to continue to occupy portions of the existing building during the entire construction period.
- B. Owner intends to occupy the Project upon Substantial Completion.
- C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- D. Schedule the Work to accommodate Owner occupancy.

1.05 CONTRACTOR USE OF SITE AND PREMISES

- A. Arrange use of site and premises to allow:
 - 1. Owner occupancy.
 - 2. Work by Others.
 - 3. Use of site and premises by the public.
- B. Provide access to and from site as required by law and by Owner.
- C. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
- D. Do not obstruct roadways, sidewalks, or other public ways without permit.
- E. Existing building spaces may not be used for storage.
- F. Provide isolated storage, separate from the Work, for hazardous materials, including but not limited to: fuels, paints and chemicals.
- G. Smoking or use of tobacco shall be prohibited on-site.
- H. Food and beverages shall be prohibited in Work areas. Contractor shall provide a designated break areas separate from the Work. Food and beverage waste shall be left in or disposed of in the Work.
- I. Use of machines and/or tools that product pollutants, such as products of combustion, shall be prohibited for use after the Work becomes enclosed.
- J. Contractor shall be responsible for maintaining the Work so as to prevent water damage. Contractor shall immediately notify the Architect and Owner immediately of wet conditions and provide appropriate follow-up correction.
- K. Time Restrictions: Schedule work to minimize disruption to normal building occupancy. Limit noisy exterior work to comply with Madison General Ordinances.
- L. Utility Outages and Shutdown:

1. Limit disruption of utility services to hours the building is unoccupied. Schedule outages with Owner's representative 5 days prior disruption.
- M. Hours of Work:
1. The work shall be done weekdays, except district designated holidays, during after school dismissal unless specified otherwise. Hours of work are:
 - a. Weekdays:
 2. District designated Holidays are as follows:
 - a. New Years Eve Day*, New Years Day*, Martin Luther King, Jr. Day, Memorial Day, Independence Day*, Labor Day, Thanksgiving Day, Day after Thanksgiving Day, Christmas Eve Day*, and Christmas Day*
 - 1) * If a district designated holiday marked by an asterisk (*) falls on a weekend during the Contract period, the weekday(s) immediately prior to, or following the indicated event will be the districts designated holiday. Verify actual dates with the Owners designated Project Representative.
 - b. Buildings will be locked and unoccupied during district designated holidays. Contractor is responsible for coordinating construction activities to avoid conflicts with district designated holidays.
 3. No access to the buildings beyond times stated herein will be allowed without prior approval of the Owners designated Project Representative. Requests for changes shall be made in writing to the Owner. Contractor shall be responsible for costs associated with such requests, as applicable. Contract price shall be adjusted prior to final payment.

1.06 WORK SEQUENCE

- A. Construct Work so as to minimize disruption to the educational programs during the construction period.
- B. Coordinate construction schedule and operations with Owner.
- C. Schedule shall establish adequate time for off-gassing of materials prior to occupancy.
- D. Contractor shall sequence the Work to prevent dust and debris from contaminating previously installed systems.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Correlation of Contractor submittals based on changes.
- D. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

- A. Document 00500 - Agreement: Contract Sum, payment period, monetary values of unit prices.
- B. Document 00 72 00 - General Conditions and Document 00 73 00 - Supplementary Conditions: Additional requirements for progress payments, retainage, final payment, changes in the Work.
- C. Section 01 20 10 - Tax Exempt Purchases

1.03 SCHEDULE OF VALUES

- A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to MMSD - Building Services for approval.
- C. Forms filled out by hand will not be accepted.
- D. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.
- E. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- F. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization.
- G. Include in each line item, the amount of Allowances specified in this section.
- H. Include within each line item, a direct proportional amount of Contractor's overhead and profit.
- I. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
 - 1. Minimum Payment Period: Monthly
 - a. Contractors option to request payments for longer durations.
- B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.
- C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to MMSD - Building Services for approval.
- D. Forms filled out by hand will not be accepted.
- E. Present required information in typewritten form.
- F. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.
- G. For each item, provide a column for listing each of the following:
 - 1. Item Number.
 - 2. Description of work.
 - 3. Scheduled Values.
 - 4. Previous Applications.
 - 5. Work in Place and Stored Materials under this Application.
 - 6. Authorized Change Orders.

7. Total Completed and Stored to Date of Application.
 8. Percentage of Completion.
 9. Balance to Finish.
 10. Retainage.
- H. Execute certification by signature of authorized officer.
- I. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- J. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- K. Submit one electronic and three hard-copies of each Application for Payment.
- L. Include the following with the application:
1. Transmittal letter as specified for submittals in Section 01 30 00.
 2. Construction progress schedule, revised and current as specified in Section 01 30 00.

1.05 PAYMENT PROCESSING:

- A. Processing of payments will be as per the Agreement.

1.06 MODIFICATION PROCEDURES

- A. For minor changes not involving an adjustment to the Contract Price or Contract Time, MMSD - Building Services will issue instructions directly to Contractor.
- B. MMSD - Building Services will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710.
- C. For other required changes, MMSD - Building Services will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
 2. Promptly execute the change.
- D. For changes for which advance pricing is desired, MMSD - Building Services will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change. Contractor shall prepare and submit a fixed price quotation within 7 days.
- E. Contractor may propose a change by submitting a request for change to MMSD - Building Services, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 60 00.
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
1. For change requested by MMSD - Building Services for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
 2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by MMSD - Building Services.
- G. Substantiation of Costs: Provide full information required for evaluation.
1. On request, provide the following data:
 - a. Quantities of products, labor, and equipment.
 - b. Taxes, insurance, and bonds.
 - c. Overhead and profit.
 - d. Justification for any change in Contract Time.
 - e. Credit for deletions from Contract, similarly documented.
 2. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

- H. Execution of Change Orders: MMSD - Building Services will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

1.07 APPLICATION FOR FINAL PAYMENT

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
 - 1. Receipt of O&M Manuals as required.
 - 2. Completed Punchlist.
 - 3. Receipt of As-Builts as required.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 20 10
TAX EXEMPT PURCHASES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Purchase of materials, products and equipment by the Contractor to be incorporated into the Work by the Contractor.

1.02 TAX EXEMPT PURCHASES

- A. The Madison Metropolitan School District, as a Unified School District of the State of Wisconsin, is exempt under Wis. Stats. s. 77.54 from payment of Wisconsin sales or use taxes for:
 - 1. tangible personal property purchased by the construction contractor and incorporated into the Work; and
 - 2. materials, products and equipment it purchases directly.
- B. Bids should reflect this exemption.

1.03 TAX EXEMPT INFORMATION

- A. The Owner's Wisconsin Department of Revenue Tax Exempt Number is ES42341.
- B. Personal property tax on property owned, including beneficial ownership under lease/purchase agreements is exempt, under s.70.11 (2), Wisconsin Statutes.
- C. The Owner's Federal Employer I.D. (FEIN) Number is 39-6003202.
- D. Federal tax imposed under Ch. 32, I.R.C. Registration No. 39-73-1021-K was issued to the State of Wisconsin by the Internal Revenue Service. This number is on file with the District Director, U.S. Treasury Department, Internal Revenue Service, Milwaukee, Wisconsin.
- E. The billing information for the District is:
 - 1. Madison Metropolitan School District
 - 2. Building Services
 - 3. 4711 Pflaum Road
 - 4. Madison WI 53718

1.04 REQUESTS FOR CREDIT APPLICATIONS

- A. The Madison Metropolitan School District, a creation of the State of Wisconsin under s.120.44 and, as such, does not provide credit information as we are required to pay for all legal purchase obligations.
- B. Bank Reference: Chase, 22 East Mifflin Street, Madison, WI 53703. Phone (608) 282-4881

PART 2 PRODUCTS

END OF SECTION

**SECTION 01 21 00
ALLOWANCES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cash allowances.
- B. Payment and modification procedures relating to allowances.

1.02 RELATED REQUIREMENTS

- A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 CASH ALLOWANCES

- A. Contractor Responsibilities:
 - 1. Coordinate and schedule the purchase services of an electrical contractor for installation of electrical from the service entrance to junction boxes by the invertors.

1.04 ALLOWANCES SCHEDULE (PER CONTACT)

- A. Include the stipulated sum of \$40,000 for purchase services of an electrical contractor for installation of electrical from the service entrance to junction boxes by the invertors.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Preconstruction meeting.
- C. Site mobilization meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Number of copies of submittals.
- G. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Section 00 72 00 - General Conditions: Dates for applications for payment.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

1.04 PROJECT COORDINATOR

- A. Project Coordinator: Architect.
- B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for public & Owner access, traffic, and parking facilities.
- C. During construction, coordinate use of site and facilities through the Project Coordinator.
- D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 10 00 - Summary.
- F. Coordinate field engineering and layout work under instructions of the Project Coordinator.
- G. Make the following types of submittals to MMSD - Building Services:
 - 1. Requests for Interpretation.
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Closeout submittals, prior to Final Payment:
 - a. Warranties
 - b. Consent of Surety for Final Payment (AIA Form).
 - c. As-Built Drawings.
 - d. O&M Manuals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. The Contractor will schedule a meeting after Notice to Proceed.
- B. Attendance Required:
 - 1. Owner.
 - 2. MMSD - Building Services.
 - 3. Contractor.
- C. Agenda:
 - 1. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 - 2. Designation of personnel representing the parties to Contract and MMSD - Building Services.
 - 3. Designation of personnel representing the parties in Contract, Owner and the MMSD - Building Services.
 - 4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 5. Review of Contractor's Preliminary Schedule.
 - 6. Review Indoor Air Quality Requirements, special products, dust control, moisture/humidity control, scheduling related to off-gasing and ventilation requirements.
- D. Contractor to record minutes and distribute copies within two days after meeting to participants, with two copies to MMSD - Building Services, Owner, participants, and those affected by decisions made.

3.02 SITE MOBILIZATION MEETING

- A. Schedule meeting at the Project site prior to Contractor occupancy.
- B. The Contractor will scheduled a meeting at the Project site prior to Contractor occupancy.
- C. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 3. MMSD - Building Services.
 - 4. Contractor's superintendent.
 - 5. Major subcontractors:
- D. Agenda:
 - 1. Use of premises by Owner and Contractor.
 - 2. Owner's requirements.
 - 3. Construction facilities and controls provided by Contractor.
 - 4. Temporary utilities provided by Owner.
 - 5. Security and housekeeping procedures.
 - 6. Schedules.
 - 7. Application for payment procedures.
 - 8. Procedures for testing.
 - 9. Procedures for maintaining record documents.
 - 10. Requirements for start-up of equipment.
 - 11. Inspection and acceptance of equipment put into service during construction period.
- E. Contractor to record minutes and distribute copies within two days after meeting to participants, with copies to MMSD - Building Services, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

- A. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

- B. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 3. MMSD - Building Services.
 - 4. Contractor's superintendent.
 - 5. Major subcontractors.
- C. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems that impede, or will impede, planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Maintenance of progress schedule.
 - 7. Corrective measures to regain projected schedules.
 - 8. Planned progress during succeeding work period.
 - 9. Coordination of projected progress.
 - 10. Maintenance of quality and work standards.
 - 11. Effect of proposed changes on progress schedule and coordination.
 - 12. Other business relating to work.
- D. Contractor to record minutes and distribute copies within two days after meeting to participants, with copies to MMSD - Building Services, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 7 days after date of the Agreement, submit preliminary schedule outlining construction activities for the duration of the project.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 15 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary telecommunications services.
- B. Temporary sanitary facilities.
- C. Temporary Controls: Barriers, enclosures, and fencing.
- D. Waste removal facilities and services.
- E. Project identification sign.

1.02 TEMPORARY UTILITIES

- A. Owner will provide the following:
 - 1. Electrical power, consisting of connection to existing facilities.
- B. Existing facilities may be used.

1.03 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services at time of project mobilization.
- B. Telecommunications services shall include:
 - 1. Contractor to provide site foreman with a mobile telephone.

1.04 TEMPORARY SANITARY FACILITIES

- A. Use of existing facilities designated by building custodian is permitted. Coordinate with building custodian.
- B. Maintain daily in clean and sanitary condition.
- C. At end of construction, return facilities to same or better condition as originally found.

1.05 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.06 INTERIOR ENCLOSURES

- A. Provide temporary partitions separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and fire-rated reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:
 - 1. Plastic films shall be certified as conforming to the requirements of Test Method #2 contained in NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

1.07 SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.08 VEHICULAR ACCESS AND PARKING

- A. Use of Owner parking facilities for Contractor parking is allowed. Parking permits may be required. Coordinate use of parking with building custodian.

1.09 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.10 PROJECT IDENTIFICATION

- A. No signs are allowed without Owner permission except those required by law.

1.11 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Cleaning and protection.
- C. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 30 00 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- C. Section 01 50 00 - Temporary Facilities and Controls: Temporary interior partitions.

1.03 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.04 PROJECT CONDITIONS

- A. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 - 1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- B. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
 - 1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.
- C. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.05 COORDINATION

- A. See Section 01 10 00 for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean-up of work of separate sections.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.06 SUBMITTALS

- A. Certificates: Certificate signed by licensed Land Surveyor and Professional Engineer certifying that location and elevation of improvements comply with requirements.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.
- G. Review of Contract Documents and Field Conditions: Promptly on discovery of the need for clarification of the contract documents submit a Request for Interpretation to Architect on form included in the manual. Include a detailed description of problem encountered, together with recommendations for resolving it.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 GENERAL INSTALLATION PROCEDURES

- A. Locate the work and components of the work accurately, in correct alignment and elevation.
- B. Install products to withstand indicated design loads.
- C. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- D. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- E. Allow for building movement, including changes in atmospheric conditions.
- F. Conduct construction operations so no part of the work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- G. Anchors and Fasteners: Provide anchors and fasteners to anchor each component securely in place.
 - 1. Furnish setting drawings, templates, and directions for installing anchorages. Deliver to Project site in time for installation.
- H. Mounting Heights: Where mounting heights are not indicated, mount components at heights approved by Architect.

- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners and installation materials that are not considered hazardous.

3.04 OWNER-FURNISHED AND CONTRACTOR-INSTALLED PRODUCTS

- A. Refer to each technical specification.

3.05 OWNER-FURNISHED AND OWNER-INSTALLED PRODUCTS

- A. Construction Manager and Contractor shall prepare and submit schedule indicating when owner-furnished and owner-installed equipment can be completed.
- B. Coordinate requirements with Owner, including scheduling and verification of equipment locations and services required. Coordinate making connections to services where required by the Contractor.
- C. Owner will protect Owner-furnished and Owner-installed equipment from damage during construction.
- D. The Contractor is not responsible for warranty obligations on equipment furnished and installed by Owner, except for related work undertaken by the Contractor.

3.06 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-complying work.
- C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.

- I. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Match color, texture, and appearance.
 - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.
- E. Installed Work: Clean installed surfaces according to written instructions of manufacturer or fabricator.
 - 1. Protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- F. Concealed Spaces: Remove debris from concealed spaces before enclosing those spaces.
- G. Waste Disposal: Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from project site and dispose of lawfully.

3.09 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 CONSERVATION

- A. Carry out construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the work.

3.11 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.12 FINAL CLEANING

- A. Prior to a final inspection and acceptance of the Work, remove all debris, rubbish, waste material, tools, construction equipment, machinery, and surplus materials from the Project site and thoroughly clean the building of all roofing stains, marks, spills, or coatings. Remove all

dirt, dust, marks, smears, spots, grease, and stains from all floors, walls, ceilings, steel, piping, interior fixtures, equipment, hardware, and all finish surfaces

- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Clean filters of operating equipment.
- G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- H. Clean site; sweep paved areas, rake clean landscaped surfaces.
- I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.13 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify MMSD - Building Services when work is considered ready for MMSD - Building Services's Substantial Completion inspection.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for MMSD - Building Services's Substantial Completion inspection.
- E. Owner will occupy all of the building as specified in Section 01 10 00.
- F. Conduct Substantial Completion inspection and create Final Correction Punch List containing MMSD - Building Services's and Contractor's comprehensive list of items identified to be completed or corrected and submit to MMSD - Building Services.
- G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- H. Notify MMSD - Building Services when work is considered finally complete and ready for MMSD - Building Services's Substantial Completion final inspection.
- I. Complete items of work determined by MMSD - Building Services listed in executed Certificate of Substantial Completion.

3.14 LANDSCAPING

- A. Fence off around existing trees to drip line. Till areas disturbed by construction and leave areas in a seed and straw condition, acceptable to the Engineer. Any landscape damage to the area, including sidewalk and shrubbery, shall be replaced by the Contractor.

END OF SECTION

SECTION 01 73 10
CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. See Divisions 23 through 28 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
- C. See Division 7 Section "Through-Penetration Firestop Systems" for patching fire-rated construction.

1.02 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
 - 7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.03 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
 - 1. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
- B. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
- C. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.04 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.03 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Insert specific refinishing requirements for floors, walls, and ceilings. Revise three subparagraphs below to suit Project.
 4. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 5. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 6. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION

SECTION 26 00 01

ELECTRICAL GENERAL REQUIREMENTS

PROJECT DESCRIPTION: Electrical work associated with the Madison Metropolitan School District West Solar project. The School District has budgeted \$140,000 for the installation of a solar photovoltaic system at this school. The suggested design depicted on these documents shows a 95.4kW system. The installed system, however, must be within the previously stated budget. Therefore, bidding Contractors must state their bid dollar amount along with the system size in kW (AC).

The installed system will need to comply with these documents in all areas except where sizes of wiring, raceways and components are reduced in order to fall within the stated budget. The following list is intended to highlight (but not limit) particular specification requirements to be included in a system sized differently than these documents indicate.

- DC/AC ratio minimum 1.2
- 10 year minimum racking warranty
- 10 year minimum solar panel warranty
- 20 year minimum Optimizer warranty
- 10 year minimum Inverter warranty
- 5 year minimum installation warranty
- Compliance with California's Go Solar program as stated in Section 48 14 00 Solar Energy Electrical Power Generation Equipment

The extension of the A/C feeders from the 3rd floor roof down to the 1st floor panel shall be provided and installed under a separate contract. See drawings for more information.

PART 1 - GENERAL

1.00 INDEX

| DIVISION 26 ELECTRICAL | | SUBMITTAL REQUIRED |
|-------------------------------|--|-------------------------------|
| 26 00 01 | Electrical General Requirements | NO |
| 26 05 19 | Wire & Cable 600 Volt and Below | YES |
| 26 05 26 | Grounding and Bonding | YES |
| 26 05 29 | Supporting Devices | NO |
| 26 05 33 | Raceways and Boxes | NO |
| 26 27 26 | Wiring Devices | YES |
| 48 14 00 | Solar Energy Electrical Power Generation Equipment | YES |

1.01 DESCRIPTION

- A. Work Includes:
1. Furnish all labor materials, tools, equipment, and services for all electrical work as indicated, in accord with provisions of Contract Documents.
 2. Completely coordinate with work of all other trades.
 3. Although such work is not specifically called out on drawing, the contractor shall furnish and install all miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
 4. See Division 01 for General Requirements.
- B. Drawings Use and Interpretation:
1. Drawings are diagrammatic and indicate general arrangement of systems and equipment, except when specifically dimensioned or detailed.
 2. For exact locations of building elements, refer to dimensioned architectural/structural drawings.
 3. Field measurements take precedence over dimensioned drawings.
 4. Intention is to show size, capacity, approximate location, direction and general relationship of one work phase to another, but not exact detail or arrangement.
 5. Field verify locations and arrangement of all existing systems and equipment.
 6. Omissions no later than ten (10) days before bid opening, the Contractor shall call the

attention of the Architect/Engineer to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted.

7. If any errors or omissions appear in Drawings, Specifications, or other documents, bidding Contractor shall notify Engineer no later than ten (10) days prior to submitting bid. Should conflict occur in or between drawings and specifications, bidding contractor is deemed to have estimated more expensive way of doing work, unless he shall have asked for and obtained written decision (addendum) before submission of bid as to which method or materials will be required.
- C. Installation of all systems and equipment is subject to clarification as indicated in reviewed shop drawings and field coordination drawings.
- D. Dimensions indicated are limiting dimensions.
- E. Do not use equipment exceeding dimensions indicated or equipment or arrangements that reduce required clearances or exceed specified maximum dimensions.
- F. Description of systems: Furnish and install all materials to provide functioning systems in compliance with performance requirements specified, and any modifications required by reviewed shop drawings and field coordinated drawings.
- G. Definitions:
 1. A/E: Architect and/or Engineer
 2. Provide: Furnish, install, wire and connect complete by Contractor.
 3. Contractor/EC: The person or group responsible for project construction under Divisions 26, 27 and 28.
 4. The word "ENERGIZE" means all material and labor necessary to apply voltage to a device or item of equipment to make same operational.
 5. The word "CODE" means all applicable codes.
 6. Corrosive areas are pool areas, pool equipment areas, chemical areas and/or as indicated on drawings.
 7. Unless noted otherwise, the terminology used throughout the Specifications shall be interpreted as defined in Article 100 of the NEC.

1.02 WEATHERPROOF EQUIPMENT

- A. Where weatherproof (WP) equipment is indicated, use NEMA 3R enclosures.
 1. All exterior devices and equipment shall be weather-proof.

1.03 CORROSIVE ENVIRONMENTS

- A. In areas noted with corrosive atmosphere; use NEMA 12 code gage steel with rust-inhibiting primer and baked enamel finish or reinforced fiberglass enclosures.

1.04 QUALITY ASSURANCE

- A. Perform all work and install materials and equipment in full accordance with the latest applicable rules, regulations, requirements, and specifications of the following:

State and Federal Laws
National Electrical Testing Association (NETA)
National Electrical Code (NEC 2011 Edition)
International Building code (IBC)
Life Safety Code (NFPA-101)
National Electrical Safety Code (NESC)
American National Standards Institute (ANSI)
National Electrical Manufacturers Association (NEMA)
Institute of Electrical and Electronic Engineers (IEEE)
Insulated Power Cable Engineers Association (ICEA)
The Occupational Safety and Health Act (OSHA)
American Society for Testing and Materials (ASTM)

Underwriters' Laboratory (UL)
Wisconsin Safety and Professional Services Code
Department of Natural Resources NR-101
Local laws, codes and ordinances
ADA Accessibility Guidelines

- B. Conflicts, if any that may exist between the above items, the more restrictive shall govern.
- C. The Electrical Contractor is charged with responsibility for full compliance with local interpretations of applicable Codes. After entering into contract, this Contractor will be held to complete all work as per the foregoing without extra compensation.

1.05 SUBMITTALS

- A. General:
 - 1. The A/E's review of shop drawings or samples shall not relieve the EC of responsibility for any deviation from the contract documents. The EC shall include with the shop drawings an index sheet detailing all deviations from the contract documents, and will be held responsible for all deviations unless he has received written approval from the A/E for the specific deviation, separate from general shop drawing approval. The A/E's review shall not relieve the EC from responsibility for errors or omissions in the shop drawings or samples.
- B. Shop Drawings:
 - 1. As indicated.
 - 2. Provide a scaled roof plan showing location of all equipment and wiring paths.
 - 3. Provide a complete one-line diagram of proposed system.
 - 4. The Contractor shall review the shop drawings and stamp with his approval prior to submitting shop drawings to A/E for review.
 - 5. Shop drawings shall be submitted electronically in an editable PDF format file. PDF file name shall contain specification number and product name. Provide one submittal (PDF file) for each specification section submitted. Each shop drawing submittal shall contain the following:
 - a. Cover Sheet
The submittals shall contain a cover sheet, which shall include the following information:
 - 1) Submittal Date
 - 2) Specification Section(s)
 - 3) Manufacturer's Representative (Contact Name, address, and telephone number)
 - 4) Electrical Contractor (Contact Name, address, and telephone number)
 - 5) Project Name, Project City, Project State, and Project Address.
 - b. Equipment List
A complete equipment list of all components, including the following: Quantity, Manufacturer, Part Number, and Description. If the supplier uses different part numbers from those of the actual manufacturer, the actual manufacturer and part numbers as they appear - marked on the shipping box/packages, shall also be identified on this list.
 - c. Product Data:
Manufacturer's product data sheets and equipment description of all system components. These data sheets shall be highlighted or suitably marked, so that included items and options are indicated. On data sheets that include multiple products, products that are not used shall be crossed out.
 - 1) Product Data Sheets shall be organized, in order, corresponding to the FIRST occurrence of the corresponding item on the equipment list.
- C. Samples:
 - 1. As indicated in Divisions 26, 27 and 28.
- D. Project Information:
 - 1. As indicated in Divisions 26, 27 and 28.

- E. Approval Documents:
 - 1. Prepare and submit all drawings, calculations, and professional seals as required to Federal, State and local authorities having jurisdiction.

1.06 PROTECTION

- A. Provide covering and shielding for all equipment to protect from damage.
- B. Protect nameplates on motors and similar equipment, to prevent defacing.
- C. Repair, restore or replace damaged, corroded and rejected items.

1.07 JOB CONDITIONS

- A. Cause as little interference or interruption of existing utilities and services as possible. Schedule work which will cause interference or interruption in advance with Owner, Architect, authorities having jurisdiction and all affected trades.
- B. Examine Contract Documents to determine how other work will affect execution of electrical work.
- C. Determine and verify locations of all existing utilities on or near site.
- D. Make arrangements for and pay for necessary permits, licenses, and inspections.
- E. Record drawings:
 - 1. Keep a complete set of all electrical drawings in job site office for showing actual installation of electrical systems and equipment.
 - 2. Use this set of drawings for no other purpose.
 - 3. Where any material, equipment, or system components are installed differently from that shown, indicate differences clearly and neatly using ink or indelible pencil.
 - 4. At project completion, submit record set of drawings (See Division 01).

1.08 QUALIFICATIONS

- A. Where specified in various Sections of this DIVISION, final wiring terminations to all equipment and testing of the completed system shall be done by a factory authorized representative. The representative shall be part of a fully equipped service organization capable of furnishing adequate maintenance to the entire system, including factory replacement parts.

1.09 COORDINATION

- A. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other sections.
- B. Determine connection locations and requirements.
- C. Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.
- D. Sequence electrical connections to coordinate with start-up schedule for equipment.
- E. Coordination: Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection and operation.
 - 1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
 - 2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Acceptable Manufacturers:
 - 1. Individual items:
 - a. Base: As noted
 - b. Optional: As noted
 - 2. Other manufacturers desiring approval comply with Instruction to Bidders
- B. Use only prime quality, new materials, apparatus and equipment.
- C. Use U/L labeled electrical materials where listing has been established for materials or devices in question.
 - 1. Manufactured items and fabricated assemblies of electrically operating equipment: U/L approval or U/L reexamination listing.
- D. Structural steel for supports: ASTM A36.
 - 1. Galvanize members or "H" green steel frame installed in areas of high humidity or condensation.
 - 2. Furnish other members with shop coat of rust inhibiting primer.
 - 3. Shop fabricate for field assembly using bolts.
 - 4. Minimize field welding.
 - 5. Retouch primer and galvanizing after field welding.
- E. Rain hoods and counter flashing not exposed to view:
 - 1. Stainless steel: Minimum 20 GA (0.91 mm).
 - 2. Sheet copper: Minimum 24 OZ.
- F. Rain hoods and counter flashings exposed to view: As specified in Division 07.
- G. Access doors, panels and frames:
 - 1. Style and type required for material in which installed.
 - 2. All materials, equipment and other electrical apparatus subject to replacement, inspection or maintenance shall be readily accessible. The Electrical Contractor shall provide metal access panels of required size and type to meet the requirements for access to equipment located in walls, above ceilings or furred in spaces. Exception: Wherever accessible acoustical tile ceilings are employed.
 - 3. Non-secure area access panels:
 - a. Size: Minimum 12 x 12 IN (300 x 300 mm), or larger as required.
 - b. Minimum 14 GA (1.9 mm) sheet metal, cadmium plated or galvanized after fabrication.
 - c. Key lock, keyed alike, for panels in public areas.
 - d. Prime painted.
 - e. U/L labeled in fire rated construction.
 - f. Base manufacturer: J L Industries.
 - g. Optional: Ventfab; American Warming; Potter-Roemer and Milcor Inc.
 - h. Other manufacturers desiring approval comply with Instructions to Bidders.

2.02 FIRESTOPPING

- A. Firestop all penetrations of fire rated walls, floors and assemblies.
- B. Use materials and methods as specified in Division 07.

PART 3 - EXECUTION

3.01 GENERAL

- A. Use only thorough, highly skilled, and experienced workmen.
- B. When changes in location of any work are required, obtain approval of Architect before making change.
 - 1. Make changes at no extra cost.
- C. Do not change indicated sizes without written approval of Architect.
- D. Provide all necessary offsets and crossovers in conduits, raceways, cable trays and ducts.
- E. Install exposed conduits parallel to walls and ceilings and vertically plumb, unless otherwise indicated.

3.02 CUTTING AND PATCHING

- A. Perform or pay for all cutting, fitting, repairing, patching and finishing of work of other sections where it is necessary to disturb such work to permit installation of electrical work.
 - 1. Repair or replace existing or new work disturbed.
- B. Avoid cutting, where possible, by setting sleeves or frames, and by requesting openings in advance.
- C. Before cutting obtain approval of Architect. See Division 01.
 - 1. Use only approved methods.
 - 2. Cut all holes neatly and as small as possible to admit work.
 - 3. Do not weaken walls or floors; locate holes in concrete to miss structural sections.
- D. Locate openings and sleeves to permit neat installation of conduits and equipment.
- E. Do not remove or damage fireproofing materials.
 - 1. Install hangers, inserts, supports, and anchors prior to installation of fireproofing.
 - 2. Repair or replace fireproofing removed or damaged, at no extra cost, in accordance with special conditions.

3.03 INSTALLATION OF EQUIPMENT

- A. Install all equipment in accord with manufacturer's recommendations.
- B. Provide all necessary anchoring devices and supports.
 - 1. Use structural supports suitable for equipment.
 - 2. Check loadings and dimensions of equipment with shop drawings.
 - 3. Do not cut, or weld to, building structural members.
- C. Verify that equipment will fit support layouts indicated.
 - 1. Where substitute equipment is used, revise indicated supports to fit at no additional cost.
- D. Arrange for necessary openings to allow entry of equipment.
 - 1. Where equipment cannot be installed as structure is being erected, provide and arrange for building-in of boxes, sleeves or other devices to allow later installation.
- E. Make all penetrations through roofs prior to installation of roofing. For penetrations required after installation of roofing:
 - 1. In built up roofing (BUR), provide all curbs, cants and base flashings.
 - 2. In elastic sheet roofing (ESR), arrange and pay for flashing work by authorized roofer.
- F. Install rain hoods and metal counter flashings as indicated and to make all penetrations of electrical work through walls and roofs water and weather tight.

1. Furnish all clamps, waterproofing material and labor necessary.
 2. Where metal flashings are applied over concrete, paint concrete with 1/8 IN (3 mm) of mastic cement first.
 3. Set flashing in mastic cement, watertight.
- G. Have repair and replacement of roof construction, damaged by this work, done in manner which will not nullify roof warranty.
- H. Install equipment to permit easy access for normal maintenance.
1. Maintain easy access to switches, motors, drives, pull boxes, receptacles, etc.
 2. Relocate items which interfere with access.
- I. Where equipment components are installed prior to final installation (back boxes, panel tubs, fixture frames), these components shall be properly protected from construction debris (paint, dirt, plaster, etc.)
- J. Provide Seismic Tested Equipment:
1. Provide all supporting devices and bracing as required for the installation of electrical equipment and materials. All supports and installation procedures are to conform to the latest requirements of the ASCE Chapter 13 Code for electrical equipment. In addition to providing all supports, anchors, etc., provide all required seismic bracing, supports, anchors, etc. necessary for compliance with applicable codes for structures located within project seismic zones, for the following equipment but not limited to: life safety equipment, battery racks, transformer, cable trays and equipment over 100 lbs.
 2. The manufacturer of the electrical equipment may certify the equipment based on a detailed computer analysis of the entire assembly structure and its components. Guidelines for the installation consistent with these requirements shall be provided by the equipment manufacturer and based upon testing of representative equipment. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment.
 3. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards.
 - a. The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision, prepared and stamped by a licensed civil engineer in the state. Mounting recommendations shall be provided by the manufacturer based upon approved shake table tests used to verify the seismic design of the equipment.
 - b. The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.
 - c. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.
- K. In wet and damp locations, use steel channel supports to stand cabinets and panelboards one inch off wall.

3.04 PAINTING

- A. See Division 09.
- B. By Electrical Contractor:
1. Touch up or completely paint all factory painted Electrical System components which have become rusted, scratched, or otherwise damaged during construction (which are not painted under Division 09) to match the original finish or pay for restoration of such items as may be stipulated by the AE.
 2. Building surfaces/finishes previously painted by the General Contractor and damaged by the Electrical Contractor shall be repainted/refinished by the General Contractor at the Electrical Contractor's expense.

3.05 FIELD QUALITY CONTROL

- A. Perform indicated tests to demonstrate workmanship, operation, and performance.
 - 1. Conduct tests in presence of Architect and, if required inspectors or agencies having jurisdiction.
 - 2. Arrange date of tests in advance with Architect, manufacturer and installer.
 - 3. Give all inspectors minimum of 24 hours' notice.
 - 4. Furnish or arrange for use of electrical energy, steam, water, diesel fuel, or gas required for tests.
 - 5. Furnish all lubricating materials required for test.
 - 6. Provide written report on all tests.
- B. Repair or replace equipment and systems found inoperative or defective and retest.
 - 1. If equipment or system fails retest, replace it with products conforming to Contract Documents.
 - 2. Continue remedial measures and retests until satisfactory results are obtained.
- C. Test equipment and systems as indicated for each item, unless otherwise recommended by manufacturer.

3.06 FINAL PERFORMANCE TEST

- A. At completion of installation, test for: operation, panel load balance, short circuits, and ground.
 - 1. Provide written report on final performance test.

3.07 ADJUST AND CLEAN

- A. Inspect all equipment and put in good working order.
- B. Clean all exposed and concealed items.
- C. Where new work occurs in existing areas where no other work has been done, clean area and restore to original condition.

3.08 PUTTING SYSTEMS IN OPERATION - START UP

- A. Prior to energizing any equipment whether installed by this section or not:
 - 1. First make a thorough inspection of it to make sure it has been unpacked correctly and all packing materials and supports have been removed.
 - 2. Be responsible for assisting the equipment startup personnel to assure correct equipment connections and rotation.
- B. Prior to final acceptance, at time agreed to by Owner and Architect, put all systems in to satisfactory operation.
- C. Operate all systems in good working order for period of 5 working days.

3.09 TRAINING

- A. See section 48 14 00 for solar equipment training requirements.

END OF SECTION

SECTION 26 05 19

WIRE AND CABLE - 600 VOLT AND BELOW

PART 1 - GENERAL

1.01 DESCRIPTION

- A. General:
1. Furnish all labor, materials, tools, equipment, and services for all wire and cable (600 V and below) as indicated, in accord with provisions of Contract Documents.
 2. Completely coordinate with work of all other trades.
 3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
 4. See Section 26 00 01 for General Electrical Requirements.
 5. See Division 01 for General Requirements.

1.02 WORK INCLUDED

- A. Building wire and cable.
- B. Control wire and cable.
- C. Wiring connectors and connections.

1.03 RELATED SECTIONS

Section 26 05 33 - Raceways and Boxes
Section 26 05 53 - Electrical Identification

1.04 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

1.05 SHOP DRAWING SUBMITTALS

- A. Submit under provisions of General conditions and Section 26 00 01.
- B. Submit product data: Provide for each cable assembly type.
- C. Submit factory test reports: Indicate procedures and values obtained.
- D. Submit shop drawings for modular wiring system including layout of distribution devices, branch circuit conduit and cables, circuiting arrangement, and outlet devices.
- E. Submit manufacturer's installation instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.08 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Conductor sizes are based on copper.
- C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.
- D. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.09 COORDINATION

- A. Coordinate Work under provisions of General conditions and Section 26 00 01.
- B. Determine required separation between cable and other work.
- C. Determine cable routing to avoid interference with other work.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All wire shall be new, delivered to the site in unbroken cartons and shall be less than one year old out of manufacturer's stock.
- B. All conductors shall be copper.
- C. Insulation shall have a 600 volt rating.
- D. In mechanical rooms, light fixtures, and other high temperature applications, the insulation shall be rated 90°C. Other areas shall use insulation rated 75°C unless stated.
- E. All conductors must be suitable for the application intended. Conductors #10 and larger must be stranded. Conductors #12 and smaller may be solid or stranded with the following requirements or exceptions.
- F. All conductors terminated with crimp type devices must be stranded.
- G. Stranded conductors may only be terminated with UL or ETL Listed type terminations or methods: e.g. stranded conductors may not be wrapped around a terminal screw but must be terminated with a crimp type device if a terminal screw is used or must be terminated in an approved back wired method.

2.02 BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Insulation: Type THW, THHN/THWN, XHHW insulation for feeders and branch circuits.
- C. Use conductors not smaller than #12 AWG.

2.03 REMOTE CONTROL AND SIGNAL CABLE

- A. Use conductors not smaller than #16 AWG for control circuits.

2.04 WIRING CONNECTORS

- A. Split Bolt Connectors: Not acceptable.
- B. Solderless Pressure Connectors: High copper alloy terminal. May be used only for cable termination to equipment pads. Not approved for splicing.
- C. Spring Wire Connectors: Solderless spring type pressure connector with insulating covers for copper wire splices and taps. Use for conductor sizes 10 AWG and smaller.
- D. Mechanical Connectors: Bolted type tin-plated; high conductivity copper alloy; spacer between conductors; belled cable entrances.
- E. Compression (crimp) Connectors: Long barrel; seamless, tin-plated electrolytic copper tubing; internally beveled barrel ends. Connector shall be clearly marked with the wire size and type and proper number and location of crimps.

PART 3 - EXECUTION

3.01 GENERAL WIRING METHODS

- A. All wire and cable shall be installed in conduit unless indicated otherwise. However, low voltage control or signal cables may be installed without conduit above accessible ceilings if the cable meets NEC requirements for the application. Fire alarm cabling shall be installed in conduit.
- B. Except where fixture whips are configured in accordance with NEC 210.19(4), Exception No. 1, 330.30(D)(2), do not use wire smaller than 12 AWG for power and lighting circuits, 14 AWG for control wiring greater than 60 volts, or 18 AWG for voltages less than 60 volts, all sizes subject to NEC 725 requirements.
- C. All conductors shall be sized to prevent excessive voltage drop at rated circuit ampacity. As a minimum use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 100 feet, for emergency lighting and exit sign wiring, and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet. Wire and cable size shall be increased from size indicated unless indicated otherwise or required by code to meet the following voltage drop requirements:
 - 1. 3% drop for branch circuits.
 - 2. 5% drop for motor circuits.
- D. Make conductor lengths for parallel conductors equal.
- E. Splice only in junction or outlet boxes.

3.02 WIRING INSTALLATION IN RACEWAYS

- A. Pull all conductors into a raceway at the same time. Use Listed wire pulling lubricant for pulling 4 AWG and larger wires and for other conditions when necessary.
- B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
- C. Completely and thoroughly swab raceway system before installing conductors.
- D. Place all conductors of a given circuit (this includes phase wires, neutral (if any), and ground conductor) in the same raceway. If parallel phase and/or neutral wires are used, then place an

3.03 WIRING CONNECTIONS AND TERMINATIONS

- A. Splice only in accessible junction boxes.
- B. Wire splices and taps shall be made firm, and adequate to carry the full current rating of the

respective wire without soldering and without perceptible temperature rise.

- C. Use solderless spring type pressure connectors with insulating cover for wire splices and taps, 10 AWG and smaller.
- D. Use mechanical or compression connectors for wire splices and taps, 8 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor.
- E. Thoroughly clean wires before installing lugs and connectors.
- F. At all splices and terminations, leave tails long enough to cut splice out and completely resplice.

3.04 FIELD QUALITY CONTROL

- A. Feeders and branch circuits shall have their insulation tested after installation and before connection to utilization devices such as fixtures, motors, or appliances.
- B. Test shall be performed by meggar and conductors shall test free from short-circuits and grounds.
- C. Test conductors phase-to-phase and phase-to-ground.
- D. The contractor shall furnish the instruments, materials, and labor for these tests.

3.05 WIRE AND CABLE INSTALLATION SCHEDULE

- A. Interior Locations: Building and control wire in raceways.
- B. Above Accessible Ceiling: Building and control wire in raceways.
- C. Exterior Locations: Building and control wire in raceways.
- D. High Temperature Areas (light fixtures and mechanical rooms): Building wire rated 90°C in raceways.

3.06 WIRE COLOR

- A. General:
 - 1. Use existing color scheme.
- B. Neutral Conductors: White. Where there are two or more neutrals in one conduit, each shall be individually identified with the proper circuit. See requirements of NEC 200-6, 200-7, 210-4, and 310-12.
- C. Branch Circuit Conductors: Three or four wire home runs shall have each phase uniquely color coded.
- D. Feeder Circuit Conductors: Each phase shall be uniquely color coded.
- E. Ground Conductors: Green for 6 AWG and smaller. For 4 AWG and larger, identify with green tape at both ends and all visible points including in all junction boxes. See requirements of NEC 210-5 and 310-12.

3.07 BRANCH CIRCUITS

- A. In general, the use of multiwire branch circuits having a common neutral feeding loads, producing a high level of harmonics, is discouraged due to the problems with overheating of the common neutral.

- B. Therefore, if multiwire branch circuits used for loads producing harmonics (such as fluorescent lighting, and computer receptacles) then the neutral shall be sized two times phase conductor overcurrent protection.
- C. Multi-wire branch circuits shall be provided with a means that will simultaneously disconnect all ungrounded conductors at a point where the branch circuit originates. Contractor shall provide multi-pole breakers or approved breaker ties as required.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. General:
 - 1. Furnish all labor, materials, tools, equipment, and services for grounding as indicated in accord with provisions of Contract Documents.
 - 2. Completely coordinate with work of all other trades.
 - 3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
 - 4. See Section 26 00 01 for General Electrical Requirements.
 - 5. See Division 01 for General Requirements.

1.02 WORK INCLUDED

- A. Equipment grounding conductors.
- B. Bonding

1.03 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.
- B. IEEE/ANSI 142-1982 - Recommended Practice for Grounding of Industrial and Commercial Power System.

PART 2 - PRODUCTS

2.01 MECHANICAL CONNECTORS

- A. Acceptable Manufacturers
 - 1. Burndy Co., Hy-Ground Series
 - 2. Or Equal
 - 3. Substitutions: Under provisions of General Conditions and Section 26 00 01.
- B. Type: Compression type applied with compression tool.
- C. Material: Bronze

PART 3 - EXECUTION

3.01 GENERAL

- A. Install Products in accordance with manufacturer's instructions.
- B. Mechanical connections shall be accessible for inspection and checking. No insulation shall be installed over mechanical ground connections.
- C. Ground connection surfaces shall be cleaned and all connections shall be made so that it is impossible to move them.

3.02 LESS THAN 600 VOLT SYSTEM GROUNDING

- A. Receptacle Grounding: All receptacle circuits and permanently wired equipment, except light fixtures, shall have a separate grounding conductor. Receptacles shall be connected to the ground conductor utilizing pigtails. At time of final inspection, any one device found improperly grounded shall mean a complete check by the Contractor of every device on the project at no additional cost to the Owner.
- B. Provide separate ground wire for light fixtures, motors and other equipment items from equipment items to nearest conduit system box. Provide green wire ground continuously from panel to all surface raceway systems and where indicated on plans.
- C. Provide grounding conductor in all non-metallic and flexible raceways. Terminate each end on a grounding lug, bus or bushing.
- D. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder circuit raceway. Terminate each end on suitable lug, bus, or bushing. Where conductors are run in parallel in multiple raceways or cables, the equipment grounding conductors shall be run in parallel in each raceway or cable. Each parallel equipment grounding conductor shall be sized on the basis of the ampere rating of the overcurrent device protecting the circuit conductors in the raceway or cable.
- E. Equipment grounding shall comprise a permanent bonding together of all metallic, noncurrent - carrying parts of the Electrical System (raceways, boxes, panels, cabinets, equipment enclosures, housings, motor frames, lighting fixtures, etc.) to insure a continuous grounding circuit. Provide a grounding bushing on each conduit entering service entrance equipment, bonding same to equipment grounding stud/bar/bus.
- F. Equipment Grounding Conductor: Provide separate, insulated grounding conductor in all branch circuit and feeder raceways. Terminate each end on suitable lug, bus, or bushing.

3.03 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

END OF SECTION

SECTION 26 05 29
SUPPORTING DEVICES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. General:
 - 1. Furnish all labor materials, tools, equipment and services for all conduit and equipment supports, straps, clamps, steel channel, etc., and fastening hardware for supporting.
 - 2. Completely coordinate with work of all other trades.
 - 3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
 - 4. See Section 26 00 01 for General Electrical Requirements.
 - 5. See Division 01 for General Requirements.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. CADDY
- B. B-Line
- C. Steel City

2.02 MATERIAL

- A. Support Channel: Galvanized
- B. Hardware: Corrosion resistant

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using precast insert system, expansion anchors, preset inserts, beam clamps, spring steel clips. Do not use spring steel clips and clamps. Do not hang any device directly from a metal deck.
- B. File and debur cut ends of support channel and spray paint with cold galvanized paint to prevent rusting.
- C. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
- D. Do not fasten supports to piping, ductwork, mechanical equipment, cable tray or conduit.
- E. Do not use powder-actuated or plastic anchors.
- F. Do not drill structural steel members unless approved by Architect/Engineer.
- G. Fabricate supports from galvanized structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

- H. Install surface-mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch off wall.
- I. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.
- J. Furnish and install all supports as required to fasten all electrical components required for the project, including free standing supports required for those items remotely mounted from the building structure, catwalks, walkways, etc.
- K. Minimum sized threaded rod for supports shall be 3/8".
- L. Conduit clamps, straps, supports, etc., shall be steel or malleable iron. All straps shall have steel or malleable backing plates.
- M. Conform to Specification Section 05 05 30, "Post-Installed Anchors in Concrete and Masonry (CMU)" for connections of hangers and supports to the structure.

END OF SECTION

SECTION 26 05 33

RACEWAYS AND BOXES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Includes:
1. Furnish all labor, materials, tools, equipment and services for all raceways as indicated, in accord with provisions of Contract Documents.
 2. Completely coordinate with work of all other trades.
 3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
 4. See Section 26 00 01 for General Electrical Requirements.
 5. See Division 1 for General Requirements.

1.02 WORK INCLUDED

- A. Electrical Metallic Tubing (EMT) and Fittings
- B. Liquidtight Flexible Metal Conduit and Fittings
- C. Conduit Supports
- D. Expansion Fittings
- E. Conduit Bodies
- F. Seals
- G. Outlet Boxes
- H. Pull and Junction Boxes
- I. Conduit Sizing, Arrangement and Support
- J. Conduit Installation
- K. Conduit Installation Schedule
- L. Connections and Fittings
- M. Supports, Sleeves and Seals
- N. Fire Stops and Penetration Seals
- O. Cutting and Patching
- P. Coordination of Box Locations
- Q. Outlet Box Installation
- R. Pull and Junction Box Installation
- S. Pull and Junction Box Installation Requirements

1.03 RELATED WORK

Section 26 27 26 - Wiring Devices

PART 2 - PRODUCTS

2.01 ELECTRICAL METALLIC TUBING (EMT)

- A. Standard lengths and size.
- B. Minimum conduit size shall be 1/2 inch.
- C. Connectors and Couplings: Threaded, insulated throat, gland compression type, rain and concrete tight. No set screw, push on or indenter type permitted.

2.02 LIQUID-TIGHT FLEXIBLE METAL CONDUIT AND FITTINGS

- A. Galvanized flexible steel.

- B. Standard conduit sizes.
- C. Heavy wall PVC jacket.
- D. Connectors: Liquidtight, suitable for grounding, suitable for wet locations. Tapered threaded hub, nonmetallic material.

2.03 EXPANSION FITTINGS

- A. Copper bonding jumper: Crouse Hinds Type XJ.
- B. Expansion/Deflection Fittings: Copper bonding jumper Crouse-Hinds Type XD.
- C. PVC expansion fittings installed per manufacturer's recommendations. Heritage Plastic Group 59000 Series or approved equal.

2.04 CONDUIT BODIES

- A. Galvanized or cadmium plated with threaded hubs.
- B. Removable cover, with gasket.
- C. Corrosion-resistant screws, 316 stainless steel.

2.05 EMPTY CONDUIT AND OUTLET BOXES

- A. Conduit: As specified in Section 26 00 01.
- B. Conduit Stub-outs: From outlet box to 6 IN above nearest lay-in type building main corridor ceiling, terminated with insulated bushing.
 - 1. Provide pulling wire or heavy nylon pulling cord for conduit more than 25 FT long.
 - 2. CCTV antenna stub-outs: 1/2 IN.
 - 3. Monitor outlets: Provide 1-1/2 IN conduit between input and output junction box.
- C. Outlet Box - General: With extension ring, of proper size and depth, with cover plate to match wiring device cover.

2.06 OUTLET BOXES

- A. Acceptable Manufacturers:
 - 1. Galvanized boxes:
 - a. Base: Appleton Electric Co.; Steel City; and Raco.
 - 2. Corrosion resistant boxes and fittings:
 - a. Base: Crouse-Hinds; and Appleton Electric Co.
 - 3. PVC boxes F Series with ground lug.
 - a. Base: Heritage Plastic Group.
 - 4. Junction box and conduit supports:
 - a. Base: CADDY.
 - 5. Other manufacturers desiring approval comply with Instruction to Bidders.
- B. Switch and Receptacle Boxes for Concealed Wiring: Galvanized.
 - 1. Provide bar hangers or CADDY quick mount for metal stud partitions.
 - 2. Narrow switch boxes (for hollow metal jambs): Raco 426.
 - 3. Between studs provide CADDY bar hanger assembly series BHA.
- C. Exposed switch and receptacle boxes: Corrosion resistant, cast, ferrous metal, with threaded hubs; Crouse-Hinds Type FS.
- D. Weatherproof receptacle boxes: Corrosion resistant cast ferrous metal type, with threaded hubs and neoprene gasket; Crouse-Hinds Type FS.

- E. Pull and junction boxes: Code-sized galvanized steel boxes provided with plain blank removable covers held in place with screws unless otherwise indicated.
 1. Where sizes are not indicated, use 4 IN square or NEC size.
- F. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- G. Install boxes to preserve fire resistance rating of partitions and other elements.
- H. Wall outlets shall comprise of 4" square box with a flush single gang raised cover and blank.

2.07 PULL AND JUNCTION BOXES

- A. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- B. Acceptable Manufacturers:
 1. For interior work, provide galvanized sheet metal boxes of code thickness with lapped and welded joints, 3/4" flanges and screw covers.
 2. For exterior work, provide galvanized sheet metal boxes of code thickness with lapped and welded joints, 3/4" flanges, bolted covers with full gaskets forming a completely raintight assembly, equal to Keystone 19000 series.
 3. For exterior work in graded areas outside the building, provide heavy duty sidewalk junction boxes externally flanged for flush mounting. Covers shall be fully gasketed, watertight with grounding strap and secured with plated screws or bolts equal to Quazite Type PC. Covers shall have logo naming the type of system, electric, high voltage lighting, etc. Shall comply with NEC 314.
- C. Large Pull Boxes: Boxes larger than 100 cubic inches in volume or 12 inches in any dimension.
 1. Interior Dry Locations: Use hinged enclosure.
 2. Other Locations: Use surface-mounted cast metal box.

PART 3 - EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT AND SUPPORTS

- A. Cut joints shall be square, reamed smooth, and drawn up tight.
- B. Keep conduit plugged, clean, and dry during construction.
- C. Install No. 12 pull wire in empty conduit.
- D. Cap spare conduits.
- E. Provide riser clamps around all conduits 1-1/4" or larger that are routed between floors.
- F. Provide a watertight conduit system where installed in wet locations.
- G. Conform to specification Section 05 05 30 "Post-Installed Anchors in Concrete and Masonry (CMU)" for connections of hangers and supports to the structure.

3.02 CONDUIT INSTALLATION

- A. Install all conduits concealed within finished areas of building.
- B. Exposed overhead conduits may be used in Switchgear Room, Mechanical Equipment Rooms, Electric Closets, and unfinished Storage and Equipment Rooms.
- C. Run exposed conduit in straight lines at right angles to or parallel with walls, beams or columns.
- D. Keep conduit away from waterlines or heating duct lines. Where crossings are unavoidable, leave

minimum 6 IN clearances.

- E. Conduits installed within 1-1/2" under metal-corrugated sheet roof decking shall be rigid metal or intermediate metal conduit.
- F. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.

3.03 CONDUIT INSTALLATION SCHEDULE

- A. Support all conduit systems from building structure or structure with approved hangers or supports.
 - 1. Do not support from piping, ducts or support systems for piping or ducts.
 - 2. Do not install to prevent ready removal of piping, ducts or ceiling tiles.
 - 3. Do not support from ceiling or ceiling support systems.
- B. Do not install more than the equivalent of three 90° bends (270 degrees total) in any conduit run.
 - 1. Where more bends are necessary, install junction box or pullbox.
 - 2. Make all bends in 1/2 IN and 3/4 IN conduit (1 IN EMT) with a conduit bender.
 - 3. Use machine bends for larger sizes.
 - 4. See Section 27 05 28 Communication Conduit System for communication conduit requirements.
- C. Make joints in threaded conduit watertight with white nonleaded compound applied to male threads only.
 - 1. Cut square, ream smooth, and properly thread field joints to receive couplings.
 - 2. Do not use running threads.
- D. Fit all conduit ends at switch and outlet boxes with approved tight bond with box when screwed tightly in place.
- E. Remove moisture and debris from conduit before wire is drawn into place. Tightly plug ends of conduit with tapered wood plugs inserts until wire is pulled.
- F. Neatly seal openings around conduits, etc., where they pass through fire rated construction or exterior walls or roof.

3.04 CONNECTIONS AND FITTINGS

- A. Above lay-in tile ceilings, make connections to lay-in type fixtures with 3/8 or 1/2 IN x 6 FT long flexible steel conduit.
 - 1. Include no. 14 branch and grounding conductors or as indicated in NEC 210.19(A) Exception No. 1.
 - 2. Arrange conduit and box systems for easy removal of lay-in ceiling.
- B. Motor and equipment connections:
 - 1. Use PVC coated type with liquid tight connectors.
- C. Install electrical fittings in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that fittings serve intended purposes.
- D. Rigidly secure connectors at cabinets and boxes with galvanized lock nut and bushing.
- E. Seal conduits that run through different temperature or atmospheric conditions to prevent condensations or moisture from entering electrical equipment and devices.
- F. Install wall entrance seal where conduits or direct burial conductors pass through foundation walls below grade.
- G. Install conduit expansion fittings complete with bonding jumper in following locations:
 - 1. Conduit runs which cross a structural expansion joint.
 - 2. Conduit runs where movement perpendicular to axis of conduit may be encountered.

- H. Locate conduit bodies so as to assure accessibility of electrical wiring.
- I. Install fittings designed for use with flexible liquid-tight conduit to ensure continuity of ground throughout the fittings and conduit and prevent entrance of moisture.

3.05 SUPPORTS, SLEEVES AND SEALS

- A. Conduit Hangers - General: Threaded rods, with straps or clamp conduit holder. For corrosive areas use stainless steel 316 threaded rods, nuts and anchors.
 - 1. Do not use perforated strap hangers or wire.
 - 2. Use trapeze assemblies for multiple conduits.
 - a. Trapeze assembly to consist of threaded rod hangers, Unistrut P1000 strut and Caddy SCH conduit clips.
 - 3. Provide sufficient hangers for support of electrical work and equipment to limit load on single hanger to 25 LB, max.; space not over 8 FT on center.
 - 4. Hangers in metal roof deck: Do not extend above tops of ribs, or otherwise interfere with vapor barrier, insulation or roofing.
 - 5. For PVC conduit provide non-metallic straps, chemical and corrosion resistant, UV inhibited, spaced per N.E.C. section 352.30. 316 stainless steel bolts and anchors shall be used.
- B. Hangers for joint between precast units: Fehr Bros., T-Hanger; Heckman Building Prod., No. 480; and Dayton Sure-Grip, F-68.
 - 1. Space minimum 4 IN from walls and minimum 2 IN apart.
- C. Hanger fasteners: Provide inserts or fasteners to attach hangers to structure.
 - 1. Do not use drilled or explosive driven inserts in precast-prestressed concrete construction.
 - 2. Drilled or explosive driven inserts may not extend more than 1 IN into post-tensioned concrete construction.
 - 3. Attachment to metal roof deck may be by means of prepunched tabs, prepunched holes, or with screws in sides of ribs or toggle bolts in bottom of ribs.
 - 4. Do not use concrete nails in masonry walls.
- D. Support for conduit in GWB walls:
 - 1. Vertical support:
 - a. If conduit is to be fastened to wall stud, provide conduit support clip mounted to stud.
 - b. If conduit is to be supported between studs provide bar hanger and bar hanger conduit clips.
 - 2. Horizontal support:
 - a. Provide conduit clips to secure conduit to studs when passing through studs horizontally.
 - b. Space clips as indicated for support.
 - 3. Do not use wire as means of anchor or support.
- E. Sleeves: Rigid steel conduit in plenum areas, and PVC in non-plenum and corrosive areas, sized to accommodate work passing through.
- F. Sealer for sleeves and openings around conduit: UL listed for assembly. See Division 07. Install per manufacturer's recommendations.
- G. All penetrations of floor slab at mechanical rooms above grade shall be sealed off and waterproofed.

3.06 FIRE STOPS AND PENETRATION SEALS

- A. All penetrations through fire rated floors and walls due to the electrical installation shall be sealed with CHASE-FOAM PR-855 Fire Resistant foam Sealant, to prevent the spread of smoke, fire, toxic gas or water through the penetration either: before, during, or after a fire. The fire rating of the penetration seal shall be at least that of the floor or wall into which it is installed, so that the original

fire rating of the floor or wall is maintained as required by Article 300-21 of the National Electrical Code. Equivalent foam sealant manufactured by Dow Corning approved.

- B. The sealant shall remain soft and pliable to allow for the removal and/or addition of cables without the necessity of drilling holes. It shall adhere to itself perfectly to allow any and all repairs to be made with the same material. It shall permit the vibration, expansion and/or contraction of anything going through the penetration without the seal cracking or crumbling.
- C. When damming materials are to be left in place after the seal is complete then all such materials shall be nonflammable.
- D. When sealant is injected into a penetration, the foam shall expand to surround all the items within the penetration and maintain pressure against the walls of the penetration. The foam shall cure within five minutes and be fire resistant at that time. No heat shall be required to further expand the foam to block the passage of fire and smoke or water.
- E. All wall or floor penetration openings shall be as small as possible.
- F. The foam sealant shall meet all fire test and hose stream test requirements of ASTM E119-73 and shall be UL Classified as a Wall Opening Protective Device.

3.07 CUTTING AND PATCHING

- A. Provisions for openings, holes, and clearances through walls, floors, ceiling, and partitions shall be made in advance of construction.
- B. Provide cutting, patching and painting necessary for the installation of electrical systems.
- C. Install 22 ga. galvanized iron steel pipe sleeves, 1 IN larger in diameter than the conduit to be routed through concrete or masonry construction. Sleeves shall extend 2" above and below the floor slab penetrated.

3.08 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
- B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.
- C. No outlet shall be located where it will be obstructed by other equipment, piping, lockers, benches, counters, etc.
- D. It shall be the Contractor's responsibility to study drawings pertaining to other trades, to discuss location of outlets with workmen installing other piping and equipment and to fit all electrical outlets to job conditions.
- E. In case of any question or argument over the location of an outlet, the Contractor shall refer the matter to the Architect/Engineer and install outlet as instructed by the Architect/Engineer.
- F. The proper location of each outlet is considered a part of this contract and no additional compensation will be paid to the Contractor for moving outlets which were improperly located.
- G. Locate and install boxes to allow access to them. Where installation is inaccessible, coordinate locations and provide 18 inch (450 mm) by 24 inch (600 mm) access doors.
- H. Locate and install to maintain headroom and to present a neat appearance.
- I. Install boxes to preserve fire resistance rating of partitions and other elements, using approved materials and methods.

- J. Boxes installed in corrosive areas shall be PVC type to match conduit. Corrosive areas are pool areas, pool equipment areas, chemical areas and/or as indicated on drawings.

3.09 OUTLET BOX INSTALLATION

- A. Do not install boxes back-to-back in walls. Provide minimum 6 inch separation, except provide minimum 24 inch separation in acoustic-rated walls.
- B. Recessed outlet boxes in masonry, drywall, concrete, or tile construction shall be masonry type; minimum 4 inch square with 4 inch square-cut device covers. Locate boxes in masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.
- C. Provide knockout closures for unused openings.
- D. Support boxes independently of conduit.
- E. Use multiple-gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- F. Install boxes in wall without damaging wall insulation.
- G. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- H. Ceiling outlets shall be 4 inch octagon, minimum 2-1/8 inch deep except that concrete boxes and plates will be approved where applicable. Position outlets to locate luminaires as shown on reflected ceiling plans. All ceiling outlets shall be equipped with 3.8 inch fixture studs.
- I. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches of recessed luminaire, to be accessible through luminaire ceiling opening.
- J. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.
- K. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.
- L. Provide cast outlet boxes in exterior locations exposed to the weather and wet locations.
- M. Surface wall outlets shall be 4 inch square with raised covers for one and two gang requirements. For three gang or larger requirements, use gang boxes with non-overlapping covers.
- N. All boxes on a common wall with common mounting heights shall be mounted so faceplates are level and square to each other. Adjustments required after installation shall be made without additional compensation.
- O. Boxes that are shown on hollow-core, precast concrete shall be flush mounted into the spancrete unless shown otherwise on drawings. Coordinate opening to be in hollow core. Provide opening.

3.10 PULL AND JUNCTION BOX INSTALLATION

- A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.
- B. Support pull and junction boxes independent of conduit.

3.11 PULL AND JUNCTION BOX INSTALLATION REQUIREMENTS

- A. Provide junction boxes as shown on drawings and otherwise where required, sized according to number of conductors in box or type of service to be provided. Minimum junction box size 4" square and 2-1/8" deep. Provide screw covers for junction boxes.

- B. Use minimum 16 gauge steel for pull boxes and provide with screw cover.
- C. Install boxes in conduit runs wherever necessary to avoid excessive runs or bends. Do not exceed 100' runs without pull boxes.
- D. Rigidly secure boxes to walls or ceilings. Conduit runs will not be considered as adequate support.
- E. Install boxes with covers in accessible locations. Size boxes in accordance with Article 314 of the latest edition of the National Electric Code.
- F. Do not install pull or junction boxes for joint use of line voltage and signal or low voltage controls unless all conductors are insulated for the highest voltage being used in the same box.
- G. Install all components as indicated.
- H. Tag ends of conduit with system identification letters.
- I. Test conduit for clear passage.
- J. Neatly mark inside of outlet boxes with system identification letters using black felt-ink mark.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. General:
1. Furnish all labor, materials, tools, equipment, and services for all wiring devices as indicated, in accord with provisions of Contract Documents.
 2. Completely coordinate with work of all other trades.
 3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices and incidental to or necessary for a sound, secure and complete installation.
 4. See Section 26 00 01 for General Electrical Requirements.
 5. See Division 01 for General Requirements.

1.02 SUBMITTALS

- A. Submit a Lighting Plan marked by manufacturer showing the location, orientation and model number of all occupancy sensors and power packs and all other accessories. Provide interconnecting wire diagrams and catalog cut sheets of all occupancy sensors and power packs.

PART 2 - PRODUCTS

2.01 MATERIALS - GENERAL

- A. Acceptable Manufacturers:
1. Lighting Switches:
 - a. Base: Hubbell; Leviton; and Pass & Seymour (P&S); and Arrow Hart.
 2. Receptacle Outlets:
 - a. Base: Hubbell; Leviton; Pass & Seymour (P&S); and Arrow Hart.
 3. GFI Receptacles:
 - a. Base: Hubbell; Leviton; Pass & Seymour (P&S); and Arrow Hart.

2.02 SWITCHES

- A. Lighting Switches: "Specification Grade", quiet operating flush toggle type lighting switches for back and side wiring, 20 amp, 120-277 volts, AC only.
1. Single pole: Hubbell HBL1221; Leviton 1221-2; P&S 20AC1.

2.03 DUPLEX AND SINGLE RECEPTACLES

- A. General:
1. Receptacles shall be flush mounted.
 2. Shall have full grounding straps and be suitable for side or side and back wiring.
 3. Shall be Hubbell Nos. listed below, or equal by approved manufacturer.
 4. Unless noted otherwise, receptacles shall be 125 volt, 2 pole, 3 wire grounding.
- B. Specification Grade (Heavy Duty):
1. 20 amp, duplex: NEMA 5-20R; Hubbell HBL 5362; Leviton 5362; P&S 5362A.
 2. 20 amp, single: NEMA 5-20R; Hubbell HBL 5361.
- C. Special Requirements:
1. Ground Fault Circuit Interrupter: 20 amp, with built-in ground fault interruption, 5 mA sensitivity, LED indicator light (on when operable) and reset, UL 943 2015 compliant. GFI receptacle shall have lock-out feature when GFI protection device fails, auto-monitoring or self-test function and reverse line-load misfire function. Duplex, Leviton 8898.

- D. Weatherproof Receptacles: GFCI receptacle with die cast weatherproof receptacle cover:
 - 1. Unless noted otherwise, cover shall be weatherproof- while-in-use type, metallic with pad lock holes, Hubbell WP Series. Ground wires shall not be readily accessible.
 - 2. Receptacles installed outside shall be GFCI weather-resistant type.
 - 3. Where designated on plans as maintenance outlets, cover shall be Hubbell CWP26H.

2.04 SPECIAL PURPOSE OUTLETS

- A. Refer to the 'Special Outlet Schedule' on the plans.
- B. The EC shall be responsible for coordinating the following items with the actual equipment being furnished for the project prior to installation of the outlet.
 - 1. Exact location and orientation of outlet. Field coordinate location of outlet with Architect's field representative, location shall not be scaled off electrical drawings.
 - 2. Electrical characteristics of the equipment, including voltage, phasing, ampacity, etc.
 - 3. Physical characteristics of the termination, e.g. receptacle configuration, cord-and-plug versus hard-wired equipment, etc.

2.05 DEVICE PLATES

- A. Device Plates for Concealed Wiring: Same manufacturer as devices, to suit device covered, single or ganged in one piece with beveled edges.
 - 1. Coverplates shall be of thermoplastic, nylon, non-combustible, mar-proof thermosetting material, minimum 0.100" thick.
 - 2. Narrow plates for hollow metal jamb posts: Arrow-Hart No. T-1650 or Bryant, stainless steel.
 - 3. 304 lined stainless steel cover plates where indicated and in corrosive areas.
 - 4. See Article 2.01, Paragraph B for cover plate color coordination.
- B. Device Plates for Surface Type Cast-metal Boxes: Cadmium-plated cast ferrous metal designed for application.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install wall switches with OFF position down.
- B. Derate ganged wall dimmers as instructed by manufacturer; do not use common neutral.
- C. Install convenience receptacles with grounding pole on bottom.
- D. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.
- E. Install devices and wall plates flush and level.
- F. Receptacles and switches shall have a bonding conductor from grounding terminal to the metal conduit system. Self-grounding receptacles using mounting screws as bonding means are not approved.

3.02 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch and sensor with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.

- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.

3.03 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Mark all conductors with the panel and circuit number serving the device, at the device.
- C. Mark the panel and circuit number serving the device on the outside of the device plate unless directed otherwise. Use machine generated labels.
- D. All devices and face plates on a common wall with common mounting heights shall be level and square to each other. Adjustments required after installation shall be made without additional compensation.

END OF SECTION

SECTION 48 14 00

SOLAR ENERGY ELECTRICAL POWER GENERATION EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. General:
1. Furnish all labor, materials, tools, equipment, and services for all wiring devices as indicated, in accord with provisions of Contract Documents.
 2. Completely coordinate with work of all other trades.
 3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices and incidental to or necessary for a sound, secure and complete installation.
 4. See Section 26 05 00 for General Electrical Requirements.
 5. See Division 01 for General Requirements.
 6. System will need to be commissioned per Engineer Requirements upon project construction completion.

1.02 SUMMARY

- A. Section includes:
1. Solar Energy System(s). The layout and configuration of the on-site solar PV system shall be the responsibility of the Electrical Contractor; however, the system must be compliant with these Engineering design guidelines. This specification delineates the minimum technical and installation specifications required of the Electrical Contractor for this Project. It is the intent of these specifications to insure that the PV systems installed are consistent with and adhere to any and all Wisconsin Building Codes and standards, the Wisconsin Focus on Energy program, applicable utility rules and tariffs, and any and all technical and installation specifications and guidelines as may be developed and established. Bidders are advised to be familiar with these rules, requirements and specifications as they pertain to the installation of solar PV systems on this project. In addition to the requirements set out in this specification (including but not limited to construction, operation and maintenance), the installer shall be a North American Board of Certified Energy Practitioners (NABCEP) certified PV Installation Professional, and shall have a minimum of one licensed Journeyman or Master Electrician on-site during all work. The number of Apprentices (Beginning Electricians)-to-Journeymen (or Master) shall not exceed three (3). The Contractor shall employ at least one Apprentice.
 2. PV Modules
 - a. System must comply with IEEE 1262 "Recommended Practice for Qualifications of Photovoltaic Modules."
 - b. Premium Bloomberg Tier 1 modules.
 - c. High efficiency panels.
 - d. Shall have a 25-year production guarantee with at least 80% to 83% power output retained after 25 years.
 - e. Shall have at least a 10-year product warranty (greater than 10 years preferred).
 - f. Shall be on California's List of GoSolar PV modules.
 3. Electric Power Requirements:
 - a. Power provided must be compatible with the onsite distribution system.
 - b. Power capacity should be measured at the inverter AC output using the Standard Test Conditions (STC), i.e. 1,000 Watts/m², 1.5 AM, 25 degree C ambient cell temperature and wind speed of 1 m/s.
 - c. The System must include all the hardware needed for the solar PV.
 - d. All systems must be installed in accordance with all applicable requirements of local electrical codes and the 2017 National Electrical Code (NEC), including but not limited to Article 690, "Solar Photovoltaic Systems" and Article 705 – "Interconnected Electrical Power Production Sources."
 - e. Systems must be designed and installed using UL or ETL listed components, including mounting systems.

- f. Modules must be certified to UL 1703 - "Flat-Plate Photovoltaic Modules and Panels."
 - g. Inverters must comply with the following requirements:
 - 1) IEEE 929-2000 - "Recommended Practice for Utility Interface of Photovoltaic Systems"
 - 2) UL 1741 - "Standard for Static Inverters and Charge Controllers for use in Photovoltaic Systems"
 - 3) Be found on the list of eligible inverters in this spec section 48 14 00 Part 2.
 - 4) Meet UL 1741 Supplement (Smart Inverters)
 - 5) Are on the State of California's GoSolar list of approved PV inverters.
 - h. Other technical codes that will apply include:
 - 1) AMSE PTC 50 (solar PV performance)
 - 2) ANSI Z21.83 (solar PV performance and safety)
 - 3) NFPA 853 (solar PVs near buildings)
 - 4) NEPA 70 (electrical components)
 - 5) IEEE 1547 (interconnections)
 - 6) National Electrical Safety Code - ANSI C2 - 1999
 - 7) All applicable State Building Codes and requirements
 - i. All Balance of Systems (wiring, component, wiring, conduits, and connections) must be suited for conditions for which they are to be installed. If inverters are in exterior locations, they shall be installed in all-weather NEMA 4X enclosures. An interval data meter must be installed to measure the AC output of the inverter. This meter shall be an independent system (i.e., not the inverter); shall be revenue grade (probably is a standard for this); shall monitor the building's electricity use (building use monitoring does not need to be revenue grade); shall be easily connected to the site's flat screen monitors and the websites; and shall use a website that can easily download historic solar production and building use data from the monitoring system.
 - j. Interconnection must comply with Wisconsin's Public Service Commission's PSC119, "RULES FOR INTERCONNECTING DISTRIBUTED GENERATION FACILITIES." Electrical Contractor will assist the Client in preparing and submitting appropriate interconnection agreements. This shall be done at no cost or liability to the Client.
4. Structural Requirements:
- a. All structures and structural elements, including array structures, shall be installed in accordance with all applicable Wisconsin Building Codes and standards set by these drawings.
 - b. The Electrical Contractor shall provide structural calculations, stamped by a licensed professional structural engineer in good standing with the State of Wisconsin.
 - c. All structural components, including array structures, shall be designed in a manner commensurate with attaining a minimum 30 year design life. Particular attention shall be given to the prevention of corrosion at the connections between dissimilar metals.
 - d. The structural design shall provide for easy and cost effective repair or replacement of the roof.
 - e. Any roof penetrations shall be designed and constructed in collaboration with the roofing professional or manufacturer responsible for the roof and roofing material warranty for the specific site, to ensure that the existing roof warranty is not invalidated by the installation of the PV system.
 - f. For rooftop installations where there is no parapet or the parapet is less than 42", a 6' safety zone from the roof edge to the PV system must be maintained. A 3' clear path of travel must be maintained to and around all rooftop equipment.
 - g. All racking shall have a minimum 10 year warranty.
 - h. Install strip sheets or other similar protection under ballasted arrays to protect the roof.
5. Operation and Maintenance
- a. The Electrical Contractor shall provide notification to the Client as early as practical, but in no event less than five days prior to any planned installation, maintenance, and repairs. The Electrical Contractor will provide a minimum of

- ten days notification to the Client if any planned repairs or maintenance that will result in any disruption to Client's electrical load.
- b. The Contractor shall respond to calls for repairs within 24 hours.
 - c. The Client will use reasonable efforts to maintain the facilities in good condition and repair so as to be able to receive and utilize the solar electricity supplied by the proposed project.
 - d. A five-year system maintenance contract (extendable for up to 30 years) shall be provided. The maintenance services at a minimum shall include:
 - 1) Responding to fault notifications.
 - 2) Regular assessment of the system's output to identify issues.
 - 3) Site visits for troubleshooting, or otherwise, as needed.
 - 4) Annual system inspections, at a minimum.
 - 5) Communications with and reports to District staff.
 - 6) Training District staff to operate and maintain the PV systems at the end of the maintenance contract (if needed).
 - e. As part of the commissioning of the solar PV system, the Electrical Contractor shall provide operations manuals, as well as instruct and provide training to not less than (2) of the Client's facilities personnel. This training shall not be less than 2 hours in duration. Additionally, training shall include how to shut down the solar PV system in the event of an emergency. The Electrical Contractor shall insure that Client's emergency first responders can easily identify what to do in the event of an emergency, and be able to perform these tasks quickly and safely. Training shall also include how to correct easily remedied issues, such as rebooting an inverter.
6. Grounding
- a. All applicable components to be grounded per NEC 2017.
7. System Wiring Requirements
- a. Direct Current Conductors
 - 1) If Exposed: Shall be USE-2, UF (inadequate at 60°C [140°F]), or SE, 90°C [194°F] wet-location rated and sunlight-resistant (usually for tracking modules).
 - 2) If in Conduit: Shall be RHW-2, THWN-2, or XHHW-2 90°C [194°F], wet-location rated.
 - b. Conduits and Raceways
 - 1) Shall use steel conduit listed per UL 6, UL 1242, UL 797 (as appropriate), except for tracking modules. Weathertight EMT installations shall be allowed for DC wiring in weather-protected areas.
 - 2) Shall use expansion joints on long conduit runs.
 - 3) Shall not be installed on photovoltaic modules.
 - c. Enclosures subject to weather shall be rated NEMA 3R or better.
 - d. Cable Assemblies and Junction Boxes
 - 1) Shall be UL listed.
 - 2) Shall be rated to 5VA flammability per UL 94.
 - e. Prohibited Wiring Materials: Those which are not UL listed, or listed materials used in environments outside those covered in their listing.
8. Network Connection
- a. Provide connection to the school's wireless network for communication of all system functions to the network.
9. Warranties
- a. Modules
 - 1) Shall have a 25-year production guarantee with at least 80% to 83% power output retained after 25 years.
 - 2) Shall have at least a 10-year product warranty.
 - b. Inverters
 - 1) Shall have a 10-year warranty at a minimum.
 - c. Racking
 - 1) Shall have at least a 10-year product warranty.
 - d. Optimizers
 - 1) Shall have a minimum 25-year warranty.
 - e. Revenue grade monitoring
 - 1) Shall have at least a 5-year product warranty.

- f. Installation workmanship
 - 1) Shall have at least a 5-year warranty.
- 10. O&M Manuals
 - a. A binder (hard copy and electronic) which describes the PV system, including:
 - 1) Component specifications.
 - 2) Component warranties.
 - 3) Component installation, operation and maintenance guides and instructions.
 - 4) Monitoring system operation guide and instructions.
 - 5) Installation warranty.
 - 6) System electrical drawings.
 - 7) Completed interconnection applications.
 - 8) Other relevant information.

1.03 SUBMITTALS

- A. Renewable Energy:
 - 1. Submit manufacturer's product data for system.
 - 2. Submit calculations indicating the energy produced by the system based on as-built efficiencies using PV Watts, Helioscope or similar program.
- B. Change in Layout or System Design:
 - 1. Submit product data for each component changed from drawings. Include the following for each (complete list of product type not shown, where values are listed, item may not be outside that range).

1.04 QUALITY ASSURANCE

- A. The Institute of Electrical and Electronic Engineers, Inc. promulgates standards for electrical and electronic equipment, most notably; P929 Recommended Practice for Utility Interface of Photovoltaic (PV) Systems (specifying frequency and voltage limits, power quality, and non-islanding inverter testing).
- B. Underwriters Laboratory promulgates standards for Electrical Equipment Safety for manufacturers, most notably UL Standard 1703, Flat-plate Photovoltaic Modules and Panels and UL Standard 1741, Standard for Static Inverters and Charge Controllers for Use in Photovoltaic Power Systems which incorporates the testing required by IEEE 929 and includes design (type) testing and production testing.
- C. The National Electrical Code (NEC) includes requirements for all renewable energy installations for electrical trades and industry experts. Article 690 includes special information for Solar Photovoltaic Systems and requires UL listing for utility interface inverters. Other sections (Article 230, 240, 250 and 300 to 384) include requirements for wiring and overcurrent protection. A good resource is www.nmsu.edu/Research/tfdi/public_html/Photovoltaics/Codes-Stds/Codes-Stds.html
- D. Solar Energy Systems:
 - 1. Photovoltaic Panels: Provide panels labeled with the following tests completed by the manufacturer.
 - a. WEATHERING:
 - ASTM E1038 - Standard Test Method for Determining Resistance of Photovoltaic Modules to Hail by Impact with Propelled Ice Balls
 - ASTM E1171 - Standard Test Method for Photovoltaic Modules in Cyclic Temperature and Humidity Environments
 - ASTM E1596 - Standard Test Methods for Solar Radiation Weathering of Photovoltaic Modules
 - ASTM E1597 - Standard Test Method for Saltwater Pressure Immersion and Temperature Testing of Photovoltaic Modules for Marine Environments

ASTM E1802 - Standard Test Methods for Wet Insulation Integrity Testing of Photovoltaic Modules

ASTM E2047 - Standard Test Method for Wet Insulation Integrity Testing of Photovoltaic Arrays

ASTM E1830 - Standard Test Methods for Determining Mechanical Integrity of Photovoltaic Modules

ASTM E781- Standard Practice for Evaluating Absorptive Solar Receiver Materials When Exposed to Conditions Simulating Stagnation in Solar Collectors With Cover Plates

ASTM E782 - Standard Practice for Exposure of Cover Materials for Solar Collectors to Natural Weathering Under Conditions Simulating Operational Mode

ASTM E823 - Standard Practice for Nonoperational Exposure and Inspection of a Solar Collector

ASTM E881- Standard Practice for Exposure of Solar Collector Cover Materials to Natural Weathering Under Conditions Simulating Stagnation Mode

b. CALIBRATION:

ASTM E1039 - Standard Test Method for Calibration of Silicon Non-Concentrator Photovoltaic Primary Reference Cells Under Global Irradiation

ASTM E1362 - Standard Test Method for Calibration of Non-Concentrator Photovoltaic Secondary Reference Cells

c. ENERGY PERFORMANCE:

ASTM E948 - Standard Test Method for Electrical Performance of Photovoltaic Cells Using Reference Cells Under Simulated Sunlight

ASTM E1021 - Standard Test Methods for Measuring Spectral Response of Photovoltaic Cells

ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres

ASTM E1040 - Standard Specification for Physical Characteristics of Nonconcentrator Terrestrial Photovoltaic Reference Cells

ASTM E1462 - Standard Test Methods for Insulation Integrity and Ground Path Continuity of Photovoltaic Modules

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. This design is based on the use of the following equipment.
1. Solar Edge inverters. Two SE43.2KUS and one SE9KUS.
 2. Solar Edge optimizers. P850.
 3. Ecolibrium EcoFoot2 ballasted racking.
 4. Philadelphia Solar PS-M72-370 (Bifacial)
- B. Equal products listed with California's Go Solar program may be used to provide an equivalent power output.
- C. The Contractor may use 135 Philadelphia Solar PS-M72-370 solar panels which can be provided at no cost to this project by the Couillard Solar Foundation and MREA.
1. Additional Philadelphia Solar panels are available at a discounted cost from Couillard. Contact Couillard at www.couillardsolarfoundation.org. Purchase of additional Philadelphia Solar panels is not required, but is acceptable.

PART 3 - EXECUTION

3.01 SITE ENVIRONMENTAL PROCEDURES

- A. Resource Management:
 - 1. Energy Efficiency: Verify equipment is properly installed, connected, and adjusted. Verify that equipment is operating as specified.
 - 2. Renewable Energy: Verify proper operation in all modes of system operation by testing. Verify proper operation under a wide range of conditions to verify energy delivery as calculated for those conditions.
 - a. Solar Energy Systems: Comply with ASTM E1799 - Standard Practice for Visual Inspections of Photovoltaic Modules.

3.02 INSTALLATION

- A. Install the solar photovoltaic system in accordance with the NEC, this section, and the printed instructions of the manufacturer.
- B. Prior to system start-up, ensure no copper wire remains exposed with the exception of grounding wire as allowed in certain circumstances per manufacturer's instructions.
- C. Wiring Installation: Workers shall be made aware that photovoltaic modules will be live and generating electricity when there is any ambient light source, and shall take appropriate precautions. Utilize on-site measurements in conjunction with engineering designs to accurately cut wires and lay out before making permanent connections. Locate wires out of the way of windows, doors, openings, and other hazards. Ensure wires are free of snags and sharp edges that have the potential to compromise the wire insulation. All cabling shall be mechanically fastened. The system shall have direct current ground fault protection according to NEC. Ensure breakers in combiner box are in the OFF position (or fuses removed) during combiner box wiring.
- D. Instrumentation: Install instruments as recommended by the manufacturer.
- E. Rack-Mounted Photovoltaic Installations: Rack-mounted photovoltaic modules shall be installed in accordance with the manufacturer's installation instructions.
- F. Provide safety signage per NEC.
- G. Remove, replace, patch and repair existing roofing materials and surfaces cut or damaged during installation of the solar energy electrical power generation system, by methods and with materials so as not to void existing roofing system warranty. All roofing work shall be subcontracted by Hernandez Roofing.

3.03 FIELD QUALITY CONTROL

- A. Field Inspection: Perform in accordance with manufacturer's recommendations. Prior to initial operation, inspect the solar energy electrical power generation system for conformance to drawings, specifications, and NEC. In addition, include the following:
 - 1. Visual Inspection and Tests
 - a. Compare equipment nameplate data with specifications and approved shop drawings.
 - b. Inspect physical, electrical, and mechanical condition.
 - c. Verify required area clearances.
 - d. Verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method, or performing thermographic survey after energization.
 - e. Verify the correct operation of all sensing devices, alarms, and indicating devices.
 - f. Verify that all cable entries from top of junction boxes are sealed per junction box rating.

- g. Verify all connections and integrity of printed circuit boards in all applicable junction boxes.
- B. Tests: Provide equipment and apparatus required for performing tests. Correct defects disclosed by the tests, and then repeat tests. Conduct tests in the presence of the Engineer.

3.04 FOLLOW-UP VERIFICATION

- A. Upon completion of acceptance checks, settings, and tests, the Contractor shall show by demonstration in service that the solar photovoltaic electrical power generation system is in good operating condition and properly performing the intended function.

3.05 COMMISSIONING

- A. Comply with the requirements of Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.
- B. The Contractor shall coordinate with the serving electric utility to establish an interconnection agreement.
- C. Connect the solar photovoltaic electrical power generation system to the serving electric utility grid only after receiving prior approval from the utility company.
- D. Only qualified personnel shall connect the solar photovoltaic electrical power generation system to the serving electric utility grid.

3.06 INTERCONNECTION SERVICES

- A. Lead the District's applications for interconnection, including:
 - 1. Be available to answer questions, provide additional information, etc., to the local utility electricity provider, if requested by the utility.
 - 2. Attend the utility's interconnection testing and/or commissioning of the system if requested by the utility.
 - 3. Provide other standard procedures as needed for successful installation, commissioning and operation of the solar system.

END OF SECTION



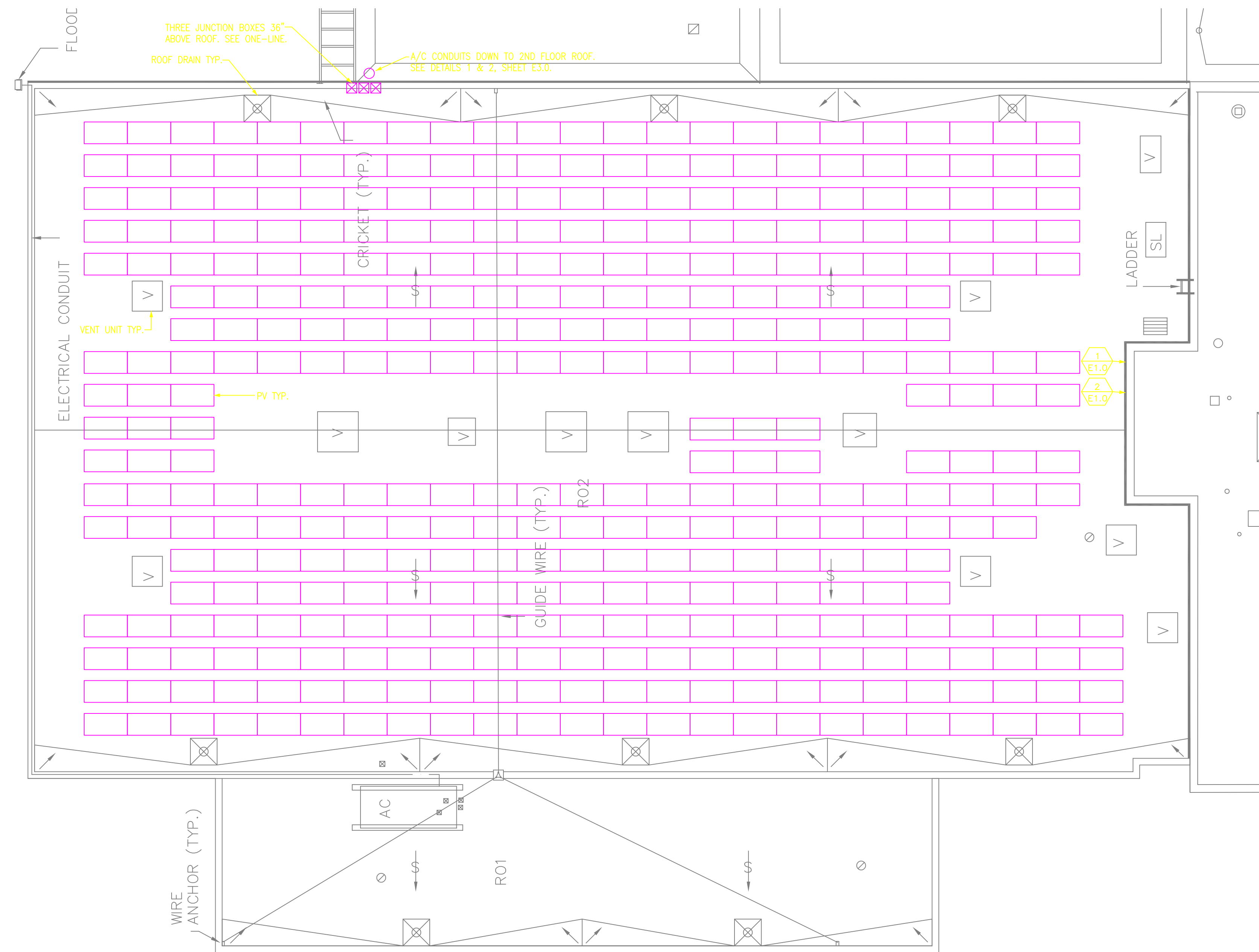
2 HALF WALL AT EAST END OF ROOF
NTS



3 ROOF LOOKING SOUTHWEST
NTS



4 ROOF LOOKING NORTHWEST
NTS



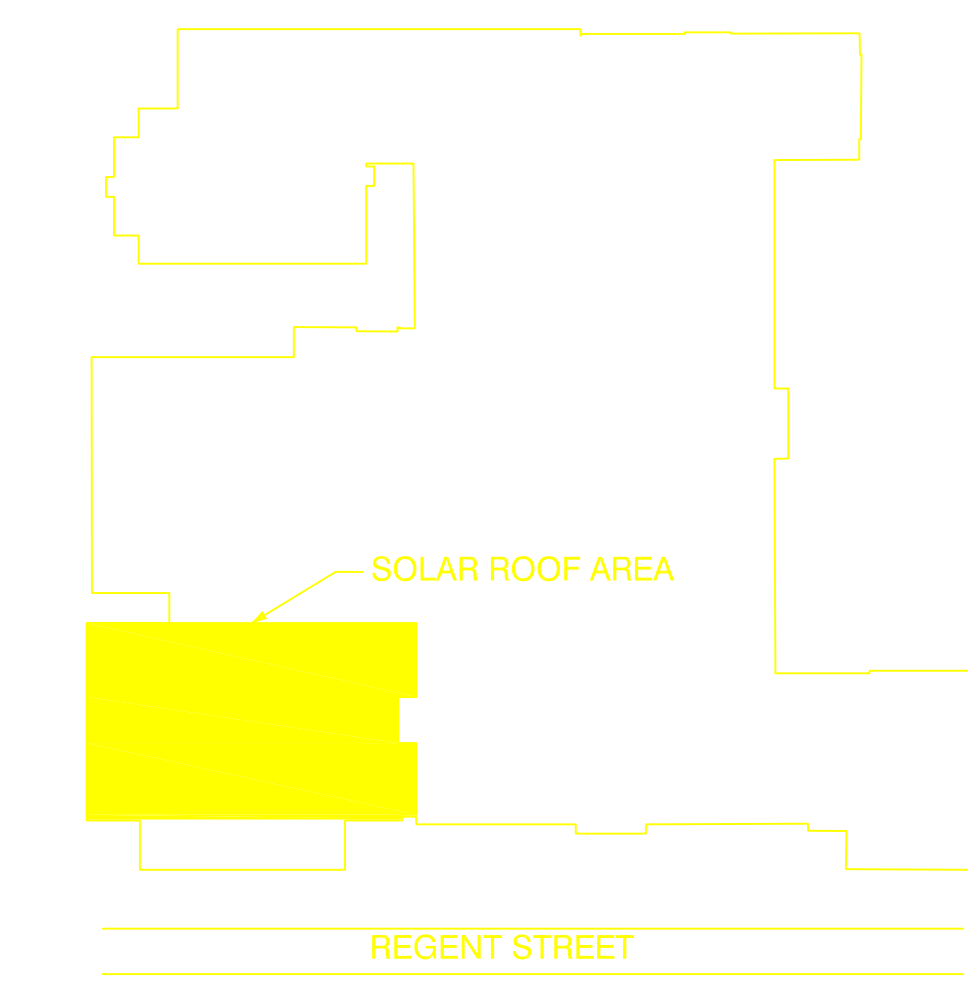
1 ROOF PLAN SOLAR PV
3/32" = 1'-0"

PLAN NOTES:

1. MOUNT INVERTERS ON BRICK WALL.
2. INSTALL A SURFACE MOUNT WP, GFI RECEPTACLE NEAR INVERTERS WIRE TO NEARBY RECEPTACLE CIRCUIT INSIDE BUILDING.

GENERAL NOTES:

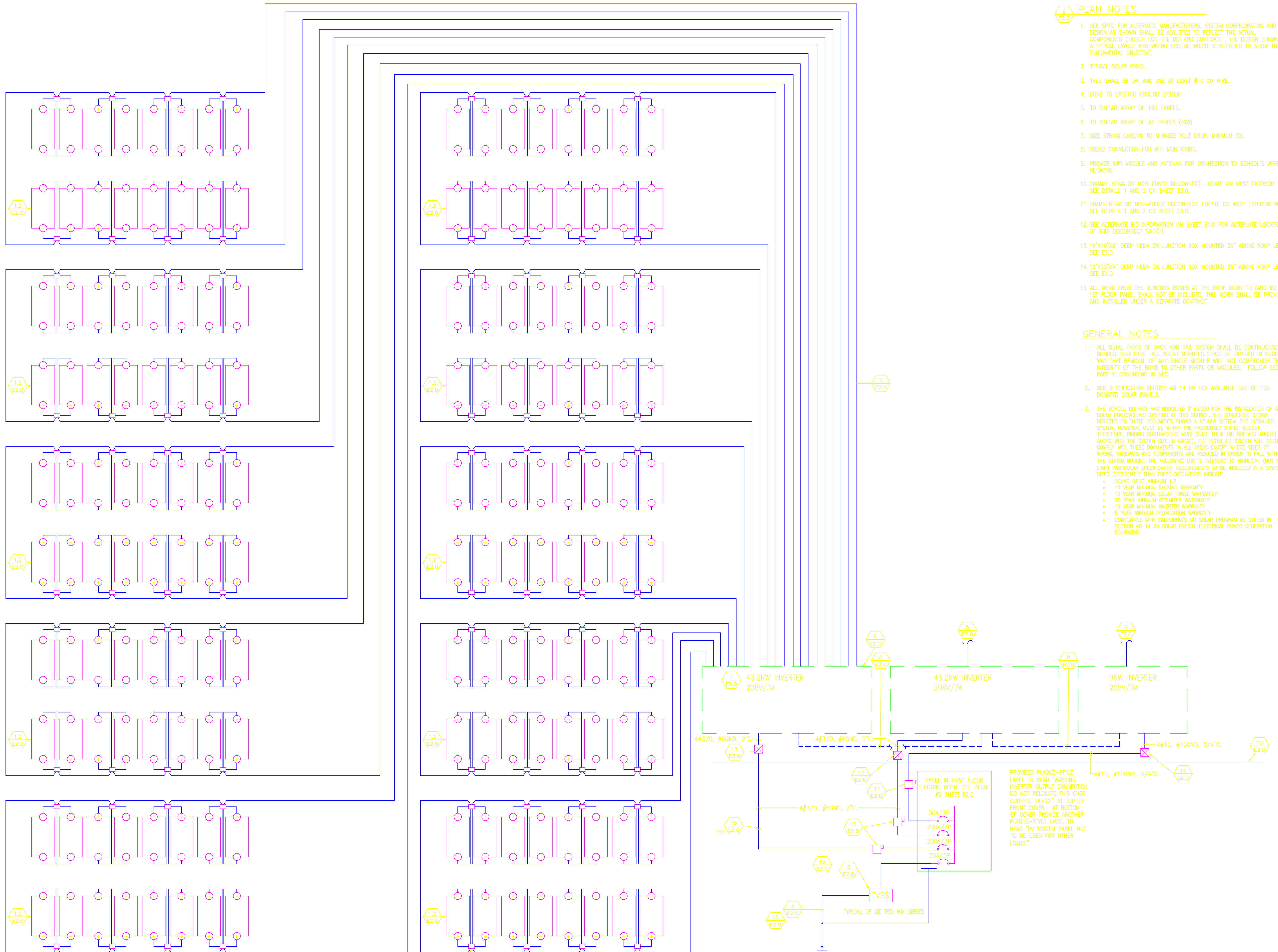
1. THIS LAYOUT INCLUDES THE FOLLOWING MINIMUM PARAMETERS TO BE PROVIDED:
 - a. 120KW OF PEAK DC POWER.
 - b. 6 FEET CLEAR FROM ROOF EDGE.
 - c. 1.5 FEET BETWEEN ROWS.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL A POE HD OUTDOOR RATED CAMERA TO MONITOR THE CONSTRUCTION PROGRESS. INSTALLATION SHALL INCLUDE ROUTING OF AN OUTDOOR RATED CATEGORY 6 CABLE (IN CONDUIT) FROM THE CAMERA TO A THIRD FLOOR IT CLOSET. FOR BIDDING PURPOSES, ASSUME THAT THE CLOSET IS 100 FEET AWAY FROM THE CAMERA LOCATION. THE CAMERA SHALL BE MOUNTED NEAR THE PROPOSED INVERTER LOCATIONS AND BE MOUNTED ON 1" RIGID CONDUIT 10 FEET ABOVE THE UPPER ROOF. CABLING SHALL BE TERMINATED AND SUCCESSFULLY TESTED TO EIA/TIA STANDARDS. AXIS P1375E OR EQUAL.
3. THE SCHOOL DISTRICT HAS BUDGETED \$140,000 FOR THE INSTALLATION OF A SOLAR PHOTOVOLTAIC SYSTEMS AT THIS SCHOOL. THE SUGGESTED DESIGN DEPICTED ON THESE DOCUMENTS SHOWS A 95.4KW SYSTEM. THE INSTALLED SYSTEM, HOWEVER, MUST BE WITHIN THE PREVIOUSLY STATED BUDGET. THEREFORE, BIDDING CONTRACTORS MUST STATE THEIR BID DOLLARS AMOUNT ALONG WITH THE SYSTEM SIZE IN KW(AC). THE INSTALLED SYSTEM WILL NEED TO COMPLY WITH THESE DOCUMENTS IN ALL AREAS EXCEPT WHERE SIZES OF WIRING, RACEWAYS AND COMPONENTS ARE REDUCED IN ORDER TO FALL WITHIN THE STATED BUDGET. THE FOLLOWING LIST IS INTENDED TO HIGHLIGHT (BUT NOT LIMIT) PARTICULAR SPECIFICATION REQUIREMENTS TO BE INCLUDED IN A SYSTEM SIZED DIFFERENTLY THAN THESE DOCUMENTS INDICATE.
 - DC/AC RATIO MINIMUM 1.2
 - 10 YEAR MINIMUM RACKING WARRANTY
 - 10 YEAR MINIMUM SOLAR PANEL WARRANTY
 - 20 YEAR MINIMUM OPTIMIZER WARRANTY
 - 10 YEAR MINIMUM INVERTER WARRANTY
 - 5 YEAR MINIMUM INSTALLATION WARRANTY
 - COMPLIANCE WITH CALIFORNIA'S GO SOLAR PROGRAM AS STATED IN SECTION 48 14 00 SOLAR ENERGY ELECTRICAL POWER GENERATION EQUIPMENT.
4. CONNECTIONS FROM THE 3RD FLOOR ROOF TO AN EXISTING PANEL ON THE 1ST FLOOR SHALL BE PROVIDED AND INSTALLED UNDER A SEPARATE CONTRACT. THIS CONTRACT WILL INCLUDE ALL SOLAR WORK, INVERTERS AND A/C FEEDERS AS SHOWN, UP TO THE THREE JUNCTION BOXES NEAR THE NORTHWEST CORNER OF THE GYM ROOF.



KEY PLAN
1" = 100'-0"

Revisions:

| No. | Date | Description |
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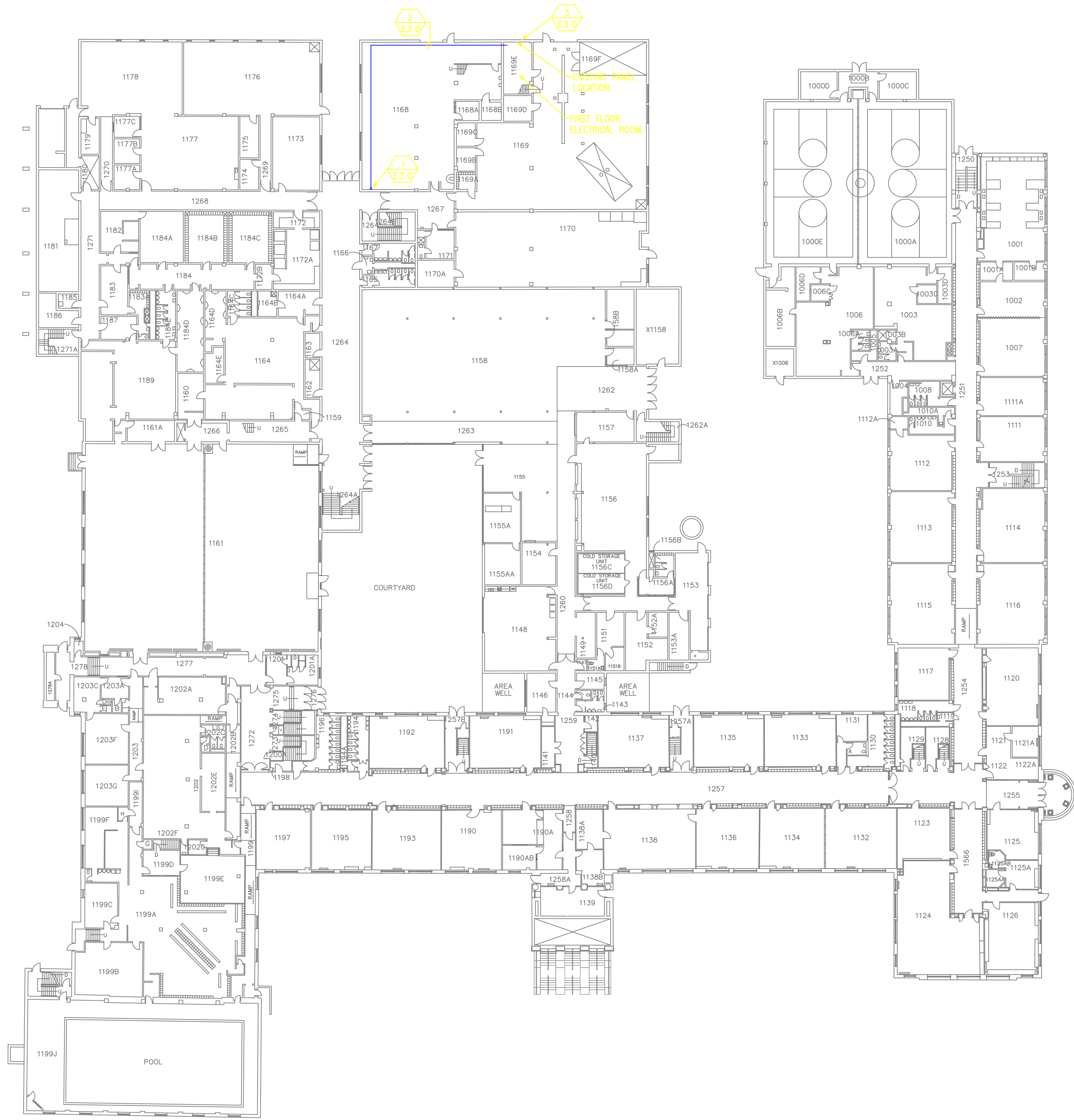


- PLAN NOTES**
- SEE SPEC FOR ALTERNATE MANUFACTURERS. SYSTEM CONFIGURATION AND DESIGN AS SHOWN SHALL BE ADJUSTED TO REFLECT THE ACTUAL COMPONENTS CHOSEN FOR THE BID AND CONTRACT. THE DESIGN SHOWN IS A TYPICAL LAYOUT AND WIRING SCHEME WHICH IS INTENDED TO SHOW THE FUNDAMENTAL OBJECTIVE.
 - TYPICAL SOLAR PANEL.
 - TVSS SHALL BE 3#, AND USE AT LEAST #10 CU WIRE.
 - BOND TO EXISTING GROUND SYSTEM.
 - TO SIMILAR ARRAY OF 160 PANELS.
 - TO SIMILAR ARRAY OF 32 PANELS (4X8)
 - SIZE STRING CABLING TO MINIMIZE VOLT DROP. MINIMUM 3%.
 - RS232 CONNECTION FOR WIFI MONITORING.
 - PROVIDE WIFI MODULE AND ANTENNA FOR CONNECTION TO SCHOOL'S WIRELESS NETWORK.
 - 200AMP NEMA 3R NON-FUSED DISCONNECT. LOCATE ON WEST EXTERIOR WALL. SEE DETAILS 1 AND 2 ON SHEET E3.0.
 - 30AMP NEMA 3R NON-FUSED DISCONNECT. LOCATE ON WEST EXTERIOR WALL. SEE DETAILS 1 AND 2 ON SHEET E3.0.
 - SEE ALTERNATE BID INFORMATION ON SHEET E1.0 FOR ALTERNATE LOCATION OF THIS DISCONNECT SWITCH.
 - 16"X16"X8" DEEP NEMA 3R JUNCTION BOX MOUNTED 36" ABOVE ROOF LEVEL. SEE E1.0.
 - 12"X12"X4" DEEP NEMA 3R JUNCTION BOX MOUNTED 36" ABOVE ROOF LEVEL. SEE E1.0.
 - ALL WORK FROM THE JUNCTION BOXES AT THE ROOF DOWN TO (AND IN) THE 1ST FLOOR PANEL SHALL NOT BE INCLUDED. THIS WORK SHALL BE PROVIDED AND INSTALLED UNDER A SEPARATE CONTRACT.

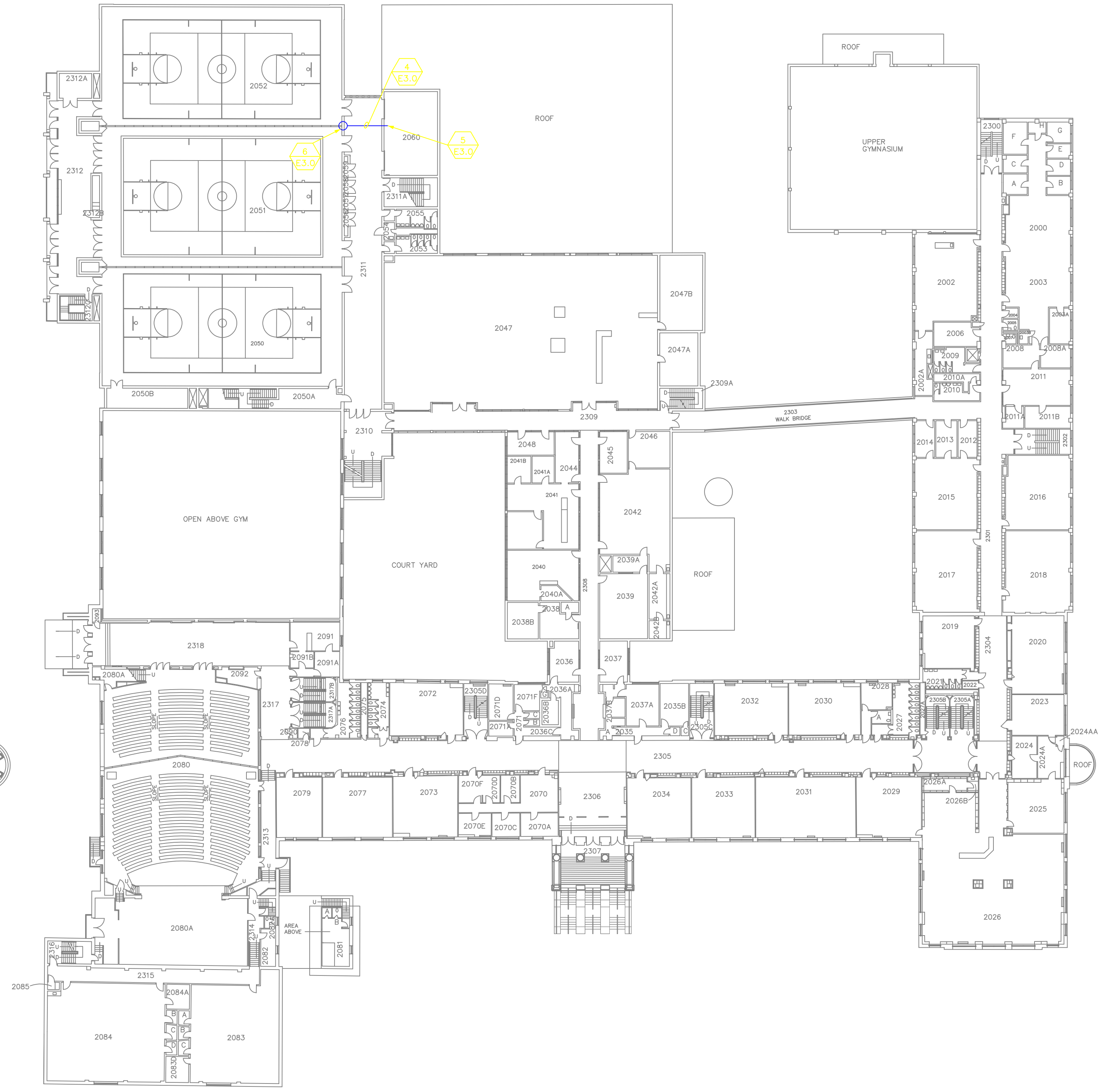
- GENERAL NOTES**
- ALL METAL PARTS OF RACK AND RAIL SYSTEM SHALL BE CONTINUOUSLY BONDED TOGETHER. ALL SOLAR MODULES SHALL BE BONDED IN SUCH A WAY THAT REMOVAL OF ANY SINGLE MODULE WILL NOT COMPROMISE THE INTEGRITY OF THE BOND TO OTHER PARTS OR MODULES. FOLLOW 690, PART V, GROUNDING IN NEC.
 - DC/AC RATIO MINIMUM 1.2
 - 10 YEAR MINIMUM RACKING WARRANTY
 - 10 YEAR MINIMUM SOLAR PANEL WARRANTY
 - 20 YEAR MINIMUM OPTIMIZER WARRANTY
 - 10 YEAR MINIMUM INVERTER WARRANTY
 - 5 YEAR MINIMUM INSTALLATION WARRANTY
 - COMPLIANCE WITH CALIFORNIA'S 60 SOLAR PROGRAM AS STATED IN SECTION 48 14 00 SOLAR ENERGY ELECTRICAL POWER GENERATION EQUIPMENT.
 - SEE SPECIFICATION SECTION 48 14 00 FOR AVAILABLE USE OF 135 DONATED SOLAR PANELS.
 - THE SCHOOL DISTRICT HAS BUDGETED \$180,000 FOR THE INSTALLATION OF A SOLAR PHOTOVOLTAIC SYSTEMS AT THIS SCHOOL. THE SUGGESTED DESIGN DEPICTED ON THESE DOCUMENTS SHOWS A 95.4KW SYSTEM. THE INSTALLED SYSTEM, HOWEVER, MUST BE WITHIN THE PREVIOUSLY STATED BUDGET. THEREFORE, BIDDING CONTRACTORS MUST STATE THEIR BID DOLLARS AMOUNT ALONG WITH THE SYSTEM SIZE IN KW(AC). THE INSTALLED SYSTEM WILL NEED TO COMPLY WITH THESE DOCUMENTS IN ALL AREAS EXCEPT WHERE SIZES OF WIRING, RACEWAYS AND COMPONENTS ARE REDUCED IN ORDER TO FALL WITHIN THE STATED BUDGET. THE FOLLOWING LIST IS INTENDED TO HIGHLIGHT (BUT NOT LIMIT) PARTICULAR SPECIFICATION REQUIREMENTS TO BE INCLUDED IN A SYSTEM SIZED DIFFERENTLY THAN THESE DOCUMENTS INDICATE.
 - DC/AC RATIO MINIMUM 1.2
 - 10 YEAR MINIMUM RACKING WARRANTY
 - 10 YEAR MINIMUM SOLAR PANEL WARRANTY
 - 20 YEAR MINIMUM OPTIMIZER WARRANTY
 - 10 YEAR MINIMUM INVERTER WARRANTY
 - 5 YEAR MINIMUM INSTALLATION WARRANTY
 - COMPLIANCE WITH CALIFORNIA'S 60 SOLAR PROGRAM AS STATED IN SECTION 48 14 00 SOLAR ENERGY ELECTRICAL POWER GENERATION EQUIPMENT.

Revisions:

| No. | Date | Description |
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| 1 | 10/16/19 | Addendum #2 |



2 FIRST FLOOR PLAN
1" = 30'-0"



1 SECOND FLOOR PLAN
1" = 30'-0"

PLAN NOTES:

1. ROUTE CONDUITS UP THROUGH 2ND FLOOR ROOF. SEE DETAIL 1 THIS SHEET FOR CONTINUATION.
2. ROUTE CONDUITS THROUGH WOOD SHOP.
3. LOCATE EXTERIOR DISCONNECT SWITCHES ON EXTERIOR WALL OUTSIDE OF ELECTRICAL ROOM.
4. ROUTE CONDUITS ON SECOND FLOOR ROOF ABOVE.
5. DOWN TO 1ST FLOOR, SEE DETAIL 2, THIS SHEET.
6. UP TO ROOF. SEE DETAIL 1, SHEET E1.0 FOR CONTINUATION.

GENERAL NOTES:

1. WORK SHOWN ON THIS SHEET IS FOR INFORMATION AND COORDINATION PURPOSES ONLY. THE WORK SHOWN ON THIS SHEET WILL BE FURNISHED AND INSTALLED UNDER A SEPARATE CONTRACT.

Consultant:
HARWOOD ENGINEERING CONSULTANTS, LTD
255 North 21st Street Milwaukee Wisconsin 53233
414.475.5554 414.773.9299 fax harwood@hect.com
HEC Project Number: 18-0125.00

Project:
MADISON METROPOLITAN SCHOOL DISTRICT
Madison West High School
Solar Power Installation

Location:
MADISON, WI

Key Plan:

Sheet:
Electrical PV Solar Plan

Scale:
As Noted 1" BAR

Revisions:

| No. | Date | Description |
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Date:
January 27, 2020

Project No.: 180125.00 (Owner) Project No.:

Sheet No.:

E3.0