OCTORARA AREA SCHOOL DISTRICT
228 Highland Rd, Atglen, PA 19310

November 21, 2023

INVITATION TO BID

Octorara Area School District, Atglen, Chester County, Pennsylvania will receive bids to **Perform Upgrades to the Electrical System at the Octorara Senior High School Weld Shop**. Bids will be received until **December 20, 2023 at 12:00 P.M., Eastern Time.**

Bids shall be submitted in sealed envelopes marked **"Weld Shop Electrical"** and delivered to the Octorara Area School District Business Office, 228 Highland Rd, Atglen, PA 19310.

No bidder may withdraw his bid for a period of ninety (90) days after the date of the actual opening of bids.

Octorara Area School District reserves the right to reject any or all bids, and to accept or reject any parts thereof, or items therein, and to waive any defects or irregularities in bids and bid securities, and to make the award that is determined to be in the best interest of the District.

Specifications and other bidding documents may be obtained electronically from the Octorara Area School District Business Office by emailing the business manager sdomowicz@octorara.org

Octorara Area School District

R. Scott Domowicz, MBA, MIOS
Business Manager

OCTORARA AREA SCHOOL DISTRICT
228 Highland Rd, Atglen, PA 19310

GENERAL REQUIREMENTS

1. Submission of Bids – Bids are due at the Octorara Area School District Administration Office, 228 Highland Rd, Atglen, PA 19310 on December 20, 2023, on or before 12:00 P.M., prevailing time. Bids are to be submitted in a sealed envelope marked to the care of Scott Domowicz, District Business Manager. The envelope shall carry the bid identified as – "Weld Shop Electrical".

2. Selection or Rejection of Proposals - The Octorara Area School District reserves the right to reject any or all bids, and to accept or reject any parts thereof, or items therein, and to waive any informalities in connection therewith at it's discretion, and to make the award that is determined to be in the best interest of the District.

3. Billing - Bills shall be submitted in duplicate to the Octorara Area School District ,228 Highland Rd, Atglen 19310 . No cash allowances for any purpose are included in the specifications of this project.

4. No vendor may withdraw his proposal for a period of ninety (90) days after the date set for the opening thereof.

5. No rights shall accrue to any person submitting a proposal until it has been accepted and the contract or purchase order awarded and such contract or purchase order is executed in writing.

6. The successful bidder shall not assign the performance of the contract, nor any portion thereof to others without the express consent, in writing, from the Octorara Area School District.

7. All applicable laws shall be deemed to be part of these specifications and the contract shall be read and enforced as though they were included.

8. Default - In the event any property or service to be furnished by the vendor under a contract or purchase order should for any reason not conform to the specifications contained therein and to the sample submitted by the vendor with the proposal, the Octorara Area School District may reject such property or service. In such event, upon receipt of specific instructions from the Business Administrator, vendor shall immediately remove any rejected property without expense to the Octorara Area School District and replace it with such property as conforms to the specifications and samples and/or provide additional or alternative property as conforms to the specifications and samples.

   Should the vendor default in the performance of the foregoing paragraph, the Octorara Area School District may procure such property or services from other sources in any manner provided by law and shall have the absolute right to deduct from any monies due to the vendor, or that may thereafter come due to the vendor, the difference between the contract price and the actual cost of the property or services to be replaced or substituted. The price paid by the Octorara Area School District in such event shall be the prevailing market price at the time the substitute purchase is made or in the event that it is necessary to seek bids for such property or service, the amount of the successful proposal.

9. Entries on the bid form must be typewritten or legibly handwritten in ink. Changes, alterations, or interlineations in the proposal are not permitted.

10. Proposal figures shall include all charges including any freight charges called for in these General Requirements. They shall also include all discounts.

11. Contractor's Evidence of Responsibility – Contractors may be required to furnish evidence in writing that they maintain permanent places of business and have adequate equipment, finances and personnel to furnish the items offered satisfactorily and expeditiously and that they are authorized dealers and can provide necessary services and warranties for items they propose to furnish.

12. Compliance with Proposal Requirements - Any inability to comply with the conditions and specifications as outlined must be clearly stated in your proposal.

13. Award-Contract: The Request for Proposal, the Bidder's Proposal and Purchase Order or Contract and it's attachments, either attached hereto or included by reference when received by the successful contractor shall constitute (1) a binding contract on the terms set forth therein and (2) the entire contract, and is to be interpreted, construed and given effect all respects according to the laws of the Commonwealth of Pennsylvania.

14. Rights and Remedies - The rights and remedies of the Octorara Area School District provided above shall not be exclusive and are in addition to any other rights and remedies provided by law or under the contract.

15. Standard of Quality –The various materials and products specified in the specifications by name or description are given to establish a standard of quality and of cost for quotation purposes. It is not the intent to limit the acceptance to any one material or product specified but rather to name or describe a material or product as the absolute minimum standard that is desired and acceptable. A material or product of lesser quality would not be acceptable. Where proprietary names are used, whether or not followed by the words "or as approved equal", they shall be subject to equals only as approved by the District.

16. Job Experience and References – Vendors must have a minimum of three (3) years experience in electrical work, installation, and repairs. Customer references are to be furnished upon request.

17. Considerations for Bid Award – Octorara Area School District will consider all factors it deems appropriate to make an award that provides the best value to the district. Such factors may include but are not limited to the following criteria:

    a. Future dealer warranties and costs.
    b. Manufacturers guides and standards estimating operating costs.
    c. Repair parts and service schedules.
    d. Rated life expectancy of the equipment.
    e. Productivity ratings.

    All bidders should include the above information with their bid submission along with any other factors they feel may be appropriate.

18. Work Schedule – After execution of the contract documents and receipt of all required bonds and insurance policies work may begin on or after January 2, 2024. All work shall be completed no later than March 31, 2024 pending availability of materials and supply chain concerns.

19. All contractors are advised that the school district will require employee background checks in accordance with Act 34 of 1985. If the decision not to award this bid to you is based, in whole or in part, on your criminal history record information, you will be so notified.

Pursuant to the Public School Code of 1949, 24 P.S. §1-111, prospective employees of public and private schools, intermediate units and area vocational technical schools, including independent contractors and their employees, except employees and independent contractors and their employees who have no direct contact with children, are required, prior to employment, to furnish certain information, as set forth on this form. ALL EMPLOYEES ON THE PROJECT SITE MUST HAVE BACKGROUND CHECK PRIOR TO ENTERING THE SITE.

You must submit a report of criminal history information from the Pennsylvania State Police or a statement from the State Police that the State Police central repository contains no such information relating to you. The report or statement must be no more than one year old. To obtain this document, contact the State Police Barracks nearest to your home. If awarded this bid, you must submit the original before commencing the project.

If you are not a resident of Pennsylvania, you must submit a report of Federal Criminal History from the Federal Bureau of Investigation. The report must be not more than one year old. To obtain such a report, contact the FBI Field Office nearest to you.

20. Domestic Relations Title 23, Chapter 63, 23 Pa. C.C. §6301 et seq. requires that prospective employees of public and private schools, intermediate units and area vocational technical schools, including independent contractors and their employees, except employees and independent contractors and their employees who have no direct contact with children, are required, prior to employment, to furnish certain information, as set forth on the Pennsylvania Child Abuse History Clearance Form. ALL EMPLOYEES ON THE PROJECT SITE MUST HAVE CLEARANCE PRIOR TO ENTERING THE SITE.

Each applicant is required to submit an official clearance statement obtained from the Department of Public Welfare within the immediately preceding year as to whether the applicant is named as the perpetrator of an indicated or a founded report or is named as the individual responsible for injury or abuse in an indicated report for school employee or a founded report for school employee. To obtain this document, contact the Department of Public Welfare. If awarded this bid, you must submit the original before commencing the project.

21. Employment Verification Act – All contractors are advised that the School District will require compliance as follows with the Employment Verification Act:

The Pennsylvania Public Works Employment Verification Act (43 P.S. §§ 167.1-167.11) requires Contractors and Subcontractors performing work on "public works projects" to comply with federal employment eligibility requirements, including verification through the U.S. Department of Homeland Security's E-Verify program which compares I-9 employment verification data to data from the Department of Homeland Security and Social Security Administration records, in order to confirm that employees are authorized to work in the United States.

All Contractors shall submit a "Public Works Employment Verification Form" to the Owner at the same time when performance and payments bonds are submitted. Submission of this form is a precondition of the Contract being awarded and executed. These requirements apply to all employees hired by the Contractor or Subcontractor regardless of whether the employee will be working onsite or offsite.

Subcontracts between the Contractor and its Subcontractors or between any Subcontractor and its Subcontractors are required to contain notification of applicability of the Act, the requirement to provide a "Public Works Employment Verification Form" as stated below, and reference to the Department of General Services website as stated in last paragraph below.

All Subcontractors shall submit a "Public Works Employment Verification Form" to the Contractor, who shall submit the form to the Owner through the Architect prior to the Subcontractor beginning either onsite or offsite work. Submission of this form shall be a precondition of the Subcontract remaining in force, and the Contractor shall terminate the Subcontract if the Subcontractor does not comply. These requirements apply to all employees hired by the Subcontractor regardless of whether the employee will be working onsite or offsite. "Subcontractor" includes any entity that performs work on the project other than the prime Contractor and other than an individual. The term does not include an entity that is solely a material supplier for the project.

The Contractor or Subcontractor shall be responsible for any penalties imposed for failure to comply with this Act.

Contractors and Subcontractors may access the form at www.dgs.state.pa.us. The Chapter 66 Guidelines may be located at http://www.pabulletin.com/secure/data/vol42/42-52/index.html.

OCTORARA AREA SCHOOL DISTRICT
228 Highland Rd, Atglen, PA 19310

INSTRUCTIONS TO BIDDERS

1. Bidding Documents

A. Bidders shall promptly notify the District of any ambiguities, inconsistencies, discrepancies, errors or omissions in the Plans and Specifications. Such notification must be made in writing no later than seven (7) days prior to the last day for receipt of bids. Any interpretation, correction, or change of the plans, specifications, or other bidding documents will be made only by the District by written addendum to all bidders. Interpretations, corrections, or changes made in any other form shall not be binding.

2. Bidding Procedure and Form of Bids

A. Proposals must be submitted on the Bid Forms included with the bidding documents. All blanks on the Bid Form shall be filled in for each item or group of items on which a bid is submitted. Changes, alterations, or interlineations in the bid are not permitted. Oral, telegraphic, or telephonic proposals or modifications will not be considered.

B. Proposals shall be for a stipulated base sum covering the furnishing of all materials and labor as called for in the Plans and Specifications, with an hourly rate for additional work beyond that covered by the base sum, as described in the Plans and Specifications.

C. The Bid Form shall include the legal name of the bidder and a statement specifying whether the bidder is a sole proprietor, a partnership, a corporation, or some other legal entity. Each copy shall be signed by the person or persons legally authorized to bind the bidder to a contract. A bid by a corporation shall give the state of incorporation and have the corporate seal affixed. A bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the bidder.

D. Proposals shall be delivered, sealed in an opaque envelope, to the Octorara Area School District, 228 Highland Avenue, Atglen, Pa 19310 on or before 12:00 P.M., prevailing time, December 20, 2023. The envelope shall be marked "Weld Shop Electrical", and include the name and address of the bidder. If the proposal is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope marked that a sealed bid is enclosed. The bidder assumes full responsibility for timely delivery of the proposal. Bids received after the time and date specified for receipt of bids will be returned unopened.

E. No bid may be withdrawn for a period of ninety (90) days after the date of the actual bid opening.

4. Acceptance or Rejection of Bids

A. The School District reserves the right, in its discretion, to reject any or all bids and to accept or reject any part of any bid and to waive any defects or irregularities in the bids.

B. The contract shall be awarded within sixty (60) days of the actual bid opening, except as otherwise provided by law. The School District shall notify the successful bidder of its intent to award. Upon receipt of such Notice of Intent to Award, the successful bidder shall have fifteen (15) days to furnish the School District with acceptable performance and payment bonds and insurance certificates (where applicable). The successful bidder will be required to furnish a Performance Bond and Labor and Material Payment Bond and each shall be in the amount of one hundred percent (100%) of the contract price.

C. The School District shall execute an acceptance of the successful bidder's proposal and an award of the contract as hereinafter provided, if the successful bidder has met the bond and insurance requirements herein specified.

5. Performance and Payment Bonds

A. Any successful bidder, upon receipt of a Notice of Intent to Award from the career center, shall furnish within fifteen (15) days there from a performance bond of a surety company authorized to do business in the Commonwealth of Pennsylvania, in an amount equal to one hundred (100%) percent of the bid amount to be accepted.

B. In the event that the amount of the bid to be accepted exceeds $5,000 and involves construction alteration, or repair of a building, public work, or public improvement, or affixing things to a building, any such successful bidder shall furnish within fifteen (15) days from receipt of a Notice of Intent to Award, a payment bond of a surety company authorized to do business in the Commonwealth of Pennsylvania, in an amount equal to one hundred (100%) percent of the bid amount to be accepted. Such bond shall be conditioned for the prompt payment of all material furnished and labor supplied or performed in the prosecution of the work. The School District, in its sole discretion, shall determine whether a payment bond is required for the type of work to be performed, and if so, shall specify this requirement in the Special Conditions.

C. All bonds shall be executed using American Institute of Architects forms (AIA Documents A311 and A312). The bidder shall require the attorney-in-fact who executes and seals the bonds on behalf of the surety to affix thereto a certified and current copy of a power of attorney.

6. Insurance

A. The successful bidder will be required to acquire and maintain during the life of this contract adequate Worker's compensation Insurance and Public Liability and Property Damage Insurance as follows:

Worker's compensation insurance coverage shall be statutory as regulated by Pennsylvania Law.
Employer's Liability minimum limits of coverage shall be:
$100,000 for each accident (bodily injury)
$500,000 policy limit (bodily injury by disease)
$100,000 each employee (bodily injury by disease)
All other insurance coverage shall either meet or exceed the following limits:
General Liability: General Aggregate $2,000,000
Products – Comp/OP. Agg $1,000,000
Bodily Injury - $1,000,000
Property Damage - $1,000,000
Automobile Liability: Combined Single Limit - $1,000,000
Excess Liability - $2,000,000

B. The Owner will provide builder's risk insurance to successful bidder.

7. Form of Agreement

A. Contracts shall be accepted and awarded only after approval by the School Board, by execution of a Standard Form of Agreement signed by a representative of the School District and the successful bidder, upon furnishing of the required bonds (and insurance certificates, where required) by the successful bidder in satisfactory form as specified herein. Any prior notification of Intent to Award a contract shall not operate as an acceptance. The Contract shall be comprised of the Invitation to Bid, the Plans and Specifications, the Instructions to Bidders, the completed Bid Form, and the Standard Form of Agreement between the School District and Bidder.

8. Standard of Quality

A. The various materials and products specified in the specifications by name or description are given to establish a standard of quality and of cost for bid purposes. It is not the intent to limit the bidder, the bid or the evaluation of the bid to any one material or product specified but rather to describe the minimum standard. When proprietary names are used, they shall be followed by the words "or alternatives of the quality necessary to meet the specifications". A bid containing an alternative that does not meet the specifications may be declared non-responsive. A bid containing an alternative may be accepted but, if an award is made to that bidder, the bidder will be required to replace any alternatives that do not meet the specifications.

9. Sales Tax

All of the items that constitute building, machinery and equipment and sales activities should be bid on a cost basis that is "Tax Exempt." All taxable items of "construction activities" should be bid on a cost basis that is "Taxable."

The awarded Contractor and all Subcontractors shall agree:

(a) to execute an "Assignment of Refund Rights," if requested by the Owner or its Agents, under which the right to file any and all sales tax refund petitions for materials purchased in connection with this project is assigned to the Owner;
(b) to execute any and all sales tax refund petitions prepared by the Owner and/or its Agents;
(c) that it will not file a claim for refund for any sales or use tax which is the subject of this assignment;
(d) to include all of the above provisions in any and all agreements with Subcontractors;
(e) further, to preserve all such records relating to sales tax payments for a period of three (3) years, or for such longer period as may be required by law, after the final payment.

10. Material Safety Data Sheets

The Pennsylvania "Worker and Community Right to Know Act" requires employers to have available Material Safety Data Sheets (MSDS) for all substances and mixtures that are found in the work place. Therefore, the School District, as a condition of doing business, requires MSDS to accompany all incoming products or supplies that are subject to the referred act (Act 159), including bid samples. Failure to properly label each individual product and the carton, container, or package in which the product is shipped shall result in the rejection of the shipment.

11. Damages

Any damage caused by the execution of this contract shall be paid for by the bidder. Any cleaning required or repairs made necessary by such damage shall be determined by the School District and corrected according to the applicable regulations. Necessary clean up will be at the School District's discretion and will be undertaken by the District. Any and all costs will be billed to and paid for by the bidder.

12. Compliance

In compliance with the Act of Assembly, the bidder further covenants, and agrees to accept, insofar as the work covered by this contract in Pennsylvania is concerned, the provisions of the Worker's Compensation Act of 1951, and any supplements thereto, which may have been or may hereafter be passed. Further, the bidder will comply with the Pennsylvania School Code, including Act 34, Criminal History Background Check; Act 151, Child Abuse Clearance; and Act 159, the Employee Right to Know Law.

GENERAL BID REQUIREMENTS

APPENDIX A

1. PERFORMANCE AND LABOR AND MATERIAL PAYMENT BONDS:

A. The contractor shall provide a performance bond and a labor and material payment bond, each in the amount of 100% of the contract price, before the award of the contract. (Section 756 and 757 of the Public School Code of 1949, as amended, and Public Works Contractors Bond Law of 1967).

B. The following bonds shall become binding upon awarding of the contract to the Contractor:

1. A Performance Bond at 100% of the contract amount, conditioned upon the faithful performance of the contract in accordance with the plans, specifications and conditions of the Agreement. Such bond shall be solely for the protection of the School District.

2. A Labor and Material Payment Bond at 100% of the contract amount. Such bond shall be solely for the protection of claimants supplying labor or materials to the Contractor or to any of his subcontractors, in the prosecution of the work provided for in this Agreement and shall be conditioned for the prompt payment of all such material furnished or labor supplied or performed in the prosecution of the work. "Labor or Materials" shall include public utility services and reasonable rentals of equipment, but only for periods when the equipment rented is actually used at the site.

The above-required bonds shall be executed by one or more surety companies legally authorized to do business in the Commonwealth of Pennsylvania on forms provided by the school district. The bonds shall be payable to the School District, and shall be filed with the School District.

2. DISCRIMINATION PROHIBITED:

According to 62 Pa.C.S.A.§ 3701, the contractor agrees that:

A. In the hiring of employees for the performance of work under the contract or any subcontract, no contractor, subcontractor or any person acting on behalf of the contractor or subcontractor shall by reason of gender, race, creed or color discriminate against any citizen of this Commonwealth who is qualified and available to perform the work to which the employment relates.

B. No contractor or subcontractor or any person on their behalf shall in any manner discriminate against or intimidate any employee hired for the performance of work under the contract on account of gender, race, creed or color.

C. The contract may be canceled or terminated by the government agency, and all money due or to become due under the contract may be forfeited for a violation of the terms or conditions of that portion of the contract.

3. HUMAN RELATIONS ACT:

A. The provisions of the Pennsylvania Human Relations Act, Act 222 of October 27, 1955 (P.L. 744) (43 P.S. Section 951, et. seq.) of the Commonwealth of Pennsylvania prohibit discrimination because of race, color, religious creed, ancestry, age, sex, national origin, handicap or disability, by employers, employment agencies, labor organizations, contractors and others. The contractor shall agree to comply with the provisions of this Act, as amended, that are

made part of this specification. Your attention is directed to the language of the Commonwealth's non-discrimination clause in 16 PA. Code 49.101.

4. CONTRACTS TO REQUIRE COMPETENT WORKMEN:

A. According to Section 752 of the Public School Code of 1949, no person shall be employed to do work under such contract except competent and first-class workmen and mechanics. No workmen shall be regarded as competent first-class, within the meaning of this Act, except those who are duly skilled in their respective branches of labor, and who shall be paid not less than such rates of wages and for such hours work as shall be established and current rates of wages paid for such hours by employers of organized labor in doing of similar work in the district where this work is being done.

5. WORKMEN'S COMPENSATION ACT:

A. The Contractor shall accept, insofar as the work covered by the Agreement is concerned, the provisions of the Pennsylvania Workmen's Compensation Act of 1915, and any supplements or amendments thereof, including any which may hereafter be passed, and shall insure his liability there under, or file with the Owner a certificate of exemption from insurance from the Bureau of Workmen's Compensation of the Department of Labor and Industry.

B. The Contractor Shall at all times indemnify and save harmless the Owner of and from all claims for Workmen's Compensation which may be made by any of the employees of the Contractor of any Subcontractor to whom the Contractor may have let the performance of any part of the work embraced in the Agreement and the Contractor will appear for and defend the Owner against any and all such claims.

6. PROHIBITION ON CASH ALLOWANCES:

Cash allowances are prohibited.

7. STANDARD OF QUALITY:

A. The various materials and products specified in the specifications by name or description are given to establish a standard of quality and of cost for bid purposes. It is not the intent to limit the bidder, the bid or the evaluation of the bid to any one material or product specified but rather to describe the minimum standard. When proprietary names are used, they shall be followed by the words "or alternatives of the quality necessary to meet the specifications". A bid containing an alternative, which does not meet the specifications, may be declared non-responsive. A bid containing an alternative may be accepted but if an award is made to that bidder the bidder will be required to replace any alternatives, which do not meet the specifications.

8. PROVISION FOR THE USE OF STEEL AND STEEL PRODUCTS MADE IN THE U.S.:

A. In accordance with Act 3 of the 1978 General Assembly of the Commonwealth of Pennsylvania, if any steel or steel products are to be used or supplied in the performance of the contract, only those produced in the United States as defined therein shall be used or supplied in the performance of the contract or any subcontracts thereunder. In accordance with Act 161 of 1982, cast iron products shall also be included and produced in the United States. Act 141 of 1984 further defines "steel products" to include machinery and equipment. The act also provides clarifications and penalties.

9. PENNSYLVANIA PREVAILING WAGE RATES AND REQUIREMENTS:

A. This regulation and the general Pennsylvania prevailing minimum wage rates, (Act 442 of 1961, P.L. 987, amended), as determined by the Secretary of Labor and Industry, which shall be paid for each craft or classification of all workers needed to perform the contract during the anticipated term therefore in the locality in which public work is performed, are made part of this specification.

OCTORARA AREA SCHOOL DISTRICT
228 Highland Rd, Atglen, PA19310

BID FORM
TO PERFORM ELECTRICAL UPGRADE WORK AT OCTORARA SENIOR HIGH SCHOOL WELD SHOP

Contractor's Name: _____

Address: _____

_____

Phone Number: _____ Fax Number: _____

Pursuant to the Request for Proposal, the undersigned proposes and agrees to furnish, deliver, and perform such services and materials of this bid as Octorara Area School District may accept, in full accordance with the Plans and Specifications, Request for Proposal, General Requirements, and Standard Form of Agreement, and at the prices set forth below.

This proposal is subject to all the terms of the specifications and bid instructions and general conditions herewith printed and we hereby agree to furnish such items as may be awarded to us. **No cash allowances for any purpose are included in the specifications of this project. All bids must be submitted through a cooperative purchasing network approved by the Pennsylvania department of Education.**

If submitting bid for only one project, enter "NO BID" on this form for other project. DO NOT LEAVE BLANKS.

1. BID SCHEDULE

PROJECT **BID**

BASE BID – Octorara Senior High School: Electrical Service Upgrade in Weld Shop. Bid includes all labor, *inspection fees, warranty charges* AND materials.

BASE BID as per job specifications herein: **$**_____

Cooperative Purchasing Network
Please Provide the co-op that will be utilized _____

2. TIME OF COMPLETION

If awarded a contract, the undersigned agrees to complete the job no later than March 31, 2024 pending availability of materials and supply chain concerns.

3. ADDENDUM RECEIPT

Receipt of the following addenda, if any, to the bidding documents is hereby acknowledged:

Addendum No. _____, Date _____.

4. BID SECURITY

The bid security accompanying this bid is a certified check, cashier's check, or bid bond in the amount of $_____, in accordance with the pertinent provisions of the Instructions to Bidders.

_____ _____

date authorized company official signature - title

Successful bidder is required to furnish the School District with a completed W-9 Form, Internal Revenue Service Taxpayer Identification Number and Certification of cooperative purchasing network.

6. CONTRACT DOCUMENTS

The undersigned agrees to be bound by the terms and conditions of the Contract Documents, which shall include the Invitation to Bid, the Plans and Specifications, the Instructions to Bidders, the completed Bid Form, and the Standard Form of Agreement between the Career and Technology Center and bidder.

Intending to be legally bound thereby, the bidder affixes the following authorized signatures to this bid:

A. INDIVIDUAL PROPRIETORSHIP:

WITNESS_____ _____ (SEAL)
(Contractor-Individual)

B. PARTNERSHIP:

WITNESS_____ _____ (SEAL)
(Contractor-Individual)

_____
(Partner)

_____
(Partner)

_____
(Partner)

C. CORPORATION:

WITNESS_____ _____ (SEAL)
(Contractor-Corporation)

By: _____
(President)

CORPORATE SEAL

_____
(Secretary)

Date: _____

NON-COLLUSION AFFIDAVIT

State of _____ : *Contract/Bid No.* _____

County of _____ **:**

I state that I am _____ of _____
(Title) (Firm)

and that I am authorized to make this affidavit on behalf of my firm, and its owners, directors, and officers. I am the person responsible in my firm for the price(s) and the amount of this bid.

(1) The price(s) and amount of this bid have been arrived at independently and without consultation, communication or agreement with any other contractor, bidder or potential bidder.

(2) Neither the price(s) nor the amount of this bid, and neither the approximate price(s) nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be disclosed before bid opening.

(3) No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, or to submit a bid higher than this bid, or to submit any intentional high or non competitive bid or other form of complementary bid.

(4) The bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from any firm or person to submit a complementary or other noncompetitive bid.

(5) _____ , its affiliates, subsidiaries, officers, directors
(Name of my firm)
and employees are not currently under investigation by any governmental agency and have not in the past four (4) years been convicted or found liable for any act prohibited by State or Federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as follows:

I state that _____ understands and acknowledges that the
(Name of my firm)
above representations are material and important, and will be relied on by Octorara Area School District in awarding the contract(s) for which this bid is submitted. I understand and my firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from Octorara Area School District of the true facts relating to the submission of bids for this contract.

Sworn to and subscribed before me

this _____ day of _____,

in the year _____ .

_____
(Name and Company Position)

_____
(Notary Public)

My Commission Expires:

INSTRUCTIONS FOR NON-COLLUSION AFFIDAVIT

1. This Non-Collusion Affidavit is material to any contract awarded pursuant to this bid. According to the Pennsylvania Antibid-Rigging Act, 73 P.S. 1611 et. seq., governmental agencies may require Non-Collusion Affidavits to be submitted together with bids.

2. This Non-Collusion Affidavit must be executed by the member, officer, or employee of the bidder who makes the final decision on the prices and the amount quoted in the bid.

3. Bid-rigging and other efforts to restrain competition, and the making of false sworn statements in connection with the submission of bids, are unlawful and may be subject to criminal prosecution. The person who signs the Affidavit should examine it carefully before signing and assure himself or herself that each statement is true and accurate, making diligent inquiry, as necessary, of all other persons employed by or associated with the bidder with responsibilities for the preparation, approval, or submission of the bid.

4. In the case of a bid submitted by a joint venture, each party to the venture must be identified in the bid documents, and an Affidavit must be submitted separately on behalf of each party.

5. The term "complimentary bid" as used in the Affidavit has the meaning commonly associated with that term in the bidding process, and includes the knowing submission of bids higher than the bid of another firm, any intentionally high or noncompetitive bid, and any other form of bid submitted for the purpose of giving a false appearance of competition.

6. Failure to file an Affidavit in compliance with these instructions will result in disqualification of the bid.

DIVISION 26 – ELECTRICAL

SECTION 26 00 10 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general administrative and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:

1. Submittals.
2. Coordination Drawings.
3. Record documents.
4. Maintenance manuals.
5. Rough-ins.
6. Electrical installations.
7. Cutting and patching.

1.2 SUBMITTALS

A. Submit, in electronic format, as a PDF, electrical related Shop Drawings and Product Data. Provide requested Samples of sufficient quantity, to allow for required distribution to Owner, Owner's Representative, Architect and Engineer.

B. Submittals must be provided with all catalog information clearly identified indicating all options to be provided as part of the product. Any submittal not containing this information will be rejected.

1.3 PRODUCT REVIEWS AND SUBSTITUTIONS

A. No Manufacturer's products will be reviewed as an equivalent to the specified products unless submitted by a Bidding Contractor for review ten (10) calendar days prior to bid due date. No products will be reviewed after that time. Product review requests must be submitted in accordance with Division 1 and this section. An addendum will be issued to all Bidding Contractors listing any Manufacturers whose products have been added to the Contract Documents as equivalents to the specified products.

1.4 SHOP DRAWINGS

A. Refer to the Conditions of the Contract (General and Supplementary) and Division-1 for submittal definitions, requirements, and procedures.

B. Where submittals include multiple items, a bill of material (not including quantity) shall be provided at the front of the shop drawing. The bill of material shall include product identification, manufacturer and model number.

C. Submittal of Shop Drawings, Product Data, and Samples will be reviewed only when submitted by the Prime Contractor. Submittals from sub-Contractors and material suppliers directly to the Architect/Engineer will not be reviewed. No equipment/materials shall be installed until the Shop Drawings have been stamped with "No Exceptions Taken" or "Make Corrections Noted" by the Architect/Engineer.

1.5 PRODUCT OBSOLESCENCE

A. In all cases, the most current iteration of the specified product shall be submitted. Where the specified product is no longer manufactured, the contractor shall submit an equivalent product with the same or better specifications. Where specific manufacturers are specified, the contractor shall supply from the same manufacturer the recommended replacement; however, under no circumstances shall the replacement product be deficient in any aspect to the specified product.

B. In the submittal for the product, the Contractor shall provide a signed letter clearly indicating the reason for the replacement product, and confirmation that the replacement product meets or exceeds all of the specified product's specifications to the best of the Contractor's knowledge.

C. The replacement product shall be provided at no additional cost to the owner, and shall not constitute any extension to the project schedule.

D. These requirements shall be inclusive to requirements listed elsewhere in the specifications, and shall not void any other requirements.

1.6 INSPECTIONS

A. The Contractor shall provide certificates of approval, in triplicate, for service equipment, building rough wiring, and building finished wiring.

B. Inspection certificates shall be submitted to the Engineer within 30 days after the inspections are made. Contractor shall use an independent NEC Certified Inspection Agency as the approved agency. Contractor must verify that the Certified Inspection Agency is approved by the local municipality and the Owner to inspect electrical installations in the project locality. All inspection certificates must be received before final payment can be made.

C. Refer to General Conditions for additional information.

1.7 INDEPENDENT COMMISSIONING

A. Independent Commissioning of electrical systems meeting local and state codes, and owner requirements shall be provided as part of this project. The independent commissioning authority may be hired by this Contractor, another project Contractor or the Owner, as indicated in the documents. However, this does not absolve the installing Contractor and manufacturer from ensuring full functionality of the systems, and manufacturer commissioning as outlined in the individual sections.

B. The Contractor shall schedule and coordinate shop drawing submissions, systems installation and systems start-up with the commissioning authority as required to allow the commissioning authority to perform their work.

C. Commissioning of the lighting control system shall take place on every project, and shall meet the local currently adopted version of the International Energy Conservation Code. This Contractor shall ensure this takes place, and contract with the applicable party as required.

1.8 MANUFACTURER'S REQUIREMENTS

A. All material shall be new, of the best respective kinds, manufactured by the company or companies mentioned and shall be of domestic manufacture unless specified otherwise.

B. All equipment, material or apparatus of any one system must be the product of one Manufacturer, or system tested products.

C. Manufacturers not listed in the Contract Documents must submit to the Engineer, via a Bidding Contractor, all product information per Division 1 requirements.

1.9 NAMEPLATE DATA

A. Each item of power operated equipment shall be provided with a permanent operational data nameplate on indicating Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliance, and similar essential data. Nameplates shall be located in an accessible location.

1.10 FAMILIARITY WITH PROPOSED WORK

A. All Contracts are with the understanding that the Contractor, prior to submission of his bid, acquainted himself with the requirements of the Drawings and Specifications, including "Conditions of the Contract," conditions of the site, its terrain, soil conditions, all other requirements of the Contract, and that he obtained all information necessary for completion of the work on or before the date specified for receiving of bids.

B. In all cases where a device or part of the equipment is herein referred to in the singular, such reference shall apply to as many such items as are required to complete the installation.

C. "Existing" information does not necessarily represent "as-built" conditions. The Contractor shall verify all existing conditions. If discrepancies are found the Contractor shall notify the Architect/Engineer for a resolution before proceeding.

1.11 DEFINITIONS

A. The terms "The Contractor" or "This Contractor" mentioned in these Specifications refers to the Electrical Contractor responsible for the work and equipment included in these Specifications.

B. The term Sub-Contractor refers to any reference to, or letting of work contained in these Specifications to any Sub-Contractor or Manufacturer by the Prime Contractor. This does not relieve the Prime Contractor of his responsibility for all work, material and equipment in this Specification.

C. The term "Provide," when used separately, shall mean to "Furnish and Install."

D. The term "Furnish," when used separately, shall mean to obtain and deliver on the job for installation by other trades.

E. The term "Install," when used separately, shall mean to mount in place, connect and make operable.

1.12 INTENT OF THE DRAWINGS AND SPECIFICATIONS

A. The Drawings which accompany the Specifications are for the purposes of illustrating the character and extent of the work, and are subject to such modifications by Architect/Engineer as may be found either necessary or advisable before ordering the prosecution of the work. The Contractor shall conform to and abide by whatever Supplementary Drawings and explanations which may be furnished by the Architect/Engineer for the purpose of illustrating the work. The Architect/Engineer shall decide as to the meaning or intention of any portion of the Specifications and Drawings.

B. Where the work is shown in complete detail on only half or a portion of a Drawing, or there is an indication of continuation, the remainder being shown in outline, the work drawn out in detail shall be understood to apply to other like portions of the structure. All work that may be called for in the Specifications and not shown on the Drawings, or shown on the Drawings and not called for in the Specifications, shall be executed and furnished by the Contractor as described in both.

C. Should any incidental work or materials be required, but not set forth in the Specifications or Drawings, either directly or indirectly, but which is necessary to fulfill the intent thereof, the Contractor is to understand same to be implied and required, and he shall perform all such work and furnish all such materials as fully as if they were particularly delineated or described, without additional cost to Owner. This shall include all materials, devices, methods peculiar to the machinery, equipment, apparatus, or systems as described herein.

1.13 EQUIPMENT ENCLOSURE RATINGS

A. Electrical equipment installed within the building shall carry a NEMA rating 1 or higher if indicated in the specifications or on the drawings.

B. Electrical equipment installed outside the building, or in environmentally wet locations shall carry a NEMA rating 3R or higher if indicated in the specifications or on the drawings.

C. Electrical equipment installed in harsh environments (i.e. natatoriums, greenhouses, etc.) shall carry a NEMA rating 4X, and be manufactured from stainless steel.

D. Where specifications and drawings conflict (i.e. drawings indicated NEMA 3R, but specifications indicate NEMA 1), the higher rating shall be provided at no additional cost to the project.

1.14 WIRING LAYOUTS

A. Should it become necessary to rearrange any of the circuit or feeder wiring, approval to do so shall first be obtained from the Engineer. The Contractor will be supplied with a spare set of Drawings on which all such approved changes shall be noted. Upon completion of all work under this Contract, these Drawings shall be returned to the Architect/Engineer, who will issue a receipt for same.

1.15 FIELD MEASUREMENTS

A. Before ordering any materials or doing any work, Contractor shall verify all measurements at the building site, and shall be responsible for correctness of same. At no time shall the Contractor scale Drawings for the purpose of installation.

B. No extra compensation will be allowed on account of differences between actual dimensions and those indicated on the Drawings. Any difference which may be found shall be submitted to the Architect/Engineer for consideration before proceeding with the work.

1.16 AIR PLENUMS

A. The Contractor shall use a conduit system or approved plenum rated wiring for all wiring located above ceilings.

1.17 RECORD DOCUMENTS

A. Mark Drawings to indicate revisions to conduit size and location both exterior and interior; actual equipment locations, dimensioned from column lines; concealed equipment, dimensioned from column lines; distribution and branch electrical circuitry; fuse and circuit breaker size and arrangements; support and hanger details; work performed via Change Orders; concealed control system devices.

B. Mark Specifications to indicate changes by addendum or Change Orders; actual equipment and materials used.

C. All new underground utilities shall be marked and dimensioned on site plan as-built drawings.

1.18 TEST AND ADJUST

A. All systems installed under this Contract shall be tested and adjusted to ensure that all equipment and systems meet or exceed the specified requirements.

1.19 PHASE LOAD BALANCE

A. A reasonable balance shall be secured on the phases of all main distribution feeders and bus bars.

B. Following installation and with the system in operation, the Electrical Contractor shall check the balance and rearrange connections so that the ampacity on any of the two single-phase phases of the main bus shall not vary more than 10% of each other.

1.20 PAINTING

A. The Contractor shall be responsible for all touch up painting on this project for electrical work.

1.21 CLEANING

A. The Contractor shall keep the building free of rubbish and material during the course of construction insofar as the work under this Contract is concerned.

B. Upon completion of the project, the Contractor shall remove all rubbish, surplus equipment and shipping labels and have all areas broom clean. The Contractor shall thoroughly clean all fixtures, and other electrical equipment, leaving same in first-class working condition.

1.22 DELIVERY AND STORAGE OF MATERIALS

A. The Contractor shall provide for, or secure use of, suitable-dry storage space for the safe delivery and storage of his materials. The Contractor shall be responsible for providing their own storage trailers on site. The use of Owner's inside-building storage will not be permitted, unless specifically noted otherwise.

1.23 PROTECTION OF EQUIPMENT AND MATERIALS

A. Responsibility for care and protection of electrical work rests with the Contractor until it has been tested and accepted by the Owner. After delivery, before and after installation, protect equipment and materials against theft, injury, or damage in all cases.

B. Protect equipment outlets, and pipe openings with temporary plugs, caps, or burlap. Electrical conduit openings shall be covered with capped bushing or fiber disks and bushings.

C. The contractor shall be responsible to protect all existing electrical or communications equipment to remain from construction dirt and debris, whether created from this contractor or another contractor. The contractor shall determine the method needed to protect each piece of equipment to remain. Should existing equipment be damaged during demolition it will be the responsibility of the contractor to provide necessary repairs or replacement of the damaged equipment.

1.24 SCAFFOLDING AND HOISTING

A. The Contractor shall provide all lumber and other material required for the erection of all staging, scaffolding, shoring, protective platforms, railings and ladders. Scaffolding shall be removed at the completion of the work.

B. The Contractor shall protect any flooring that is to remain. The Contractor shall inspect the flooring before the scaffolding is installed and report any damage that exists before the start of construction. The Contractor shall be responsible to repair any damage to the flooring after the scaffolding is removed to the acceptance of the owner at no additional cost to the owner.

1.25 PERMITS AND FEES

A. Unless noted otherwise, all electrical work permits, certificates, tests, and inspection fees required for the electrical work provided under this contract shall be paid by the Contractor, including any electrical licenses required to work on the project.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

3.2 CUTTING AND PATCHING

A. Perform cutting and patching in accordance with Division 1. In addition to the requirements specified in Division 1, the following requirements apply. The Contractor shall be responsible for providing all cutting and patching required to perform his work unless noted otherwise.

B. Perform cutting, fitting, and patching of electrical equipment and materials required to:

1. Uncover work to provide for installation of ill-timed work.
2. Remove and replace defective work.
3. Remove and replace work not conforming to requirements of the Contract Documents.
4. Remove samples of installed work as specified for testing.
5. Install equipment and materials in existing structures.

6. Upon written instructions from the Architect, uncover and restore work to provide for Architect observation of concealed work.

C. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new work.

D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.3 PROTECTION OF INSTALLED WORK

A. During construction activities, including cutting and patching operations, protect adjacent installations.

B. Patch existing finished surfaces and building components using new materials matching existing materials and experienced installers. For installers' qualifications refer to the materials and methods required for the surface and building components being patched.

3.4 ELECTRICAL INSTALLATION

A. Coordinate electrical equipment and material installation with other building components. Verify all dimensions by field measurements. If no dimensions are given, Contractor shall verify with Architect or Engineer before starting work. At no time shall the Contractor scale Drawings for the purpose of locating items.

B. Provide for chases, slots, and openings in other building components to allow for electrical installations. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.

C. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

D. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible, or to meet current local, national and ADA codes.

E. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

F. Install systems, materials, and equipment to conform with submittal data, including Coordination Drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect/Engineer.

G. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

H. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

1. Contractor shall also take care to leave access to other systems located behind electrical components being installed as part of this project. Should it be found that access has been blocked to other equipment requiring access (i.e. filters, valves, etc.), the offending system will be required to be removed and reinstalled at no additional cost to the owner.

I. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

J. Where exterior conduits, duct banks, equipment and pads are installed by this contractor, the contractor shall follow all NEC requirements, as well as those requirements listed on the drawings and in the specifications. Where excavation, both interior and exterior, is indicated to be performed by this contractor, backfill shall also be performed, meeting all requirements of the applicable drawing notes and specifications. Backfill shall include clean earth and/or stone, as specified in the applicable specifications, placed and tamped as indicated in the specifications. Provide all testing as outlined in the applicable specifications.

K. Electrical component installation in spaces where abuse may occur (i.e. gymnasiums, locker areas, exterior areas) shall be provided with vandal covers. Covers shall be provided with a means to be locked. System components include, but are not limited to light switches/dimmers, occupancy sensors, sound system controls, fire alarm devices, clocks, wireless access points, etc.

3.5 LOW VOLTAGE WIRING INSTALLATION

A. All low voltage wiring, installed above ceilings, must be plenum rated, unless noted otherwise. Wiring shall be installed perpendicular to steel, located in j-hooks and/or cable tray as available and allowed. Refer to individual specification and drawings for allowance if cable installation in cable trays.

B. All low voltage wiring, installed in spaces without ceilings, must be installed within conduit or other approved raceway. This requirement shall apply to finished spaces (i.e. gymnasium, etc.) and unfinished spaces (i.e. mechanical rooms, electrical rooms, etc.) Under no circumstances is exposed wiring acceptable.

3.6 EXISTING INSTALLED EQUIPMENT

A. Where existing installed equipment (including, but not limited to gymnasium equipment (batting cage, divider nets, etc.), free hanging projection screens, theatrical equipment, etc.) is in the way of construction, the Contractor shall move equipment as required to accommodate their work.

B. During relocation, and work, the Contractor shall take care to no damage the equipment. Should the equipment be damaged prior to work commencing, they shall take photographic evidence, and report, in writing to the Owner, Architect and Engineer, the existing observed damage.

C. Should the existing equipment be damaged during construction activities, the contractor shall repair at no additional cost to the Owner.

3.7 ELECTRICAL REQUIREMENTS FOR EQUIPMENT INSTALLATION

A. Conduit and power wiring of required size and voltage, from a panelboard or similar source, shall be furnished and installed by this Contractor, to the equipment furnished by another Contractor.

A junction box or means of disconnect (as required) shall be furnished and installed at the equipment by this Contractor meeting the National Electric Code.

B. Unless noted otherwise, a full complement of electrical control components, required for the intended use and/or operation of specified equipment, including variable frequency controllers, speed controllers and/or other control devices required, whether integral or remote, shall be furnished by the Contractor furnishing the equipment. These control devices as well as power wiring (where required) through these devices shall be installed by this Contractor.

3.8 ELECTRICAL DEMOLITION

A. The Contractor shall be responsible for all demolition.

B. The Contractor shall be responsible for disconnecting and removing from the site all conduit, wiring, devices, panelboards, disconnect switches, etc. as required to facilitate the proposed work. The Owner shall tag or notify the Contractor as to any devices, equipment or systems which they wish to salvage before start of each phase of construction. See paragraph, "Salvage" for additional information.

C. Where fastened equipment is removed, the contractor shall be responsible to remove the associated lags or bolts that fastened the equipment down. Grind lags or bolts to below exiting surface and patch surface to match existing condition.

3.9 SALVAGE

A. The Owner reserves the right to salvage any electrical equipment prior to the start of each phase of construction.

END OF SECTION 26 00 10

SECTION 26 05 00 – COMMON REQUIREMENTS – ELECTRICAL CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes materials and methods that are common to various Electrical Systems.

1.2 SUBMITTALS

A. Product Data: For the following:

1. Fireproofing

PART 2 - PRODUCTS

2.1 FIRESTOPPING

A. The Contractor shall be responsible for providing permanent, UL approved firestopping systems for all penetrations through fire rated floor or fire rated wall assemblies. For areas that will require future access for the installation of additional cables, repair, or retrofit, the firestopping system shall consist of re-usable intumescent pillows or putty. All firestopping shall meet the requirements of ASTM E-814 and UL 1479.

1. Subject to compliance with project requirements, firestopping materials may be provided by one of the following Manufacturers.

a. Specified Technologies Inc. (STI) Somerville, NJ (800) 992-1180
b. Tremco, Beechwood, OH (800) 321-7906
c. 3M, St. Paul, MN (800) 328-1687

2. Submit for review the following product data.

a. Product data sheets.
b. UL System Drawings for each firestopping application.
c. Manufacturer's Certificates of Conformance for their products.

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

3.2 EQUIPMENT INSTALLATION – COMMON REQUIREMENTS

A. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

B. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

3.3 FIRESTOPPING

A. Comply with manufacturer's written instructions for install fire stopping. When mechanical system is used, set securely in place in accessible locations.

B. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

C. Firestopping shall be installed in all fire rated walls. Review all drawings, including architectural, and site conditions to determine where fire rated walls are located.

D. Preparation

1. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:

    a. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
    b. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
    c. Remove laitance and form-release agents from concrete.

E. Installation

1. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
2. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

    a. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

3. Install fill materials by proven techniques to produce the following results:

    a. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
    b. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
    c. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

F. Identification

1. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.

2. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).

G. Cleaning and Protection

1. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
2. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 26 05 00

SECTION 26 05 19 – WIRES AND CABLES – 600V AND BELOW

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of the wire and cable work is indicated by Drawings and by requirements or other sections of the Specifications for cables used for power, lighting, signal, control and related system rated 600 volts or less. See below article "CABLES" for permitted use of Type MC Cables on this project.

1.2 CODES AND STANDARDS

A. NEC Compliance: Comply with applicable requirements of NEC for construction and installation of wires/cables and connectors.

B. UL Compliance: Comply with UL Stds 44, 83 and 486A, B and C. Provide wiring/cabling and connector products which are UL-listed and labeled consistent with their uses.

C. ICEA Compliance: Insulated Cable Engineers Association Inc., Standard WC-5-86.

D. IEEE Compliance: Institute of Electrical and Electronic Engineers, Standard 82-83.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide all wires and cables of sizes indicated on the Drawings and suitable for the temperature, conditions and location where installed. Install all wire in raceway.

2.2 CONDUCTOR MATERIAL

A. Use copper conductors of 98% conductivity and rated at 600V for all wires and cables, unless otherwise noted.

2.3 INSULATION

A. No conductors smaller than No. 12 AWG shall be used unless noted elsewhere. All wires No. 8 AWG or larger shall be stranded. Wire sizes No. 12 and No. 10 AWG. shall be solid (stranded wire used for No. 12 AND 10 will not be permitted unless otherwise noted).

B. All conductors shall be provided with type THHN/THWN insulation, unless noted otherwise.

C. Each circuit shall be provided with a dedicated neutral wire. Sharing of neutral wire for multiple circuits shall not be permitted, unless otherwise noted.

2.4 CABLES

A. Provide the following in NEC approved locations and project applications where indicated.

B. Type MC Cable: Provide Metal Clad Cable wiring using two No. 12 or 10 AWG with separate insulated copper ground wire (unless noted otherwise). Where AC (armored cable without

separate neutral) is installed, Contractor will be required to remove cable and reinstall with approved cable type at no additional cost to the owner. Metal Clad cable may be used on this project only as follows:

1. For lighting and receptacle branch circuits from panel to device(s) or light fixture(s).
2. Connection to motors (2 feet maximum).
3. Fishing existing walls.
4. Branch circuits in stud walls.
5. Mechanical equipment/miscellaneous branch circuits inside of the building (less than 50amps) where condition warrants.

C. Where MC cables are run in parallel (i.e., down corridors), the Contractor shall bundle the cables and zip tie them together.

D. The Contractor shall bear all costs related for removing MC cable not pre-approved. Support and secure type MC cable at intervals not exceeding 6'-0". In addition, type MC cable must be supported within 12" of every fitting, junction box or outlet box that the cable enters.

E. All other wiring shall be installed in conduit as specified in Division 26 "Raceways," unless approved otherwise by the Engineer prior to installation.

F. All switchboard, transformer and panelboard feeder wiring shall be run in conduit.

2.5 CONNECTORS FOR CONDUCTORS

A. Provide UL-listed factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

PART 3 - EXECUTION

3.1 WIRES AND CABLES

A. General: Install electrical cables, wires, and connectors in compliance with NEC. Coordinate cable installation with other work. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.

B. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.

C. While installing cables, care shall be taken to protect outer coating. If outer coating is damaged, contractor shall remove and reinstall cables.

D. Conceal all cable in finished spaces. Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours, where possible. Keep conductor splices to minimum.

E. Install splice and tap connectors which possess equivalent or better mechanical strength and insulation rating than conductors being spliced. Use splice and tap connectors which are compatible with conductor material.

F. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Make terminations so there is no bare conductor at the terminal. Provide wire ties and neatly train and rack wires in all boxes, panels, and other areas as required.

G. Tighten electrical connectors and terminals, including screws and bolts, in accordance with Manufacturer's published torque tightening values. Where Manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B.

H. Each branch circuit shall be provided with a dedicated neutral wire, unless noted otherwise.

I. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.2 FIELD QUALITY CONTROL

A. Prior to energizing, provide the following tests to all cables, 600 Volt or less and size no. 3 AWG or larger:

1. Inspect exposed sections of Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
2. Test bolted connections for high resistance using one of the following:

    a. A low-resistance ohmmeter.
    b. Calibrated torque wrench.
    c. Thermographic survey.

3. Inspect compression-applied connectors for correct cable match and indentation.
4. Inspect for correct identification.
5. Inspect cable jacket and condition.
6. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500 V(dc) for 300 V rated cable and 1000 V(dc) for 600 V rated cable for a one-minute duration. Use an industry approved meter for all tests.
7. Continuity test on each conductor and cable.
8. Uniform resistance of parallel conductors.
9. All inspection, cleaning and testing procedures shall be in compliance with the recommendations and standards outlined in the "maintenance testing specifications for electrical power distribution equipment and systems", latest edition, published by International Electrical Testing Association (NETA).

B. Prepare test and inspection reports and locate in the O&M manuals at the completion of the project. Test and inspection reports shall be provided to record the following:

1. Procedures used.
2. Results of above tests that comply with requirements.
3. Results that do not apply, corrective action taken, and retesting showing that they comply with the above requirements.

C. Subsequent to wire and cable hook-ups, energize circuits and demonstrate proper functioning. Correct malfunctioning units, and retest to demonstrate compliance.

D. Color-Coding for Phase Identification:

1. Color-code secondary service, feeder, and branch circuit conductors with factory-applied color as follows:

Phase	120/208 Volts	120/240 Volts	277/480 Volts
A	Black	Black	Brown
B	Red	Orange (High-Leg)	Orange
C	Blue	Blue	Yellow
Traveler	Yellow	Yellow	Yellow w/ "T" tag
Neutral	White	White	Gray
Ground	Green	Green	Green w/ Yellow stripe

2. Switch legs shall include an additional "S" tag.
3. Provide visible colored taped as listed above at all termination points for No. 8 and larger wires.

END OF SECTION 26 05 19

SECTION 26 05 26 – GROUNDING

PART 1 - GENERAL

1.1 SUMMARY

A. Extent of electrical grounding and bonding work is indicated by Drawings and Schedules and as specified herein. Grounding and bonding work is defined to encompass systems, circuits, and equipment.

B. Type of electrical grounding and bonding work specified in this section includes the following:

1. Solidly grounded.

1.2 CODES AND STANDARDS

A. Electrical Code Compliance: Comply with applicable local electrical code requirements of the authority having jurisdiction, and NEC as applicable to electrical grounding and bonding, pertaining to systems, circuits and equipment.

B. UL Compliance: Comply with applicable requirements of UL 467, 486A, and 869, pertaining to grounding and bonding of systems, circuits and equipment. Provide grounding and bonding products which are UL-listed and labeled for their intended usage.

C. NRTL: Connectors shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. General: Except as otherwise indicated, provide electrical grounding and bonding system assembly of materials, including, but not limited to, cables/wires, connectors, solderless lug terminals, grounding electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for a complete installation. Where more than one type component product meets indicated requirements, selection is Installer's option. Where materials or components are not indicated, provide products which comply with NEC, UL, and IEEE requirements and with established industry standards for those applications indicated.

B. Conductors: Unless otherwise indicated, provide electrical grounding conductors for grounding system connections that match power supply wiring materials and are sizes according to NEC.

C. Bonding Plates, connectors, Terminals, and Clamps: Provide electrical bonding plates, connectors, terminals, lugs and clamps as recommended by bonding plate, connector, terminal and clamp Manufacturers for indicated applications.

D. Electrical Grounding connection Accessories: Provide electrical insulating tape, heat shrinkable insulating tubing, welding materials, bonding straps, as recommended by accessories Manufacturers for type service indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which electrical grounding and bonding connections are to be made and notify Architect/Engineer in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEM

A. General: Install electrical grounding and bonding system as indicated, in accordance with Manufacturer's instructions and applicable portions of NEC, NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products comply with requirements.

B. Coordinate with other electrical work as necessary to interface installation of electrical grounding and bonding system work with other work.

C. Branch Circuits: Install a minimum 12 AWG ground wire in each 20A circuit and conduit run and to connect to each device. Size larger circuit ground wires as per NEC Table 250-122.

D. Ground each separately-derived system neutral to separate grounding electrode.

E. Connect together system neutral, service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.

F. Terminate feeder and branch circuit insulated equipment grounding conductors with grounding lug, bus, or bushing.

G. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with Manufacturer's published torque tightening values for connectors and bolts. Where Manufacturer's torquing requirements are not indicated, tighten connections to comply with tightening torque values specified in UL 486A to assure permanent and effective grounding.

H. Route grounding connections and conductors to ground and protective devices in shortest and straightest paths as possible to minimize transient voltage rises.

I. Apply corrosion-resistant finish to field-connections, buried metallic grounding and bonding products, and places where factory-applied protective coatings have been destroyed, which are subjected to corrosive action.

J. Install clamp-on connectors on clean metal contact surfaces, to ensure electrical conductivity and circuit integrity.

K. Provide ground wire connection to all electrical boxes and wiring devices.

L. Provide minimum #6 AWG ground connection from transformer to building steel. Provide larger conductor as required per NEC and drawings.

M. Bond service ground conduit to grounding conductor if conduit is metallic.

N. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.3 FIELD QUALITY CONTROL

A. Upon completion of installation of electrical grounding and bonding systems, test ground resistance of each separately derived system with ground resistance tester. Where tests show resistance-to-ground is over 25 ohms, take appropriate action to reduce resistance to 25 ohms, or less, by driving additional ground rods; then retest to demonstrate compliance.

1. Provide type-written report in O&M manual documenting test results.

B. Contractor shall coordinate with local inspector to provide tests as required, and provide additional tests as required.

END OF ECTION 26 05 26

SECTION 26 05 29 – SUPPORTING DEVICES

PART 1 - GENERAL

1.1 CODES AND STANDARDS

A. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical supporting devices.

B. NECA Compliance: Comply with National Electrical Contractors Association's "Standard of Installation" pertaining to anchors, fasteners, hangers, supports, and equipment mounting.

C. UL Compliance: Provide electrical components and devices which are UL-listed and labeled.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide supporting devices which comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installation; and as herein specified. Where more than one (1) type of device fulfills indicated requirements, selection is Installer's option.

2.2 SUPPORTS

A. Provide supporting devices of types, sizes and materials indicated; and having the following construction features:

1. Clevis Hangers: For supporting up to 2" rigid metal conduit; galvanized steel; with 2" diameter hole for round steel rod; approximately 54 pounds per 100 units.
2. Riser Clamps: For supporting up to 5" rigid metal conduit; black steel; with 2 bolts and nuts, and 4" ears; approximately 510 pounds per 100 units.
3. Reducing Couplings: Steel rod reducing coupling, 2" x 5/8", black steel; approximately 16 pounds per 100 units.
4. C-Clamps: Black malleable iron; 2"rod size; approximately 70 pounds per 100 units.
5. I-Beam Clamps: Black steel, 1-1/4" x 3/16" stock; 3/8" cross bolt; flanges width 2"; approximately 52 pounds per 100 units.
6. One-Hole Conduit Straps: For supporting 3/4" rigid metal conduit; galvanized steel; approximately 7 pounds per 100 units.
7. Two-Hole Conduit Straps: For supporting 3/4" rigid metal conduit; galvanized steel; 3/4" strap width; and 2-1/8" between center of screw holes.
8. Hexagon Nuts: For 2" rod size; galvanized steel; approximately 4 pounds per 100 units.
9. Round Steel Rod: Black steel; 2" diameter; approximately 67 pounds per 100 feet.
10. Offset conduit clamps: For supporting 2" rigid metal conduit; black steel; approximately 200 pounds per 100 units.

2.3 ANCHORS

A. Provide anchors of types, sizes and materials indicated; and having the following construction features:

1. Lead Expansion Anchors: 2"; approximately 38 pounds per 100 units.

2. Toggle Bolts: Spring head; 3/16" x 4"; approximately 5 pounds per 100 units.
3. Manufacturers: Provide anchors of one of the following (for each type of anchor):

    a. Ackerman Johnson Fastening Systems, Inc.
    b. Ideal Industries, Inc.
    c. Joslyn Manufacturing and Supply Co.
    d. McGraw Edison Co.

2.4 SLEEVES AND SEALS

A. Provide sleeves and seals, including armored cable seals, of types, sizes, and materials indicated, with the following construction features:

1. Sleeve Seals: Provide sleeves for piping which penetrated foundation walls below grade, or exterior walls. Caulk between sleeve and pipe with non-toxic, UL-classified caulking material to ensure watertight seal.
2. Wall and Floor Seals: Provide watertight wall and floor seals, or types and sizes indicated; suitable for sealing around conduit, pipe, of tubing passing through concrete floors and walls. Construct seals with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps, and cap screws.

B. Fire-Rated Walls and Floors: At all locations where conduits, cables, or ducts penetrate a fire-rated wall or floor, a special fire-retardant caulking compound or other approved device as specified in Division 26 "Common Requirements - Electrical" shall be used.

2.5 CONDUIT CABLE SUPPORTS

A. Provide cable supports with insulating wedging plug for non-armored type electrical cables in risers; construct for 2" rigid metal conduit; 3-wires, type wire as indicated; construct body of malleable-iron casting with hot-dip galvanized finish.

2.6 U-CHANNEL STRUT SYSTEMS

A. Provide U-channel strut system for supporting equipment supplied under this contract, 12-ga hot-dip galvanized steel, or types and sizes indicated; construct with 9/16" diameter holes, 8" on center on top surface, with standard green finish, and with the fittings which mate and match with U-channel. The Contractor is responsible to size and install strut to meet properly support its intended load.

B. Auxiliary Steel Supports: Provide all required auxiliary steel to install any equipment supplied under this contract. The design and gauge of steel used shall be as required by the manufacturer's specifications. The Contractor is responsible to size and install auxiliary steel to properly support its intended load.

C. Drop Cords: At Drop Cord locations provide miscellaneous threaded rod, unistrut, steel plates, etc. to vertically and laterally support Drop Cord. Where drop cord is located in ceilings provide proper support to prevent movement and damage to ceiling tile.

D. Manufacturers: Provide U-channel strut systems of one of the following (for each type system):

1. Allied Tube and Conduit Corp.
2. Midland-Ross Corp.
3. OZ/Gedney Div; General Signal Corp.
4. Power-Strut Div; Van Huffel Tube Corp.
5. Unistrut Div; GTE Products Corp.

PART 3 - EXECUTION

3.1 GENERAL

A. Install hangers, anchors, sleeves and seals as indicated, in accordance with manufacturer's written instructions and with recognized industry practices. Comply with installation requirements of NECA and NEC pertaining to supporting devices.

B. Coordinate with other mechanical and electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.

C. Where supports or anchors are installed after the spray on insulation and/or firestopping is installed, patch the spray on insulation and/or firestopping to match surrounding area.

END OF SECTION 26 05 29

SECTION 26 05 33 – RACEWAYS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of the raceway and work required by this section is indicated by Drawings and requirements of other sections of this Specification.

B. Provide metal and nonmetallic conduit, tubing and fittings of types, grades, sizes and weights (wall thicknesses) for each service indicated on plans. Where types and grades are not indicated, provide proper selection determined by installer to fulfill wiring requirements and comply with applicable portions of NEC for raceways.

C. It is the intent of these Specifications and Drawings that all feeder wiring be run in a continuous conduit system. Type MC cables are permitted for lighting and power, branch circuits above ceilings and in stud walls, fishing existing walls, and connection to equipment/motors (2 feet max). In areas of exposed structure all wiring shall be run in conduit. At all locations where MC cable cannot be fished in an existing wall, surface (nonmetallic or metallic as specified) raceway shall be used. Finish of raceway shall be verified with the Architect before ordering. Surface raceway shall be screwed into the surface being installed at both ends and every 24" minimum along raceway. All surface raceway shall be run parallel and perpendicular to wall surfaces and run to blend in with surrounding equipment.

D. Refer to Division 26, "Wires and Cables – 600V and Below" for acceptable uses of MC cables.

1.2 CODES AND STANDARDS

A. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.

B. UL Compliance and Labeling: Comply with provisions of UL safety standards pertaining to electrical raceway systems; provide products and components which have been UL-listed and labeled.

C. NEC Compliance: Comply with NEC requirements as applicable to construction and installation of raceway systems.

PART 2 - PRODUCTS

2.1 CONDUITS

A. Rigid Steel Conduit: Provide rigid steel, zinc-coated, threaded type conforming to FS WW-C-581, ANSI C80.1 and UL 6. Provide zinc-coating fused to inside and outside walls.

B. Intermediate Steel Conduit: Provide rigid intermediate grade (IMC) hot-dip galvanized threaded conforming to FS WW-C-581 and UL 1242.

C. Electrical Metallic Tubing (EMT): FSW-C-563, ANSI C80.3, and UL 797.

D. Liquid-Tight Flexible Metal Conduit: Provide liquid-tight flexible metal conduit; construct of single strip, flexible, continuous, interlocked, and double-wrapped steel; galvanized inside and outside; coat with liquid-tight jacket of flexible polyvinyl chloride (PVC).

E. Flexible Metal Conduit: FS WW-C-566 and UL 1. Formed from continuous length of spirally wound, interlocked zinc-coated strip steel.

F. No other type of conduit shall be used, unless otherwise noted, or prior approval granted by the engineer.

2.2 CONDUIT FITTINGS

A. Flexible Metal Conduit Fittings: Provide conduit fittings for use with flexible steel conduit of threadless hinged clamp type.

B. Straight Terminal Connectors: Contractor shall provide one-piece body, with female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.

C. 45-Deg or 90-Deg Terminal Angle Connectors: Two-piece body construction with removable upper section, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.

D. Rigid Metal Conduit Fittings: Cast-malleable-iron, galvanized or cadmium plated, conforming to FS W-F-408. Use Type 1 fittings for raintight connections, Type 2 fittings for concrete tight connections, and Type 3 fittings for other miscellaneous connections.

E. Rigid Aluminum Conduit Fittings: Provide cast-aluminum conduit fittings and mounting hardware conforming to ANSI and UL standards of types required for the application.

F. Liquid-Tight Flexible Metal Conduit Fittings: FS W-F-406, Type 1, Class 3, Style G. Provide cadmium-plated, malleable-iron fittings with compression type steel ferrule and neoprene gasket sealing rings, with insulated, or non-insulated throat.

G. EMT Fittings: All couplings and connectors shall be of the compression type.

H. Conduit and Tubing Accessories: Provide conduit, tubing and duct accessories of types, sizes, and materials, complying with Manufacturers' published product information, which mate and match conduit and tubing.

I. Conduit Bodies: Provide galvanized cast-metal conduit bodies of types, shapes, and sizes as required to fulfill job requirements and NEC requirements. Construct conduit bodies with threaded-conduit entrance ends, removable covers, either cast or galvanized steel, and corrosion-resistant screws.

J. MC Fittings: The Snap2It connector with insulated throat as manufactured by Arlington may be used for MC cable connectors in lieu of the traditional cast fitting. However, these fittings may not be used for any other application.

K. All raceway conduit and fittings above a ceiling shall be plenum rated.

L. Press type fittings may not be used unless specifically specified to be acceptable elsewhere in the specifications or on the drawings.

2.3 WIREWAYS

A. General: Provide electrical wireways of types, grades, sizes, and number of channels for each type of service as indicated. Provide complete assembly of raceway including, but not limited to, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other components and accessories as required for complete system.

B. Lay-In Wireways: Provide lay-in wireways with hinged covers, in accordance with UL 870 and with components UL-listed, including lengths, connectors and fittings. Design units to allow fastening hinged cover closed without use of parts other than standard lengths, fittings and connectors. Construct units to be capable of sealing cover in closed position with sealing wire. Provide wireways with knockouts.

C. Connectors: Provide wireway connectors suitable for "lay-in" conductors, with connector covers permanently attached that removal is not necessary to utilize the lay-in feature.

D. Finish: Protect sheet metal parts with rust inhibiting coating and baked enamel finish. Plate finish hardware to prevent corrosion. Protect screws installed toward inside of wireway with spring nuts to prevent wire insulation damage.

E. Raintight Troughs: Construct in accordance with UL 870, with components UL listed.

F. Construction: 16-ga galvanized sheet metal parts for 4" x 4" to 6" x 6" sections, and 14-ga parts for 8" x 8" and larger sections. Provide knockouts only in bottom of troughs, with suitable adapters to facilitate or tear during installation, or would compromise raintight capability of the trough. Do not use cover screws that will protrude into the trough area and damage wire insulation.

G. Finish: Provide 14-ga and 16-ga galvanized sheet metal parts with corrosion-resistant phosphate primer and baked enamel finish. Plate hardware to prevent corrosion.

2.4 SURFACE RACEWAY

A. Provide single or dual channel surface raceway as specified on the drawings. Unless noted otherwise, raceway finish shall be selected at shop drawings from full list of standard and premium finishes.

B. Device plates matching the raceway system shall be utilized. Standard wall mounted device plates shall not be acceptable.

PART 3 - EXECUTION

3.1 GENERAL

A. Low voltage wiring in walls must be run in conduit system rated for 600V, as specified above. the use of flexible innerduct material in walls shall not be acceptable, unless specifically specified elsewhere. In new construction, conduits shall be rigid of appropriate type for the installation. In existing construction, flexible metallic conduit shall be used.

B. Unless noted otherwise, all conduit shall be installed concealed in walls, under slabs, or above ceilings.

C. Type MC cables shall be permitted only as noted.

D. Unless noted otherwise, raceways and cables shall be installed near the structure and be supported independently from the structure. Support systems for other building systems (i.e. ductwork, HVAC equipment, system piping, ceiling supports, etc.) shall not be used to support conduits and cables. When routed from light fixtures and other system connections, raceways and cables shall be routed directly vertical to structure and across. Drop wire supports shall not be used on any ceiling support wires under any circumstances.

E. Use rigid aluminum conduit where installed exposed outdoors.

F. Use EMT conduit in mechanical equipment rooms, electrical equipment rooms, penthouses, crawl spaces, walls, and areas above ceiling.

G. Use flexible metal conduit in moveable partitions and from outlet boxes to recessed lighting fixtures, and final 24" of connection to motors, or control items subject to movement or vibration, and in cells of precast concrete panels. Conduit size shall be increased as required to fit wiring per NEC.

H. Use liquid-tight flexible metal conduit in mechanical spaces. Conduit size shall be increased as required to fit wiring per NEC.

I. Cut conduits straight, properly ream, and cut threads for heavy wall conduit deep and clean.

J. Field-bend conduit with benders designed for purpose so as not to distort nor vary internal diameters.

K. Size conduits to meet NEC, except no conduit shall be smaller than 3/4" on this project.

L. Fasten conduit terminations in sheet metal enclosures by two locknuts, and terminate with bushing. Install locknuts inside and outside enclosure. **Metallic insulating conduit bushings shall be used on all power conduits.** Split bushings shall **not** be acceptable.

M. Conduits are not to cross pipe shafts or ventilating duct openings.

N. Keep conduits a minimum distance of 6" from parallel runs of hot water pipes or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.

O. Support riser conduit at each floor level with clamp hangers.

P. Use of running threads at conduit joints and terminations is prohibited.

Q. Where required, use 3-piece union or split coupling.

R. Complete installation of electrical raceways before starting installation of cables/wires within raceways.

S. Install underground conduits minimum of 24" below finished grade.

T. Install conduits so as not to damage or run through structural members. Avoid horizontal or cross runs in building partitions or side walls.

U. Above requirements for exposed conduits also apply to conduits installed in space above hung ceilings, and in crawl spaces.

V. EMT conduits shall not be installed against roof deck. Allow minimum 3" space between top conduit and roof deck for the possible penetration of roof nails to protrude without damaging conduit.

1. Where conduits are indicated to be installed against roof deck, or where required by construction, IMC or GRS conduits may be used. Unless specifically stated on the documents, prior written approval shall be requested of the Architect/Engineer prior to installation.
2. Where boxes and conduit bodies are installed to accommodate conduits against the roof deck, they shall be cast type.

W. In finished spaces without ceilings (i.e. gymnasiums, natatoriums, etc.), conduits shall be installed as high as possible, while meeting other requirements within these specifications. Conduits along

bottom cord of open joists shall not be acceptable. Where conduits need to be installed along bottom of joists or beams, they shall be installed against walls.

X. Provide fish wire or pull string in all spare conduits.

Y. Cap all spare conduits installed for future use.

Z. Install surface metal raceways in corners or walls or conceal as much as possible.

AA. There shall be no more than three (3) 20A branch circuits installed in a single 3/4" conduit. Each circuit shall be provided with a dedicated neutral wire. Sharing of neutral wire for multiple circuits will not be permitted.

BB. At locations where conduits are installed after painting is done, the contractor shall be responsible to go back and paint conduit and boxes same color to match. At locations where there is no General Trades painting, this Contractor shall be responsible to paint conduit and boxes to match adjacent surfaces.

CC. Metallic and non-metallic raceway shall be mechanically fastened to surfaces at intervals as recommended by the manufacturer. Under no circumstances shall glue, two-sided tape, or other type of adhesive be the only means of attachment.

DD. For exterior wall or foundation penetrations, seal around conduits/sleeves and annular space between sleeve and conduits to limit water migration.

1. Select seal material to fit the installation location, and ensures no degradation of the sealing material over time due to environmental conditions including, but not limited to continuous ground or rain water, solar impact, temperature changes, freezing, etc. Where exposed, sealing compound shall match adjacent surfaces in texture and color.

EE. Installation through walls:

1. Where conduits are installed to pass through existing walls, the wall shall be cored to allow the conduit to be installed through the wall, and fire calk installed around the conduit.
2. Where MC cable is installed through a wall, an EMT sleeve of sufficient size to fit all of the MC cables shall be installed through a core in the wall, fire calk installed around the sleeve, and fire putty installed around the MC cables.
3. Should the contractor break out blocks, or cut an opening in the wall, not using a properly sized hole saw, he shall provide an appropriately sized lintel to maintain structural integrity of the wall, patch the wall by toothing in new block, new drywall sheet, or other means matching the wall material, and provide fire calk around the conduit or sleeve in the opening.

3.2 EXPOSED CONDUITS

A. Install exposed conduits and extensions from concealed conduit systems neatly, parallel with, or at right angles to walls of building.

B. Install exposed conduit work as not to interfere with ceiling inserts, lights, or ventilation ducts or outlets.

C. Support exposed conduits by use of hangers, clamps, or clips. Support conduits on each side of bends and on spacing not to exceed following: Up to 1": 6'-0"; 1-1/4" and over: 8'-0".

D. Run conduits for outlets on waterproof walls exposed. Set anchors for supporting conduit on waterproof wall in waterproof cement.

E. Where possible, exposed conduits shall be run along walls and at 3" from roof deck. Care shall be given to avoid creating a ledge of conduits along bottom of steel.

F. Where exposed conduits are installed outside of spaces labeled as electrical or mechanical, they shall be prepped and painted with appropriate products to match adjacent surfaces, unless specifically stated, in writing, by the architect/engineer/owner that they may remain unfinished.

3.3 NON-METALLIC CONDUITS

A. Non-metallic conduits (PVC) shall not be used on this project.

3.4 CONDUIT FITTINGS

A. Construct locknuts for securing conduit to metal enclosure with sharp edges for digging into metal, and ridged outside circumference for proper fastening.

B. Bushings for terminating conduits smaller than 1-1/4" are to have flared bottom and ribbed sides, with smooth upper edges to prevent injury to cable insulation.

C. Install insulated type bushings for terminating conduits 1-1/4" and larger.

D. Bushings are to have flared bottom and ribbed sides. Upper edge to have phenolic insulating ring molded into bushing.

E. Bushing of standard or insulated type to have screw type grounding terminal.

F. Miscellaneous fittings such as reducers, chase nipples, 3-piece unions, split couplings, and plugs to be specifically designed for their particular application.

3.5 RACEWAYS AND WIREWAYS

A. Avoid use of dissimilar metals through system to eliminate possibility of electrolysis. Where dissimilar metals are in contact, coat all surfaces with corrosion inhibiting compound before assembling.

B. Install expansion fittings in all raceways/wireways wherever structural expansion joints are crossed.

C. Make changes in direction to raceway/wireway run with proper fittings, supplied by raceway Manufacturer. No field bends of raceway/wireway sections will be permitted.

D. Properly support and anchor raceways/wireways for their entire length by structural materials. Raceways are not to span any space unsupported.

E. Use boxes as supplied by Manufacturer wherever junction, pull or device boxes are required. Standard electrical "handy" boxes, etc., shall not be permitted for use with surface installations.

END OF SECTION 26 05 33

SECTION 26 05 35 – ELECTRICAL BOXES AND FITTINGS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of electrical box and associated fittings work is indicated by Drawings and Schedules.

1.2 CODES AND STANDARDS

A. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical wiring boxes and fittings.

B. UL Compliance: Comply with UL Std No.'s 50, 514-series and 886. Provide electrical boxes and fittings which are UL-listed and labeled.

C. NEMA Compliance: Comply with applicable requirements of NEMA Stds/Pub No.'s OS1, OS2 and Pub 250.

PART 2 - PRODUCTS

2.1 FABRICATED MATERIALS

A. Outlet Boxes: Provide galvanized coated flat-rolled sheet-steel outlet wiring boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated (or as required), suitable for installation at respective locations. Construct outlet boxes with mounting holes, and with cable and conduit-size knockout openings in bottom and sides. Provide boxes with threaded screw holes, with corrosion-resistant cover and grounding screws for fastening surface and device type box covers, and for equipment type grounding. Flush boxes must be mounted flush with finished wall surface.

B. Outlet Box Accessories: Provide outlet box accessories as required for each installation, including box supports, mounting ears and brackets, wallboard hangers, box extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used to fulfill installation requirements for individual wiring situations. Choice of accessories is Installer's code-compliant option.

C. Device Boxes: Provide galvanized coated flat-rolled sheet-steel non-gangable device boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated (or as required), suitable for installation at respective locations. Construct device boxes for flush mounting with mounting holes, and with cable-size knockout openings in bottom and ends, and with threaded screw holes in end plates for fastening devices. Provide cables clamps and corrosion-resistant screws for fastening cable clamps, and for equipment type grounding. Flush boxes must be mounted flush with finished wall plate.

D. Device Box Accessories: Provide device box accessories as required for each installation, including mounting brackets, device box extensions, switch box supports, plaster ears, and plaster board expandable grip fasteners, which are compatible with device boxes being utilized to fulfill installation requirements for individual wiring situations. Choice of accessories is Installer's codes-compliant option.

E. Surface-Mounted Device and Outlet Boxes: Provide a minimum depth galvanized-coated steel box where indicated on the Drawings, without pre-punched knockouts.

F. Raintight Outlet Boxes: Provide corrosion-resistant cast-metal raintight outlet wiring boxes, of types, shapes and sizes, including depth of boxes, with threaded conduit holes for fastening electrical conduit, including face plate gaskets and corrosion-resistant plugs and fasteners. Provide raintight outlet boxes where installed outside, and within moisture rich environments (showers, locker areas, natatoriums, etc.)

G. Junction and Pull Boxes: Provide galvanized code-gauge sheet steel junction and pull boxes, with screw-on covers; of types, shapes and sizes, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers. Provide handles on covers over 4 square feet.

H. Where surface or recessed boxes are indicated to be blank or with wire leads for future use, they shall be provided with blank covers per Division 26 "Wiring Devices".

I. All boxes shall be metallic, unless noted otherwise.

J. Under no circumstances shall low voltage rings be used on the project. All outlet boxes used for low voltage system including, but not limited to tele/data, controls, A/V wiring, etc. shall be fully enclosed device boxes, rated for 600V wiring as specified above.

PART 3 - INSTALLATION

3.1 GENERAL

A. Install electrical boxes and fittings as indicated, in accordance with Manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.

B. When installed in stud walls (wood or steel), electrical boxes shall be installed in walls, supported from both sides, bridged between studs, the use of cantilevered supports shall be unacceptable.

C. Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices, and raceway installation work.

D. Provide weathertight outlets for interior and exterior locations exposed to weather or moisture.

E. Provide knockout closures to cap unused knockout holes where blanks have been removed.

F. Install electrical boxes in those locations which ensure ready accessibility to enclosed electrical wiring.

G. Position recessed outlet boxes accurately to allow for surface finish thickness.

H. Where devises are shown at casework, contractor shall coordinate exact location and height with casework to ensure usability of devices.

I. Avoid using round boxes where conduit must enter box through side of box, which would result in difficult and insecure connections when fastened with locknut or bushing on rounded surfaces.

J. Fasten electrical boxes firmly and rigidly to substrates, or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry.

K. Provide electrical connections for installed boxes.

L. Subsequent to installation of boxes, protect boxes from construction debris and damage.

M. Ground electrical boxes properly upon completion of installation work and demonstrate compliance with requirements. Ground electrical box and wiring device.

N. Where boxes and conduit bodies are installed against roof deck, they shall be cast type.

3.2 INSTALLATION TO MEET ACOUSTICAL PERFORMANCE

A. In order to reduce sound transmission through walls, when back boxes are installed to serve both sides of the wall, they shall be installed in different stud cavities. Where boxes are found to be installed in the same stud cavity, feeding two different sides of the wall, they will be required to be removed and reinstalled at the contractor's expense.

END OF SECTION 26 05 35

SECTION 26 05 53 – ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 CODES AND STANDARDS

A. UL Compliance: Comply with UL Std 969.

B. NEC and NEMA Compliances: Comply with NEC and NEMA WC-1 and WC-2.

C. ANSI Compliance: Comply with ANSI Std A13.1.

PART 2 - PRODUCTS

2.1 GENERAL

A. Except as otherwise indicated, provide Manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, selection is installer's option, but provide single selection for each application.

B. The Electrical Identification, as outlined in this specification, shall be provided in addition to the labeling requirements listed in other specification sections.

2.2 CABLE/CONDUCTOR IDENTIFICATION BANDS

A. Provide Manufacturer's standard vinyl-cloth self-adhesive cable/conductor markers of wrap-around type; either pre-numbered plastic-coated type, or write-on type with clear plastic self-adhesive cover flap; numbered to show circuit identification.

2.3 SELF-ADHESIVE PLASTIC SIGNS

A. Provide Manufacturer's standard, self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instructions or warnings; of sizes suitable for application areas and adequate for visibility, with proper wording for each application areas and adequate for visibility, with proper wording for each application (e.g., "EXHAUST FAN FED FROM PANEL PD1").

B. Colors: Unless otherwise indicated, or required by governing regulations, provide white signs with black lettering.

2.4 ENGRAVED PLASTIC-LAMINATE SIGNS

A. Provide engraving stock melamine plastic laminate with black face and white core plies (letter color), complying with FS L-P-387, in sizes and thicknesses indicated. Engrave laminate with engraver's standard letter style of sizes and wording indicated, and punch for mechanical fastening except where adhesive mounting is necessary because of substrates.

B. Thickness: 1/16", for units up to 20 sq. in. or 8" length; 1/8" for larger units.

C. Fasteners: Self-tapping stainless-steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.

2.5 LETTERING AND GRAPHICS

A. Coordinate names, abbreviations and other designations used in electrical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by Manufacturers or as required for proper identification and operation/maintenance of electrical systems and equipment systems and equipment. Comply with ANSI A13.1 pertaining to minimum sizes for letters and numbers.

2.6 MANUFACTURER

A. Provide electrical identification products of one of the following (for each type marker):

1. Ideal Industries, Inc.
2. LEM Products, Inc.
3. Markal Company
4. National Band and Tag Co.

PART 3 - EXECUTION

3.1 GENERAL

A. Install electrical identification products as indicated, in accordance with Manufacturer's written instructions, and requirements of NEC.

3.2 COORDINATION

A. Where identification is to be applied to surfaces which require finish, install identification after completion of painting.

3.3 REGULATIONS

A. Comply with governing regulations and requests of governing authorities for identification of electrical work.

3.4 CABLE/CONDUCTOR IDENTIFICATION

A. Apply cable-conductor identification where wires of communication/signal system are present, except where another form of identification (such as color-coded conductors) is provided. Match identification with marking system used in panelboards, shop drawings, Contract Documents, and similar previously established identification for project's electrical work.

B. Install engraved plastic-laminate tags on new power cables in all manholes and in pullboxes to identify over current device number. Use tie wraps to attach tag to cables. The nameplate shall bear the following information: Building served; voltage, cable size, class of insulation, phase designation.

3.5 CONDUIT IDENTIFICATION

A. Where spare conduits are installed, labels shall be provided at each end clearly identifying destination. Where one end is located in a handhole or manhole, provide label directly above spare conduit.

B. Where spare conduit path includes intermediate pull boxes, conduit bodies, wireways, etc., provide label at each location indicating the next termination point. The label at each end shall identify quantity of intermediate pull boxes, conduit bodies, wireways, etc. as well as location.

C. Where spare conduits are provided above ceilings on either side of an inaccessible area, provide small label on T-bar to indicate location of spare conduit.

D. Where low voltage and conduit sleeves enter floor or below grade, provide label identifying termination point.

3.6 DANGER SIGNS

A. In addition to installation of danger signs required by governing regulations and authorities, install appropriate danger signs at locations indicated and at locations subsequently identified by Installer of electrical work as constituting similar dangers for persons in or about project.

B. High Voltage: Install danger signs wherever it is possible, under any circumstances, for persons to come into contact with electrical power of voltages higher than 110-120 volts.

C. Critical Switches/Controls: Install danger signs on switches and similar controls, regardless of whether concealed or locked up, where untimely or inadvertent operation (by anyone) could result in significant danger to persons, or damage to or loss of property.

3.7 ARC FLASH LABELS

A. Provide arc flash labels on equipment per NEC and NFPA. Labels shall be placed in a prominent position that is clearly visible before access to a dangerous area is reached. This includes the front of devices similar to disconnect switches, motor starters, switchboards, etc. and just inside the front cover of panelboards. The labels shall be of sufficient durability to withstand the environment involved.

B. Provide signs for each unit of the following categories of electrical work.

1. Panelboards, electrical cabinets and enclosures.
2. Disconnect switches.

3.8 EQUIPMENT/SYSTEM IDENTIFICATION

A. Install engraved plastic-laminate sign on each major unit of electrical equipment in building; including central or master unit of each electrical system including communication/control/signal systems, unless unit is specified with its own self-explanatory identification or signal system. Except as otherwise indicated, provide single line of text, 1/2" high lettering on 1-1/2" high sign (2" high where 2 lines are required), White lettering in Black field. Provide text matching terminology and numbering of the Contract Documents and shop drawings. Each listed piece of equipment below shall have a sign that has the following: 1. Equipment Name, 2. Where the equipment is fed from. Example: PANEL "PD1" (FED FROM PANEL DPD).

B. Provide signs for each unit of the following categories of electrical work.

1. Panelboards, electrical cabinets and enclosures.
2. Access panel/doors to electrical facilities.
3. Disconnect switches.

C. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment.

Secure to substrate with fasteners, except use adhesive where fasteners should not or cannot penetrate substrate.

3.9 DIRECTORIES

A. Provide typed circuit directory cards in all panelboards (both breaker and fuse type) and low voltage lighting control panels indicating the room number or area, and the item or items controlled by each circuit. Provide typed circuit directory cards for all "Existing" panelboards and low voltage lighting control panels where the Contractor has added, deleted or moved circuits with in an "Existing" panelboard.

1. Contractor shall trace existing circuits within existing panelbaords and low voltage lighting control panels to properly identify all circuits within the panelboards and low voltage lighting control panels.

B. Directories shall use actual room numbers to indicate locations of all devices, including, but not limited to receptacles, lighting, mechanical equipment, etc. When preparing schedule, use a room number schedule generated by the architect and/or the owner, which indicates the actual room numbers that will be used when the building is occupied. If the schedule is not available, request, in writing, a schedule to reflect the proper room numbers.

C. Provide sufficient information to meet requirements of Article 408 of the National Electric Code. Specifically, location of device fed shall be added to directory cards.

3.10 ADDITIONAL FUSE LABELING

A. At the exterior enclosure of all fused switches, provide additional labeling designating fuse sizes, types and quantity.

3.11 RECEPTACLE CIRCUIT IDENTIFICATION

A. At each receptacle, identify panelboard and circuit number from which receptacle is served. Use machine printed, pressure sensitive, abrasion resistant label tape on backs of the wall plate and durable wire markers or tags within outlet boxes.

END OF SECTION 26 05 53

SECTION 26 24 16 – PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for the following types:

1. Lighting and appliance branch circuit panelboards.

1.2 DEFINITIONS

A. GFCI: Ground fault circuit interrupter.

1.3 SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and Manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details for types other than NEMA 250, Type 1.
b. Bus configuration, current, and voltage ratings.
c. Short circuit current rating of panelboards and overcurrent protective devices.
d. UL listing for series rating of installed devices.
e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Wiring Diagrams: Diagram power, signal, and control wiring and differentiate between Manufacturer installed and field installed wiring.

C. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

D. Maintenance Data: For panelboards and components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Contract Closeout," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time current curves, including selectable ranges for each type of overcurrent protective device.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For switchboards and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Division 01 "Operation and Maintenance Data," include the following:

a. Routine maintenance requirements for switchboards and all installed components.
b. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
c. Time-current coordination curves for each type and rating of overcurrent protective device included in switchboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Square D Company.

B. Siemens.

C. GE by ABB.

D. Eaton (Cutler Hammer).

E. No Other Manufacturers Will Be Considered.

2.2 FABRICATION AND FEATURES

A. Enclosures: Flush and surface mounted cabinets. Refer to panel Schedules on Drawings to determine flush or surface. NEMA PB 1, Type 1 for interior locations and Type 3R for exterior locations, unless noted otherwise in the documents.

B. Front: See panelboard, Hinged Trim Covers.

C. Finish: Manufacturer's standard enamel finish over corrosion resistant treatment or primer coat.

D. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.

E. Bus Material (Main, Neutral & Ground): Aluminum.

F. Main and Neutral Lugs: Mechanical type suitable for use with conductor material.

G. Equipment Ground Bus: Adequate for feeder and branch circuit equipment ground conductors; bonded to box.

H. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches. Provide when indicated on the panel Schedules.

I. Skirt for Surface Mounted Panelboards: Provide skirts with same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor. Skirts shall be provided for all surface mounted panels in all rooms with exception of rooms labeled on plans "Electric or Mechanical."

J. Feed through Lugs: Mechanical type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

2.3 PANELBOARD SHORT CIRCUIT RATING

A. Panelboards shall be fully rated to interrupt symmetrical short circuit current as indicated on the schedules. All breakers within panelboards shall be fully rated to the panel AIC rating. Series ratings of branch breakers or bus shall not be acceptable.

2.4 LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARDS

A. Branch Overcurrent Protective Devices: Bolt on circuit breakers, replaceable without disturbing adjacent units.

B. Doors: Standard manufacturer type lockable doors shall be provided.

2.5 OVERCURRENT PROTECTIVE DEVICES

A. Lighting and Appliance Branch Circuit Panelboards:

1. Molded Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

    a. Thermal Magnetic Circuit Breakers: Inverse time current element for low level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit breaker frame sizes 250 A and larger.
    b. GFCI Circuit Breakers: Single pole configurations with 5mA trip sensitivity.

2. Molded Case Circuit Breaker Features and Accessories. Standard frame sizes, trip ratings, and number of poles.

    a. Lugs: Mechanical style, suitable for number, size, trip ratings, and material of conductors.
    b. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air conditioning, and refrigerating equipment.
    c. Ground Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time delay settings, push to test feature, and ground fault indicator.

d. Shunt Trip: 120 V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Mounting Heights: Top of trim 74 inches above finished floor, unless otherwise indicated.

C. Mounting: Plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.

D. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable. Refer to Section 260553 for more information.

E. Install filler plates in unused spaces.

F. Provision for Future Circuits at Flush Panelboards: Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub two 1-inch empty conduits below slab not on grade into suspended ceiling cavity.

G. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

A. Provide panel and circuit identification as outlined in Division 26 "Electrical Identification".

3.3 CONNECTIONS

A. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.

B. Tighten electrical connectors and terminals according to Manufacturers' published torque tightening values. If Manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Test continuity of each circuit.

B. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:

1. Measure as directed during period of normal system loading.
2. Perform load balancing circuit changes outside normal occupancy/working Schedule of the facility and at time directed. Avoid disrupting critical 24 hour services such as on line data processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference exceeding 10 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.5 PROTECTIVE SHIELDS

A. Provide metal protective shield(s) under all piping located within 3'-0" of the panelboard to defect a pipe leak away from the electrical equipment. Shield(s) shall be sized as required to cover the required pipe to prevent water from reaching the panelboard.

3.6 ADJUSTING

A. Set field adjustable switches and circuit breaker trip ranges.

3.7 CLEANING

A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 26 24 16

SECTION 26 27 26 – WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes receptacles, connectors, switches, dimmers, finish plates and cord reels.

1.2 DEFINITIONS

A. GFCI: Ground fault circuit interrupter.

1.3 SUBMITTALS

A. Product Data: For each product specified.

B. Shop Drawings:

1. Legends for receptacles and switch plates, where indicated on the drawings.
2. Cord Reels.

C. Samples: For devices and device plates for color selection and evaluation of technical features, when requested by the Architect-Engineer and/or Owner.

D. Maintenance Data: For materials and products to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

B. Comply with NEMA WD 1.

C. Comply with NFPA 70.

D. Compliance with Federal Specifications – identified by the federal specifications mark (capital letters 'F' and 'S' each in a wing on either side of the UL Listing mark):

1. Receptacles and GFCI's: Federal Specification number WC596.
2. Switches: Federal Specification number WS896.

1.5 COORDINATION

A. Receptacles for Owner Furnished Equipment, or Equipment furnished by other trades: Match plug configurations.

1. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.1 RECEPTACLES

A. Duplex Convenience Receptacle

1. Manufacturers

   a. Hubbell HBL5362 Series.
   b. Leviton 5362 Series.
   c. Pass & Seymour PS5362 Series.

2. Description: Heavy-Duty Federal Industrial Spec Grade with nylon face (smooth), brass strap, brass contacts for side and back wiring, and nylon base.
3. Provide with WR (weather resistant) label when installed in exterior applications per code.
4. Where indicated on the drawings, or per current version of NEC, provide the tamper resistant version with internal shutter system.
5. Color of receptacles shall be as selected by the Architect.
6. Prewired and plug-in devices shall be acceptable provided device matches specifications and plug-in devices are crimped and welded. Provide similar to Pass & Seymour "Plug Tail" type receptacles.

B. Tamper Resistant Ground Fault Circuit Interrupter (GFCI) Receptacle

1. Manufacturers

   a. Hubbell GFTR20 Series.
   b. Leviton X7899 Series.
   c. Pass & Seymour 2097TR Series.

2. Description: Federal Specification Grade tamper resistant with high-impact-resistant thermoplastic construction, brass contacts for side and back wiring and LED trip indicator light.
3. GFCI receptacles shall not be connected to protect downstream devices, unless noted otherwise on the drawings. Provide unit designed for installation in a 2-3/4" deep outlet box without adapter, grounding type, Class A, Group 1, per UL 943.
4. Device shall comply with Federal Specification WC596. Devices shall have protection so that if critical components are damaged and ground fault protection is lost, power to receptacle shall be disconnected.
5. Provide with WR (weather resistant) label when installed in exterior applications per code.
6. Provide tamper resistant with internal shutter system.
7. Prewired and plug-in devices shall be acceptable provided device matches specifications and plug-in devices are crimped and welded.

C. Weatherproof Receptacle

1. Consisting of a GFCI receptacle as specified above in an outlet enclosure that is UL listed for wet locations, and meet NEC and OSHA requirements while in use.
2. Exterior-mounted receptacles installed in existing walls and on mechanical units shall have a self-closing weatherproof (in use) cover similar to Pass & Seymour WIUCAST series. Exterior-mounted receptacles installed in new walls shall have a self-closing weatherproof (in use) and be mounted over a recessed box similar to Arlington Industries DSBVR1W series. Paint cover to match adjacent surface with appropriate type of paint. Coordinate color with Architect prior to ordering.

2.2 CORD REELS

A. Manufacturers: As specified on the drawings.

B. Provide all accessories as required for a complete installation.

2.3 SPECIAL PURPOSE RECEPTACLES

A. Manufacturers

1. Hubbell.
2. Leviton.
3. Pass & Seymour.

B. Description: Polarized, grounding type

C. Device Body: Black nylon

D. Configuration: As required by the amperage and voltage of the equipment to be connected on the drawings.

E. Provide equipment cord and caps as required for equipment.

2.4 WIRING DEVICE ACCESSORIES

A. Wall Plates: Provide wall plates for single and combination wiring devices, of types, sizes, and with ganging and cutouts as indicated. Provide plates which mate and match with wiring devices to which attached. Provide metal screws for securing plates to devices with screw heads colored to match finish of plates.

B. Wall Plates: Provide 302 satin finished stainless steel wall plates throughout the building.

C. Provide galvanized steel wall plates in unfinished spaces.

D. Floor Service Outlets: Provide duplex receptacles as required and specified under receptacles.

2.5 CORD AND PLUG SETS

A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.

1. Cord: Rubber insulated, stranded copper conductors, with type SOW A jacket. Green insulated grounding conductor, and equipment rating ampacity plus a minimum of 30 percent.
2. Plug: Nylon body and integral cable clamping jaws. Match cord and receptacle type for connection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate with other work, including painting, electrical boxes and wiring work, as necessary to interface installation of wiring devices with other work.

B. Verify all receptacle mounting heights before roughing in unless noted. If an outlet is installed in such a location as to be out of proper relation to beams, walls, or finish details of the building, its location shall be corrected by and at the expense of the Contractor under direction of the Architect/Engineer.

C. Install devices and assemblies plumb and secure only in electrical boxes which have been cleaned of excess building materials, dirt, and debris. Device to be secure tight against wall box and flush with wall plate.

D. Install switches on latch side of doorways.

E. Install wall plates when painting is complete.

F. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

G. Protect devices and assemblies during painting.

H. Coord reels shall be installed at structure or in ceiling (where architectural drawings indicate a ceiling). Provide all miscellaneous steel as required to support cord reel, both vertically and laterally. When installed in ceiling:

1. Support cord reel so that ceiling is not impacted from pulling cable.
2. Provide power connection to cord reel at ceiling plane to meet NEC.

3.2 INSTALLATION TO MEET ACOUSTICAL PERFORMANCE

A. In order to reduce sound transmission through walls, when devices boxes are installed to serve both sides of the wall, they shall be installed in different stud cavities. Where boxes are found to be installed in the same stud cavity, feeding two different sides of the wall, they will be required to be removed and reinstalled at the contractor's expense.

3.3 IDENTIFICATION

A. The requirements listed below are in addition to the requirements listed in Division 26 "Electrical Identification".

B. Receptacles: Identify panelboard and circuit number from which served. Use machine printed, pressure sensitive, abrasion resistant label tape on backside of the wall faceplate and durable wire markers or tags within outlet boxes.

3.4 CONNECTIONS

A. Connect wiring device grounding terminal to outlet box with bonding jumper.

B. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.

C. Tighten electrical connectors and terminals according to manufacturers published torque tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

A. Test wiring devices for proper polarity and ground continuity. Operate each device at least six times.

B. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

C. Replace damaged or defective components.

3.6 CLEANING

A. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION 26 27 26

SECTION 26 28 13 – FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes cartridge fuses, rated 600 V and less, for use in switches, panelboards, switchboards, controllers, and motor control centers; and spare fuse cabinets.

1.2 SUBMITTALS

A. Product Data: Include dimensions and Manufacturer's technical data on features, performance, electrical characteristics, and ratings for each fuse type indicated.

1.3 QUALITY ASSURANCE

A. Source Limitations: Provide fuses from a single Manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NEMA FU 1.

D. Comply with NFPA 70.

1.4 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply Manufacturer's ambient temperature adjustment factors to fuse ratings.

1.5 COORDINATION

A. Coordinate fuse ratings with equipment nameplate limitations of maximum fuse size.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged in original cartons or containers and identified with labels describing contents.

1. Fuses: Quantity equal to one (1) set for every five (5) installed sets, but not fewer than one set of three of each kind.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Bussmann Series

2. Mersen (Ferraz Shawmut) by Powerfuse.
3. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

B. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Main Service: Class L, time delay (601 to 6000A) or Class J, time delay (0 to 600A).

B. Main Feeders: Class L, time delay (601 to 6000A) or Class J, time delay (0 to 600A).

C. Combination Starter/Disconnect Switches: Class RK1, time delay.

D. Disconnect Switches: Class RK1, time delay (30-600A).

E. Other Branch Circuits: Class J, time delay.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

A. The requirements listed below are in addition to the requirements listed in Division 26 "Electrical Identification".

B. Install labels indicating fuse replacement information on inside door of each fused switch.

END OF SECTION 26 28 13

SECTION 26 28 16 – DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Disconnect Switches.

B. Molded-Case Circuit Breakers and Switches.

C. Enclosures.

1.2 REFERENCES

A. FS W F 870 Fuse Holders (For Enclosed Cartridge Fuses).

B. FS W S 865 Switch, Box, (Enclosed), Surface Mounted.

C. NEMA KS 1 Enclosed Switches.

1.3 SUBMITTALS

A. Include outline Drawings with dimensions, and equipment ratings for voltage, capacity, horsepower, and short circuit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Square D Company.

B. Siemens.

C. Eaton (Cutler Hammer).

D. General Electric by ABB.

E. No Other Manufacturers will be considered.

2.2 HEAVY DUTY TYPE FUSED AND NON-FUSED DISCONNECT SWITCHES

A. All switches shall have switch blades which are visible when the switch is OFF and the cover is open.

B. Lugs shall be mechanical type, front removable and UL listed for 60°C or 75°C conductors in switches rated 30 through 100 ampere, 75°C conductors in switches rated 200 through 1200 ampere, copper conductors.

C. Switches rated over 1200 amperes shall be provided as switchboard sections, with all applicable accessories.

D. All current carrying parts shall be plated to resist corrosion.

E. Switches shall have removable arc suppressors to facilitate easy access to line side lugs.

F. Switches shall have provisions for a field installable electrical interlock.

G. Switch operating mechanism shall be quick make, quick break such that, during normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the operating handle after the closing or opening action of the contacts has started.

H. The operating handle shall be an integral part of the box, not the cover.

I. The handle position shall travel at least 90 degrees between OFF and ON positions to clearly distinguish and indicate handle position.

J. All switches shall have a dual cover interlock mechanism to prevent unintentional opening of the switch cover when the switch is ON and prevent turning the switch ON when the cover is open. The cover interlock mechanism shall have an externally operated override but the override shall not permanently disable the interlock mechanism. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

K. The enclosure shall have ON and OFF markings on the cover to clearly identify the position of the switch.

L. All switches shall have provisions to lock the operating handle in the OFF position.

M. Switches shall be horsepower rated for ac and/or dc as indicated on the plans.

N. The UL listed short circuit current rating of the switches shall be: 200,000 rms symmetrical amperes when used with or protected by Class R fuses (30 through 600 ampere switches employing appropriate fuse rejection schemes).

O. Switch Accessories:

1. Provide the following where required/indicated on the documents:

    a. Where switches are designated to be used as service entrance, the switch shall be labeled for such use.
    b. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
    c. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
    d. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
    e. Where fused switches are designated to have type "R" fuses, the switch shall be provided with rejection clips.
    f. Provide fuse clip adaptors as required to accommodate smaller fuses when required.
    g. Auxiliary Contact Kit: Two NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Provide contact rating as required to accommodate application.

2.3 MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES

A. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

B. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center,

be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.

C. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated.

D. MCCBs shall be equipped with a device for locking in the isolated position.

E. Lugs shall be suitable for 60 deg C 125 ampere circuit breakers and below and 75 deg C over 125 ampere.

F. Switches rated over 1200 amperes shall be provided as switchboard sections, with all applicable accessories.

G. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.

H. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I-squared t response, when ground-fault is required or indicated.

I. Ground-Fault Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip). Provide where indicated or required by code.

J. Ground-Fault Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip). Provide where indicated.

K. Features and Accessories:

1. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
2. Ground-Fault Protection: Comply with UL 1053; integrally mounted type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
3. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
4. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
5. Electrical Operator: Provide remote control for on, off, and reset operations.

2.4 ENCLOSURES

A. Switch and breaker enclosure shall be NEMA 1 unless otherwise on the Drawings or required by the NEC in accordance with the project conditions.

1. Exterior switches and breakers shall be rated NEMA 3R, unless noted otherwise.
2. Kitchen and wash-down areas shall be provided with NEMA 4X with stainless steel enclosure, unless noted otherwise.

B. The enclosure shall be finished with Gray baked enamel paint which is electrodeposited on cleaned, phosphate pretreated steel (Type 1), or Gray baked enamel paint which is electrodeposited on cleaned, phosphate pretreated galvannealed steel (Type 3R).

C. Tangential knockouts shall be provided to facilitate ease of conduit entry for switches rated 30 through 200 amperes.

D. Enclosures for Type 3R switches through 200 amperes shall have provisions for interchangeable bolt on hubs in the top end wall.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install disconnect switches to meet N.E.C. working clearance requirements.

B. Install fuses in fusible disconnect switches.

3.2 IDENTIFICATION

A. The requirements listed below are in addition to the requirements listed in Division 26 "Electrical Identification."

B. Provide labeling on the exterior of each disconnect switch Stating the following:

1. What the piece of equipment is fed from the switch.
2. Where the piece of equipment is fed from the switch.
3. Size, type and quantity of fuses within cabinet.

3.3 FIELD QUALITY CONTROL

A. Subsequent to completion of installation of disconnects, energize circuits and demonstrate capability and compliance with requirements. Demonstrate switch operation through six (6) opening/closing cycles with circuit unloaded. Open each switch enclosure to display interior, mechanical and electrical connections and fuse installation, and for verification of type and rating of fuses installed. Where possible, correct deficiencies at project site, then retest or demonstrate compliance; otherwise, remove and replace with new units and retest.

END OF SECTION 26 28 16

PARTIAL FIRST FLOOR PLAN - AREA 'A' - POWER

SCALE: 1/4" = 1'-0"

SQUARE 'D' NQ WITH GRD. BAR

PANEL: SFP	MAINS: 225A MLO	Ø: 3	A.I.C. RATING:	FED FROM: SLP
VOLTS: 120/208	MOUNTING: SURFACE		WIRES: 4	POLES: 42
			LOCATION: STORAGE A107	

REMARKS & LOCATION	LOAD	BKR	CKT	A	B	C	CKT	BKR	LOAD	REMARKS & LOCATION
BOOTH #1 EXHAUST	1920	20	1				2	20	1920	BOOTH #9 EXHAUST
BOOTH #2 EXHAUST	1920	20	3				4	20	1920	BOOTH #10 EXHAUST
BOOTH #3 EXHAUST	1920	20	5				6	20	1920	BOOTH #11 EXHAUST
BOOTH #4 EXHAUST	1920	20	7				8	20	1920	BOOTH #12 EXHAUST
BOOTH #5 EXHAUST	1920	20	9				10	20	1920	BOOTH #13 EXHAUST
BOOTH #6 EXHAUST	1920	20	11				12	20	1920	BOOTH #14 EXHAUST
BOOTH #7 EXHAUST	1920	20	13				14	20	0	SPARE
BOOTH #8 EXHAUST	1920	20	15				16	20	0	SPARE
BOOTH #15 EXHAUST	1920	20	17				18	20	0	SPARE
SPARE	0	20	19				20	20	0	SPARE
SPARE	0	20	21				22	20	0	SPARE
SPARE	0	20	23				24	20	0	SPARE
SPARE	0	20	25				26	20	0	SPARE
SPARE	0	20	27				28	20	0	SPARE
SPARE	0	20	29				30	20	0	SPARE
SPARE	0	20	31				32	20	0	SPARE
SPARE	0	20	33				34			BLANK SPACE
SPARE	0	20	35				36			BLANK SPACE
BLANK SPACE			37				38			BLANK SPACE
BLANK SPACE			39				40			BLANK SPACE
BLANK SPACE			41				42			BLANK SPACE

DRAWING NOTES:

1. REFER TO EQUIPMENT WIRING DETAIL ON DRAWING E-2 FOR REQUIREMENTS. PROVIDE REQUIRED CORD AND PLUG FOR EXISTING LATHE'S. VERIFY LOCATION IN FIELD SO NOT TO INTERFERE WITH OVERHEAD DOOR OPERATION.
2. 2#12&#12G-3/4"C TO SPARE 20A-1P GFI CIRCUIT BREAKER IN EXISTING PANEL 'SP' & CONNECT. LABEL DIRECTORY CARD ACCORDINGLY.
3. PROVIDE (6) 20A-1P GFI CIRCUIT BREAKERS IN EXISTING SHOP PANEL 'SP'.
4. CONNECT TO ASSOCIATED BUS DUCT DISCONNECT SWITCH VIA 2#4&#8G-1"C.
5. CONNECT TO ASSOCIATED BUS DUCT DISCONNECT SWITCH INDICATED IN BRACKET [#] VIA 2#8&#10G-3/4"C.
6. WELDER BUS DUCT DISCONNECT SWITCH 60A-2P WITH 35A FUSES. TYPICAL OF 15.
7. PROVIDE 200A-3P CIRCUIT BREAKER IN PANEL 'SLP' AND CONNECT VIA 4#3/0&#6G-2"C. APPROXIMATE DISTANCE TO PANEL 'SLP' (LOCATED PLAN SOUTH IN RECEIVING) IS 170'.
8. PROVIDE 20A-3P CIRCUIT BREAKER IN EXISTING PANEL 'SMP' AND CONNECT VIA 3#12&#12G-3/4"C. LABEL DIRECTORY CARD ACCORDINGLY.
9. CONNECT TO SPARE 20A-2P CIRCUIT BREAKER IN EXISTING PANEL 'SMP' AND CONNECT VIA 2#12&#12G-3/4"C. LABEL DIRECTORY CARD ACCORDINGLY.
10. WELDING BOOTH INSTALLED BY OTHERS, PROVIDE DISCONNECT SWITCH, RECEPTACLE AND MOUNTING HARDWARE/ BRACKET REQUIRED. PROVIDE ALL REQUIRED COMPONENTS FOR COMPLETE INSTALLATION.
11. BOOTH FUME EXTRACTOR, INSTALLED BY OTHERS. PROVIDE RECEPTACLE AND CIRCUIT INDICATED. PROVIDE HARDWARE REQUIRED TO MOUNT RECEPTACLE.

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RENOVATIONS TO THE WELDING SHOP
OCTORARA AREA HIGH SCHOOL
FOR THE
OCTORARA AREA SCHOOL DISTRICT
ATGLEN, CHESTER COUNTY, PENNSYLVANIA

PARTIAL FIRST FLOOR PLAN - AREA 'A' - POWER

DRAWN: SH
CHECKED: CV
DATE: 9-08-23
SCALE: AS NOTED
JOB NO.: 2867
SHEET: E-1

ELECTRICAL LEGEND

(REFER TO SPECIFICATIONS FOR MORE INFORMATION)
NOTE: DIMENSIONS ARE TO CENTER OF DEVICE, UNO.

RECEPTACLES

SYMBOL	DESCRIPTION
(duplex receptacle)	– DUPLEX RECEPTACLE – 20 AMP – 120 VOLT 18" AFF.
GF (receptacle)	– GROUND FAULT RECEPTACLE – INDIVIDUAL TYPE – 18" ABOVE FINISHED FLOOR.
(special outlet)	– SPECIAL OUTLET – SIZE AND TYPE INDICATED – 18" AFF.

EQUIPMENT

SYMBOL	DESCRIPTION
(J)	– JUNCTION BOX – PROVIDE FINAL CONNECTION TO EQUIPMENT AND OR BLANK COVERPLATE.
(motor)	– MOTOR – SIZE AND TYPE AS INDICATED – BY OTHERS. PROVIDE FINAL CONNECTIONS.
(panelboard)	– PANELBOARD.
(existing panelboard)	– EXISTING PANELBOARD.
St	– THERMAL SWITCH MANUAL STARTER WITH THERMAL PROTECTION AND HAND/AUTO SWITCH TO ALLOW STARTER CONTROL FROM REMOTE SOURCE. HAND/AUTO SWITCH ONLY REQUIRED FOR RE-CIRCULATING PUMPS. SQUARE D CLASS 2510 SERIES WITH HANDLE GUARD/LOCK OFF ATTACHMENT MOUNT ON OR ADJACENT TO EQUIPMENT.
(non-fused disconnect)	– NON-FUSED DISCONNECT SWITCH – SIZE AND TYPE INDICATED.
(fused disconnect)	– FUSED DISCONNECT SWITCH – SIZE AND TYPE INDICATED (PROVIDE FUSES AS PER EQUIPMENT MANUFACTURERS REQUIREMENTS).
(D)	– CABLE REEL DROP SIMILAR TO HUBBELL HBLC40123TT

WIRING

SYMBOL	DESCRIPTION
(homerun arrow)	HOMERUN TO APPLICABLE PANEL – WIRING SHALL BE 2#12 AWG WITH SEPARATE GROUND WIRE IN 3/4" CONDUIT UNLESS OTHERWISE NOTED.
(line)	WIRING – CONCEALED AS SPECIFIED OR AS OTHERWISE NOTED.
(1)	INDICATES DRAWING NOTE NUMBER.

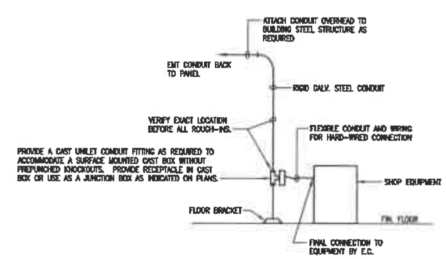
ABBREVIATIONS

SYMBOL	DESCRIPTION
AFF	– ABOVE FINISHED FLOOR
AFG	– ABOVE FINISHED GRADE
ER	– EXISTING ITEM TO BE REMOVED
ERL	– EXISTING ITEM TO BE RELOCATED
EX	– EXISTING ITEM TO REMAIN
UNO	– UNLESS NOTED OTHERWISE
WP	– WEATHER PROOF
NFDS	– NON FUSED DISCONNECT SWITCH
FDS	– FUSED DISCONNECT SWITCH

NOTE: THE ABOVE ELECTRICAL LEGEND IS STANDARD. SOME ITEMS LISTED ARE NOT NECESSARILY USED ON THIS PROJECT. ALL ITEMS LISTED SHALL BE PROVIDED BY THIS CONTRACTOR UNLESS NOTED OTHERWISE.

GENERAL ELECTRICAL NOTES: (APPLY TO ALL SHEETS)

1. THE CONTRACTOR SHALL PROVIDE ALL CIRCUITS (FEEDER AND BRANCH) WITH AN EQUIPMENT GROUND CONDUCTOR SIZED IN ACCORDANCE WITH N.E.C. TABLE 250-122.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ANY MISCELLANEOUS STEEL REQUIRED FOR MOUNTING ELECTRICAL EQUIPMENT. THE CONTRACTOR IS RESPONSIBLE TO SIZE STEEL AND INSTALL PROPERLY FOR THE LOAD INTENDED.
3. ALL LOW VOLTAGE WIRING MUST BE AN APPROVED AIR PLENUM CABLE, OR RUN IN CONDUIT.
4. ALL LOW VOLTAGE WIRING, NOT INSTALLED IN CONDUIT, ABOVE CEILINGS MUST BE RUN PERPENDICULAR AND/OR PARALLEL TO BUILDING STEEL. ALL CABLES MUST BE NEATLY TRAINED AND WIRE TIED TO THE BUILDING STEEL OR INSTALLED ON J-HOOKS, BRIDLE RINGS OR IN CABLE TRAY WITH 25% SPARE CAPACITY. CABLES THAT ARE SIMPLY DRAPED THROUGH STEEL OR RUN AT ODD ANGLES WILL HAVE TO BE REMOVED AND REINSTALLED.
5. THE CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING AND PATCHING OF EXISTING SURFACES THAT IS REQUIRED FOR HIS WORK. PATCHING SHALL INCLUDE EVERYTHING TO MATCH ADJACENT SURFACES.
6. ALL WIRING SHALL BE COPPER CONDUCTOR, TYPE THHN/THWN. ALL CONDUITS SHALL BE OF TYPE APPROVED FOR THEIR USE. INDOOR CONDUITS SHALL BE EMT.
7. WHERE WIRE AND CONDUIT IS LISTED, MC CABLE MAY BE USED, WHERE ACCEPTABLE PER NEC ARTICLE 330 AND THE OWNER.
8. WHEN INSTALLING CONDUITS ABOVE CEILING, LOCATE IN SUCH A MANNER TO ALLOW ACCESS TO ALL PIPING, DUCTS, VALVES, AND OTHER DEVICES LOCATED ABOVE CONDUITS.
9. CONDUIT SLEEVES MUST BE PROVIDED FOR ALL LOW VOLTAGE WIRING RUN IN OR THROUGH WALLS.
10. ALL LOW VOLTAGE WIRING MUST BE AN APPROVED AIR PLENUM CABLE, OR RUN IN CONDUIT.



EQUIPMENT WIRING DETAIL

NO SCALE

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ATGLEN, CHESTER COUNTY, PENNSYLVANIA

ELECTRICAL LEGEND, GENERAL AND DEMOLITION NOTES

DRAWN	SN
CHECKED	CV
DATE	9-08-23
SCALE	AS NOTED
JOB NO.	2357
SHEET	E-2