CONTRACT DOCUMENTS

FOR
BUCKS COUNTY FREE LIBRARY BENSALEM
CEILING AND LIGHTING

BENSALEM BRANCH LIBRARY
3700 HULMEVILLE ROAD
BENSALEM, PA 19020

#2026BN-01

Prevailing Wage
#26-00758

February 17th, 2026

PREPARED FOR:
Bucks County Free Library
150 S Pine Street
Doylestown, PA 18901

PREPARED BY:
RHJ Associates, P.C.
10 Leopard Road
Paoli, PA 19301

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FOR
BUCKS COUNTY FREE LIBRARY CEILING AND LIGHTING
BENSALEM BRANCH LIBRARY

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3700 HULMEVILLE ROAD
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SECTION 000110

END OF DOCUMENT 000110

LEGAL NOTICE

Bucks County Free Library will receive bid responses until 2:00 PM on March 31, 2026. Bids are to be mailed or hand delivered to:

Bucks County Free Library
Attn: John J. Doran III, Chief Financial Officer
150 South Pine Street
Doylestown, PA 18901

BUCKS COUNTY FREE LIBRARY
BENSALEM CEILING AND LIGHTING

A Mandatory Pre-Bid Meeting will be held at 9:00 AM on March 11, 2026 at the

Bensalem Library, 3700 Hulmeville Road, Bensalem, PA 19020.

All questions must be emailed to Mike Henretty at mhenretty@rhjassoc.com and Leigh Sheldron at sheldronl@buckslib.org by 12pm on March 18, 2026. The questions will be answered, via email, by 5pm on March 23, 2026.

A security deposit in the form of a properly executed Bid Bond for 5% of the bid amount is required. Performance and Payment Bonds are required in the amount of 100% of the contract amount. A Maintenance Bond is required in the amount of 10% of the contract. Bidders are advised Prevailing Minimum Wage Rates, determined by the Secretary of Labor and Industry, must be paid to all workers employed on this project.

A link to the solicitation may be found on the Bid page of the library website at www.buckslib.org/bids

Bids are opened publicly in the second-floor conference room of the Doylestown Library 150 S Pine St, Doylestown PA, 18901 at 2:00pm the day they are due, March 31, 2026.

INSTRUCTIONS TO BIDDERS

1. RECEIPT AND OPENING OF BIDS

   a. All sections of the Bid, including downloads and Requests for Information (RFI's) shall be submitted with the bid and acknowledges the Bidder affirms, understands, and will abide by the requirements of the Bid. Failure to do so may cause the Bid to be rejected as non-responsive.
   b. The submission of a bid will be considered as conclusive evidence of complete examination of specifications and samples.
   c. The Bucks County Free Library (BCFL) reserves the right to accept and award an Agreement to the lowest responsive, responsible bidder. BCFL reserves the right to reject any or all bids or any part thereof. BCFL reserves the right to award an Agreement based on evaluation of specific criteria found in these specifications.
   d. No verbal instructions or information to bidders will be binding. The specifications will be considered clear and complete unless written attention is called to any apparent discrepancies or incompleteness thereof before the opening of bids. Should any written inquiries be received by the BCFL, these inquiries will be answered in the form of addenda and issued to all providers. These addenda shall then be considered a part of these specifications.
   e. Each bid must be submitted by 2:00 P.M. on the day of the bid opening.
   f. The bids will be opened and read publicly on the second-floor conference room of the Doylestown Library located at 150 S Pine St, Doylestown PA, by the BCFL Chief Financial Officer or their Representative at 2:00 P.M. on the day the bid is due.
   g. BCFL reserves the right to reject any or all bids or parts thereof, as deemed to be in the best interest of BCFL.
   h. If information is not included with your bid, and you receive a request from BCFL to provide it, you MUST deliver the information to the person making the request within 48 hours (excluding weekends). Any information not received within 48 hours may result in your bid being excluded from the evaluation and award process.
   i. BCFL is the sole authority to provide this bid package to interested companies or individuals. Bidders who are working from a bid package obtained from any other source may be working from an incomplete set of documents. BCFL assumes no responsibility for a bid's errors, omissions, or misinterpretations resulting from a Bidder's use of an incomplete bid package.
   j. Bidders who have received the bid package from a source other than BCFL are not an official vendor of record for the bid.

2. MODIFICATION AND WITHDRAWAL OF BIDS

   A Bid may be modified or withdrawn via e-mail at any time up to the bid due date and time.

3. PREPARATION OF BIDS

   Bidders will have been assumed to have carefully examined the Contract Documents for the work, all attached hereto, and to have carefully investigated physical conditions at the site and character of the work to be done, and to have inquired fully into the difficulties of construction of the work before preparing their bid. BCFL will not be responsible for the failure of the successful bidder to properly estimate such difficulties and costs, or for overlooking any of the requirements of the Contract Documents.

4. INTENT OF CONTRACT DOCUMENTS

The intent of the Contract Documents is to obtain a complete job, satisfactory to our Architect, RHJ Associates (RHJ). It shall be understood that the bidder has satisfied themself as to the full requirements of the Contract and has based their bid upon such understanding. Compensation for all work and materials required to complete the Contract shall be considered included in the prices bid for the items listed in the Agreement.

5. ADDENDA AND INTERPRETATIONS

All questions about the meaning or intent of the Bidding Documents are to be submitted by 12pm on March 18, 2026 via e-mail to BCFL sheldronl@buckslib.org and RHJ mhenretty@rhjassoc.com. Interpretations or clarifications considered necessary in response to such questions will be issued through an Addendum via e-mail and the BCFL website by 5pm on March 23, 2026. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by BCFL or RHJ.

Failure of any bidder to download any such addenda or interpretations shall not relieve said bidder from any obligations under this bid as submitted. All addenda so issued shall become part of the Contract Documents.

6. DISCLOSURE OF CONTENTS

All proposals/bids and other material submitted become the property of the library and may be returned only at the BCFL's option. Information contained in the proposals/bids will not be disclosed during the evaluation process.

7. CONDITIONS OF WORK

Each bidder must inform themself fully of the conditions relating to the construction and labor under which the work will be performed; failure to do so will not relieve the successful bidder of their obligation to furnish all material and labor necessary to carry out the provisions of the Contract Documents and to complete the contemplated work for the consideration set forth in their bid.

At the time of the opening of bids, each bidder will be presumed to have inspected physical conditions at the site and to have read and to be thoroughly familiar with the Contract Documents (including all addenda); the failure or omission of any bidder to receive or examine any form, instrument, or document shall in no way relieve any bidder from any obligation in respect to their bid.

8. TIME FOR COMPLETING WORK AND LIQUIDATED DAMAGES

The time for completion of the work under this Contract shall be one hundred and twenty (120) calendar days after formal Notice-to-Proceed from the Owner/Library. All bidders are notified that time is of the essence for this Contract. The successful bidder will be required to prosecute the work so as to ensure its completion within the above number of calendar days

set forth. It is mutually agreed that damages to the OWNER for failure of the successful bidder to fully complete the work under this Contract on or before the above-stated date shall be Two Hundred Dollars ($200.00) for each calendar day after said date that shall elapse before the work is fully completed, which amount shall in no event be considered as a penalty, but as liquidated damages due BCFL because of said delay. BCFL may retain the amount thereof from any money which otherwise would be payable hereunder to the successful bidder.

In addition to the above, in order that the work may be accomplished in the shortest possible time, the successful bidder, weather permitting, shall be required to have qualified workers with designated foreman at work on-site at all times. The successful bidder's personnel shall remain on-site throughout the duration of the successful bidder's work. At no time shall successful bidder pull off project without the express consent of RHJ or BCFL. In addition, no change in foreman shall be permitted without approval from the RHJ or BCFL. The successful bidder will be required to submit a detailed schedule for completion of work which will be subject to the review and approval of RHJ and BCFL.

9. QUALIFICATIONS OF BIDDERS

To demonstrate Bidder's qualifications to perform the Work, Bidder must submit with their Bid a complete Contractor's Qualification Statement. The bidder shall also, submit written evidence such as financial data, previous experience, present commitments, and such other data as may be reasonably requested.

10. BID SECURITY

Each bid must be accompanied by a Bid Bond, duly executed by the bidder as principal and having as surety thereon a surety company approved by RHJ or BCFL, in an amount not less than five percent (5%) of the amount of the base bid. Bid Bonds will be covered with surety of a company authorized to do business in the Commonwealth of Pennsylvania. Bid Bonds provided as surety will not be returned to the bidder after award unless bidder specifically requests BCFL to do so. Bids submitted with a Bid Bond must be properly signed and sealed by the Bidder and Surety Company.

11. CONTRACT

The bidder to whom the Contract is awarded shall, within ten (10) days after the official notice of acceptance of their bid, submit all required Bonds and Insurance to BCFL. The time for such submittal may be extended at the election of BCFL and for the sole benefit of BCFL. Failure or refusal of the bidder to do so will be considered an abandonment of the Contract, and the security posted with said bid shall be forfeited to and become the property of BCFL in an amount not to exceed the difference between the amount specified in said bid and such larger amount for which BCFL may in good faith contract with another party to perform the work covered by said bid.

It is expressly understood and agreed by the Bidders that the contractual obligations of BCFL to the Bidders are effective only after the execution of a contract signed by all parties. It is further expressly understood and agreed that the mere issuance of a contract between BCFL and a Bidder will not oblige BCFL in any fashion.

12. BONDS AND INSURANCE

The successful bidder must deliver to BCFL executed certificates of insurance as stipulated in end of these instructions and executed bonds as security for the faithful performance of his Contract and for the payment of all persons performing labor or furnishing materials in connection therewith, and for maintenance of the work for the designated period after it has been accepted by BCFL.

The Performance and Payment Bonds shall each be in the amount of 100% of the Contract Price and the Maintenance Bond shall be in the amount of 10% of the Contract Price and shall cover a maintenance period of one year

All bonds shall be prepared in the form of bonds attached hereto and have as security thereon such surety company or companies as are acceptable to BCFL and as are authorized to transact business in this state. Alterations made in the terms of the Specifications, and/or quantities of work shall in no way violate the bonds.

13. BASIS OF AWARD

The Contract will be awarded on the basis of competitive bidding to the responsible bidder submitting the lowest responsive bid. BCFL reserves the right to award locations individually or combine locations as determined to be in our best interest.

14. REJECTION OF BIDS

BCFL reserves the right to reject any or all bids, or to accept any bid should it deem it to be in its best interest to do so. Bids which are incomplete, conditional, or obscure, or which contain additions not called for, erasures, alterations, or irregularities of any kind, may be rejected as non-responsive. The right to reject or accept bids shall be solely for the benefit of BCFL, and shall create no right, entitlement, or expectation in any bidder.

15. PROGRESS PAYMENTS

Refer to the agreement for details on progress payments and retainage.

16. TRADE NAMES

Wherever trade names are used either on the Drawings or in the Specifications, it is understood that such names and designations indicate a type or kind of material and/or equipment. Approved equal in kind, type, and/or quality will be accepted at the discretion of the BCFL. The successful bidder shall submit manufacturers' specifications, etc., sufficient for RHJ to determine equivalency of material and/or equipment as directed in the Instructions to Bidders, Article 22.

17. POWER OF ATTORNEY

Attorneys-in-fact who execute contract bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

18. PERMITS, APPROVALS AND LICENSES

Each bidder shall be required to determine the necessity for and obtain all necessary permits, licenses and approvals from the municipality or other public authorities and shall give all notices required by law or municipal ordinances for this work. The bidder is solely and exclusively responsible for adherence to any existing historical, local, state, and federal codes and regulations, and all required permits, including permit costs.

19. PROGRESS SCHEDULE

Within seven (7) consecutive calendar days after the award of the Contract to them, the successful bidder shall submit a proposed program of operation, showing clearly how they propose to conduct the work to bring about the completion of their work within the time limit specified. This program shall outline the proposed sequence of operations, the rates of progress and the dates when their work will be sufficiently finished to permit the installation of the work under other contracts. The work under this contract shall be so scheduled that as structures are completed, they can be placed in use or operation with a minimum of delay. The program shall be subject to the approval of BCFL and shall be updated by the successful bidder at any time during performance of the Contract, should BCFL determine that the successful bidder's actual progress does not correspond to that projected in the then-existing progress schedule.

20. OTHER CONTRACTS

Bidders are advised that work other than the work covered under their Contract may be in progress at the site of the work during the performance of the work covered by these documents. Accordingly, bidders are warned that coordination of construction activities at the site must be such as to avoid interference. UNDER NO CIRCUMSTANCES SHALL BCFL or RHJ BE HELD RESPONSIBLE TO THE SUCCESSFUL BIDDER FOR DELAYS OR EXTRA WORK OCCASIONED BY INTERFERENCE OF OTHER CONTRACTORS.

21. SAFETY

It shall be the single and sole responsibility of the successful bidder to ensure that its activities comply with applicable safety requirements. Neither RHJ nor BCFL shall owe any duty under this Contract or otherwise to the successful bidder or its agents, employees, or guests to inspect the work or otherwise ensure compliance by the successful bidder with applicable safety requirements. No increases in the contract price or extensions in contract completion time shall be given by BCFL as the consequence of the successful bidder's failure to so comply.

22. PRODUCT SPECIFICATIONS

The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by the successful bidder if acceptable to RHJ and BCFL, application for such acceptance will be documented on a Substitution Request Form.

BCFL reserves the right to reject any unspecified product or products submitted which requires changes in design, construction, or other changes which may increase the contract price for the performance of the work. The substitute or "or-equal" product submitted by the successful bidder shall meet the requirements of the Specifications and shall, in all respects, be equal to the products specified by name herein. BCFL shall be the sole judge as to the equality of the proposed alternate product.

23. EMPLOYMENT VERIFICATION ACT

The PA Public Works Employment Verification Act (Act 127 of 2012) will apply to this Contract. This Act requires public works contractors and subcontractors to verify employment eligibility; provides for the powers and duties of the Department of General Services; prescribes sanctions; and establishes good faith immunity under certain circumstances.

24. STEEL PRODUCTS PROCUREMENT ACT

The successful bidder agrees to comply with the provisions of the Steel Products Procurement Act of March 3, 1978, P.L. 6, as amended (73 P.S. §1881 et seq.) where applicable. Information regarding the Act's requirements, including a list of exempt products, is available on the Department of General Services web site. See https://www.pa.gov/agencies/dgs/programs-and-services/design-and-construction-info/steel-products-procurement-act for further guidance.

25. PROJECT WAGES

The successful bidder shall comply with the provisions, duties, obligations, remedies, and penalties of the Pennsylvania Prevailing Wage Act, 43 P.S. §§ 165-1 et seq., which is incorporated herein by reference.

26. NONDISCRIMINATION/SEXUAL HARASSMENT

The successful bidder shall comply with all applicable provisions of state and federal constitutions, laws, regulations, and judicial orders pertaining to nondiscrimination, sexual harassment, and equal employment opportunity.

27. PAST PERFORMANCE

Any bidder who has demonstrated poor performance during either a current or previous agreement with BCFL may be considered as an unqualified source and their bid may be rejected. BCFL reserves the right to exercise this option as is deemed proper and/or necessary.

28. ACCESS TO ACCOUNTING RECORDS

The Successful bidder shall check all materials, equipment and labor entering into the Work and shall keep such full and detailed accounts as may be necessary for proper financial management under this Agreement, and the system shall be satisfactory to BCFL. BCFL or RHJ shall be afforded access to all the successful bidder's records, books, correspondence,

instructions, drawings, receipts vouchers, memoranda, and similar data relating to this contract, and the Successful bidder shall preserve all such records for a period of three years, or for such longer period as may be required by law, after the final payment.

29. ASSIGNMENT OF REFUND RIGHTS

The successful bidder agrees to assign and transfer to BCFL all its rights to sales and use tax which may be refunded as a result of a claim for refund or materials purchased in connection with this contract. The successful bidder further agrees that it will not file a claim for refund for any sales or use tax that is the subject of this assignment.

30. CONTRACTS WITH SUBCONTRACTORS

The successful bidder agrees to include the "Access to Accounting Records" and "Assignments of Refund Rights" paragraphs, in full, in any contracts with subcontractors.

31. REQUIRED ATTACHMENTS TO BID

The following documents must be delivered whether in person or by mail as attachments to the bid:

- Bid Bond (BB). Financial statement of the surety company, certified copy of Power of Attorney of person who signed the Bid Bond, and officer-signed certificate of surety company that they will provide the required bonds if bidder is awarded the Contract.
- Non-Collusion Affidavit (NCA)
- Signed Agreement

INSURANCE REQUIREMENTS

Commercial General Liability - (policy to include premises and operations, products/completed operations and blanket contractual liability - the contractual section of the coverage must cover this agreement)

General Aggregate Limit	$5,000,000.
Products and Completed Operations Aggregate Limit	$2,000,000.
Each Occurrence Limit	$1,000,000.

Automobile Liability - to include owned, non-owned and hired vehicles:

Combined Single Limit	$ 500,000.
or Bodily Injury	$ 250,000. each person
Bodily Injury	$ 500,000. each accident
And Property Damage	$ 100,000.

Workers Compensation

Statutory and Employer's Liability Bodily Injury by Accident	$ 100,000. each accident
Bodily Injury by Disease	$ 100,000. each employee
Bodily Injury by Disease	$ 500,000. policy limit

All insurance policies required under this Agreement shall, with the exception of the Worker's Compensation Insurance, designate "The Bucks County Free Library, its Board of Directors, and their respective officers, administrators, employees, professionals, and agents" as additional insureds with respect to liability arising out of the Supplier's performance of its obligations under this Agreement. The Supplier shall deliver to the Library certificates of insurance as evidence of the insurance and limits stipulated herein including the Additional Insured requirements. The Supplier shall subsequently provide the Library with certificates of insurance for renewals of such policies, and all insurance required hereunder shall be primary, and not in excess over or contributing with any insurance maintained by the Library.

Certificate Holder - "Bucks County Free Library", Attn: Administration offices of the Bucks County Free Library, 150 South Pine Street Doylestown PA 18901

Additional Insured – The County of Bucks and RHJ Associates must be included as additional insured with respect to the work performed for this project.

BID BOND

KNOW ALL MEN BY THESE PRESENTS, we, the undersigned, _____

_____ as Principal, and

_____as Surety, are hereby held and firmly bound unto Bucks County Free Library as Owner, in the penal sum of

_____($_____)

for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

Signed this _____ day of _____, 20___.

The Condition of the above obligation is such that whereas the Principal has submitted to _____ a certain Bid, attached hereto and hereby made a part hereof, to enter into a contract in writing for:

BUCKS COUNTY FREE LIBRARY BENSALEM CEILING AND LIGHTING

With this addition:

Contract # 2026BN-01

NOW, THEREFORE,

A.) If said Bid shall be rejected, or in the alternate,

B.) If said Bid shall be accepted and the Principal shall furnish bonds for his faithful performance of said Contract, for the payment of all persons performing labor or furnishing materials in connection therewith, for the maintenance of said project as contemplated in said Contract, and shall in all respects perform the agreement created by the acceptance of said Bid,

Then this obligation shall be void, otherwise the same shall remain in force effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such Bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____
(Principal)

_____
(Surety)

BY: _____

IMPORTANT:

Surety companies executing bonds must be authorized to do business in the Commonwealth of Pennsylvania.

NON-COLLUSION AFFIDAVIT

BUCKS COUNTY FREE LIBRARY

BENSALEM CEILING AND LIGHTING

With this addition:

Contract #2026BN-01

State of Pennsylvania

County of Bucks

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

and 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.

I state:

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 intentionally 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 non-competitive bid.
5. _____, its affiliates, subsidiaries, officers,
(Name of My Firm)
directors, and employees are not currently under investigation by any governmental agency and have not in the last four 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 _____ understands and acknowledges the above
(Name of My Firm)
representations are material and important and will be relied on by the Bucks County Free Library Board of Directors in awarding the contract(s) for which this bid is submitted.

I understand and my firm understands any misstatement in this affidavit is and shall be treated as fraudulent concealment from Bucks County Free Library of the true facts relating to the submission of bids for this contract.

_____
(Name and Company Position)

Sworn to and subscribed before me this _____ day of _____, 20__

My commission Expires: _____

Notary Public: _____

INSTRUCTIONS FOR NON-COLLUSION AFFIDAVIT

1. This Non-Collusion Affidavit is material to any contract awarded pursuant to this bid. According to the Pennsylvania Anti-Bid-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 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 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 bid submitted by a joint venture, each party to the venture must identified in the bid documents, and an Affidavit must be submitted separately on behalf of each party.
5. The term “complementary 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 false appearance of competition.

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

AGREEMENT

BUCKS COUNTY FREE LIBRARY

BENSALEM CEILING AND LIGHTING

With this addition:

Contract #2026BN-01

THIS AGREEMENT made this _____day of _____, 20___ by and between Bucks County Free Library, 150 S Pine Street, Doylestown, PA 18901, hereinafter "Library", and

_____

hereinafter "Contractor" or "Bidder." The Library and the Contractor in consideration of the mutual promises contained in this Agreement, and intending to be legally bound, agree as follow:

GENERAL PROVISIONS:
The Contractor shall:

(a) have charge of and be responsible for the entire work for which they have contracted until its final completion and acceptance by the library.

(b) be held liable for any defects which may appear in the material they have furnished or in their work for a period of one (1) year after final acceptance by the library.

(c) be solely liable for any damage occasioned by their work to the property of the library and others; and,

(d) upon conclusion, clean up the ground worked over.

RESPONSIBILITIES OF THE CONTRACTOR:

The Contractor agrees to pay for all materials furnished and services rendered for the performance of the Contract and any person or corporation furnishing materials or rendering services to the Contractor as though such person or corporation were expressly named herein, provided the action is brought within one (1) year after the time and cause of the action accrued.

The Contractor shall defend, indemnify and save harmless the Library, their General Contractor, officers, employees and agents from and against any and all claims, demands, suits, judgments, costs and expenses of any kind arising out of the work to be performed hereunder and resulting in any injury (including death) to any person or damage to any property (including loss of use) caused by any act or failure to act by the Contractor, its officers, employees, agents or guests.

It is also agreed and understood acceptance of final payment by the Contractor shall be considered as a release in full of any claim against the library out of, or by reason of, the work done, and materials furnished under this Contract.

The Contractor shall cooperate with the library in carrying on the work, without interrupting any service to the public.

BONDS AND INSURANCE CERTIFICATES

The Contract Documents are not complete until the library has received satisfactory performance, material payment bonds executed by responsible surety companies listed to do business in the Commonwealth of Pennsylvania and acceptable to the Library; together with Certificates of Insurance in respect to the insurance required by these specifications under policies issued by companies authorized to do business in the Commonwealth of Pennsylvania and acceptable to the Library.

FAILURE TO SUPPLY PROOF OF INSURANCE SHALL CONSTITUTE MATERIAL BREACH OF THIS AGREEMENT. Remedies for such material breach include termination of agreement by Library and / or the withholding of payments by the library until such time that material breach is cured.

STARTING AND PROSECUTION OF WORK

The Bidder agrees to begin the work within seven (7) consecutive calendar days after receipt of Notice to Proceed, and to prosecute it expeditiously to a conclusion, using an adequate number of competent men, suitable equipment, and machinery at all times, and working each working day weather conditions permit.

WORK INCLUDED IN THE CONTRACT:

The Contract shall consist of furnishing all labor, superintendence, materials, equipment, tools and other facilities, and all things necessary and proper for performance of the work as shown on the Contract Drawings and as described in these Specifications (prepared by the General Contractor) and the Advertisement for Bid.

CONTRACT DOCUMENTS:

The Contract Documents consist of this Agreement, the General Terms of the Contract, the Contract Drawings, the Specifications, all Addenda issued prior to bidding and all modifications issued after execution of this Agreement. These form the Contract, and all are as fully a part of the Contract if attached to this Agreement or repeated herein.

MATERIALS TO BE FURNISHED BY THE LIBRARY:

No materials shall be furnished by the Library.

WORK DONE BY THE LIBRARY:

No work shall be done by the Library in connection with this Contract.

PAYMENTS:

In consideration of the Contractor faithfully complying with the terms and stipulations of the Contract, the Library covenants and agrees to pay said Contractor the sum set forth in the bid of said Contractor, and also pay for extra work that may be agreed upon in writing and said prices shall be full compensation under the terms of the Contract.

APPLICABLE LAW:

This Agreement shall be governed by and interpreted and enforced in accordance with the laws of the Commonwealth of Pennsylvania (without regard to any conflict of law's provisions) and the decisions of the Pennsylvania courts. The Contractor consents to the venue and jurisdiction of the Court of Common Pleas of Bucks County in Pennsylvania, waiving any claim or defense that such forum is not convenient or proper. The Contractor agrees that any such court shall have in personal jurisdiction over it, and consents to service of process in any manner authorized by Pennsylvania law.

INTEGRATION:

The Agreement, including all referenced documents and attachments, constitutes the entire agreement between the parties. No agent, representative, employee or officer of either the Library or Contractor has authority to make, or had made, any statement, agreement or representation, oral or written, in connection with the Agreement, which in any way can be deemed to modify, add to or detract from, or otherwise change or alter its terms and conditions unless otherwise explicitly stated within the agreement. No negotiations between the parties, nor any custom or usage, shall be permitted to modify or contradict any of the terms and conditions of the Agreement. No modifications, alterations, changes, or waiver to the Agreement or any of its terms shall be valid or binding unless accomplished by a written amendment signed by both parties. All such amendments will be made pursuant to the terms of the Agreement or using the appropriate Library form.

CONTROLLING TERMS AND CONDITIONS:

The terms and conditions of this Agreement, including the Contract Documents set forth above, shall be the exclusive terms of agreement between the Contractor and the Library. Other terms and conditions or additional terms and conditions included or referenced in the Contractor's invoices, business forms, or other documentation shall not become part of the parties' agreement and shall be disregarded by the parties, unenforceable by the Contractor and not binding on the library.

TOTAL AMOUNT OF BID:

$ _____
(Written)

$ _____
(Numbers)

IN WITNESS WHEREOF: The parties hereto have caused the signature of their proper officers and seals to be affixed thereto:

ATTEST:

_____ BY: _____

ATTEST:

_____ BY: _____
Contractor

DATE: _____

Note: An executed copy of this Agreement shall be provided with the Bid.

PAYMENT BOND

KNOWN ALL MEN, we _____, as Principal, and _____ as Surety, are held and firmly bound unto Bucks County Free Library, 150 S Pine Street, Doylestown, PA 18901 and its successors and assigns (hereinafter called the Obligee), in the just sum of:

_____ ($_____)

Written Figures

Lawful money of the United States of America, for the payment of which sum truly to be made we bind ourselves and each of our respective heirs, personal representatives, successors and assigns joints and severally by these presents, this _____ day of _____, 20____.

WHEREAS, the Principal has entered into a written Agreement with the Obligee, dated _____, _____, 20_____ for performance of the Contract work in connection with the **"BUCKS COUNTY FREE LIBRARY BENSALEM CEILING AND LIGHTING"**

With this addition:

Contract #_____-_____ Contract

Contract in connection with Obligee (which agreement together with the specifications therefore, including all related drawings and documents) and such alterations as may be made in such specifications as therein provided, are hereby made a part hereof as fully as if set out herein, and shall together be hereinafter referred to as the "Contract"; and it was a condition of the award of said Contract that this bond be furnished.

THEREFORE, THE CONDITIONS OF THE ABOVE OBLIGATIONS ARE:

That, if the Principal and all the Principal's subcontractors shall promptly make payment for all material furnished and labor supplied or performed in the prosecution of the work under the Contract, whether or not said material or labor enter into and become

component parts of said work, then this obligation shall be void; but otherwise it shall remain in full force, “Labor” and “materials”, as used in this Bond, shall include public utility services and reasonable rentals of equipment, but only for periods when the equipment is rented is actually used at the site of the work.

The Principal and Surety, for value received, hereby agree no change, extension of time, alterations or additions to the terms of any of the Contract Documents or to the items to be provided there under nor any forbearance by either the Obligee or the Principal to the other, shall in any way affect the obligation of either of them on this bond, and they hereby waives notice of any such change, extension of time, alteration or addition.

The Principal and Surety further acknowledge and agree this Bond is furnished pursuant to requirements of the Public Works Contractors’ Bond Law of 1967, solely for the protection of claimants supplying labor or material to the Principal or any of the Principal’s subcontractors in the prosecution of the work under the Contract, and this Bond is subject to all provisions of said Law as fully as though said provisions were set fourth herein at length. They also agree any claimant entitled under the said Law to sue on this Bond may use a copy of this obligation, certified by the Obligee, for the purpose of establishing his, or its or their claim without requiring production in court of an executed original, and that action by one or more claimants shall not bar any subsequent or concurrent action(s) by the same or other claimant(s). However, the Obligee shall in no event be liable for payment of any costs or expenses of any claimant’s suit.

Both Principal and Surety acknowledge all references herein to the Principal, in singular form, shall include plural, as may be appropriate to the Principal.

IN WITNESS WHEREOF, The Principal and Surety, intending to be legally bound, have executed this bond the day and year aforementioned.

_____

Principal

_____

By: _____
Attorney-in-Fact, Surety

PERFORMANCE BOND

KNOWN ALL MEN, we _____, as Principal, and _____ as Surety, are held and firmly bound unto Bucks County Free Library, 150 S Pine Street, Doylestown, PA 18901 and its successors and assigns (hereinafter called the Obligee), in the just sum of:

_____ ($_____)

Written Figures

for faithful performance of the Contract as specified below, in lawful money of the United States of America, for the payment of which sum truly to be made, we bind ourselves and each of our respective heirs, personal representatives, successors and assigns, joints and severally, firmly by these presents, this _____ day of _____, 20____.

WHEREAS, the Principal has entered into a written Agreement with the Obligee, dated _____, _____, 20_____ for performance of the Contract work in connection with the "**BUCKS COUNTY FREE LIBRARY BENSALEM CEILING AND LIGHTING"**

With this addition:

Contract #_____-_____ Contract

Contract in connection with Obligee (which agreement together with the specifications therefore, including all related drawings and documents) and such alterations as may be made in such specifications as therein provided, are hereby made a part hereof as fully as if set out herein, and shall together be hereinafter referred to as the "Contract"; and it was a condition of the award of said Contract that this bond be furnished.

THEREFORE, THE CONDITIONS OF THE ABOVE OBLIGATIONS ARE:

That, if the Principal shall faithfully perform the Contract (including any alterations for additions thereto) in accordance with the specifications and conditions of the Contract, and satisfy all claims and demands to persons or property, or for wrongful death in the performance thereof, and shall fully indemnify and save harmless the Obligee from any and all costs and damage which the Obligee may suffer, and fully reimburse and repay the Obligee any and all outlay and expense which it may incur, by reasons of any such default, then this part of the Obligation shall be void, but otherwise it shall remain in full force.

The Surety, for value received, hereby agrees no change, extension of time, alterations or additions to the terms of any of the Contract Documents or to the items to be provided thereunder nor any forbearance by either the Obligee or the Principal to the other, shall in any way affect its obligation on this bond, and it hereby waives notice of any such change, extension of time, alteration or addition.

Both Principal and Surety acknowledge all references herein to the Principal, in singular form, shall include plural, as may be appropriate to the Principal.

IN WITNESS WHEREOF, The Principal and Surety, intending to be legally bound, have executed this bond the day and year aforementioned.

_____
Principal

_____

By: _____
Attorney-in-Fact, Surety

MAINTENANCE BOND

KNOWN ALL MEN, we _____, as Principal, and _____, as Surety, are held and firmly bound unto Bucks County Free Library, 150 S Pine Street, Doylestown, PA 18901 and its successors and assigns (hereinafter called the Obligee), in the just sums of:

_____ ($_____)

Written Figures

for maintenance as specified below:

in lawful money of the United States of America, for the payment of which sum truly to be made, we bind ourselves and each of our respective heirs, personal representatives, successors and assigns joints and severally, firmly by these presents, this _____ day of _____, 20____.

WHEREAS, the Principal has entered into a written Agreement with the Obligee, dated as of _____, _____, 20_____ for the performance of the Contract work in connection with the "Contract for the "**BUCKS COUNTY FREE LIBRARY BENSALEM CEILING AND LIGHTING"**

With this addition:

Contract #_____-_____ Contract

together with the plans and specifications, therefore, (including all related drawings and documents) and such alterations as may be made in such plans and specifications as therein provided, are hereby made a part hereof as fully as if set out herein, and shall together be hereinafter referred to as the "Contract"; and it was a condition of the award of said Contract that this bond be furnished.

THEREFORE, THE CONDITIONS OF THE ABOVE OBLIGATIONS ARE:

That, if the Principal shall remedy without cost to the Obligee any defects which may develop during a period of one (1) year from the date of completion and acceptance of the

work performed under the Contract, provided that such defects in the judgment of the Obligee or its successor, are caused by defective or inferior materials or workmanship, then this part of the obligation shall be void, but otherwise it shall remain in full force. However, the Principal agrees the foregoing one-year limitation shall apply to the surety only and shall not relieve the Principal of any liability otherwise provided by law or by the Contract Documents.

The Principal and Surety, for value received, hereby agrees no change, extension of time, alterations or additions to the terms of any of the Contract Documents or to the items to be provided thereunder nor any forbearance by either the Obligee or the Principal to the other, shall in any way affect the obligation of either of them on this bond, and they hereby waives notice of any such change, extension of time, alteration or addition.

Both Principal and Surety acknowledge all references herein to the Principal, in singular form, shall include plural, as may be appropriate to the Principal.

IN WITNESS WHEREOF, The Principal and Surety, intending to be legally bound, have executed this bond the day and year aforementioned.

_____
Principal

_____

By: _____
Attorney-in-Fact, Surety

CONTRACTOR'S AFFIDAVIT OF PAYMENTS OF DEBTS AND CLAIMS

STATE OF: _____

COUNTY OF: _____

CONTRACT: **BUCKS COUNTY FREE LIBRARY BENSALEM CEILING AND LIGHTING**

Before me, the undersigned, a _____(Notary Public, Justice of the Peace, or Alderman), in and for said County and State, personally appeared

_____(Individual, Partner, or Duly Authorized Representative of Corporate Contractor), who, being duly sworn according to law, deposes and says all labor, material and outstanding claims and indebtedness of whatever nature arising out of the performance of the _____, 20___ Contract of Bucks County Free Library, 150 S Pine Street, Doylestown, PA 18901 (Owner) with

_____(Contractor) have been paid in full.

_____

(Individual, Partner, or Duly Authorized Representative of Corporate Contractor)

Subscribed and Sworn to me this _____day of _____, 20___

Notary Public: _____

My Commission Expires: _____

CONSENT OF SURETY COMPANY TO FINAL PAYMENT

In accordance with the provisions of the contract dated _____, 20___ between _____(Contractor), and Bucks County Free Library, 150 S Pine Street, Doylestown, PA 18901 (Owner).

The _____(Name of Surety),

Surety on the Bond of _____(Contractor)

After careful examination of the books and records of said Contractor, and after receipt of Affidavit and Releases, satisfies this Company all claims for labor and materials have been satisfactorily settled, hereby approved of the final payment of said Contractor, and by these presents witnesseth payment to the Contractor of the final estimates shall not relieve the Surety Company of any of its obligations to the Bucks County Board of Commissioners for Contract of **"BUCKS COUNTY FREE LIBRARY WINDOW REPLACEMENT DOYLESOTWN BRANCH.**

With this addition:

Contract #_____-_____ Contract

as set fourth in the said Surety Company's Bond No. _____.

IN WITNESS WHEREOF, the said Surety Company has hereunto set its hand and seal this _____day of _____, 20____.

WITNESS:

_____ _____

(Name of Surety)

BY:_____

(Attorney-in-Fact)

CONTRACTOR'S RELEASE OF LIENS

The undersigned, _____, hereinafter known as CONTRACTOR, for itself, its subcontractors, and all parties acting through or under it, has furnished labor, equipment and materials, for the erection and construction of certain improvements consisting of the **"BUCKS COUNTY FREE LIBRARY BENSALEM CEILING AND LIGHTING"**

With this addition:

Contract #_____-_____ Contract

for Bucks County Free Library, 150 S Pine Street, Doylestown, PA 18901, hereinafter known as OWNER, and has agreed to release all liens which he or any of them have or might have on the improvement and the property by reason of materials furnished or work performed for erecting and constructing the improvement; and

NOW, contingent upon receipt of final payment from the OWNER, the undersigned CONTRACTOR, for itself, its subcontractors and all parties acting through or under it, hereby remise, release and forever quit claim to OWNER, his heirs and assigns all liens, claims and demands which he or any of them now have or might or could have on or against the interest of OWNER in the improvement and the property for labor or materials previously or subsequently furnished for erecting and constructing the improvement; so OWNER, his heirs and assigns shall hold and enjoy the improvement and the property free and clear from all liens, claims or demands for labor or materials furnished by the undersigned CONTRACTOR, which are hereby released and discharged.

CONTRACTOR: _____

ADDRESS: _____

BY: _____

TITLE: _____

Subscribed and Sworn to me this _____day of _____, 20___.

Notary Public: _____

My Commission Expires: _____

CONTRACTOR'S QUALIFICATION STATEMENT
(NOTE: Attach separate sheets as required.)

BUCKS COUNTY FREE LIBRARY BENSALEM

CEILING AND LIGHTING

The undersigned certifies under oath the truth and correctness of all statements of all answers to questions made hereinafter:

TO:

Submitted By: _____ Corporation: _____

Name: _____ Partnership: _____

Address: _____ Individual: _____

Principle Office: _____ Joint Venture: _____

Other: _____

1.0 How many years has your organization been in business as a contractor? _____

2.0 How many years has your organization been in business under its present business name?

_____

3.0 If a corporation, answer the following:

3.1 Date of incorporation: _____

3.2 State of incorporation: _____

3.3 President's name: _____

3.4 Vice President's name(s): _____

3.5 Secretary or Clerk's name: _____

3.6 Treasurer's name: _____

3.7 List name and address of all parties holding greater than ten percent (10%) interest in the corporation: _____

_____

_____

_____

4.0 If individual or partnership, answer the following:

4.1 Date of organization: _____

4.2 BUCKS COUNTY FREE LIBRARY Name and address of all Partners: (State whether general or limited partnership):

_____

_____

_____

_____

_____

_____

_____

_____

5.0 If other than corporation or partnership, describe organization and name principals:

_____

_____

_____

_____

_____

_____

6.0 We normally perform _____ % of the work with our own forces. List trades below:

_____

_____

_____

_____

7.0 Have you ever failed to complete any work awarded to you? If so, note when, and why.

_____

_____

_____

_____

_____

_____

8.0 Has any officer or partner of your organization ever been an officer or partner of another organization that failed to complete a construction project? If so, state circumstances.

_____

_____

_____

_____

_____

_____

9.0 List name of project, owner, architect, contract amount, percent complete and scheduled completion of the comparable construction projects your organization has in progress on this date:

_____

_____

_____

_____

_____

_____

10.0 List the names of project, owner, architect, contract amount, date of completion, percent of work with own forces of the projects your organization has completed in the past two (2) years which equal at least fifty percent (50%) of the total amount Bid for the project under consideration:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

11.0 List the construction experience of the principal individuals of your organization:

_____

_____

_____

_____

_____

_____

_____

12.0 List the categories in which your organization is legally qualified to do business in Pennsylvania:

_____

_____

_____

_____

_____

_____

_____

13.0 Trade References:

_____

_____

_____

_____

_____

_____

_____

14.0 Bank References:

_____

_____

_____

_____

_____

_____

_____

15.0 Name of Bonding Company and name and address of agent:

_____

_____

_____

_____

_____

_____

_____

16.0 Dated at _____this _____ day of _____, 20__.

Name of Organization: _____

_____

_____

_____

By: _____

Title: _____

17.0 M_____, being duly sworn, deposes and says he/she is the _____ of Contractor(s), and answers to the foregoing questions and all statements herein contained are true and correct.

Subscribed and Sworn before me this _____day of _____, 20__.

Notary Public: _____

My Commission Expires: _____

PUBLIC WORKS EMPLOYMENT VERIFICATION ACT

In accordance with Act of July 5, 2012 (P.L. 1086, No. 127), known as the "Public Works Employment Verification Act" (43 P.S. 167.1 et. seq.), CONTRACTOR and subcontractors (if any) shall verify employment eligibility. An employee is an individual hired by CONTRACTOR or a subcontractor for whom CONTRACTOR or subcontractor is required by law to file a Form W-2 with the Internal Revenue Service. The Act does not apply to material suppliers for projects.

CONTRACTOR and subcontractors shall participate in EVP and shall, subject to the requirements of Federal law governing the use of EVP, use EVP to verify employment eligibility of each new employee (EVP is the E-Verify Program operated by the Department of Homeland Security that electronically verifies employment eligibility for employees). The Department of General Services of the Commonwealth shall post on its publicly accessible Internet website information regarding the requirements of Federal law governing the use of EVP. In conducting the verification required, CONTRACTOR and subcontractors shall not discriminate against an employee on the basis of race, ethnicity, color or national origin.

As a precondition of being awarded a contract for a Public Work, as defined in the Pennsylvania Prevailing Wage Act, 43 P.S. 165.1 et. seq.; or with respect such a contract that was awarded prior to the effective date identified in Section 20 of the Act but has not yet been executed, prior to the execution of the contract, CONTRACTOR shall provide OWNER with a verification form described in Subsection (c) of Section 4, acknowledging its responsibilities under and its compliance with Section 3 of the Act. Contracts between CONTRACTOR and subcontractors shall contain information about the requirements of the Act.

Prior to commencing work on a public works project, subcontractor(s) shall provide the OWNER with a verification form described in Subsection (c) of Section 4 of the Act acknowledging subcontractor's responsibilities and compliance with Section 3 of the Act. Contracts between a subcontractor and its subcontractors shall contain information about the requirements of the Act.

The verification required by Section 4 of the Act shall be in a form prescribed by the Secretary of General Services of the Commonwealth and shall be posted on the Internet, and shall comply with the following additional requirements:

1) The statement shall include a certification that the information in the statement is true and correct and the individual signing the statement understands the submission of false or misleading information in connection with the verification shall subject the individual and the CONTRACTOR or subcontractor, as the case may be, to sanctions provided by law.

2) The statement shall be signed by a representative of the CONTRACTOR or subcontractor, as applicable, who has sufficient knowledge and authority to make the representations and certifications contained in the statement.

The Public Works Employment Verification Form is on the next page.

COMMONWEALTH OF PENNSYLVANIA

PUBLIC WORKS EMPLOYMENT VERIFICATION FORM

Date _____

Business or Organization Name (Employer) _____

Address _____

City _____ State _____ Zip Code _____

Contractor Subcontractor (check one)

Contracting Public Body _____

Contract/Project No _____

Project Description _____

Project Location _____

As a contractor/subcontractor for the above referenced public works contract, I hereby affirm that as of the above date, our company is in compliance with the Public Works Employment Verification Act ('the Act') through utilization of the federal E-Verify Program (EVP) operated by the United States Department of Homeland Security. To the best of my/our knowledge, all employees hired post January 1, 2013 are authorized to work in the United States.

It is also agreed to that all public works contractors/subcontractors will utilize the federal EVP to verify the employment eligibility of each new hire within five (5) business days of the employee start date throughout the duration of the public works contract. Documentation confirming the use of the federal EVP upon each new hire shall be maintained in the event of an investigation or audit.

I, _____, authorized representative of the company above, attest that the information contained in this verification form is true and correct and understand that the submission of false or misleading information in connection with the above verification shall be subject to sanctions provided by law.

_____

Authorized Representative Signature

U.S. Department of Labor
Wage and Hour Division

PAYROLL

(For Contractor's Optional Use; See Instructions at www.dol.gov/whd/forms/wh347instr.htm)

Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number.

U.S. Wage and Hour Division

Rev. Dec. 2008

OMB No.:1235-0008
Expires: 03/31/2018

NAME OF CONTRACTOR ☐ OR SUBCONTRACTOR ☐	ADDRESS	
PAYROLL NO.	FOR WEEK ENDING	PROJECT AND LOCATION / PROJECT OR CONTRACT NO.

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER) OF WORKER	(2) NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	OT. OR ST.	(4) DAY AND DATE — HOURS WORKED EACH DAY	(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS: FICA	WITH-HOLDING TAX			OTHER	TOTAL DEDUCTIONS	(9) NET WAGES PAID FOR WEEK
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While completion of Form WH-347 is optional, it is mandatory for covered contractors and subcontractors performing work on Federally financed or assisted construction contracts to respond to the information collection contained in 29 C.F.R. §§ 3.3, 5.5(a). The Copeland Act (40 U.S.C. § 3145) contractors and subcontractors performing work on Federally financed or assisted construction contracts to "furnish weekly a statement with respect to the wages paid each employee during the preceding week." U.S. Department of Labor (DOL) regulations at 29 C.F.R. § 5.5(a)(3)(ii) require contractors to submit weekly a copy of all payrolls to the Federal agency contracting for or financing the construction project, accompanied by a signed "Statement of Compliance" indicating that the payrolls are correct and complete and that each laborer or mechanic has been paid not less than the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information to determine that employees have received legally required wages and fringe benefits.

Public Burden Statement

We estimate that is will take an average of 55 minutes to complete this collection, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. If you have any comments regarding these estimates or any other aspect of this collection, including suggestions for reducing this burden, send them to the Administrator, Wage and Hour Division, U.S. Department of Labor, Room S3502, 200 Constitution Avenue, N.W. Washington, D.C. 20210

(over)

Date _____

I, _____ _____
(Name of Signatory Party) (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by

_____ on the
(Contractor or Subcontractor)

_____; that during the payroll period commencing on the
(Building or Work)

_____ day of _____, _____, and ending the _____ day of _____, _____,

all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said

_____ from the full
(Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

_____

_____

_____

_____

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

☐ – in addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ – Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.

GENERAL CONDITIONS

BUCKS COUNTY FREE LIBRARY BENSALEM

CEILING AND LIGHTING

#2026BN-01

3700 HULMEVILLE RD, BENSALEM, PA 19020

1. "OWNER" DEFINED

Wherever the word "Owner" is used in these Specifications, it shall be understood to mean:

Bucks County Free Library
150 S Pine Street
Doylestown, PA 18901

2. "ARCHITECT" DEFINED

Wherever the word "ARCHITECT" is used in these Specifications, it shall be understood to mean:

RHJ Associates, 10 Leopard Rd., Paoli, PA 19301

3. "CONTRACTOR" DEFINED

Wherever the word "Contractor" is used in these Specifications, it shall be understood to mean the person, firm or corporation to whom the execution of any part of the work herein contemplated shall be awarded by the Owner.

4. SPECIFICATIONS AND DRAWINGS -COMPREHENSIVE

All of the contemplated installation and each and every part thereof, shall be subject to all of the requirements throughout these specifications - which the Engineer may deem pertinent. All of the installations to be furnished and all of the work to be done by the Contractor shall strictly conform to these specifications, to the general and detailed drawings made for the work and forming part thereof, and to such further drawings as may be furnished to the Contractor by the Engineer at any time during the progress of the work and prior to its entire completion.

5. PRECEDENCE

The Drawings and Specifications are intended to be consistent with each other, but should there be any discrepancy, the Specifications shall take precedence. Technical specifications shall take precedence over general specifications or conditions. The Contractor shall closely examine the Specifications and Drawings prior to commencing work under this Agreement and shall inform the Engineer of discrepancies therein. Except in the case of apparent clerical error or inaccuracy, the figures and notes on the Drawings shall take precedence over measurements by scale. Should the Contractor observe any apparent discrepancy between any point, line or elevation and these Specifications or the Drawings, it shall be the duty of the Contractor to immediately report same to the Engineer.

6. SPECIFICATIONS AND DRAWINGS ON THE JOB

The Contractor or the representatives of the Contractor shall always have on hand on the job site a copy of the Specifications, Drawings, and approved shop drawings for ready reference of the Engineer.

7. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

Within seven (7) days after the effective date of the Agreement, the Contractor shall submit for review a preliminary schedule of shop drawing submissions.

The Contractor shall review, approve and submit, with reasonable promptness and in such sequence as to cause no delay in the work of the constructor or any separate contractor, all Shop Drawings, Product Data and Samples required by the Contract Documents.

By approving and submitting Shop Drawings, Product Data and Samples, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Engineer's review of Shop Drawings, Product Data or Samples, unless the Contractor has specifically informed the Engineer in writing of such deviation at the time of submission and the Engineer has reviewed the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the Engineer's review thereof.

The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data or Samples, to revisions other than those requested by the Engineer on previous submittals.

No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been reviewed by the Engineer.

8. ENGINEER'S REVIEW

The review of the Engineer of drawings or other data furnished by the Contractor shall in no way relieve the Contractor from responsibility for the correctness thereof, or for the accurate and satisfactory execution of the Contract.

9. LOCATION

The entire installation during its progress shall be accurately located in plan and elevation as shown on the Drawings, or specified or as located, staked out, marked, or otherwise directed by the Engineer. When directed to do so by the Engineer, the Contractor shall provide and have at hand on the job site, all necessary stakes, straight edges, levels, chalk lines, sounding rods, augers, and all other implements and materials which the Engineer or his representative may desire to use in the location or measurement of the work by the Contractor and in making any tests thereof. The Contractor shall furnish such man or men as the Engineer or his representative may desire to assist in laying out or measuring up all or any portions of the work of the Contractor, and in making any tests thereof.

10. STAKES AND MARKS

The Contractor shall place distinct marks at or near all points where any and all buried or concealed appliances or fittings are located, or at such other points where it may be important to preserve or which might be difficult to find without such marks. Any stakes or other marks set by the Engineer, shall be under the care of the Contractor and if any stake or any mark shall be disturbed or removed, except when authorized by the Engineer, the cost of replacing the said stake or mark shall be paid by the Contractor.

11. LEGAL REQUIREMENTS

The Contractor shall conform to all general, state and local legal requirements having to do with the installation, and shall protect and defend the Owner against any claim for any accident or damage resulting from any violation thereof by the Contractor. The Contractor shall, without additional expense to the Owner, obtain all required licenses and permits.

12. LIENS

The Contractor, for itself, its subcontractors and all parties acting through or under it, covenants and agrees that no mechanics' claims or liens shall be filed or maintained by it, them or any of them against the work and the lot of ground appurtenant thereto for or on account of the work done or materials furnished by it, them or any of them, under this Contract or otherwise, for, towards, in or about the work; and the Contractor, for itself, its subcontractors, and others under it, hereby expressly waives and relinquishes the right to have, file or maintain any mechanics' liens or claim against the work, and the lot of ground appurtenant thereto, and further agrees that this waiver of the right of lien shall be an independent covenant and shall operate and be effective as well with respect to work and labor done and materials furnished under any supplemental Contract, verbal or written, or Contract for extra work, as to work and labor done and materials furnished under this Contract. Before the final payment is made to the Contractor, he shall, if required by the Owner, furnish the Owner with a complete Release of Liens, or other acceptable evidence that all payments have been made in full for all labor and materials used in the work. In case any lien, stop notice or claim for work, labor or materials done, performed, or delivered and used in the prosecution of the work herein provided for shall be filed (whether in strictly legal form or otherwise) then, in that case, the Owner may retain from any moneys due the Contractor a sum equal to the amount of said claim or notice, until such time as the Contractor shall furnish a receipt or release there from or thereof.

13. PATENT INFRINGEMENTS

The Contractor shall protect and defend the Owner against any claim for royalty, bonus, license or other expense or cost or damage, by reason of the introduction or use of any patented invention, arrangement or appliance, whether or not included in the requirements of these Specifications or shown on the Drawings herein referred to, which invention, arrangement or appliance may enter into or form part of the permanent work, or be used in connection with the construction thereof.

14. GENERAL RISKS

The Contractor shall assume all risks whatsoever as to all damages from the natural elements, fire, flood, trespass, and from any and all other causes, and shall protect accordingly all materials both before and after installation.

15. NON-INTERFERENCE

The Contractor shall, in such manner as the Engineer may require, so arrange the execution of the work as not to unnecessarily interfere with the execution of any other work which may be in progress or with the existing system. If any part of Contractor's work depends for proper execution or results upon the work of any such other contractor or utility owner (or Owner), Contractor shall inspect and promptly report to Engineer in writing any delays, defects or deficiencies in such work that render it unavailable or unsuitable for such proper execution and results. Contractor's failure so to report will constitute an acceptance of the work as fit and proper for integration with Contractor's work except for latent or non-apparent defects and deficiencies in the other work.

If Owner contracts with others for the performance of other work on the project at the site, the person or organization who will have authority and responsibility for coordination of the activities among the

various prime contractors will be identified herein and the specific matters to be covered by such authority and responsibility will be itemized, and the extent of such authority and responsibilities will be provided herein. Unless otherwise provided herein, neither Owner nor Engineer shall have any authority or responsibility in respect of such coordination.

16. STORAGE LOCATIONS

All materials delivered for the work, or excavated or otherwise disturbed, and which are not subject to immediate removal, shall be stored or placed where and as the Engineer may direct or approve, and so as to interfere as little as possible with public or other safety and convenience, and with the simultaneous prosecution of any other work.

17. TEMPORARY PASSAGEWAYS

The Contractor shall provide and maintain such safe and adequate temporary passageways as the Engineer or other authorities may direct or approve.

18. PROTECTION OF WORK AND PROPERTY

The Contractor shall provide adequate signs, lights, barricades and other devices necessary or appropriate to warn the public of the work being performed hereunder, and shall undertake such measures necessary to prevent any injury to the public or to the property of the Owner or others. The Contractor shall not interfere with or interrupt the Owner's current operations and shall coordinate with the Owner's employees in connection therewith. The Contractor shall protect existing facilities within and/or adjacent to his work.

19. PROTECTION OF THE PUBLIC

In all cases where any of the operations of the Contractor, including the temporary storage or placing the material, appliances or plant, might endanger travel or traffic on any public highway or any other thoroughfare, or persons, animals, and vehicles, sufficient barricades shall be placed and maintained during daylight. The area so affected shall be equipped with warning devices of the types, in the numbers, and at intervals required by all applicable laws and regulations.

20. NO TRESPASS

Before entering upon or in any way disturbing any public, corporation or private property, the Contractor shall give sufficient notice to the responsible official or to the Owner thereof, and shall conform to all of the reasonable requirements of such official or Owner.

21. THE PROPERTY OF THE OWNER

In obtaining free of charge and making use of any materials which the Owner may permit the Contractor to so obtain from the property of the Owner, by excavation or otherwise, the Contractor shall not only conform to all requirements herein but also to all of the wishes of the Owner.

22. PROTECTION OF THE SUSPENDED WORK

During all hours of the day and night when active work is suspended, including Sundays, the Contractor shall provide such watchmen, or take such other precautions as may be necessary to prevent injurious

trespass upon, and the entire safety of all of the materials and finished work, for the protection of all of which the Contractor shall be responsible until it is finally accepted.

23. REPAIR AND RESTORATION

The Contractor shall care for, repair, restore and make good any structure or surface or things on or in any private, corporation or public property, which may in any way be disturbed, injured, or destroyed by, or in consequence of, the work of the Contractor.

24. REFUSE MATERIAL AND FINISH

The Contractor shall promptly remove, during the progress of the work, to the satisfaction of the Engineer, all false works, rubbish, and waste materials which may accumulate on any private or public property on account of the work, and the whole work and its vicinity shall be neatly finished and made clean and tidy in every particular before it will be accepted by the Owner.

25. GENERAL RESPONSIBILITY OF CONTRACTOR

To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner and Engineer and their agents and employees from and against all claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from the performance of the work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting there from, and (2) is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or whether or not it is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this paragraph.

In any and all claims against the Owner or the Engineer or any of their agents or employees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workers' or workmen's compensation acts, disability benefits acts or other employee benefit acts.

26. MATERIALS, PLANT AND LABOR

The Contractor shall furnish all of the materials, in the rough or finished, of whatsoever kind, which may be required or desirable to completely execute the Contract. The Contractor shall furnish all of the tools, and other working plant and construction materials and appliances, of whatsoever kind, which may be required or desirable to completely execute the Contract. The Contractor shall furnish all of the skilled and other labor which may be required or desirable to completely execute the Contract.

27. SKILLED AND LOCAL LABOR

All work shall be done by tradesmen specialty skilled in the parts of the work to which they may be assigned.

In the employment of labor, the Contractor shall give a just preference to the residents of the general neighborhood of the proposed installations, but shall not be required to continue the employment of such local labor when more efficient labor can be obtained from elsewhere. This paragraph shall not alter or abridge the Contractor's responsibility to comply with federal, state or local laws or regulations concerning the employment of resident labor or affirmative action requirements or any authority.

28. INFORMATION NOT GUARANTEED

All information relating to existing subsurface structures and/or underground facilities, pipes or other utilities is from the best sources at present available to the Owner and the Engineer. All such information and the drawings of existing construction are furnished only for the information and convenience of Contractors.

It is agreed and understood that the Owner and the Engineer do not warrant or guarantee that the subsurface structures and/or underground facilities, pipes or other utilities encountered during construction will be the same as those indicated by the information given on the Drawings or in the Specifications.

The Contractor is responsible for ascertaining the character, location, quantities, and conditions of the various materials and the work to be done. Test pits to locate utilities may be dug at the Contractor's discretion and at the Contractor's expense.

It is further agreed and understood that the Contractor will not use any of the information made available to him or obtained in any examination made by him in any manner as a basis or ground of claim or demand of any nature, against the Owner or the Engineer, arising from or by reason of any variance which may exist between the information offered and the actual materials or structures encountered during the construction work, except as may otherwise be provided for in the Contract Documents.

The Contractor shall notify the Engineer of any and all variances from the Drawings which are discovered from test pits which the Contractor chooses to dig.

29. HAULING

The Contractor shall furnish all vehicles, and drivers and other helpers which may be required for all transportation incidental to the entire work, and the Contractor shall make any roadways which may be required, and shall restore the lines of said roadways to their original condition, upon the completion of the work.

30. REJECTION OF MATERIALS OR WORKMANSHIP

All materials and workmanship may be rejected by the Engineer if, in his opinion, they do not conform, in general and in detail, to these specifications and to the drawings, or to any drawings, descriptions and samples which the Contractor may furnish, when bidding or thereafter.

31. ORDER OF EXECUTION

All of the materials shall be delivered, and all of the different parts of the work shall be executed, at the time and in the order and sequence which may be designated or approved by the Engineer.

32. CONTRACTOR TO PROMPTLY UNLOAD AND CARE FOR SHIPMENTS

As soon as any shipment, which the Contractor is required to unload, arrives at the railroad station, or elsewhere, it shall be under the care of the Contractor, who shall henceforward be responsible for its safety, and who shall be liable for any demurrage or other costs on account of failure to immediately remove from the railroad station, or other point of delivery, any shipments which may be acceptable under these Specifications.

33. EMERGENCY WORK

Should any emergency occur, which, in the opinion of the Engineer, should demand it, the execution of the Contract shall be prosecuted with extraordinary vigor, additional shifts of men shall be employed, and the work shall be accelerated as the Engineer shall require. If such acceleration causes an increase in the Contractor's cost of performance of this work the Contractor may request a Change Order in accordance with the "Changes Clause" of the Contract.

34. IN CASE OF TARDINESS

Upon the refusal, neglect or failure of the Contractor to deliver any portion of the material, or to do or complete any part of the work, when, within the time named in the Contract, the Engineer shall order the same to be delivered or completed, the Engineer may order such portion or portions of the material elsewhere, and employ such labor as he may require to do the said work, and charge the cost thereof to the account of the Contractor.

35. MATERIALS AND WORKMANSHIP

All materials, patterns, shapes, dimensions, workmanship, methods and finish, in general and in detail, shall be such as shall be ordered or approved by the Engineer, and the Engineer shall be the sole and final judge of the quality and fitness thereof.

36. INSPECTIONS AND TESTS

Contractor shall give Engineer timely notice or readiness of the work for all required inspections, tests or approvals. If laws or regulations of any public body having jurisdiction require any work (or part thereof) to specifically be inspected, tested or approved, Contractor shall assume full responsibility therefore, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection, testing or approval. Contractor shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with Owner's or Engineer's acceptance of a supplier of materials or equipment proposed to be incorporated in the work, or of materials or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the work. All inspections, tests, or approvals other than those required by laws or regulations of any public body having jurisdiction shall be performed by organizations acceptable to Owner and Contractor (or by Engineer if so specified).

If any work (including the work of others) that is to be inspected, tested or approved is covered without written concurrence it must, if requested by the Engineer, be uncovered for observation. Such uncovering shall be at Contractor's expense unless Contractor has given the Engineer timely notice of Contractor's intention to cover the same and the Engineer has not acted with reasonable promptness in response to such notice.

If Engineer considers it necessary or advisable that covered work be observed by the Engineer or inspected or tested by others, the Contractor, at the Engineer's request, shall uncover, expose or otherwise make available for inspection or testing as Engineer may require, that portion of the work in question, furnishing all necessary labor, material and equipment. If it is found that such work is defective, the Contractor shall bear all direct, indirect and consequential costs of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction (including, but not limited to fees and charges of engineers, architects, attorneys and other professionals), and Owner shall be entitled to an appropriate decrease in the contract price. If, however, such work is not found to be defective, the Contractor shall be allowed an increase in the contract price or an extension of the contract completion time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction.

The Engineer, or his representative, shall be afforded all opportunities, and all convenient facilities that may be requested to inspect and test all materials and appliances, in the shops, on the ground, or elsewhere, and the Contractor shall subject each and all of the installations to such tests as shall satisfy the Engineer that all of these specifications have been complied with, before the installations shall be eligible for final acceptance. Any or all such inspections or tests shall be for the sole benefit of the Owner and shall be for the purpose of ascertaining whether the work complies with Contract requirements as set forth herein. Such observations shall not create or constitute a duty on the part of the Engineer to the Contractor, its agents, employees or guests to perform such observations. The Contractor shall at all times be solely responsible for compliance with job safety requirements as set forth herein.

37. INSPECTION NOT ACCEPTANCE

No materials or workmanship will be considered as accepted, which may be found to be defective in manufacture, construction or execution, or deficient in any of the requirements of these specifications, in consequence of any negligence of any inspector or subordinate engineer to point out said defect or deficiency, during or subsequent to manufacture, and during the entire progress of the work; and the Contractor will be required to correct any imperfect work, remedy, and make good or replace any defective material, whenever discovered, before the final acceptance of the work and before the release of the Surety of the Contractor.

38. CONTRACTOR TO PAY FOR REPAIRS

All materials used and all plant and labor furnished for the replacing or making good of any defective materials or workmanship shall be at the expense of the Contractor, with no extra allowance therefore by the Owner.

39. REMOVAL AND REPLACEMENT OF DEFECTNE MATERIAL

Should the Contractor fail to promptly make good, to the satisfaction of the Engineer, any defect, or fail to remove from the work any material which the Engineer shall pronounce imperfect, the Engineer may employ workmen to remedy such defect or to remove such materials, and may order such other material elsewhere as may be required to replace that which is removed, and the cost of all such labor and material shall be charged to the account of the Contractor.

40. CONTRACTOR RESPONSIBILITY FOR EMPLOYEES

The Contractor shall at all times enforce strict discipline and good order among his employees, and shall not employ any unfit person or anyone not skilled in the task assigned to him.

41. ONE YEAR'S RESPONSIBILITY

It shall be understood that the Contractor agrees to furnish such material and appliances, and to construct the whole work in such substantial and workmanlike manner that it shall be continuously stable and efficient, and the Contractor shall promptly make good, or replace, any or all parts of the materials or installation, including all details, which may be found to be unstable or defective in any particular, ordinary wear and tear excepted, for a period of guarantee of one (1) year after the whole installation has been entirely completed, tested and accepted by the Owner.

42. ONE YEAR'S RESPONSIBILITY NOTWITHSTANDING INSPECTION

The acceptance, after inspection by the Engineer, or his representative, of any portion of the work or material, shall be subject to its freedom from the exhibition of any inherent or developed defect, or any failure to conform to these Specifications, between the time of its acceptance, and the expiration of the above-named period of one (1) year.

43. ONE YEAR'S RESPONSIBILITY FOR DIMENSIONS

The acceptance by the Engineer of any of the dimensions proposed by the Contractor shall always be understood to be with the proviso, whether stated at the time of acceptance or not, that the said dimensions shall be proved to be adequate and proper at all times until the expiration of the above-named period of one (1) year.

44. EXCELLENCE OF WHOLE - WHETHER OR NOT HEREIN SPECIFIED

It is understood that these Specifications are intended to provide that all necessary and desirable materials and appliances shall be furnished by the Contractor, and that all of the same shall be of the best quality and kind, and that the whole work shall be done and entirely completed in a workmanlike and satisfactory manner, in all details, whether herein particularly specified or not.

45. EXTRA WORK

No claim shall be allowed, and no bill shall be paid for any extra work, unless said extra work shall have been done by special written agreement with the Owner entered into prior to the commencement of said work.

If prices for such extra work are not included in the unit price bid, the Contractor shall agree to furnish the necessary materials and perform such labor as extra work, and shall agree to accept in full payment therefore the actual field cost of the material and labor plus fifteen (15) percent.

46. SUBLETTING OF WORK

Assignment or subletting of the furnishing of any materials or of the execution of any part of the work shall be subject to approval by the Engineer. Unauthorized assignment or subletting of any or all the Contract by the Contractor shall constitute a material breach of this Contract.

47. AUTHORITY OF ENGINEER'S ASSISTANTS

In the absence of the Engineer, any person whom he may designate as having charge of the work, or any part thereof, shall have and exercise all the powers of the said Engineer in all matters relating to the execution of the work herein specified, and the orders of said person shall be fully observed and obeyed.

48. TERMS OF PAYMENT FOR MACHINERY UNITS

The Contractor shall receive payment in three installments of the contract price for furnishing and installing any machinery, as follows:

A. Thirty-five (35) percent thereof upon delivery of all of the machinery at the construction site.

B. Thirty-five (35) percent thereof when the erection, setting and connections thereof shall be entirely completed and the whole installation be finished in every particular.

C. Thirty (30) percent thereof when the whole installation shall have been tested and is in successful operation and is ready, as herein required, for approval and acceptance by the Engineer and by the Owner.

The term machinery shall be defined for this article as meaning any equipment with rotating or reciprocating parts.

49. MONTHLY ESTIMATE

Unless otherwise expressly provided in the Contract, monthly payment will be made for all work and materials other than machinery, by the Owner to the Contractor, during the progress of the installation according to the following:

B. Up to fifty (50) percent completion - Ninety (90) percent of the contract value rendered by the Contractor to the Owner.

B. Fifty (50) percent completion to beneficial occupancy - Ninety-five (95) percent of the contract value rendered by the Contractor to the Owner.

Value rendered shall be determined by monthly estimates made by the Contractor and approved by the Engineer and Owner. Increasing the percentage paid at the 50% completion point will be subject to the Engineer's determination of satisfactory and diligent performance by the Contractor.

NOTE: Applications for Payment shall be submitted for review. Sample document provided in these Specifications is for reference purposes only.

When the Contract provides for the furnishing of materials only, the said estimates shall be based upon the quantity thereof which has been delivered during the preceding month.

When the Contract provides for the furnishing of labor and the furnishing and installation of materials, the said monthly estimates shall be based upon the amount of labor performed and the quantity of materials delivered to the job site (including transportation costs) during the preceding month.

50. FINAL ESTIMATES

The balance will be paid by the Owner to the Contractor upon the satisfactory completion of the Contract obligation, the filing with the Owner by the Contractor of such satisfactory Release of Liens, or other assurance as is provided for in the following paragraph, and the approval and acceptance of all materials and work contracted for, by the Engineer and by the Owner.

51. RELEASE OF LIENS

Before the work shall be finally accepted and final payment be made, the Contractor shall furnish the Owner with a complete Release of Liens, or with such other evidence as shall be entirely satisfactory to the Owner that the finished work, including all materials therein incorporated and thereunto appertaining is, and will be, entirely free from any then present or future liens or claims.

52. SPECIFICATIONS NOT PROHIBITIVE

These Specifications are issued to bidders as a guide as to what is to be required, and it is not intended to ignore manufacturers' standards and patterns, and should any bidder wish to submit a proposal for an equivalent installation, other than that generally contemplated herein, which will be guaranteed under all of the general conditions and requirements herein specified, such a proposal will receive due consideration. The Contractor shall submit manufacturer's data, etc., as required by the Engineer to permit a thorough evaluation of the proposed equivalent installation.

53. CHANGES CLAUSE

The Owner may, at any time, by written order, and without notice to the sureties, make changes in the general scope of this Contract. If such changes cause an increase or decrease in the Contractor's cost of, or time required for, performance of the Contract, an adjustment shall be made and the Contract

modified in writing accordingly. No claim by the Contractor for payment on account of any extra work shall be enforceable unless such extra work is covered by a written order signed by a duly-authorized representative of the Owner. However, nothing in this Contract shall be construed to excuse the Contractor from executing the Contract as amended.

54. TIME EXTENSIONS

The Contractor may at any time during the performance of the contract request in writing an extension of time in performance based upon delays caused by factors beyond the control of the Contractor, such factors include labor stoppages (strikes), acts of God (natural disasters, unusually unseasonable weather), delays in delivery of materials caused by factors beyond the control of material suppliers and manufacturers. Written notice of expected delay and explanation therefore shall be made within ten (10) calendar days from the time the contractor is aware of the cause for delay, even though the expected duration or effect of delay is not yet known. As soon as possible after the impact of the delay is determined, the Contractor will submit in writing a request for extension of time for a specific number of calendar days with fully substantiated justification therefore. Such a request may entitle the Contractor to an extension of time as recommended by the Engineer and as agreed to in writing by the Owner. Time extensions granted under these provisions are solely to relieve the Contractor's liability for liquidated damages, and will not justify an increase in the cost of the work.

55. NO DAMAGES FOR DELAY

The Contractor shall not be entitled to any claim for damages on account of hindrances or delays in performance of this contract from any cause whatsoever, including acts or failures to act on the part of the Owner or Engineer or their agents, employees or servants. The Contractor acknowledges and agrees that its sole remedy for any such delay in performance shall be an extension of contract completion time in accordance with the terms of Article 54, TIME EXTENSIONS.

56. TERMINATION BY OWNER FOR CAUSE

Without prejudice to any other legal or equitable right to remedy which it would otherwise possess hereunder, or as a matter of law, the Owner shall be entitled, by giving the Contractor five (5) days prior written notice, to terminate this Contract in its entirety at any time:

A. if the Contractor shall fail to prosecute the work, or any part thereof, with the diligence necessary to insure its progress and completion as set forth in this contract and addenda or change orders thereto, and shall fail to take such steps to remedy such default within ten (10) days after written notice thereof from Owner as Owner shall direct; or,

B. if the Contractor shall commit a substantial default under any of the terms, provisions, conditions or covenants contained in this contract and shall fail to take such steps to remedy such default within ten (10) days after written notice thereof from the Owner as Owner shall direct.

57. TERMINATION FOR OWNER'S CONVENIENCE

The performance of the work may be terminated at any time in whole or from time to time in part, by the Owner for its convenience. Any such termination shall be affected by delivery to the Contractor of a written notice ("Notice of Termination") specifying the extent to which performance of the work is terminated and the date upon which termination becomes effective. After receipt of a Notice of Termination, and except as otherwise directed by the Owner, the Contractor shall, in good faith, and to the best of its ability, do all things necessary, in light of such notice and of such requests in implementation thereof as the Owner may make to assure the efficient, proper closeout of the terminated work (including the protection of Owner's property).

Among other things, the Contractor shall, except as otherwise directed or approved by the Owner:

A. stop the work on the date and to the extent specified in the Notice of Termination;

B. place no further orders or subcontracts for services, equipment or materials except as may be necessary for completion of such portion of the work as is not terminated;

C. terminate all orders and subcontracts to the extent they relate to the performance of work terminated by the Notice of Termination;

D. assign to Owner, in the manner and to the extent directed by it, all of the right, title and interest of the Contractor under the orders of subcontracts so terminated, in which case the Owner shall have the right to settle or pay any or all claims arising out of the termination of such orders and subcontracts;

E. with the approval of the Owner, settle all outstanding liabilities and all claims arising out of such termination or orders and subcontracts; and

F. deliver to the Owner, when and as directed by the Owner, all documents and all property which, if the work had been completed, the Contractor would be required to account for or deliver to the Owner, and transfer title to such property to the Owner to the extent not already transferred.

In the event of such termination, there shall be a reduction of the amount of this Contract to reflect the reduction in the work. No cost incurred after the effective date of the Notice of Termination shall be treated as a reimbursable cost unless it relates to carrying out the unterminated portion of the work or taking closeout measures.

58. WORKER'S COMPENSATION INSURANCE

The Contractor shall carry Worker's Compensation Insurance during the life of the Contract to insure his statutory liability to his employees in the State of Pennsylvania. Coverage shall include employer's liability at minimum limits as stated in the Supplemental Conditions.

59. COMPREHENSIVE GENERAL LIABILITY INSURANCE

The Contractor shall carry the Comprehensive Form of Commercial General Liability Insurance during the life of the Contract covering the risks itemized in the form of "Certificate of Insurance" provided for in this Contract. The limits shall be as stated in the Supplemental Conditions. The Certificate of Insurance shall include coverage for, but not limited to, explosion, collapse and underground hazards. Comprehensive General Liability Insurance shall be written on an "occurrence" basis. Claims made will not be accepted. The Contractor shall carry a general umbrella liability as shown in the Supplemental Conditions. The umbrella coverage shall include Commercial General Liability, Automobile Liability and Employer's Liability. Policies shall be written in the name of the Contractor, Owner and Engineer "as their respective interests may appear." The policies shall provide coverage against any loss caused by the negligence of the Owner, its officers, employers and agents, except where the loss is caused by the sole negligence of the Owner or its aforesaid representatives.

60. COMPREHENSIVE AUTOMOBILE LIABILITY INSURANCE

The Contractor shall carry the Comprehensive Form of Automobile Liability Insurance during the life of the Contract covering the risks itemized in the form of "Certificate of insurance" provided for in this Contract. The limits shall be as stated in the Supplemental Conditions and shall be combined single limit with symbol for any automobile including hired and non-owned.

61. UNEMPLOYMENT INSURANCE

The Contractor hereby agrees to accept exclusive liability for and shall hold the Owner harmless for all payroll taxes for contributions to unemployment insurance, old age pensions, or annuities, as measured by wages, salaries or other remuneration paid to employees of said Contractor.

62. BUILDER'S RISK INSURANCE

The Contractor shall insure the structures and improvements against loss or damage by Builders Risk Insurance using "all risk" form or "special form" of coverage during the progress of the work, and until final acceptance of the work by the Owner. Such insurance shall be written in completed value form for 100% of the completed value of the Contract including stored materials connected therewith, with the amount to be certified to the Contractor by the Engineer.

63. CERTIFICATE OF INSURANCE

All policies will be subject to the approval of the Owner and Engineer.

Certificates of Insurance must be executed in quintuplicate and submitted to the Engineer prior to the execution of the Agreement. Certificates of Insurance will be required of all subcontractors documenting Worker's Compensation Insurance coverage prior to performance of work on the site by subcontractors. Prime Contractors are responsible to make sure all subcontractors have adequate General Liability Insurance. The Owner shall be the certificate holder of all Certificates of Insurance and all Certificates of Insurance shall name the Owner and Engineer as named insured or additional insured. Each certificate shall contain therein or have contained in a rider attached thereto and made a part thereof, a clause to the effect that the insurer will notify the Owner in writing thirty (30) days prior to cancellation of the policy.

The Surety on all bonds and insurance shall be rated "A" or better by A.M. Best Co. and shall be licensed to conduct business in the Commonwealth of Pennsylvania.

64. SITE ACCESSIBILITY

The Contractor must provide that the representatives of the Owner, Federal Government and the State will have access to the work wherever it is in preparation or progress and that the Contractor will provide proper facilities for such access and inspection.

65. UTILITY SERVICES

Except as otherwise provided for in the specifications, reasonable amounts of water and electricity will be made available if practicable, to the Contractor from existing system outlets on the property of the Owner. Provision of all other utility requirements, including sanitary facilities, shall be the responsibility of the Contractor. If temporary service connections are necessary, they shall be the responsibility of the Contractor.

66. DOMESTIC CONSTRUCTION MATERIALS

In obtaining materials for the execution of this Contract, preference shall be given to domestic construction material by the Contractor, subcontractors, materialmen and suppliers. An unmanufactured material shall be construed as a domestic construction material if it has been mined or produced in the United States. A manufactured construction material shall be construed as a domestic construction material if it has been manufactured in the United States substantially from articles, materials or supplies mined, produced or manufactured in the United States.

In accordance with the Buy American provision in Public Law 95-217 (section 215 of public Law 92- 500 as amended) regulations and guidelines, the Contractor agrees that preference will be given to domestic construction material by the Contractor, subcontractor, materialmen, and suppliers in the performance of this Contract.

The Owner may waive the Buy American provision based upon those factors that are deemed relevant:

A. Such use is not in the public interest or the cost is unreasonable.

B. The available resources of the project are not sufficient to implement this provision.

C. The articles, materials, or supplies of the class or kind to be used or the articles, materials, or supplies from which they are manufactured are not mined, produced, or manufactured, as the case may be, in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality for the particular project.

The amount of cost differential by which domestic construction material may be given preference shall generally be the sum determined by computing; up to six percent of the bid or offered price of materials of foreign origin including all cost of delivery to the construction site, including any applicable duty, whether or not accessed. Computations will normally be based on costs on the date of opening of bids or proposals.

67. STEEL PRODUCTS PROCUREMENT ACT

The Contractor shall comply with the Steel Product Procurement Act, Pennsylvania Act No. 3, 1978, including any revisions. Only steel products as defined below shall be used in performance of this Contract.

Steel products shall be defined as products rolled, formed, shaped, drawn, extruded, forged, coast, fabricated or otherwise similarly processed, or processed by a combination of two or more operations from steel made in the United States by the open hearth, basic oxygen, electric furnace, Bessemer or other steel making process.

68. LABOR EMPLOYMENT REQUIREMENTS

Contractor and all subcontractors shall observe and comply with all Federal and State laws and local ordinances that affect those engaged or employed on the project; they shall note carefully, specific legal requirements as follows, relative to the employment of all labor and mechanics required in the execution of the work on this Program.

A. Non-Discrimination - No Contractor, subcontractor, nor any persons acting on behalf of such contractor shall by reason of age, sex, race, creed or color, discriminate against any citizen of the Commonwealth of Pennsylvania who is qualified and available to perform the work to which the Program relates. No Contractor, subcontractor nor any person on his behalf, shall in any manner discriminate against or intimidate any employee hired for the performance of work under this Contract on account of age, sex, race, creed, or color.

B. Affirmative Action

(I)) The Contractor shall take Affirmative Action to ensure that applicants are employed, and that employees are treated during employment without regard to their age, race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer: recruitment or recruitment advertising: layoff or termination, rates of pay or other forms of compensation: and

selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notice to be provided by the Contracting Officer setting forth the provisions of this non-discrimination clause.

(2) The Contractor agrees to hire local disadvantaged youth to perform unskilled tasks wherever possible. The Contractor will provide constant supervision and training so as to enable training participants to be upgraded from unskilled to skilled in all cases where there is a positive reaction to said training.

(3) The Contractor shall comply with Federal and State Equal Opportunity Construction Contract Regulations (Executive Order 11246) in all respects. Contractors attention is specifically drawn to the equal opportunity clause and the goals and time tables for minority and female participation set forth in the rules and regulations of the Department of Labor relative there to CER 60-41.

(4) This Contract may be canceled or terminated by the Owner and all money due or become due hereunder, shall be forfeited for a second or any subsequent violation of the terms or conditions of this portion of the Contract.

69. RE-USE OF DOCUMENTS

Neither Contractor nor any subcontractor or supplier or other person or organization performing or furnishing any of the work under a direct or indirect contract with Owner shall have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer; and they shall not re-use any of them on extensions of the project or any other project without written consent of Owner and Engineer, and specific written verification or adaptation by Engineer.

70. REQUIREMENTS OF PREVAILING WAGE ACT

The Contractor shall pay no less than the minimum wage rates determined by Secretary of Labor and Industry and attached herein, and shall comply with all conditions of the Pennsylvania Prevailing Wage Act 442 and as amended by Act 342, all Regulations issued pursuant thereto. These requirements shall be included in all sub contractual relations of the Contractor.

Each contractor and each subcontractor shall file a statement each week and a final statement at the conclusion of the work on the Contract with the contracting agency, under oath, and in form satisfactory to the Secretary, certifying that all workmen have been paid wages in strict conformity with the provisions if any wages remain unpaid to set for the amount of wages due and owing to each workman respectively.

Before final payment is made, the Contractor must submit final wage certifications from all contractors and subcontractors.
If notified by Secretary of Labor and Industry of the filing of wage claims by workmen, the Owner shall withhold from the monies due to the Contractor or subcontractor sufficient funds to pay all claims determined to be valid and when so directed by the Secretary of Labor and Industry, shall pay these monies directly to the workmen.

71. SUBSTANTIAL COMPLETION

Substantial Completion means that point at which the construction of the project is sufficiently completed, in the opinion of the Engineer and in accordance with the Contract Documents, so that the project, or specified part, can be utilized for the purposes for which it was intended.

Prior to final payment, Contractor may, in writing to Owner and Engineer, certify that the entire project or part thereof is Substantially Complete and request that Engineer issue a notice of Substantial Completion. Within a reasonable time thereafter, Owner, Contractor and Engineer shall make an inspection of the project to determine the status of completion. If Engineer does not consider the project substantially complete, he will notify Contractor in writing giving his reasons therefore. If Engineer considers the project substantially complete, he will prepare and deliver to the Owner a tentative notice of Substantial Completion which shall fix the date of Substantial Completion and the responsibilities between Owner and Contractor for maintenance, heat and utilities. There shall be attached to the notice a tentative list of items to be completed or corrected before final payment, and the notice shall fix the time within which such items shall be completed or corrected, said time to be within the contract completion time. Owner shall have seven (7) days after receipt of the tentative notice during which he may take written objection to Engineer as to any provisions of the notice or attached list. If, after considering such objections, Engineer concludes that the project is not Substantially Complete, he will within fourteen (14) days after submission of the tentative notice to Owner notify Contractor in writing stating his reasons therefore. If after consideration of Owner's objections, Engineer considers the project substantially complete, he will within said fourteen (14) days execute and deliver to Owner and Contractor a definitive notice of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the tentative notice as he believes justified after consideration of any objections from Owner. Owner shall have the right to exclude Contractor from the project after the date of Substantial Completion, but Owner shall allow Contractor reasonable access to complete or correct items on the punch list.

Prior to final payment, Owner may request Contractor in writing to permit Owner to use a specified part of the project which he believes he may use without significant interference with construction of the other parts of the project. If Contractor agrees, he will certify to Owner and Engineer that said part of the project is Substantially Complete and request Engineer to issue a notice of Substantial Completion for that part of the project. Within a reasonable time thereafter Owner, Contractor, and Engineer shall make an inspection of that part of the project to determine its status of completion. If Engineer does not consider that it is Substantially Complete, he will notify Owner and Contractor in writing giving his reasons therefore. If Engineer, Owner and Contractor consider that part of the project to be Substantially Complete, the Engineer will execute and deliver to Owner and Contractor a notice to that effect, fixing the date of Substantial Completion as to that part of the project, attaching thereto a tentative list of items to be completed or corrected before final payment and fixing the responsibility between Owner and Contractor for maintenance, heat and utilities as to that part of the project. Owner shall have the right to exclude Contractor from any part of the project which Engineer has so ce1iified to be Substantially Complete, but Owner shall allow Contractor reasonable access to complete or correct items on the tentative list.

72. RULES AND REGULATIONS FOR OUTSIDE CONTRACTORS

Rules:

A. The contractor is responsible for adherence to existing local, state and federal codes and regulations.
B. Personal vehicles may be parked in designated areas; all parking regulations as posted must be observed.
C. The possession of any type of weapon on county property is prohibited. The contractor shall not allow his employees to work under the influence of narcotics or intoxicating beverages.
D. Fighting, horse-play and running are prohibited within the entire facility.
E. Smoking is not permitted.
F. Before starting any excavation, the contractor must consult with the General Services department for all known underground utilities. The contractor is also responsible to schedule a PA one Call before starting any work. All open pits and excavated areas must be properly protected at all times. Barricades, identification signs or other warning devices must be used at these hazardous locations when no work is being performed.
G. The treatment of injuries sustained by the contractor's employees shall be the responsibility of the contractor.

H. Regardless of the type of fuel used, all fuel-driven machines must be shut down for refueling.

I. Gasoline powered trucks must be equipped with a spark-arrester on tail pipe. No riders, other than the driver, are permitted on either empty or loaded trucks. Refueling must be done outside the building.

J. Adequate and proper eye protection such as safety glasses, face shields or goggles must be properly worn at all times when work offers an eye injury exposure. Safety glasses must also be worn in any posted area requiring their use.

K. Oily or otherwise dirty disposable wiping cloths must be deposited in closed covered containers.

L. Housekeeping is the contractor's responsibility. Clean-up of the respective working areas must be accomplished at the end of the day or shift or more often if an unusual hazard is created.

M. Bulk storage of flammable liquids must be kept outside of buildings. No more than one day's working supply should be inside the building at any time and they must be kept in properly labeled self-closing covered safety containers.

N. Dunnage, binding wire, metal strapping and other types of debris must be cleaned up immediately after use and taken to designated collection areas. At no time shall scrap be permitted to remain in aisles and areas where it could become a "tripping" or a "slip and fall" hazard.

O. Aisles, exits, walkways and fire protection equipment must be maintained free from obstruction at all times. Fire doors must not be blocked or fastened open. Wires, cables or hoses, etc. shall not pass through a doorway and prevent the fire door from closing completely.

P. Adequate fire protection must be provided at every job site where flame and spark producing equipment is used. This equipment must be inspected by the contractor before it is used to ensure that it is in good working order. A Cutting and Welding Permit must be secured from the General Service Department before starting such work.

Q. General Services, in conjunction with the Fire Marshal's Office shall show the contractor the various methods of transmitting fire alarms within the facility. It is the responsibility of the contractor to familiarize his employees with these methods.

R. When welding and/or cutting are done in storage rooms, flammable liquid area and vapor degreaser areas, the flammable material must be adequately covered with flame retardant tarpaulins. While the cutting and/or welding is being done, at least one person must be stationed in the immediate area with a suitable fire extinguisher.

S. When cutting, welding or grinding work is to be done in the immediate vicinity of county employees, adequate screen protection from flying objects must be provided.

T. If and when it becomes necessary to use a fire extinguisher, it must be reported immediately to the General Services Department.

U. All ladders must be substantially built, free of defects and provided with the necessary safety equipment.
Extension ladders, while in use, must be securely fastened to prevent them from falling or skidding Aluminum ladders are not permitted.

V. Acetylene, oxygen, nitrogen and other compressed gas cylinders must be securely fastened in an upright position.

W. Contractors must store gas cylinders in a specified location. After completion of the work, the contractor is responsible for the removal of all his gas cylinders.

X. Any spillage, regardless of its nature, must be cleaned up immediately.

Y. Safety guards or other devices shall not be removed from tools or equipment except for repairs and must be replaced upon completion of repair.

Z. Scaffolds planks, ladders, ropes, ground wires, etc., shall be inspected by the contractor and replaced if they prove to be defective.

AA. Hard hats should be worn when overhead work is being performed.

BB. Temporary wiring must be properly insulated and substantially supported

CC. If work necessitates the turning off of any portion of the sprinkler systems or power, General Services Department in conjunction with the Fire marshal's Office, must be notified 24 hours prior to these systems being turned off or on.

DD. It is the responsibility of the contractor to see that only authorized, qualified (licensed if required) personnel use power actuated (stud) tools. Adequate shields to lessen the danger of flying materials must be erected if work is done in close proximity to county employees.

EE. It is the responsibility of the contractor's representative to familiarize himself with the building or work area.

FF. The contractor's employees will be permitted access only to those areas necessary for the performance of contractual work. Under no circumstances are the contractor's employees allowed to tour or roam around the facility or enter areas not necessary for the performance of their work.

GG. "Strike anywhere" matches are not permitted.

HH. All personnel must wear shirts with sleeves that cover the shoulders and pants that cover the entire leg to the ankle.

II. At no time is work permitted with materials that the employee does not understand or are not aware of the hazard. The contractor is required to have Material Safety Data Sheets for all materials.

END OF GENERAL CONDITIONS

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project Name:	Bensalem Library Ceiling and Lighting Renovation
General Description:	Replace the lighting fixtures on the main floor of the branch. Repair suspended ceiling as necessary.
Project Locality	Bensalem Township
Awarding Agency:	Bucks County Free Library
Contract Award Date:	3/17/2026
Serial Number:	26-00758
Project Classification:	Building
Determination Date:	1/27/2026
Assigned Field Office:	Philadelphia
Field Office Phone Number:	(215)560-1858
Toll Free Phone Number:	
Project County:	Bucks County

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-00758 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Asbestos & Insulation Workers	5/1/2025		$60.84	$48.71	$109.55
Boilermaker (Commercial, Institutional, and Minor Repair Work)	3/1/2024		$36.71	$19.13	$55.84
Boilermakers	1/1/2024		$52.10	$35.72	$87.82
Bricklayer	5/1/2023		$47.50	$31.42	$78.92
Bricklayer	5/1/2025		$50.00	$32.57	$82.57
Carpenter - Chief of Party (Surveying & Layout)	5/1/2025		$54.59	$29.02	$83.61
Carpenter - Instrument Person (Surveying & Layout)	5/1/2025		$47.47	$29.02	$76.49
Carpenter - Rodman (Surveying & Layout)	5/1/2025		$23.74	$20.62	$44.36
Carpenters	5/1/2025		$47.47	$29.02	$76.49
Cement Masons	5/1/2024		$46.70	$32.46	$79.16
Cement Masons	5/1/2025		$48.70	$32.46	$81.16
Dockbuilder, Pile Drivers	5/1/2024		$52.98	$37.99	$90.97
Dockbuilder, Pile Drivers	5/1/2025		$55.23	$37.99	$93.22
Dockbuilder, Pile Drivers	5/1/2026		$56.98	$37.99	$94.97
Dockbuilder/Pile Driver Diver	5/1/2024		$61.54	$41.74	$103.28
Dockbuilder/Pile Driver Diver	5/1/2025		$64.35	$41.74	$106.09
Dockbuilder/Pile Driver Diver	5/1/2026		$66.54	$41.74	$108.28
Dockbuilder/pile driver tender	5/1/2024		$52.98	$37.99	$90.97
Dockbuilder/pile driver tender	5/1/2025		$55.23	$37.99	$93.22
Dockbuilder/pile driver tender	5/1/2026		$56.98	$37.99	$94.97
Drywall Finisher	5/1/2025		$40.14	$32.35	$72.49
Electricians	5/1/2024		$69.58	$45.66	$115.24
Electricians	5/1/2025		$70.97	$47.27	$118.24
Elevator Constructor	1/1/2025		$71.85	$45.77	$117.62
Floor Coverer	5/1/2025		$51.67	$31.69	$83.36
Floor Coverer	5/1/2026		$52.84	$32.86	$85.70
Glazier	5/1/2024		$48.00	$37.50	$85.50
Glazier	5/1/2025		$49.96	$38.34	$88.30
Interior Finish	5/1/2023		$34.60	$25.80	$60.40
Iron Workers (Bridge, Structural, Ornamental, Precast)	7/1/2024		$53.20	$45.01	$98.21
Iron Workers (Riggers)	7/1/2024		$44.64	$34.39	$79.03
Iron Workers (Riggers)	7/1/2025		$44.77	$36.27	$81.04
Iron Workers (Rodman/Reinforcing)	7/1/2024		$47.70	$34.77	$82.47
Iron Workers (Rodman/Reinforcing)	7/1/2025		$47.80	$36.65	$84.45
Laborers (Class 01 - See notes)	5/1/2024		$35.85	$26.00	$61.85
Laborers (Class 01 - See notes)	5/1/2025		$37.25	$26.10	$63.35
Laborers (Class 02 - See notes)	5/1/2024		$39.40	$27.55	$66.95
Laborers (Class 02 - See notes)	5/1/2025		$41.00	$27.70	$68.70
Laborers (Class 03 - See notes)	5/1/2024		$36.27	$26.18	$62.45
Laborers (Class 03 - See notes)	5/1/2025		$37.67	$26.28	$63.95
Laborers (Class 04 - See notes)	5/1/2024		$36.27	$26.18	$62.45
Laborers (Class 04 - See notes)	5/1/2025		$37.67	$26.28	$63.95
Laborers (Class 05 - See notes)	5/1/2024		$35.85	$26.00	$61.85
Laborers (Class 05 - See notes)	5/1/2025		$37.25	$26.10	$63.35

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-00758 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Landscape Laborer	5/1/2024		$30.70	$24.23	$54.93
Landscape Laborer	5/1/2025		$32.15	$24.30	$56.45
Marble Finisher	5/1/2025		$41.17	$30.75	$71.92
Marble Mason	5/1/2023		$47.20	$31.95	$79.15
Mason Tender, Cement	5/1/2023		$35.02	$25.98	$61.00
Millwright	5/1/2025		$57.39	$35.81	$93.20
Millwright	5/1/2026		$60.20	$35.81	$96.01
Operators (Building, Class 01 - See Notes)	5/1/2024		$53.36	$33.65	$87.01
Operators (Building, Class 01 - See Notes)	5/1/2025		$54.52	$34.49	$89.01
Operators (Building, Class 01 - See Notes)	5/1/2026		$55.67	$35.34	$91.01
Operators (Building, Class 01A - See Notes)	5/1/2024		$56.37	$34.53	$90.90
Operators (Building, Class 01A - See Notes)	5/1/2025		$57.52	$35.38	$92.90
Operators (Building, Class 01A - See Notes)	5/1/2026		$58.68	$36.22	$94.90
Operators (Building, Class 02 - See Notes)	5/1/2024		$53.11	$33.58	$86.69
Operators (Building, Class 02 - See Notes)	5/1/2025		$54.27	$34.42	$88.69
Operators (Building, Class 02 - See Notes)	5/1/2026		$55.43	$35.26	$90.69
Operators (Building, Class 02A - See Notes)	5/1/2024		$56.13	$34.45	$90.58
Operators (Building, Class 02A - See Notes)	5/1/2025		$57.29	$35.29	$92.58
Operators (Building, Class 02A - See Notes)	5/1/2026		$58.44	$36.14	$94.58
Operators (Building, Class 03 - See Notes)	5/1/2024		$49.03	$32.37	$81.40
Operators (Building, Class 03 - See Notes)	5/1/2025		$50.18	$33.22	$83.40
Operators (Building, Class 03 - See Notes)	5/1/2026		$51.34	$34.06	$85.40
Operators (Building, Class 04 - See Notes)	5/1/2024		$48.73	$32.28	$81.01
Operators (Building, Class 04 - See Notes)	5/1/2025		$49.88	$33.13	$83.01
Operators (Building, Class 04 - See Notes)	5/1/2026		$51.04	$33.97	$85.01
Operators (Building, Class 05 - See Notes)	5/1/2024		$47.00	$31.78	$78.78
Operators (Building, Class 05 - See Notes)	5/1/2025		$48.16	$32.62	$80.78
Operators (Building, Class 05 - See Notes)	5/1/2026		$49.32	$33.46	$82.78
Operators (Building, Class 06 - See Notes)	5/1/2024		$46.02	$31.48	$77.50
Operators (Building, Class 06 - See Notes)	5/1/2025		$47.17	$32.33	$79.50
Operators (Building, Class 06 - See Notes)	5/1/2026		$48.34	$33.16	$81.50
Operators (Building, Class 07A- See Notes)	5/1/2024		$64.80	$38.61	$103.41
Operators (Building, Class 07A- See Notes)	5/1/2025		$66.26	$39.55	$105.81
Operators (Building, Class 07A- See Notes)	5/1/2026		$67.73	$40.48	$108.21
Operators (Building, Class 07B- See Notes)	5/1/2024		$64.50	$38.53	$103.03
Operators (Building, Class 07B- See Notes)	5/1/2025		$65.97	$39.46	$105.43
Operators (Building, Class 07B- See Notes)	5/1/2026		$67.44	$40.39	$107.83
Painters Class 1 (see notes)	5/1/2024		$42.97	$34.11	$77.08
Painters Class 1 (see notes)	5/1/2025		$44.38	$34.55	$78.93
Painters - Line Stripping	12/1/2024		$44.12	$27.91	$72.03
Painters - Line Stripping	12/1/2025		$45.12	$29.41	$74.53
Painters Class 4 (see notes)	5/1/2024		$45.06	$34.11	$79.17
Painters Class 4 (see notes)	5/1/2025		$46.47	$34.55	$81.02
Plasterers	5/1/2024		$39.88	$33.08	$72.96

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-00758 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
plumber	5/1/2024		$67.53	$38.31	$105.84
plumber	5/1/2025		$70.53	$39.46	$109.99
Pointers, Caulkers, Cleaners	5/1/2025		$51.35	$31.80	$83.15
Roofers (Composition)	5/1/2024		$44.13	$34.77	$78.90
Roofers (Composition)	5/1/2025		$46.03	$34.77	$80.80
Roofers (Shingle)	5/1/2024		$34.35	$22.20	$56.55
Roofers (Slate & Tile)	5/1/2024		$37.35	$22.20	$59.55
Sheet Metal Workers	5/1/2024		$59.22	$50.56	$109.78
Sheet Metal Workers	5/1/2025		$62.62	$52.17	$114.79
Sign Makers and Hangars	7/15/2024		$32.32	$25.82	$58.14
Sign Makers and Hangars	7/15/2025		$33.48	$26.41	$59.89
Sprinklerfitters	1/1/2023		$62.23	$31.99	$94.22
Sprinklerfitters	5/1/2025		$70.37	$34.85	$105.22
Steamfitters	5/1/2024		$70.32	$43.09	$113.41
Steamfitters	5/1/2025		$72.52	$44.89	$117.41
Stone Masons	5/1/2023		$47.20	$31.95	$79.15
Stone Masons	5/1/2025		$50.00	$32.80	$82.80
Terrazzo Finisher	5/1/2023		$43.75	$27.86	$71.61
Terrazzo Finisher	5/1/2025		$45.61	$29.41	$75.02
Terrazzo Grinder	5/1/2023		$44.02	$27.86	$71.88
Terrazzo Grinder	5/1/2025		$45.88	$29.41	$75.29
Terrazzo Mechanics	5/1/2023		$50.26	$29.56	$79.82
Terrazzo Mechanics	5/1/2025		$52.21	$31.26	$83.47
Tile Finisher	5/1/2023		$39.52	$29.30	$68.82
Tile Finisher	5/1/2025		$41.17	$30.75	$71.92
Tile Setter	5/1/2023		$50.26	$29.56	$79.82
Tile Setter	5/1/2025		$52.21	$31.26	$83.47
Truckdriver class 1(see notes)	5/1/2024		$36.79	$22.54	$59.33
Truckdriver class 2 (see notes)	5/1/2024		$36.89	$22.54	$59.43
Window Film / Tint Installer	6/1/2019		$24.52	$12.08	$36.60
Window Film / Tint Installer	6/1/2024		$26.37	$14.83	$41.20

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-00758 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Bricklayer	5/1/2025		$50.00	$32.57	$82.57
Carpenter - Chief of Party (Surveying & Layout)	5/1/2025		$65.96	$30.09	$96.05
Carpenter - Chief of Party (Surveying & Layout)	5/1/2026		$67.52	$30.44	$97.96
Carpenter - Instrument Person (Surveying & Layout)	5/1/2025		$58.39	$29.06	$87.45
Carpenter - Instrument Person (Surveying & Layout)	5/1/2026		$60.09	$29.06	$89.15
Carpenter - Rodman (Surveying & Layout)	5/1/2025		$45.88	$23.19	$69.07
Carpenter - Rodman (Surveying & Layout)	5/1/2026		$46.97	$23.54	$70.51
Carpenter	5/1/2025		$57.36	$30.09	$87.45
Carpenter	5/1/2026		$58.71	$30.44	$89.15
Cement Masons	5/1/2023		$43.20	$32.91	$76.11
Cement Masons	5/1/2025		$46.55	$32.66	$79.21
Dockbuilder, Pile Drivers	5/1/2024		$52.98	$37.99	$90.97
Dockbuilder, Pile Drivers	5/1/2025		$55.23	$37.99	$93.22
Dockbuilder, Pile Drivers	5/1/2026		$56.98	$37.99	$94.97
Dockbuilder/Pile Driver Diver	5/1/2024		$61.54	$41.74	$103.28
Dockbuilder/Pile Driver Diver	5/1/2025		$60.31	$44.97	$105.28
Dockbuilder/Pile Driver Diver	5/1/2026		$61.88	$45.47	$107.35
Dockbuilder/pile driver tender	5/1/2024		$52.98	$37.99	$90.97
Dockbuilder/pile driver tender	5/1/2025		$55.23	$37.99	$93.22
Dockbuilder/pile driver tender	5/1/2026		$56.98	$37.99	$94.97
Electric Lineman	6/3/2024		$62.07	$33.96	$96.03
Iron Workers (Bridge, Structural, Ornamental, Precast)	7/1/2024		$53.20	$45.01	$98.21
Iron Workers (Riggers)	7/1/2023		$42.53	$34.14	$76.67
Iron Workers (Rodman/Reinforcing)	7/1/2023		$45.70	$34.77	$80.47
Laborers (Class 01 - See notes)	5/1/2024		$38.80	$27.65	$66.45
Laborers (Class 01 - See notes)	5/1/2025		$40.20	$27.80	$68.00
Laborers (Class 02 - See notes)	5/1/2024		$39.00	$27.65	$66.65
Laborers (Class 02 - See notes)	5/1/2025		$40.40	$27.80	$68.20
Laborers (Class 03 - See notes)	5/1/2024		$39.00	$27.65	$66.65
Laborers (Class 03 - See notes)	5/1/2025		$40.40	$27.80	$68.20
Laborers (Class 04 - See notes)	5/1/2024		$33.60	$27.65	$61.25
Laborers (Class 04 - See notes)	5/1/2025		$35.00	$27.80	$62.80
Laborers (Class 05 - See notes)	5/1/2024		$39.65	$27.65	$67.30
Laborers (Class 05 - See notes)	5/1/2025		$41.05	$27.80	$68.85
Laborers (Class 06 - See notes)	5/1/2024		$39.70	$27.65	$67.35
Laborers (Class 06 - See notes)	5/1/2025		$41.10	$27.80	$68.90
Laborers (Class 07 - See notes)	5/1/2024		$39.55	$27.65	$67.20
Laborers (Class 07 - See notes)	5/1/2025		$40.95	$27.80	$68.75
Laborers (Class 08 - See notes)	5/1/2024		$39.30	$27.65	$66.95
Laborers (Class 08 - See notes)	5/1/2025		$40.70	$27.80	$68.50
Laborers (Class 09 - See notes)	5/1/2024		$39.15	$27.65	$66.80
Laborers (Class 09 - See notes)	5/1/2025		$40.55	$27.80	$68.35
Laborers (Class 10- See notes)	5/1/2024		$39.30	$27.65	$66.95
Laborers (Class 10- See notes)	5/1/2025		$40.70	$27.80	$68.50

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-00758 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 11 -See Notes)	5/1/2024		$39.20	$27.65	$66.85
Laborers (Class 11 -See Notes)	5/1/2025		$40.60	$27.80	$68.40
Laborers (Class 12 -See Notes)	5/1/2024		$40.90	$27.65	$68.55
Laborers (Class 12 -See Notes)	5/1/2025		$42.30	$27.80	$70.10
Laborers (Class 13 -See Notes)	5/1/2024		$42.93	$27.65	$70.58
Laborers (Class 13 -See Notes)	5/1/2025		$44.33	$27.80	$72.13
Laborers (Class 14 -See Notes)	5/1/2024		$39.50	$27.65	$67.15
Laborers (Class 14 -See Notes)	5/1/2025		$40.90	$27.80	$68.70
Laborers Utility (PGW ONLY) (Flagperson)	5/1/2025		$34.07	$19.73	$53.80
Laborers Utility (PGW ONLY)	5/1/2025		$41.10	$19.73	$60.83
Landscape Laborer	5/1/2024		$30.28	$24.05	$54.33
Landscape Laborer	5/1/2025		$31.73	$24.15	$55.88
Millwright	5/1/2025		$57.39	$35.81	$93.20
Millwright	5/1/2026		$60.20	$35.81	$96.01
Operators Class 01 - See Notes (Building, Heavy, Highway)	5/1/2024		$53.36	$33.65	$87.01
Operators Class 01 - See Notes (Building, Heavy, Highway)	5/1/2025		$54.52	$34.49	$89.01
Operators Class 01 - See Notes (Building, Heavy, Highway)	5/1/2026		$55.67	$35.34	$91.01
Operators Class 01a - See Notes (Building, Heavy, Highway)	5/1/2024		$56.37	$34.53	$90.90
Operators Class 01a - See Notes (Building, Heavy, Highway)	5/1/2025		$57.52	$35.38	$92.90
Operators Class 01a - See Notes (Building, Heavy, Highway)	5/1/2026		$58.68	$36.22	$94.90
Operators Class 02 - See Notes (Building, Heavy, Highway)	5/1/2024		$53.11	$33.58	$86.69
Operators Class 02 - See Notes (Building, Heavy, Highway)	5/1/2025		$54.27	$34.42	$88.69
Operators Class 02 - See Notes (Building, Heavy, Highway)	5/1/2026		$55.43	$35.26	$90.69
Operators Class 02a - See Notes (Building, Heavy, Highway)	5/1/2024		$56.13	$34.45	$90.58
Operators Class 02a - See Notes (Building, Heavy, Highway)	5/1/2025		$57.29	$35.29	$92.58
Operators Class 02a - See Notes (Building, Heavy, Highway)	5/1/2026		$58.44	$36.14	$94.58
Operators Class 03 - See Notes (Building, Heavy, Highway)	5/1/2024		$49.03	$32.37	$81.40
Operators Class 03 - See Notes (Building, Heavy, Highway)	5/1/2025		$50.18	$33.22	$83.40
Operators Class 03 - See Notes (Building, Heavy, Highway)	5/1/2026		$51.34	$34.06	$85.40
Operators Class 04 - See Notes (Building, Heavy, Highway)	5/1/2024		$48.73	$32.28	$81.01
Operators Class 04 - See Notes (Building, Heavy, Highway)	5/1/2025		$49.88	$33.13	$83.01
Operators Class 04 - See Notes (Building, Heavy, Highway)	5/1/2026		$51.04	$33.97	$85.01
Operators Class 05 - See Notes (Building, Heavy,	5/1/2024		$47.00	$31.78	$78.78

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-00758 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Highway)					
Operators Class 05 - See Notes (Building, Heavy, Highway)	5/1/2025		$48.16	$32.62	$80.78
Operators Class 05 - See Notes (Building, Heavy, Highway)	5/1/2026		$49.32	$33.46	$82.78
Operators Class 06 - See Notes (Building, Heavy, Highway)	5/1/2024		$46.02	$31.48	$77.50
Operators Class 06 - See Notes (Building, Heavy, Highway)	5/1/2025		$47.17	$32.33	$79.50
Operators Class 06 - See Notes (Building, Heavy, Highway)	5/1/2026		$48.34	$33.16	$81.50
Operators Class 07 (A) - See Notes (Building, Heavy, Highway)	5/1/2024		$64.80	$38.61	$103.41
Operators Class 07 (A) - See Notes (Building, Heavy, Highway)	5/1/2025		$66.26	$39.55	$105.81
Operators Class 07 (A) - See Notes (Building, Heavy, Highway)	5/1/2026		$67.73	$40.48	$108.21
Operators Class 07 (B) - See Notes (Building, Heavy, Highway)	5/1/2024		$64.50	$38.53	$103.03
Operators Class 07 (B) - See Notes (Building, Heavy, Highway)	5/1/2025		$65.97	$39.46	$105.43
Operators Class 07 (B) - See Notes (Building, Heavy, Highway)	5/1/2026		$67.44	$40.39	$107.83
Painters - Line Stripping	12/1/2024		$44.12	$27.91	$72.03
Painters - Line Stripping	12/1/2025		$45.12	$29.41	$74.53
Painters Class 2 (see notes)	2/1/2024		$49.57	$33.34	$82.91
Painters Class 2 (see notes)	2/1/2025		$50.85	$33.91	$84.76
Painters Class 3 (see notes)	2/1/2024		$60.53	$33.38	$93.91
Painters Class 3 (see notes)	2/1/2025		$61.81	$33.95	$95.76
Pointers, Caulkers, Cleaners	5/1/2025		$51.35	$31.80	$83.15
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2024		$66.80	$42.93	$109.73
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2025		$68.89	$44.73	$113.62
Truckdriver class 1(see notes)	5/1/2024		$36.64	$22.54	$59.18
Truckdriver class 2 (see notes)	5/1/2024		$36.74	$22.54	$59.28

SECTION 000115

LIST OF DRAWINGS

The drawings listed below accompanying this specification form a part of the contract.

Drawing No.	Title
CS	Bensalem Branch Cover Sheet
E&O	Bensalem Branch Egress and Occupancy Plan
D.1	Bensalem Branch Demolition Reflected Ceiling Plan
A.1	Bensalem Branch Reflected Ceiling Plan
E1.1	Bensalem Branch Electrical Notes and Legends
E2.1	Bensalem Branch Electrical Demolition Plan
E3.1	Bensalem Branch Electrical New Work Plan

END OF SECTION 000115

DOCUMENT 004130 - BID FORM

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: Bucks County Free Library Ceiling and Lighting Bensalem Branch Library

C. Project Locations: Bensalem Branch – 3700 Hulmeville Road, Bensalem, PA 19020

D. Owner: Bucks County Free Library

E. Library Spec #2026BN-01

F. A mandatory Pre-Bid Meeting will be at 9:00 AM on March 11th, 2026. Meet at the Bensalem Branch located at 3700 Hulmeville Road, Bensalem, PA 19020.

1.2 CERTIFICATIONS AND BASE BID

A. Lump Sum Base Bid (Single Prime Contract):

1. The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Holstein White, Inc. and Engineer's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

Base Bid

_____Dollars ($_____)
Written Figures

1.3 BID GUARANTEE

A. The undersigned Bidder shall furnish surety as specified within 10 days after a written Notice of Award, if offered within 60 days after receipt of bids, and on failure to do so agrees to forfeit to Library the attached cash, cashier's check, certified check, U.S. money order, or bid bond, in the following amount constituting five percent (5%) of the Base Bid amount above:

_____ Dollars ($_____).
(Written amount) (Numbers)

B. In the event Library does not offer Notice of Award within the time limits stated above, Library will return to the undersigned the cash, cashier's check, certified check, U.S. money order, or bid bond.

1.4 SUBCONTRACTORS AND SUPPLIERS

A. List all subcontractors expected to perform work as part of this project:

1. Company: _____ Trade: _____

2. Company: _____ Trade: _____

3. Company: _____ Trade: _____

4. Company: _____ Trade: _____

5. Company: _____ Trade: _____

6. Company: _____ Trade: _____

1.5 TIME OF COMPLETION

A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Engineer and shall fully complete the Work within 120 calendar days.

1.6 ACKNOWLEDGEMENT OF ADDENDA

A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

1. Addendum No. _____ Dated _____.

2. Addendum No. _____ Dated _____.

1.7 BID SUPPLEMENTS

A. The following supplements are a part of this Bid Form and are attached hereto.
   1. Bid Bond Form
   2. Non-Collusion Affidavit
   3. Contractor's Qualification Statement
   4. Proposed Schedule of Values Form
   5. Verification of Performance Bond and Labor and Material Bond
   6. Verification of Certificates of Insurance
   7. Public Works Employment Verification Form.

1.8 CONTRACTOR'S LICENSE

A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in the Jurisdiction of the Project, and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

1.9 SUBMISSION OF BID

Respectfully submitted this ____ day of _____, 20___.

Submitted By: _____
(Name of bidding firm or corporation)

Authorized Signature: _____
(Handwritten signature)

Signed By: _____
(Type or print name)

Title: _____
(Owner/Partner/President/Vice President)

Witness By: _____
(Handwritten signature)

Attest: _____
(Handwritten signature)

By: _____
(Type or print name)

Title: _____
(Corporate Secretary or Assistant Secretary)

Street Address: _____

City, State, Zip _____

Phone: _____

License No.: _____

Federal ID No.: _____

(Affix Corporate Seal Here)

Note: Bids submitted with a bid bond that is not properly signed and sealed by the bidder and surety company will be rejected.

Bid responses that do not include pages 00413-1 thru 00413-4 and other items indicated above may not be considered for evaluation and award.

Bids submitted with a bid bond that is not properly signed and sealed by the bidder and Surety Company may not be considered for evaluation and award.

END OF DOCUMENT 004130

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. General Conditions
2. Project information.
3. Definitions
4. Work covered by Contract Documents.
5. Project Completion Date
6. Access to site.
7. Coordination with occupants.
8. Work restrictions.
9. Specification and drawing conventions.

1.2 GENERAL CONDITIONS

A. The Contractor shall visit the site before they submit their proposal. They shall examine all existing conditions which affect the work. Submission of the proposal shall be considered evidence that this requirement has been fulfilled. No extra payment will be allowed for additional work made necessary by the failure to visit the site.

B. In preparing their estimate, the Contractor shall review all of the contract documents and visit the site in order to acquaint themself with the existing and related conditions that may, will or could affect their work. They shall be experienced, skilled and knowledgeable with this type of construction and shall be expert and proficient in the preparation of estimates and the comprehension, implementation, and interpretation of contract documents such as those prepared for this project.

C. The Contractor by their acceptance of the contract guarantees that all work installed shall be free from all defects in workmanship and materials and that all apparatus furnished by them shall develop the capacities and characteristics specified. They further guarantee that if, during a period of one (1) year from the date of the certificate of completion and acceptance of the work, any such defects in workmanship, material or performance appear, such defects shall be remedied by them without cost to the Bucks County Free Library.

D. The Bid Plans issued for procurement of contract are diagrammatic and indicate the general arrangement of systems. The Contractor shall provide all work required for a complete installation. The Bid Plans are not to be scaled. The contractor is solely responsible to field verify all dimensional information.

E. The Contractor shall give all necessary notices, obtain all permits, pay all governmental taxes, fees, and other costs in connection with their work. They shall file all necessary plans and prepare all other documents including additional detailed plans that are required for compliance with all applicable laws, ordinances, rules, and regulations.

F. The Contractor shall be responsible for all working conditions and shall maintain a safe working environment at the job site for all employees and building occupants.

1.3 PROJECT INFORMATION

A. Project Identification:

1. Bucks County Free Library Ceiling and Lighting Bensalem Branch Library.

B. Project Address:

1. 3700 Hulmeville Rd, Bensalem, PA 19020

C. Owner: Bucks County Free Library.

D. Owner's Representative: Leigh Sheldron

E. Project Architect:

1. RHJ Associates, P.C.

a. Michael Henretty

Office: 610.377.4555 ext.102

Direct: 302.482.2269

1.4 DEFINITIONS

A. "Owner" Defined:

1. Wherever the word "Owner" is used in these specifications, it shall be understood to mean:
Bucks County Free Library
Doylestown Branch – 150 S Pine Street
Doylestown, PA 18901

B. "Architect" Defined:

1. Wherever the word "Architect" is used in these Specifications, it shall be understood to mean:
RHJ Associates, P.C.
10 Leopard Road
Paoli, PA 19301

C. "Contractor" Defined:

1. Wherever the word "Contractor" is used in these Specifications, it shall be understood to mean the person, firm, or corporation to whom the execution of any part of the work herein contemplated shall be awarded by the Bucks County Free Library.

D. "He," "Him," "They," or "Them" as used in the Specifications is intended to identify the responsible party implied in each section of this Specification.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

Bensalem Branch Library

1. The intent of the project is to upgrade existing light fixtures with LED light fixtures.

2. Elements to be removed as shown in the drawings and defined by the scope of work;
   a. Existing linear pendant light fixtures
   b. Acoustical ceiling “cloud” systems
   c. Additional downlights in “cloud” systems
   d. Existing light fixtures in entry vestibule
   e. Damaged ceiling tiles

3. Elements to be installed as shown in the drawings and defined by the scope of work;
   a. 2’X4’ flat panel LED fixtures
   b. New 6” downlights
   c. New Switching

B. Type of Contract.

The work will be performed under one prime contract as follows:

1. GENERAL NOTES REGARDING THE PRIME CONTRACTS.

   a. All contractors are responsible for their respective sections of work, which may include work in other sections or shown on drawings other than their respective format. All contractors must make themselves familiar with the total project and all the project documents. No additions to Contract sums will be approved for any contract where work may be shown or included as part of the Contract Documents including Drawings AND/OR the Project Specifications.
   b. There shall be no political signs or activities permissible on this project. The Owner (BUCKS COUNTY FREE LIBRARY) will hold the contractor responsible for any non-compliance acts and may be subject to back charges for each occurrence.

1.6 PROJECT COMPLETION DATE

A. Project Completion Date: Project must be complete and fully operational within 120 days of notice to proceed.

1.7 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine construction operations to the areas of work indicated on the plans and as defined by the Owner's representative.
2. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Bucks County Free Library, Library's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

    a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

D. Building Security: Contractor shall be responsible for checking in with building security each day to obtain an ID badge for each employee performing work at the facility.

E. Contractor shall obtain clearance from Bucks County Free Library prior to commencing work in any areas of building.

1.8 COORDINATION WITH OCCUPANTS

A. Full Bucks County Free Library Occupancy: Bucks County Free Library will occupy site, existing and adjacent building(s) during entire construction period. Cooperate with Bucks County Free Library during construction operations to minimize conflicts and facilitate County usage. Perform the Work so as not to interfere with Library's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Bucks County Free Library and approval of authorities having jurisdiction.
2. Notify Bucks County Free Library not less than (2) weeks prior to planned activity and confirm work 72 hours in advance of activities that will affect Library's operations. **Coordinate with and receive written permission and sign-off from Owner.**

B. Contractor shall not proceed with any work in any area of building unless they have obtained clearance to work in that area by the Library's Representative.

C. All Hazardous material remediation in occupied areas of the building shall occur on the weekends and be coordinated with Library's Representative.

1.9 WORK RESTRICTIONS

A. Refer to Appendix for General Services Contractor Rules and Regulations. These rules and regulations supersede the specifications and shall be referred to in the event of conflicting information.

B. General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

C. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7 a.m. to 5 p.m., Monday through Friday, and Weekends as coordinated with Bucks County Free Library, unless otherwise indicated.

D. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Bucks County Free Library or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Bucks County Free Library not less than two (2) weeks in advance of proposed utility interruptions and provide a detailed schedule indicating exact systems to be interrupted and expected completion time.
2. Obtain Library's written permission before proceeding with utility interruptions.

E. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Bucks County Free Library occupancy with Library.

1. Notify Bucks County Free Library not less than two (2) days in advance of proposed disruptive operations.
2. Obtain Library's written permission before proceeding with disruptive operations.

F. Non-smoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.

G. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 1 General Requirements: Requirements of Sections in Division 1 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Specification.

END OF SECTION 011000

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Acceptance: The Owner shall have the option to delay the award of any Alternate for thirty (30) days after the Owner’s execution of the Contract.

C. Execute accepted alternates under the same conditions as other Work of this Contract including Project schedule, Milestones and Phases Plan required for completion of the Work.

D. Specification sections and drawings contain requirements for materials and systems necessary to achieve the Work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A (Refer to Appendix for sample form).
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication, or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Bucks County Free Library and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.

f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of Architects and Libraries.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution will not adversely affect Contractor's construction schedule.
c. Requested substitution has received necessary approvals of authorities having jurisdiction.
d. Requested substitution is compatible with other portions of the Work.
e. Requested substitution has been coordinated with other portions of the Work.
f. Requested substitution provides specified warranty.
g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

END OF SECTION 012500

SECTION 012500 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

1. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Engineer's Supplemental Instructions." (Refer to Appendix for sample form).

1.3 PROPOSAL REQUESTS

A. Bucks County Free Library-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
e. Quotation Form: Use CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail" or forms acceptable to Architect (Refer to Appendix for sample forms).

B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Construction Manager.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 1 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Work Change Proposal Request Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail" or form acceptable to Architect (Refer to Appendix for sample forms).

1.4 CHANGE ORDER PROCEDURES

1. On Library's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Bucks County Free Library and Contractor on AIA Document G701 (Refer to Appendix for sample form), or other forms acceptable to the County.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 (Refer to Appendix for sample form), or other forms acceptable to the Bucks County Free Library. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

END OF SECTION 012500

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:
1. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Sub-schedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values coordinated with each phase of payment.

B. Format and Content: Use Specification table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

a. Project name and location.
b. Bucks County Free Library.
c. Library's project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703 (Refer to Appendix for sample form).
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Specification table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

    a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Bucks County Free Library.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: Submit Application for Payment to Architect by the 15th of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment (Refer to Appendix for sample forms).

D. Certified Payroll: Submit certified payroll in accordance with the Pennsylvania Prevailing Wage Act. Certification shall be submitted for the work period applied. Documents shall consist of Certified Payroll Report and a Statement of Compliance. Forms can be downloaded and/or obtained from the Pennsylvania Department of Labor and Industry.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
3. Retainage in the amount of 10% of the work completed shall be held back from each application for payment. At the discretion of the Bucks County Free Library and the Engineer, the retainage amount may be reduced to 5% when the project has reached 80% completion.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Engineer by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. County reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit executed waivers of lien on forms acceptable to County.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Schedule of unit prices.

5. Submittal schedule (preliminary if not final).
6. List of Contractor's staff assignments.
7. List of Contractor's principal consultants.
8. Copies of building permits.
9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
10. Initial progress report.
11. Report of preconstruction conference.
12. Certificates of insurance and insurance policies.
13. Certified Payroll documents.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Library occupancy of designated portions of the Work.
3. Certified Payroll documents

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. Contractor's Affidavit of Payment of Debts and Claims.
5. Contractor's Affidavit of Release of Liens.
6. Consent of Surety Company to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Library took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.
10. Final Certified Payroll reports.
11. Maintenance Bond.

K. Payment from the Bucks County Free Library will be made in 45 days after all of the appropriate documents have been approved.

END OF SECTION 012900

SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination drawings.
2. Requests for Information (RFIs).
3. Project meetings.

1.2 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

4. Name, address, and telephone number of entity performing subcontract or supplying products.
5. Number and title of related Specification Section(s) covered by subcontract.
6. Drawing number and detail references, as appropriate, covered by subcontract.

1.4 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

7. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
8. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
9. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-installation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.5 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

9. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.

b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

D. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Rough Opening Elevations: show dimensions of existing rough openings.
2. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

1.6 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

3. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
4. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

E. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

F. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for coordination information already indicated in the Contract Documents.
d. Requests for adjustments in the Contract Time or the Contract Sum.
e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly.

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

H. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

3. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
4. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
5. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

I. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Critical work sequencing and long-lead items.
    c. Designation of key personnel and their duties.
    d. Procedures for processing field decisions and Change Orders.
    e. Procedures for RFIs.
    f. Procedures for testing and inspecting.
    g. Procedures for processing Applications for Payment.
    h. Distribution of the Contract Documents.
    i. Submittal procedures.
    j. Preparation of record documents.
    k. Use of the premises and existing building.
    l. Work restrictions.
    m. Working hours.
    n. Owner's occupancy requirements.
    o. Responsibility for temporary facilities and controls.
    p. Procedures for moisture and mold control.
    q. Procedures for disruptions and shutdowns.
    r. Construction waste management and recycling.
    s. Parking availability.
    t. Office, work, and storage areas.
    u. Equipment deliveries and priorities.
    v. First aid.
    w. Security.
    x. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

J. Pre-installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.
    e. Purchases.
    f. Deliveries.
    g. Submittals.
    h. Review of mockups.
    i. Possible conflicts.
    j. Compatibility problems.
    k. Time schedules.
    l. Weather limitations.
    m. Manufacturer's written instructions.
    n. Warranty requirements.
    o. Compatibility of materials.
    p. Acceptability of substrates.
    q. Temporary facilities and controls.
    r. Space and access limitations.
    s. Regulations of authorities having jurisdiction.
    t. Testing and inspecting requirements.
    u. Installation procedures.
    v. Coordination with other work.
    w. Required performance results.
    x. Protection of adjacent work.
    y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

K. Progress Meetings - not required

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.
2. Construction schedule updating reports.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Float: The measure of leeway in starting and completing an activity.

1. Float time belongs to Bucks County Free Library.

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Five paper copies.

B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

C. Construction Schedule Updating Reports: Submit with Applications for Payment.

1.4 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each library branch as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Architect’s administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use of premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

3. Work Stages: Indicate important stages of construction for each major portion of the Work.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

F. Recovery Schedule: When periodic update indicates the Work is fourteen or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule.

G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

1. Use Microsoft Project, for Windows XP, Macintosh OS X operating system, or other industry accepted scheduling software capable of exporting a pdf of each schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established from the contract award.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 REPORTS

A. Biweekly Construction Reports: Prepare bi-weekly construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. Approximate count of personnel at Project site.
3. Equipment at Project site.
4. Material deliveries.
5. Accidents.
6. Meetings and significant decisions.
7. Unusual events.
8. Stoppages, delays, shortages, and losses.
9. Orders and requests of authorities having jurisdiction.
10. Change Orders received and implemented.
11. Construction Change Directives received and implemented.
12. Equipment or system tests and startups.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Library, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have

completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.

a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect and Construction Manager.
3. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of subcontractor.
    g. Name of supplier.
    h. Name of manufacturer.
    i. Submittal number or other unique identifier, including revision identifier.

        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).

    j. Number and title of appropriate Specification Section.
    k. Drawing number and detail references, as appropriate.
    l. Location(s) where product is to be installed, as appropriate.
    m. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

   a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review or discard submittals received from sources other than Contractor.

   a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

      1) Project name.
      2) Date.
      3) Destination (To:).
      4) Source (From:).
      5) Name and address of Architect.
      6) Name of Construction Manager.
      7) Name of Contractor.
      8) Name of firm or entity that prepared submittal.
      9) Names of subcontractor, manufacturer, and supplier.
      10) Category and type of submittal.
      11) Submittal purpose and description.
      12) Specification Section number and title.
      13) Specification paragraph number or drawing designation and generic name for each of multiple items.
      14) Drawing number and detail references, as appropriate.
      15) Indication of full or partial submittal.
      16) Transmittal number, numbered consecutively.
      17) Submittal and transmittal distribution record.
      18) Remarks.
      19) Signature of transmitter.

E. Options: Identify options requiring selection by Architect.

F. Deviations: Identify deviations from the Contract Documents on submittals.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block and clearly indicate extent of revision.
   3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Submit electronic submittals via email as PDF electronic files.

    a. Engineer will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Action Submittals: Submit five paper copies of each submittal unless otherwise indicated. Engineer will return two copies.
3. Informational Submittals: Submit five paper copies of each submittal unless otherwise indicated. Engineer will not return copies.
4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.

g. Notation of coordination requirements.
h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

a. PDF electronic file.
b. Five paper copies of Product Data unless otherwise indicated. Architect will return two copies.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).
3. Submit Shop Drawings in the following format:
a. Five opaque (bond) copies of each submittal. Architect will return two copies.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.

c. Sample source.
d. Number and title of applicable Specification Section.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as County's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

   a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Submit three sets of Samples. Engineer will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

      1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

   1. Submit product schedule in the following format:

a. Three paper copies of product schedule or list unless otherwise indicated. Engineer will return two copies.

F. Coordination Drawings Submittals: Comply with requirements specified in Division 1 Section "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."

I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 1 Section "Closeout Procedures."

J. Maintenance Data: Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."

K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Architects and Bucks County Free Library, and other information specified.

L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

R. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

S. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

T. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

U. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

V. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.

B. Project Closeout and Maintenance Material Submittals: See requirements in Division 1 Section "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and –control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and –control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
3. Specific test and inspection requirements are not specified in this Section.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

C. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

K. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

L. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.5 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and re-inspecting.

M. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

N. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

O. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

P. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

Q. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

R. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

S. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

    1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

T. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

    1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
    2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

U. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

V. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

    1. Contractor responsibilities include the following:

        a. Provide test specimens representative of proposed products and construction.
        b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.

c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.

d. When testing is complete, remove test specimens, assemblies, do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

3. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.

4. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

W. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. agency to perform these quality-control services.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 72 hours in advance of time when Work that requires testing or inspecting will be performed.

3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

X. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

Y. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

Z. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

AA. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

BB. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

2. Date test or inspection was conducted.
3. Description of the Work tested or inspected.
4. Date test or inspection results were transmitted to Architect.
5. Identification of testing agency or special inspector conducting test or inspection.

CC. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

DD. Protect construction exposed by or for quality-control service activities.

EE. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 013300

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 USE CHARGES

A. General: Installation and removal of temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Bucks County Free Library's existing water system is available for use without metering and without payment of use charges.

C. Electric Power Service from Existing System: Electric power from Bucks County Free Library's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.4 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Coordinate the use of existing facilities with County. All existing systems required for temporary use shall be returned to preconstruction conditions.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

A. Field Office and Material Storage: Location shall be approved by Bucks County Free Library prior to commencement of work.

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Existing HVAC system shall be used.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.
2. Connect temporary service to Library's existing power source, as directed by Library.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
1. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Bucks County Free Library.

B. Waste Disposal Facilities: Contractor shall be responsible for removal of trash from site daily.

C. Waste Disposal Facilities: Coordinate waste removal with Library. Waste shall not be allowed to accumulate in any areas. Waste shall be removed from site daily.

D. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

C. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

D. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Library and from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
2. Construct dustproof partitions with two layers of 6-mil (0.14-mm) polyethylene sheet on each side. Cover floor with two layers of 6-mil (0.14-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.

3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.

E. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.

1. Prohibit smoking in construction areas.

2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Bucks County Free library reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period.

END OF SECTION 015000

SECTION 016000 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Section 013300 "Submittal Procedures."

b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

D. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

E. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

7. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
8. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

F. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

G. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 – PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

H. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

I. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

J. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2.1 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017000 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of County-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

B. Related Requirements:

1. Division 1 Section "Summary" for limits on use of Project site.

1.2 INFORMATIONAL SUBMITTALS

A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.3 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

B. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility and County that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Division 1 Section "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
   1. Do not scale Drawings to obtain required dimensions.
   2. Inform installers of lines and levels to which they must comply.
   3. Check the location, level and plumb, of every major element as the Work progresses.
   4. Notify Architect when deviations from required lines and levels exceed allowable tolerances.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
   3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce noise levels disruptive to occupants in adjacent spaces.

G. Templates: Obtain and distribute to the parties' involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

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

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering, and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
5. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and

appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather-tight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017000

SECTION 017419 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous construction waste.
2. Recycling nonhazardous construction waste.
3. Disposing of nonhazardous construction waste.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total non-hazardous solid waste generated by the Work. Facilitate recycling and salvage of materials.

1.4 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 30 days of date established for the Notice to Proceed.

1.5 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual in tons.
5. Quantity of waste recycled, both estimated and actual in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

G. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

H. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

I. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

J. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

K. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

L. Qualification Data: For waste management coordinator.

1.6 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements.

M. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

1.7 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

N. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

O. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

P. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

Q. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

R. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:

3. Clean salvaged items.
4. Pack or crate items after cleaning. Identify contents of containers.
5. Store items in a secure area until installation.
6. Protect items from damage during transport and storage.
7. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

3.3 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

S. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

T. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.

4. Store components off the ground and protect from the weather.

5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Wood Materials: Sort and stack members according to size, type, and length.

U. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

3. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
4. Polystyrene Packaging: Separate and bag materials.
5. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
6. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

V. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

3. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
4. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

W. Burning: Do not burn waste materials.

X. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Division 1 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
2. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Division 1 Section "Demonstration and Training" for requirements for instructing County's personnel.

1.2 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Bucks County Free Library unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 1 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit test/adjust/balance records.
4. Submit changeover information related to Library's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Bucks County Free Library of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Bucks County Free Library. Advise Library's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Bucks County Free Library's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 1 Section "Demonstration and Training."
6. Advise Bucks County Free Library of changeover in heat and other utilities.
7. Participate with Bucks County Free Library in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with

inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Bucks County Free Library's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.

B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Submit list of incomplete items in the following format:

a. Three paper copies unless otherwise indicated. Architect will return two copies.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Bucks County Free Library's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
p. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Division 1 Section "Temporary Facilities and Controls." Prepare written report.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017820 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
b. Enable inserted reviewer comments on draft submittals.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect’s comments. Submit copies of each corrected manual within 15 days of receipt of Architect’s comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name, and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

C. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017820

SECTION 017839 – PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

4. Number of Copies: Submit one set(s) of marked-up record prints.
5. Number of Copies: Submit copies of record Drawings as follows:

a. Final Submittal:

1) Submit one paper-copy set(s) of marked-up record prints.
2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data,

whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Record data as soon as possible after obtaining it.
c. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

D. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
2. Format: DWG operating system.
3. Format: Annotated PDF electronic file with comment function enabled.
4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
5. Refer instances of uncertainty to Architect for resolution.
6. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

E. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

a. Project name.

b. Date.

c. Designation "PROJECT RECORD DRAWINGS."

d. Name of Architect.

e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

5. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
6. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
7. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
8. Note related Change Orders, record Product Data, and record Drawings where applicable.

F. Format: Submit record Specifications as annotated PDF electronic file.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

G. Format: Submit record Product Data as annotated PDF electronic file.

PART 3 – EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

H. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 024119 – SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Selective Building Demolition:

1. Selective demolition of interior partitions, systems, and building components designated to be removed.
2. Selective demolition of exterior facade, structures, and components designated to be removed.
3. Removal of abandoned utilities and wiring systems.
4. Notification to Owner of schedule of shut-off of utilities which serve occupied spaces.
5. Pollution control during selective demolition, including noise control.
6. Removal and legal disposal of materials.
7. Protection of adjacent construction.
8. Interruption, capping or removal of utilities as applicable.

1.2 SUBMITTALS

A. Schedule: Submit for approval selective demolition schedule, including schedule and methods for capping utilities to be abandoned and maintaining existing utility service.

1.3 QUALITY ASSURANCE

A. Codes and Regulations: Comply with governing codes and regulations. Use experienced workers.

1.4 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to starting work of this section.

1.5 SEQUENCING

A. Immediate areas of work will not be occupied during selective demolition. The public, including children, may occupy adjacent areas.

B. No responsibility for buildings and structures to be demolished will be assumed by the Owner.

C. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

PART 2 - PRODUCTS - Not applicable to this Section.

PART 3 - EXECUTION

3.1 SELECTIVE DEMOLITION

A. Demolition Operations: Do not damage building elements and improvements indicated to

remain. Items of salvage value, not included on schedule of salvage items to be returned to Owner, shall be removed from structure. Storage or sale of items at project site is prohibited.

B. Utilities: Locate, identify, disconnect, and seal or cap off utilities in buildings to be demolished.

C. Shoring and Bracing: Provide and maintain interior and exterior shoring and bracing.

D. Occupied Spaces: Do not close or obstruct streets, walks, drives or other occupied or used spaces or facilities without the written permission of the Owner and the authorities having jurisdiction. Do not interrupt utilities serving occupied or used facilities without the written permission of the Owner and authorities having jurisdiction. If necessary, provide temporary utilities.

E. Security: Provide adequate protection against accidental trespassing. Secure project after work hours.

F. Restoration: Restore finishes of patched areas.

3.2 SCHEDULE

A. Items to be Salvaged for Delivery to Owner:
   1. [Light Bulbs/Tubes]

B. Utilities Requiring Interruption, Capping, or Removal:
   1. [Electric.]

END OF SECTION 024119

SECTION 260010 - SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Supplemental requirements applicable to Work specified in Division 26.

B. Related Requirements:

1. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
2. Section 260501 “Basic Electrical requirements” for additional scope and requirements.

1.2 REFERENCES

A. Abbreviations and Acronyms for Electrical Terms and Units of Measure (Note: not all abbreviations may be used and do not allow specific materials to be substituted in place of later specifications sections):

1. 8PSJ or 8P8C: Miniature 8-position series jack, also called an 8-position 8-contact modular jack for some applications.
2. A: Ampere, unit of electrical current.
3. AC or ac: Alternating current.
4. AFCI: Arc-fault circuit interrupter.
5. AIC: Ampere interrupting capacity.
6. AL, Al, or ALUM: Aluminum.
7. ASD: Adjustable-speed drive.
8. ATS: Automatic transfer switch.
9. AWG: American wire gauge; see ASTM B258.
10. BAS: Building automation system.
11. BIL: Basic impulse insulation level.
12. BIM: Building information modeling.
13. CAD: Computer-aided design or drafting.
14. CATV: Community antenna television.
15. CB: Circuit breaker.
16. CO/ALR: Copper-aluminum, revised.
17. COPS: Critical operations power system.
18. CU or Cu: Copper.
19. CU-AL or AL-CU: Copper-aluminum.
20. dB: Decibel, a unitless logarithmic ratio of two electrical, acoustical, or optical power values.
21. dB(A-weighted) or dB(A): Decibel acoustical sound pressure level with A-weighting applied in accordance with IEC 61672-1.

22. dB(adjusted) or dBa: Decibel weighted absolute noise power with respect to 3.16 pW (minus 85 dBm).
23. dBm: Decibel absolute power with respect to 1 mW.
24. DC or dc: Direct current.
25. DCOA: Designated critical operations area.
26. DDC: Direct digital control (HVAC).
27. EGC: Equipment grounding conductor.
28. EMF: Electromotive force.
29. EMI: Electromagnetic interference.
30. EPM: Electrical preventive maintenance.
31. EPS: Emergency power supply.
32. EPSS: Emergency power supply system.
33. ESS: Energy storage system.
34. EV: Electric vehicle.
35. EVPE: Electric vehicle power export equipment.
36. EVSE: Electric vehicle supply equipment.
37. fc: Footcandle, a unit of illuminance equal to one lumen per square foot.
38. FLC: Full-load current.
39. ft.: Foot.
40. GEC: Grounding electrode conductor.
41. GFCI: Ground-fault circuit interrupter.
42. GFPE: Ground-fault protection of equipment.
43. GND: Ground.
44. HACR: Heating, air conditioning, and refrigeration.
45. HDPE: High-density polyethylene.
46. HID: High-intensity discharge.
47. HP or hp: Horsepower.
48. HVAC: Heating, ventilating, and air conditioning.
49. Hz: Hertz.
50. IBT: Intersystem bonding termination.
51. inch: Inch. To avoid confusion, the abbreviation "in." is not used.
52. IP: Ingress protection rating (enclosures); Internet protocol (communications).
53. IR: Infrared.
54. IS: Intrinsically safe.
55. IT&R: Inspecting, testing, and repair.
56. ITE: Information technology equipment.
57. kAIC: Kiloampere interrupting capacity.
58. kcmil or MCM: One thousand circular mils.
59. kV: Kilovolt.
60. kVA: Kilovolt-ampere.
61. kVAr or kVAR: Kilovolt-ampere reactive.
62. kW: Kilowatt.
63. kWh: Kilowatt-hour.
64. LAN: Local area network.
65. lb: Pound (weight).
66. LCD: Liquid-crystal display.
67. LCDI: Leakage-current detector-interrupter.
68. LED: Light-emitting diode.
69. LNG: Liquefied natural gas.
70. LP-Gas: Liquefied petroleum gas.

71. LRC: Locked-rotor current.
72. MCC: Motor-control center.
73. MDC: Modular data center.
74. MG set: Motor-generator set.
75. MIDI: Musical instrument digital interface.
76. MLO: Main lugs only.
77. MVA: Megavolt-ampere.
78. mW: Milliwatt.
79. MW: Megawatt.
80. MWh: Megawatt-hour.
81. NC: Normally closed.
82. NiCd: Nickel cadmium.
83. NIU: Network interface unit.
84. NO: Normally open.
85. NPT: National (American) standard pipe taper.
86. OCPD: Overcurrent protective device.
87. ONT: Optical network terminal.
88. PC: Personal computer.
89. PCS: Power conversion system.
90. PCU: Power-conditioning unit.
91. PF or pf: Power factor.
92. PHEV: Plug-in hybrid electric vehicle.
93. PLC: Programmable logic controller.
94. PLFA: Power-limited fire alarm.
95. PoE: Power over Ethernet.
96. PV: Photovoltaic.
97. PVC: Polyvinyl chloride.
98. pW: Picowatt.
99. RFI: Radio-frequency interference (electrical); Request for interpretation (contract).
100. RMS or rms: Root-mean-square.
101. RPM or rpm: Revolutions per minute.
102. SCADA: Supervisory control and data acquisition.
103. SCR: Silicon-controlled rectifier.
104. SPD: Surge protective device.
105. sq.: Square.
106. SWD: Switching duty.
107. TCP/IP: Transmission control protocol/Internet protocol.
108. TEFC: Totally enclosed fan-cooled.
109. TR: Tamper resistant.
110. TVSS: Transient voltage surge suppressor.
111. UL: Underwriters Laboratories, Inc. (standards) or UL LLC (services).
112. UL CCN: UL Category Control Number.
113. UPS: Uninterruptible power supply.
114. USB: Universal serial bus.
115. UV: Ultraviolet.
116. V: Volt, unit of electromotive force.
117. V(ac): Volt, alternating current.
118. V(dc): Volt, direct current.
119. VA: Volt-ampere, unit of complex electrical power.
120. VAr: Volt-ampere reactive, unit of reactive electrical power.

121. VFC: Variable-frequency controller.
122. VOM: Volt-ohm-multimeter.
123. VPN: Virtual private network.
124. VRLA: Valve-regulated lead acid.
125. W: Watt, unit of real electrical power.
126. Wh: Watt-hour, unit of electrical energy usage.
127. WPT: Wireless power transfer.
128. WPTE: Wireless power transfer equipment.
129. WR: Weather resistant.

B. Abbreviations and Acronyms for Electrical Raceway Types:

1. EMT: Electrical metallic tubing.
2. EMT-A: Aluminum electrical metallic tubing.
3. EMT-S: Steel electrical metallic tubing.
4. EMT-SS: Stainless steel electrical metallic tubing.
5. ENT: Electrical nonmetallic tubing.
6. EPEC: Electrical HDPE underground conduit.
7. EPEC-40: Schedule 40 electrical HDPE underground conduit.
8. EPEC-80: Schedule 80 electrical HDPE underground conduit.
9. EPEC-A: Type A electrical HDPE underground conduit.
10. EPEC-B: Type B electrical HDPE underground conduit.
11. ERMC: Electrical rigid metal conduit.
12. ERMC-A: Aluminum electrical rigid metal conduit.
13. ERMC-S: Steel electrical rigid metal conduit.
14. ERMC-S-G: Galvanized-steel electrical rigid metal conduit.
15. ERMC-S-PVC: PVC-coated-steel electrical rigid metal conduit.
16. ERMC-SS: Stainless steel electrical rigid metal conduit.
17. FMC: Flexible metal conduit.
18. FMC-A: Aluminum flexible metal conduit.
19. FMC-S: Steel flexible metal conduit.
20. FMT: Steel flexible metallic tubing.
21. FNMC: Flexible nonmetallic conduit. See LFNC.
22. HDPE: See EPEC.
23. IMC: Steel electrical intermediate metal conduit.
24. LFMC: Liquidtight flexible metal conduit.
25. LFMC-A: Aluminum liquidtight flexible metal conduit.
26. LFMC-S: Steel liquidtight flexible metal conduit.
27. LFMC-SS: Stainless steel liquidtight flexible metal conduit.
28. LFNC: Liquidtight flexible nonmetallic conduit.
29. LFNC-A: Layered (Type A) liquidtight flexible nonmetallic conduit.
30. LFNC-B: Integral (Type B) liquidtight flexible nonmetallic conduit.
31. LFNC-C: Corrugated (Type C) liquidtight flexible nonmetallic conduit.
32. PVC: Rigid PVC conduit.
33. PVC-40: Schedule 40 rigid PVC conduit.
34. PVC-80: Schedule 80 rigid PVC Conduit.
35. PVC-A: Type A rigid PVC concrete-encased conduit.
36. PVC-EB: Type EB rigid PVC concrete-encased underground conduit.
37. RGS: See ERMC-S-G.
38. RMC: See ERMC.

39. RTRC: Reinforced thermosetting resin conduit.
40. RTRC-AG: Low-halogen, aboveground reinforced thermosetting resin conduit.
41. RTRC-AG-HW: Heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
42. RTRC-AG-SW: Standard wall, low-halogen, aboveground reinforced thermosetting resin conduit.
43. RTRC-AG-XW: Extra heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
44. RTRC-BG: Low-halogen, belowground reinforced thermosetting resin conduit.

C. Abbreviations and Acronyms for Electrical Cable Types:

1. AC: Armored cable.
2. CATV: Coaxial general-purpose cable.
3. CATVP: Coaxial plenum cable.
4. CATVR: Coaxial riser cable.
5. CI: Circuit integrity cable.
6. CL2: Class 2 cable.
7. CL2P: Class 2 plenum cable.
8. CL2R: Class 2 riser cable.
9. CL2X: Class 2 cable, limited use.
10. CL3: Class 3 cable.
11. CL3P: Class 3 plenum cable.
12. CL3R: Class 3 riser cable.
13. CL3X: Class 3 cable, limited use.
14. CM: Communications general-purpose cable.
15. CMG: Communications general-purpose cable.
16. CMP: Communications plenum cable.
17. CMR: Communications riser cable.
18. CMUC: Under-carpet communications wire and cable.
19. CMX: Communications cable, limited use.
20. DG: Distributed generation cable.
21. FC: Flat cable.
22. FCC: Flat conductor cable.
23. FPL: Power-limited fire-alarm cable.
24. FPLP: Power-limited fire-alarm plenum cable.
25. FPLR: Power-limited fire-alarm riser cable.
26. IGS: Integrated gas spacer cable.
27. ITC: Instrumentation tray cable.
28. ITC-ER: Instrumentation tray cable, exposed run.
29. MC: Metal-clad cable.
30. MC-HL: Metal-clad cable, hazardous location.
31. MI: Mineral-insulated, metal-sheathed cable.
32. MTW: Moisture-, heat-, and oil-resistant thermoplastic cable (machine tool wiring).
33. MV: Medium-voltage cable.
34. NM: Nonmetallic sheathed cable.
35. NMC: Nonmetallic sheathed cable with corrosion-resistant nonmetallic jacket.
36. NMS: Nonmetallic sheathed cable with signaling, data, and communications conductors, plus power or control conductors.
37. NPLF: Non-power-limited fire-alarm circuit cable.

38. NPLFP: Non-power-limited fire-alarm circuit cable for environmental air spaces.
39. NPLFR: Non-power-limited fire-alarm circuit riser cable.
40. NUCC: Nonmetallic underground conduit with conductors.
41. OFC: Conductive optical fiber general-purpose cable.
42. OFCG: Conductive optical fiber general-purpose cable.
43. OFCP: Conductive optical fiber plenum cable.
44. OFCR: Conductive optical fiber riser cable.
45. OFN: Nonconductive optical fiber general-purpose cable.
46. OFNG: Nonconductive optical fiber general-purpose cable.
47. OFNP: Nonconductive optical fiber plenum cable.
48. OFNR: Nonconductive optical fiber riser cable.
49. P: Marine shipboard cable.
50. PLTC: Power-limited tray cable.
51. PLTC-ER: Power-limited tray cable, exposed run.
52. PV: Photovoltaic cable.
53. RHH: Thermoset rubber, heat-resistant cable (high heat).
54. RHW: Thermoset rubber, moisture-resistant cable.
55. SA: Silicone rubber cable.
56. SE: Service-entrance cable.
57. SER: Service-entrance cable, round.
58. SEU: Service-entrance cable, flat.
59. SIS: Thermoset cable for switchboard and switchgear wiring.
60. TBS: Thermoplastic cable with outer braid.
61. TC: Tray cable.
62. TC-ER: Tray cable, exposed run.
63. TC-ER-HL: Tray cable, exposed run, hazardous location.
64. THW: Thermoplastic, heat- and moisture-resistant cable.
65. THHN: Thermoplastic, heat-resistant cable with nylon jacket outer sheath.
66. THHW: Thermoplastic, heat- and moisture-resistant cable.
67. THWN: Thermoplastic, moisture- and heat-resistant cable with nylon jacket outer sheath.
68. TW: Thermoplastic, moisture-resistant cable.
69. UF: Underground feeder and branch-circuit cable.
70. USE: Underground service-entrance cable.
71. XHH: Cross-linked polyethylene, heat-resistant cable.
72. XHHW: Cross-linked polyethylene, heat- and moisture-resistant cable.

D. Definitions:

1. Basic Impulse Insulation Level: Reference insulation level expressed in impulse crest voltage with a standard wave not longer than 1.5 times 50 microseconds and 1.5 times 40 microseconds.
2. Communications Jack: A fixed connecting device designed for insertion of a communications cable plug.
3. Communications Outlet: One or more communications jacks, or cables and plugs, mounted in a box or ring, with a suitable protective cover.
4. Designated Seismic System: A system component that requires design in accordance with ASCE/SEI 7, Ch. 13 and for which the Component Importance Factor is greater than 1.0.
5. Direct Buried: Installed underground without encasement in concrete or other protective material.

6. Enclosure: The case or housing of an apparatus, or the fence or wall(s) surrounding an installation, to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. Types of enclosures and enclosure covers include the following:

    a. Cabinet: An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.
    b. Concrete Box: A box intended for use in poured concrete.
    c. Conduit Body: A means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
    d. Conduit Box: A box having threaded openings or knockouts for conduit, EMT, or fittings.
    e. Cutout Box: An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure.
    f. Device Box: A box with provisions for mounting a wiring device directly to the box.
    g. Extension Ring: A ring intended to extend the sides of an outlet box or device box to increase the box depth, volume, or both.
    h. Floor Box: A box mounted in the floor intended for use with a floor box cover and other components to complete the floor box enclosure.
    i. Floor-Mounted Enclosure: A floor box and floor box cover assembly with means to mount in the floor that is sealed against the entrance of scrub water at the floor level.
    j. Floor Nozzle: An enclosure used on a wiring system, intended primarily as a housing for a receptacle, provided with a means, such as a collar, for surface-mounting on a floor, which may or may not include a stem to support it above the floor level, and is sealed against the entrance of scrub water at the floor level.
    k. Junction Box: A box with a blank cover that joins different runs of raceway or cable and provides space for connection and branching of the enclosed conductors.
    l. Outlet Box: A box that provides access to a wiring system having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for the entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting an outlet box cover, but without provisions for mounting a wiring device directly to the box.
    m. Pedestal Floor Box Cover: A floor box cover that, when installed as intended, provides a means for typically vertical or near-vertical mounting of receptacle outlets above the floor's finished surface.
    n. Pull Box: A box with a blank cover that joins different runs of raceway and provides access for pulling or replacing the enclosed cables or conductors.
    o. Raised-Floor Box: A floor box intended for use in raised floors.
    p. Recessed Access Floor Box: A floor box with provisions for mounting wiring devices below the floor surface.
    q. Recessed Access Floor Box Cover: A floor box cover with provisions for passage of cords to recessed wiring devices mounted within a recessed floor box.
    r. Ring: A sleeve, which is not necessarily round, used for positioning a recessed wiring device flush with the plaster, concrete, drywall, or other wall surface.
    s. Ring Cover: A box cover, with raised center portion to accommodate a specific wall or ceiling thickness, for mounting wiring devices or luminaires flush with the surface.

t. Termination Box: An enclosure designed for installation of termination base assemblies consisting of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors, or both.

7. Emergency Systems: Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction that are designed to ensure continuity of lighting, electrical power, or both, to designated areas and equipment in the event of failure of the normal supply for safety to human life.
8. Essential Electrical Systems: Those systems designed to ensure continuity of electrical power to designated areas and functions of a healthcare facility during disruption of normal power sources, and also to minimize disruption within the internal wiring system. (healthcare facilities)
9. High-Performance Building: A building that integrates and optimizes on a life-cycle basis all major high-performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.
10. Jacket: A continuous nonmetallic outer covering for conductors or cables.
11. Luminaire: A complete lighting unit consisting of a light source such as a lamp, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light.
12. Miniature 8-Position Series Jack (8PSJ): Also called an 8-position 8-contact (8P8C) modular jack. An unkeyed jack with up to eight contacts commonly used to terminate twisted-pair and multiconductor Ethernet cable. Shape and dimensions are specified by TIA-1096.

    a. Caution: An 8PSJ is not the same thing as an FCC "registered jack" RJ45S, now called a miniature 8-position keyed jack (8PKJ). Ethernet cable plugs do not have rejection keys. Many manufacturers and suppliers incorrectly use "RJ45" as a generic term to describe any 8-position series plug or jack whether it has a rejection key or not.

13. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the Energy Independence and Security Act (EISA) of 2007.
14. Multi-Outlet Assembly: A type of surface, flush, or freestanding raceway designed to hold conductors, receptacles, and switches, assembled in the field or at the factory.
15. Plenum: A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.
16. Receptacle: A fixed connecting device arranged for insertion of a power cord plug. Also called a power jack.
17. Receptacle Outlet: One or more receptacles mounted in a box with a suitable protective cover.
18. Sheath: A continuous metallic covering for conductors or cables.
19. UL Category Control Number: An alphabetic or alphanumeric code used to identify product categories covered by UL's Listing, Classification, and Recognition Services.
20. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:

    a. Control Voltage: Listed and labeled for use in remote-control, signaling, and power-limited circuits supplied by Class 2 or Class 3 power supplies having rated output not greater than 150 V and 5 A, allowing use of alternate wiring methods complying with NFPA 70, Article 725.

b. Low Voltage: Listed and labeled for use in circuits supplied by Class 1 or other power supplies having rated output not greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Part I.
c. Medium Voltage: Listed and labeled for use in circuits supplied by a power supply having rated output greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Parts I and II.

1.3 COORDINATION

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions:

1. Notify Owner no fewer than seven days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Owner's written permission.
3. Coordinate interruption with systems impacted by outage including, but not limited to, the following:

a. Exercising generators.
b. Emergency lighting.
c. Elevators.
d. Fire-alarm systems.

B. Arrange to provide temporary electrical power in accordance with requirements specified in Division 01.

1.4 PREINSTALLATION MEETINGS

A. Electrical Preconstruction Conference: Schedule conference with Architect and Owner, not later than 10 days after notice to proceed. Agenda topics include, but are not limited to, the following:

1. Electrical installation schedule.
2. Status of power system studies.
3. Value analysis proposals and requests for substitution of electrical equipment.
4. Utility work coordination and class of service requests.
5. Commissioning activities.

1.5 SEQUENCING

A. Conduct and submit results of power system studies before submitting Product Data and Shop Drawings for electrical equipment.

1.6 ACTION SUBMITTALS

A. Coordination Drawings for Structural Supports: Show coordination of structural supports for equipment and devices, including restraints and bracing for control of seismic and wind loads, with other systems, equipment, and structural supports in the vicinity.

B. Coordination Drawings for Ceiling Areas: Where indicated on drawings, provide reflected ceiling plan(s), supplemented by sections and other details, drawn to scale, in accordance with Section 013100 "Project Management and Coordination," on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which equipment and suspension systems will be attached.
3. Size and location of access panels on ceilings.
4. Elevation, size, and route of sprinkler piping.
5. Elevation, size, and route of plumbing piping.
6. Elevation, size, and route of ductwork.
7. Elevation, size, and route of cable tray.
8. Elevation, size, and route of conduit.
9. Elevation and size of wall-mounted and ceiling-mounted equipment.
10. Access panels.
11. Sprinklers.
12. Air inlets and outlets.
13. Control modules.
14. Luminaires.
15. Communications devices.
16. Speakers.
17. Security devices.
18. Fire-alarm devices.
19. Indicate clear dimensions for maintenance access in front of equipment.
20. Indicate dimensions of fully-open access doors.

C. Coordination Drawings for Cable Tray Routing: Reflected ceiling plan(s), supplemented by sections and other details, drawn to scale, in accordance with Section 013100 "Project Management and Coordination," on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Elevation, size, and route of cable trays.
2. Relationships between components and adjacent structural, electrical, and mechanical elements.
3. Vertical and horizontal offsets and transitions.
4. Elevation and size of sleeves for wall, ceiling, and floor cable penetrations.
5. Elevation of ceilings and size of ceiling tiles.
6. Locations of access panels on ceilings.
7. Locations where cable tray crosses or parallels sprinkler piping.
8. Locations where cable tray crosses plumbing piping.
9. Locations where cable tray crosses or parallels ductwork.
10. Locations of access panels on ductwork.
11. Locations where cable tray crosses conduit.
12. Items blocking access around cable trays, including the following:

    a. Light fixtures.
    b. Speakers.
    c. Fire-alarm devices.
    d. Power outlets.
    e. Wall-mounted equipment.

f. Equipment racks.
g. Furniture.
h. Door swings.
i. Building features.

13. Indicate clear dimension between cable tray and walls or obstructions that are closer than 10 ft. (3 m).
14. Highlight locations where cable tray is greater than 3 ft. (1 m) above ceilings. Explain how personnel access will be accommodated for cable tray maintenance.

D. Coordination Drawings for Conduit Routing: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

E. Coordination Drawings for Bus Assembly Routing: Floor plans and sections, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Scaled bus-assembly layouts and relationships between components and adjacent structural, mechanical, and electrical elements.
2. Vertical and horizontal enclosed bus-assembly runs, offsets, and transitions.
3. Clearances for access above and to the side of enclosed bus assemblies.
4. Vertical elevation of enclosed bus assemblies above the floor or bottom of structure.
5. Support locations, type of support, and weight on each support.
6. Location of adjacent construction elements including luminaires, HVAC and plumbing equipment, fire sprinklers and piping, signal and control devices, and other equipment.

F. Coordination Drawings for Large Equipment Indoor Installations:

1. Location plan, drawn to scale, showing heavy equipment or truck access paths to loading dock or other freight access into building. Indicate available width and height of doors or openings.
2. Floor plan for entry floor and floor where equipment is located, drawn to scale, showing heavy equipment access paths for maintenance and replacement, with the following items shown and coordinated with each other, based on input from installers of the items involved:

a. Dimensioned concrete bases, outlines of equipment, conduit entries, and grounding equipment locations.
b. If freight elevator must be used, indicate width and height of door and depth of car. Indicate if large equipment must be tipped to use elevator.
c. Dimensioned working clearances and dedicated areas below and around electrical equipment where obstructions and tripping hazards are prohibited.

3. Reflected ceiling plans for entry floor and floor where equipment is located, drawn to scale, on which the following items shown and coordinated with each other, based on input from installers of the items involved:

    a. Support locations, type of support, and weight on each support. Locate structural supports for structure-supported raceways.
    b. Location of lighting fixtures, sprinkler piping and sprinklers, ducts and diffusers, and other obstructions, indicating available overhead clearance.
    c. Dimensioned working clearances and dedicated areas above and around electrical equipment where foreign systems and equipment are prohibited.

G. Coordination Drawings for Large Equipment Outdoor Installations:

1. Utilities site plan, drawn to scale, showing heavy equipment or truck access paths for maintenance and replacement, with the following items shown and coordinated with each other, based on input from installers of the items involved:

    a. Fences and walls, dimensioned concrete bases, outlines of equipment, conduit entries, and grounding and bonding locations.
    b. Indicate clear dimensions for fence gates and wall openings.
    c. Indicate depth and type of ground cover, and locations of trees, shrubbery, and other obstructions in access path.
    d. Indicate clear height below tree branches, overhead lines, bridges, and other overhead obstructions in access path, or where cranes and hoists will be needed to handle large electrical equipment.
    e. Support locations, type of support, and weight on each support. Locate structural supports for structure-supported raceways.
    f. Dimensioned working clearances and dedicated areas around electrical equipment.

H. Coordination Drawings for Duct Banks: Signed and sealed by qualified professional engineer.

1. Show duct profiles and coordination with other utilities and underground structures.
2. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.

1.7 INFORMATIONAL SUBMITTALS

A. Electrical Installation Schedule: At preconstruction meeting, and periodically thereafter as dates change, provide schedule for electrical installation Work to Owner and Architect including, but not limited to, milestone dates for the following activities:

1. Submission of power system studies.
2. Submission of specified coordination drawings.
3. Submission of action submittals specified in Division 26.
4. Orders placed for major electrical equipment.
5. Arrival of major electrical equipment on-site.
6. Preinstallation meetings specified in Division 26.
7. Utility service outages.
8. Utility service inspection and activation.

9. Mockup reviews.
10. Closing of walls and ceilings containing electrical Work.
11. System startup, testing, and commissioning activities for major electrical equipment.
12. System startup, testing, and commissioning activities for emergency lighting.
13. System startup, testing, and commissioning activities for automation systems (SCADA, BMS, lighting, HVAC, fire alarm, fire pump, etc.).
14. Pouring of concrete housekeeping pads for electrical equipment and testing of concrete samples.
15. Requests for special inspections.
16. Requests for inspections by authorities having jurisdiction.

B. Delegated Design Drawings for Structural Masonry Wall Penetrations: Where indicated on Drawings, provide reflected ceiling plan(s), supplemented by elevations, sections, and other details, drawn to scale, signed and sealed by a qualified structural professional engineer, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Location and dimensions of structural members supporting wall.
2. Location and dimensions of columns near penetrations.
3. Location and dimension of headers and lintels.
4. Doors and windows near penetrations.
5. Location and dimensions of penetrating cuts.
6. Sprinkler piping and sleeves.
7. Plumbing piping and sleeves.
8. Ductwork and sleeves.
9. Cable tray and sleeves.
10. Conduit and sleeves.
11. Firestopping assemblies for rated penetrations.
12. Structural supports for piping, ductwork, and conduit on both sides of wall.

C. Certificates:

1. Welding certificates.

2. Wind-Load Performance Certificates: Provide special certification for systems and components designated on Drawings or in the Specifications to be subject to high wind exposure and impact damage.

    a. The following systems and components require written special certification of resistance to the effects of high wind-load and impact damage by manufacturer:

    b. Include the following information:

        1) Provide equipment manufacturer's written certification for each designated system and component, stating that it will remain in place and operable following the design wind event and comply with requirements of authorities having jurisdiction.
        2) Certification must be based on ICC-ES or similar nationally recognized testing standard procedures acceptable to authorities having jurisdiction.

D. Qualification Statements:

1. For qualified regional manufacturer.
2. For structural professional engineer.
3. For electrical professional engineer.
4. For lighting professional engineer.
5. For EPM specialist.
6. For welder.
7. For ERMC-S-PVC raceway Installer.
8. For medium-voltage cable Installer.
9. For medium-voltage duct Installer.
10. For medium-voltage equipment Installer.
11. For electrical power monitoring Installer.
12. For switchboard Installer.
13. For EVSE Installer.
14. For generator set Installer.
15. For lightning protection system Installer.
16. For theatrical lighting Installer.
17. For exterior athletic lighting Installer.
18. For power quality specialist.
19. For low-voltage electrical testing agency and on-site electrical testing supervisor.
20. For control-voltage electrical testing agency and on-site control-voltage testing supervisor.
21. For structural testing and inspecting agency.
22. For outdoor pole testing and inspecting agency.
23. For luminaire photometric testing laboratory.
24. For lighting testing and inspecting agency.

1.8 CLOSEOUT SUBMITTALS

A. Facility EPM Program Binders:

1. Complete Set: On approved online or cloud solution.
2. Volumes 2 and 8: Reproducible hardcopy on archival quality, 28 lb, acid-free, bond paper.

B. Operation and Maintenance Data:

1. Refer to Section 260501 “Basic Electrical Requirements”.

C. Software and Firmware Operational Documentation: Provide software and firmware operational documentation in Facility EPM Program Binders, including the following:

1. Software operating and upgrade manuals.
2. Names, versions, and website addresses for locations of installed software.
3. Device address list.
4. Printout of software application and graphic screens.
5. Testing and adjusting of panic and emergency power features.
6. For lighting controls include the following:

a. Adjustments of scene preset controls, adjustable fade rates, and fade overrides.

b. Operation of adjustable zone controls.

D. Software:

1. Program Software Backup: Provide username and password for approved online or cloud solution.
2. Provide to Owner upgrades and unrestricted licenses for installed and backup software, including operating systems and programming tools required for operation and maintenance.

1.9 QUALIFICATIONS

A. Qualified Regional Manufacturer: Manufacturer, possessing qualifications specified in Section 014000 "Quality Requirements," that maintains a service center capable of providing training, parts, and emergency on-site repairs to Project site with response time less than eight hours.

B. Structural Professional Engineer: Professional engineer possessing active qualifications specified in Section 014000 "Quality Requirements," with expertise in structural engineering, including seismic- and wind-load modeling and analysis.

C. Electrical Professional Engineer: Professional engineer possessing active qualifications specified in Section 014000 "Quality Requirements," with expertise in electrical engineering, including electrical power system modeling and analysis of electrical safety in accordance with NFPA 70E.

D. Lighting Professional Engineer: Professional engineer possessing active qualifications in accordance with Section 014000 "Quality Requirements" and the following:

1. Expertise in electrical engineering, lighting design, and structural requirements for exterior poles and standards.
2. Lighting Certified (LC) Professional by the National Council on Qualifications for the Lighting Professions (NCQLP).

E. EPM Specialist: Recognized experts possessing the following qualifications in accordance with Section 014000 "Quality Requirements" and NFPA 70B:

1. Technical Competence: Person should, by education, training, and experience, be well-rounded in all aspects of electrical maintenance.
2. Administrative and Supervisory Skills: Person should be skilled in planning and development of long-range objectives to achieve specific results and should be able to command respect and solicit cooperation of persons involved in EPM Program development.

F. Welder: Installer possessing active qualifications specified in Section 014000 "Quality Requirements," with training and certification in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M.

G. ERMC-S-PVC Installers: Installer possessing active qualifications specified in Section 014000 "Quality Requirements," and able to present unexpired certified Installer credentials issued by ERMC-S-PVC manufacturer prior to starting installation.

H. Electrical Power Monitoring Installers: Installer possessing active qualifications specified in Section 014000 "Quality Requirements," and able to present unexpired certified Installer credentials issued by manufacturer prior to starting installation.

I. EVSE Installers: Installer possessing active qualifications specified in Section 014000 "Quality Requirements," and able to present unexpired certified Installer credentials issued by EVSE manufacturer prior to starting installation.

J. Generator Set Installers: Installer possessing active qualifications specified in Section 014000 "Quality Requirements," and able to present unexpired certified Installer credentials issued by generator set manufacturer prior to starting installation.

K. Theatrical Lighting Installers: Installer possessing active qualifications specified in Section 014000 "Quality Requirements," and able to present unexpired certified Installer credentials issued by theatrical lighting manufacturers prior to starting installation.

L. Exterior Athletic Lighting Installers: Installer possessing active qualifications specified in Section 014000 "Quality Requirements," and able to present unexpired certified Installer credentials issued by exterior athletic lighting manufacturer prior to starting installation.

M. Power Quality Specialist: Recognized experts possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction, and able to present unexpired NICET Level 4 credentials with documented experience in power quality testing for installations similar in complexity to this Project.

N. Low-Voltage Electrical Testing and Inspecting Agency: Entities possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site electrical testing supervisors must have documented certification and experience with testing electrical equipment in accordance with NETA testing standards.

O. Control-Voltage Electrical Testing Agency: Entity possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site control-voltage testing supervisor must have BICSI Registered Communications Distribution Designer certification and documented training and experience with testing control-voltage equipment in accordance with NETA testing standards.

P. Structural Testing and Inspecting Agency: Entity possessing active qualifications specified in Section 014000 "Quality Requirements" with documented training and experience with testing structural concrete, seismic controls, and wind-load controls.

Q. Outdoor Pole Testing and Inspecting Agency: Entity possessing active qualifications specified in Section 014000 "Quality Requirements" with documented training and experience in accordance with ASTM C1093 for foundation testing and inspections.

R. Luminaire Photometric Testing Laboratory: Entity possessing active qualifications specified in Section 014000 "Quality Requirements" accredited under the NVLAP for Energy Efficient Lighting Products, and complying with applicable IES testing standards.

S. Lighting Testing and Inspecting Agency: Entity possessing active qualifications specified in Section 014000 "Quality Requirements" with documented training and experience with testing and inspecting lighting installations in accordance with IES LM-5.

1.10 MOCKUPS

A. Simple Mockups for Coordinating Accessibility of Electrical Devices around Fixed Furnishings and Equipment:

1. Build simple mockups using art supplies and other inexpensive materials for verification of general arrangement, actual dimensions, and accessibility by Architect and Owner prior to fabrication and installation of Work. Depict products from all Divisions requiring coordination including, but not limited to, fixed furnishings, casework, outlet covers and plates, HVAC controls, exposed raceway, exposed plumbing, equipment, and signage.

B. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.

1.11 FIELD CONDITIONS

A. Modeling, analysis, product selection, installation, and quality control for Work specified in Division 26 must comply with requirements specified in Section 260011 "Facility Performance Requirements for Electrical."

B. Service Conditions for Electrical Power Equipment: Besides conditions specified in Section 260011 "Facility Performance Requirements for Electrical," specified electrical power equipment must be suitable for operation under service conditions specified as usual service conditions in applicable NEMA PB series, IEEE C37 series, and IEEE C57 series standards, except for the following:

1. Electrical Rooms:

a. Exposure to significant solar radiation.
b. Exposure to fumes, vapors, or dust.
c. Exposure to explosive environments.
d. Ambient temperature not exceeding 104 deg F.
e. Exposure to hot and humid climate or to excessive moisture, including steam, salt spray, and dripping water.
f. Unusual transportation or storage conditions.
g. Unusual grounding resistance conditions.
h. Unusual space limitations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 260010

SECTION 260011 - FACILITY PERFORMANCE REQUIREMENTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Field conditions and other facility performance requirements applicable to Work specified in Division 26.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260501 “Basic Electrical requirements” for additional scope and requirements.

1.2 FIELD CONDITIONS

A. Altitude:

1. Sea level to **500 ft.**

B. Ambient Temperature:

1. Outdoor Conditions

a. Summer – 92 deg F
b. Winter – 0 deg F

2. Space Conditions

a. Summer

1) Employee Services – 75 deg F

b. Winter

1) Employee Services – 70 deg F

C. Temperature Variation: Allow for thermal movements from the following differential temperatures:

1. Ambient Temperature Differential: 120 deg F.
2. Material Surface Temperature Differential: 180 deg F.

3. Ground Surface Temperature Differential to 10 ft. Depth:.

D. Ground Water:

1. Assume ground-water level is at grade level unless a lower water table is noted on Drawings.
2. Assume ground-water level is 36 inch below ground surface unless a higher water table is indicated on Drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 260011

SECTION 260501 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Field conditions and other facility performance requirements applicable to Work specified in Division 26.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 GENERAL REQUIREMENTS

A. Applicable requirements of the Contract Documents, preceding the Technical Specifications, apply to this Section. In the event of conflict between the Specifications, the most stringent shall apply.

B. Separation of these Specifications into Divisions and Sections is for convenience only and is not intended to establish limits of work.

C. Consult index to be certain that set of Documents and Specifications is complete. Report omissions or discrepancies to the Owner's Representative.

D. The Contractor shall employ high standards of good workmanship and shall pay special attention to the safety of personnel and equipment. The installation of material and equipment shall be in conformance with the latest edition of all codes and standards, as adopted by the local authority having jurisdiction, including those listed in Paragraph: STANDARDS. The agency having the most stringent requirements shall be adhered to.

E. The Contractor shall make a thorough examination of the site and shall make due allowances for difficulties and contingencies to be encountered. All dimensions shall be checked and verified by the Contractor at the site.

F. The Contractor and all Sub-Contractors shall have a minimum of three years proven experience on projects with similar levels of complexity and magnitude. Experience shall be based on the experience as a company and not on the experience as individuals.

G. The Drawings and Specifications are intended to function as a common set of documents. Anything shown on the Drawings but not mentioned in the Specifications or mentioned in the

Specifications and not shown on the Drawings, shall be equally binding as if both noted on the Drawings and called for in the Specifications.

1.3 OWNER'S REPRESENTATIVE

A. The Owner's Representative is the person appointed by the Owner. The Owner's Representative will advise and consult with the Owner during construction and until final payment is due. The Owner's instructions to the Contractor shall be forwarded through the Owner's Representative.

1.4 SCOPE

A. The work covered by and included in these Specifications consists of the furnishing of all materials, all equipment, labor, tools and supervision and performing all operations necessary for the proper and complete execution of the Electrical work in strict accordance with the Specifications and the Drawings and subject to the terms and conditions of the Contract.

B. Unless noted otherwise, this Contractor shall furnish and install all control devices together with control wiring, conduit and all appurtenances and accessories necessary to perform the operating functions as specified. Control devices shall include, but not be limited to, thermostats, switching relays, control relays and transformers. Wiring materials and installation shall conform to the National Electric Code. All control system wiring shall be 14 AWG minimum installed in 1/2 inch diameter minimum conduit.

C. It is the intent of these Drawings and Specifications to provide complete and fully functional systems unless otherwise indicated. The Contractor shall provide all incidental components (locknuts, screws, washers, etc.) required to accomplish this intent. This shall include furnishing devices which are obviously required by the design intent such as the second three-way switch where one such switch is shown, fuses for fused disconnect switches, etc.

1. Contractor shall review the drawings and is required to prepare request for information (RFI) questions for any discrepancies or if portions of systems as shown and it is unclear what is to be provided prior to submitting bid. If a system is shown and no RFI is presented, Contractor will provide a full system and components to ensure that the entire system is functioning properly.

1.5 DEFINITIONS

A. The term "Contractor" or "Electrical Contractor" when used in this Specification refers to the Contractor responsible for all work under this Section.

B. The term "Provide" refers to this Contractor purchasing, delivering and installing as a part of this Contract.

1.6 STANDARDS

A. NFPA 70 National Electrical Code (NEC).

B. NFPA 72 National Fire Alarm Code.

C. NFPA 101 Code for Safety to Life from Fire in Buildings and Structures.

D. Pennsylvania Act 45, Uniform Construction Code (UCC).

E. Underwriters Laboratories Electrical Construction Materials Directory.

F. International Building Code (IBC).

G. Public Law 101-336, The Americans with Disabilities Act of 1990.

H. ASTM B-8 Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, or Soft.

I. ASTM B-496 Specification for Compact Round Concentric-Lay-Stranded Copper Conductors.

J. ICEA S-95-658/NEMA WC70 Non-Shielded 0-2 KV Cables.

K. NETA ATS acceptance testing specifications for electrical power distribution equipment and systems.

1.7 NOTIFICATION

A. Trades that have work connected with the Electrical work and trades that do preparatory work for electrical equipment shall be notified for installation requirements and scheduling.

B. The Owner's Representative shall be informed of the installation schedule to allow sufficient time for inspection without any work delay.

C. All work shall be coordinated to avoid cutting of work in place and interfering with other operations.

D. In compliance with Act 38, contact individual companies to have utility locations marked in the field and to otherwise locate underground objects as may be necessary prior to the start of construction.

1. Pennsylvania law requires three working days notice for the construction phase and ten working days in design stage. Call Pennsylvania One Call System, Inc. (1-800-242-1776, as of this writing).

1.8 CONTRACT DRAWINGS

A. The Contract Drawings are diagrammatic and indicate relation of conduits, connections and equipment. Vendor catalog numbers do not necessarily indicate trim and fitting requirements. Drawings do not indicate all boxes and fittings that may be required. Therefore, the Contractor shall carefully investigate structural and finish conditions affecting work. The Contractor shall

furnish all boxes, fittings, hangers and accessories as may be required to meet these conditions at no additional cost to the Owner.

B. Do not scale the Drawings. The Contractor shall check conditions at the site for dimensions and sizes pertaining to the structure.

C. Do not deviate from the Drawings without prior written approval.

1.9 LINES, GRADE AND SURVERYS

A. All necessary surveys, lines, grades and measurements are the responsibility of the Contractor desiring the information for the proper installation of his work. The Contractor is responsible for the proper installation of the work with respect to other Contractors.

B. Grades, elevations and locations shown on the Drawings are approximate and the Contractor shall check all such information on the site before proceeding with the work

1.10 WORKMANSHIP

A. All equipment, conduit, fixtures, etc. shall be installed in a workmanlike manner meeting the accepted standards of the representative industry.

B. All work to be performed shall be done by qualified mechanics. All mechanics in the employ of this Contractor on this project shall be skilled in the phases of the work to which they are used. The mechanic’s affiliation with labor organizations shall be acceptable to all trades employed on the project.

1.11 CUTTING AND PATCHING

A. In new construction, the Contractor shall give the General Contractor complete information as to size of openings required in floors and walls, etc., so that such openings may be provided as the project progresses. In existing construction, the Contractor shall do his own cutting and patching required for the installation of his work.

B. If openings are omitted or are incorrect through failure of the Contractor to follow these instructions, the Contractor shall, at his own expense, engage the trade, which originally installed the work, to cut and patch to the satisfaction of the Owner's Representative

C. All cutting and patching of every nature required in connection with this Contract shall be done by the Contractor with mechanics experienced in their respective lines of work. All patching shall match adjacent finishes.

D. All cutting in building shall be done with great care so as not to leave an unsightly surface, which may not be concealed by plates, escutcheons, or other normal concealing construction. If such unsightly conditions occur the Contractor shall be required at his own expense, to engage the General Contractor to replace the damaged materials with new materials.

E. Any penetrations of a roof shall be done in accordance with the roof manufacturer's recommended details for that type of roof and per industry recognized good practices. The penetration methods shall not invalidate any existing warranties.

1.12 CONCRETE AND MASONARY WORK.

A. Unless otherwise noted, all concrete bases, reinforcing, etc. and masonry work required to install the respective Contract Work shall be furnished and installed by the respective Contractor.

B. Provide a 3-1/2 inch high housekeeping pad for all substations, switchboards, motor control centers, transformers, power converters, and other floor mounted equipment. Pads shall extend one inch in all directions beyond the edge of the equipment.

C. The Contractor shall furnish all materials, labor, equipment and tools necessary to complete concrete and cement work.

D. All concrete work shall comply with the requirements of the ACI Building Code (ACI 318), the ACI Detailing Manual (ACI 315) and the Specifications for Structural Concrete for Buildings (ACI 301).

E. All reinforcing steel shall be manufactured from high strength billet steel conforming to ASTM Designation A-615 Grade 60. Welded-wire fabric shall comply with ASTM A-185

1.13 MATERIALS

A. All materials and equipment provided by this Contractor shall be new, without imperfections and blemishes and shall be protected from the elements prior to installation in building.

B. All equipment shall meet the requirements of NFPA 70 and, in addition, shall be tested, listed and labeled by an approved authority (UL) and shall be installed in accordance with its listing. The Owner's Representative shall have full authority to reject any equipment, material or installation of same, showing defects of manufacture or workmanship.

C. All equipment subject to specific requirements of the Owner's insurance company (fire alarm system, security system, etc.) shall meet the insurance company's requirements.

1.14 METHOD

A. The Electrical Contractor shall confer with all other Contractors and shall apply for detailed and specific information regarding the location of all equipment as the final location may differ from that indicated on the Drawings. Outlets, equipment or wiring improperly placed because of the Electrical Contractor's failure to obtain this information shall be relocated and reinstalled by the Electrical Contractor without additional expense to the Owner

B. Each Contractor, upon request of the Owner's Representative, shall expedite the work of a specific area, section or part of the project to permit the installation of another part of the work.

C. All conduits, wire, cable, wiring devices and equipment shall be installed in such a manner as to preserve access with sufficient space provided for proper operation and maintenance to any existing equipment or to any new equipment installed under this Specification or under other Specifications or Contracts for this building.

D. This Contractor shall coordinate his work with that of other trades so that all work may be installed in the most direct manner and so that interference between piping, ducts, equipment, architectural or structural features will be avoided. If an interference results, the Owner's Representative shall decide which work is to be relocated, regardless of which was first installed. Such relocation shall be at no additional cost to the Owner.

E. All materials and equipment installed by the Contractor shall be firmly supported and secured to the building construction where required.

F. All items of labor, material and equipment not specified in detail or shown on the Drawings but incidental to, or necessary for, the complete and proper installation and proper operation of the work described herein or reasonably implied in connection therewith, shall be furnished as if called for in detail by the Specifications or Drawings.

G. All equipment shall be installed in accordance with the manufacturer's recommendations and installation instructions. The manufacturer's installation recommendations and instructions shall be considered part of the Contract.

H. The equipment installation shall also adhere to the installation recommendations and instructions of other building components such as wall and roof materials which the installation impacts.

I. Any questions regarding means or methods of construction shall be addressed during the bidding phase of the project.

1.15 SCHEDULING OF WORK

A. The Contractor shall attend all planning meetings, provide scheduling information and work with all trades to obtain a workable project schedule that meets the Owner's requirements.

1.16 PROTECTION

A. Each Contractor shall effectively protect his work and materials with tarpaulins or heavy plastic material against dirt, water, chemicals, plaster, or damage during the entire period of installation or until he is directed to remove the coverings by the Owner's Representative. Any damaged material must be removed and replaced by the Contractor without additional cost regardless of the cause of the damage. All openings in conduit, fittings, etc., must be effectively sealed to exclude dirt, sand and other foreign substances.

1.17 PROTECTION OF OWNER’S EQUIPMENT

A. The Contractor shall provide any temporary work required to protect the Owner's equipment and to contain the dust generated during construction. Any measures taken by the Contractor for the

protection of equipment shall be installed to the satisfaction of the Owner or Owner's Representative, which may include any and all provisions listed in DIVISION-1 General Requirements and/or in accordance with the appropriate technical specifications for wood and plastics in DIVISION-6. An approved protection material is nylon reinforced flame retardant and anti-static Griffolyn T-55 ASFR 6 mil film (1-800-231-6074 - as of this writing).

1.18 RUBBISH REMOVAL AND CLEAN UP

A. Each Contractor is responsible for periodic removal of all rubbish resulting from his work. All surplus material, refuse, rubbish, etc., shall be removed from the job site at the completion of the Contract. The Owner's Representative must be satisfied with the removal and clean up.

B. All rubbish shall be legally disposed of by the Contractor. Rubbish removed from the site shall become the responsibility of the Contractor.

C. Any hazardous materials discovered which are not included in the contract shall be brought to the Owner's attention prior to removal from the site.

1.19 DELIVERING AND STOARGE OF MATERIALS EQUIPMENT

A. Deliver accessories, small unmarked parts, adhesives, sealants and incidental items to site in manufacturer's original, unopened, labeled containers

B. Store materials and equipment to prevent damage and injury. Store ferrous materials to prevent rusting. Store equipment and lighting fixtures to prevent staining and discoloring.

1.20 INDENTIFICATION OF MATERIALS AND EQUIPMENT

A. All panels, combination motor starters, safety switches, motor operated time switches, junction and pull boxes, in-panel sub-feeders and similar items installed under this project shall be identified by name, function and/or control. Included on nameplates shall be the voltage of the involved circuits. Nameplates shall be at least one by three inch with characters not less than 1/4 inch high. They shall be made up of two laminated black plastic sheets bonded with a middle sheet of white plastic and characters engraved in one black sheet to the depth of the white plastic.

B. The Contractor shall provide a typewritten indexed directory in each panelboard indicating the item or items controlled by each circuit.

C. Directories in any existing panelboards shall be updated in typewritten format showing all circuit changes.

D. All circuits shall be identified in outlet boxes as to the specific circuit connection. All circuit conductors shall also be identified as to the voltage of the circuit.

E. Color coding shall be as listed in Section "WIRING" of these Specifications.

F. A typewritten list of nameplates shall be submitted to the Owner's Representative for approval before ordering.

1.21 PAINTING

A. Where factory finishes are provided and no additional field painting is specified; all marred or damaged surfaces shall be touched up or refinished to a smooth and uniform finish. Provide one-pint quantity of factory finish touch-up paint to the Owner.

B. All exposed ferrous metalwork, pipe, supports, hangers, insulation and other surfaces not factory painted shall be painted with one prime and two finish coats. Paint, surface preparation and application shall be as specified in the Architectural Section: PAINTING. Colors shall match existing work or shall be as selected by the Owner's Representative.

C. A quantity of touch-up paint (minimum size - one pint) shall be provided for each color used by the Contractor. Touch-up paint shall be delivered to the Owner.

1.22 LAWS, ORDINANCES, AND REGULATIONS

A. All systems in all and/or part shall conform to all pertinent laws, ordinances, and regulations of ALL bodies having jurisdiction, at all governing levels. In case of conflict between governing levels, the more stringent law shall apply. As a minimum, all work shall comply with IBC, NFPA, OSHA and USBC requirements.

B. The Contractor shall pay all fees and prepare and submit all utility applications and obtain and pay for all permits, inspections, and certifications required with his work.

C. All electrical work shall be inspected and certified by the local authorities; if no local authority inspection is available an independent inspection agency such as the Middle Department Inspection Agency (MDIA) shall be hired by the Contractor.

D. The Contractor shall make the Owner’s Representative aware of any and all code variances that may apply to the electrical equipment/systems. Application for said variances shall be the responsibility of the Owner’s Representative.

1.23 BUILDING EXPANSION JOINTS AND FIRE RATED ASSEMBLIES

A. Provide expansion joints in conduits where they cross building expansion joints.

B. Where cables or conduits pass through fire rated portion of the structure, the annular space between them and the structure shall be filled with an approved fireproof material.

C. Meet all requirements of Underwriter's Laboratories and all applicable codes for maintaining the integrity of all fire rated assemblies.

D. Contractor shall engage the services of a fire protection contractor to review the drawings and install fire protection products to maintain the integrity of all pipe, wire, conduit, etc. penetrations

through any and all fire rated walls, floors, barriers, and assemblies. Fire stop training and products shall be 3M or approved equal.

1.24 ACCESS DOORS

A. The Contractor shall provide access panels/access doors for access to dampers, valves, controllers or any other equipment or component requiring access for maintenance, adjustment or service wherever these items are concealed in building walls, partitions or ceilings. Frames shall be anchored in walls, partitions or ceilings and shall be set true to lines of the building and flush with the finished surfaces. Access panels/access doors shall be as specified in the General Construction Sections of the Specifications.

1.25 FASTENINGS, SUPPORTS, AND HANGERS

A. Fastenings, supports, hangers, miscellaneous steel, clamps, and anchors shall be made for purpose for which they are to be used. Toggle bolts or machine bolt fastenings shall be used for hollow tile, terra cotta or lath construction; machine screws for structural steel fastenings; lead expansion shields, and machine screws or lag screws for solid masonry fastening; lag screws for wood fastening. All equipment and conduit shall be rigidly and firmly installed to prevent swaying, vibrating or sagging by malleable or wrought steel hangers of standard design, pipe clamps or fabricated steel supports of approved design. Hangers of horizontal conduit runs shall be adjustable clevis type. Perforated strap iron hangers and caddy clips are not permissible.

1.26 SOUND PARTITIONS

A. Contractor shall be responsible to identify all sound partitions indicated on the architectural plans. Contractor shall seal all penetrations through the wall to maintain the sound absorption integrity of the partition.

1.27 CONCRETE INSERTS

A. The Electrical Contractor shall provide concrete inserts of an approved carbon steel wedge type for all hangers. Where two or more parallel conduits are installed continuous inserts may be used. Where required to distribute the load on the inserts, a piece of reinforcing steel of sufficient length shall be passed through the insert. Each insert shall include a knockout piece. Concrete inserts shall have a minimum safety factor of five.

1.28 SLEEVES

A. The Electrical Contractor shall provide and install sleeves where required to protect equipment or facilities in the installation. Each sleeve shall extend through its respective floor, wall, or partition and shall be cut flush with each surface unless otherwise required.

B. Sleeves in bearing and masonry walls, floors and partitions shall be of standard weight steel pipe finished with smooth edges. For other masonry partitions, through suspended ceilings and for concealed vertical piping, sleeves shall be No. 22 U.S.G. galvanized iron.

C. All sleeves shall be properly installed and securely cemented in place.

D. Floor sleeves shall extend one inch above the finished floor. Space between floor sleeves and passing conduit shall be caulked with an approved graphite packing and/or waterproof caulking compound.

E. Where conduits pass through waterproofed floors or walls, design of sleeves shall be such that waterproofing can be flashed into and around the sleeves.

F. Where sleeves pass through fire-rated walls or floors, a fire barrier protection system shall be used.

G. See architectural drawings for fire ratings of building components.

1.29 FIRE STOPPING

A. The contractor shall be responsible to provide and install fire-stopping materials and/or systems where his work penetrates fire and/or smoke rated portions of the building and non-fire resistance-rated assemblies. All materials used shall be manufactured such that they are intended to resist the spread of fire and the passage of smoke. This includes but is not limited to rated walls, floors, shafts, ceilings, and non-fire resistance-rated horizontal assemblies. All fire stopping materials used shall have a fire resistance rating equal to or greater than the rated assembly for which they are installed.

B. For locations where the installed fire stopping material is exposed to normal view, the contractor shall conceal the material with chrome-plated escutcheon plates or other materials that have a flame-spread value of 25 or less and a smoke developed rating of 50 or less, as determined per ASTM E 84. The concealing device shall be approved by the owner's representative prior to installation. Provide shop drawings for each device.

C. The contractor shall provide components/accessories for each fire-stopping system that are needed to install fill materials and to comply with all system performance requirements as recommended by the fire stopping material manufacturer. Accessories include but are not limited to: mineral wool insulation, ceramic fiber, sealants used to aid in the formation of the fire stopping materials, fire-rated formboard, joint fillers and sealers, collars and steel sleeves.

D. Fire stopping materials and systems shall include, but are not limited to, the following: fire barrier caulk and sealants, intumescent caulk, intumescent putty, intumescent wrap strips, silicone foams and sealants, fire barrier composite sheets and cast-in-place fire barrier systems.

E. Fire stopping materials and systems shall be as manufactured by 3M Fire Protection Products, Hilti Corporation, or ProSet Systems Inc.

1.30 ANCHOR BOLTS

A. The Contractor shall provide and set in place, at the time of pouring of concrete foundations, all necessary anchor bolts as required for the equipment called for in these specifications. Anchor bolts shall be of the hook type, of proper size and length to suit the equipment. Anchor bolts shall be set in pipe sleeves of approximately twice the bolt diameter and one half the embedded length of the bolt. The Contractor shall assume full responsibility for proper coordination and placement of the bolts. Upon completion of equipment installation, pipe sleeves shall be caulked in accordance with Section, "SLEEVES" of these Specifications.

1.31 WARRANTY

A. The systems specified herein shall be guaranteed to be free from defects in workmanship and material under normal use and service for a period of one year from acceptance by the Owner or Owner’s Representative.

B. If, within the aforementioned warranty period, any of the materials specified herein is proven to be defective in any way, it shall be replaced or repaired at no additional cost to the Owner. The warranty shall include the providing of all labor and materials necessary for repair or replacement of any defective components. The Contractor is responsible for the costs of any services required by equipment suppliers that are not included in the suppliers' warranties.

C. The Contractor shall, after acceptance of the installation by the Owner or the Owner's Representative, provide any service incidental to the proper performance of the system under the warranties outlined above for the time periods listed above.

D. The Contractor shall be responsible to ensure that his work does not invalidate either wholly or partially any existing warranties or the warranties of material or work performed by others. The Contractor is responsible for the costs to repair damaged work and to re-establish the warranty.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used

END OF SECTION 260501

SECTION 260502 – SPECIAL ELECTIRCAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Field conditions and other facility performance requirements applicable to Work specified in Division 26.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 230501 “Basic Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.

1.2 GENERAL REQUIREMENTS

A. Applicable requirements of the Contract Documents, preceding the Technical Specifications, apply to this Section. In the event of conflict between the Specifications, the most stringent shall apply.

1.3 SCOPE.

A. The work covered by and included in these Specifications consists of the furnishing of all materials, all equipment, labor, tools and supervision and performing all operations necessary for the proper and complete execution of the Electrical work in strict accordance with the Specifications and the Drawings and subject to the terms and conditions of the Contract.

1.4 WORK IN THE EXISTING BUILDING.

A. The Electrical Contractor shall be responsible for thoroughly surveying the existing building to determine the extent and cost of installing new equipment and materials in the existing building.

B. All new equipment and materials shall be installed in existing building as herein specified.

C. All Contractors before starting any cutting in the existing building must first obtain approval from the Owner's Representative on the site before cutting at each location. This Contractor shall provide any temporary work required to retain the dust generated by his work as may be directed by the Owner's Representative. All dust found, which has escaped the area of cutting shall be properly removed by the Contractor without additional cost to the Owner.

D. All openings cut into the exterior of the existing structure must be completely sealed and waterproofed before leaving the job site each day. This shall be done by the Contractor responsible for the cutting.

E. Contractor should not assume utilities can be installed as shown. Drawings are diagrammatic and utilities may need to shift to accommodate existing conditions. It is believed that in general the project can be constructed with utilities in approximately the locations as shown

1.5 INTERRUPTION OF SERVICES

A. The Contractor shall schedule his work to avoid any interruption of any utility services to the operating areas of the building during normal working hours. Interruption of services shall be done during off hours at no additional cost to the Owner.

B. The Contractor shall notify the Owner and the Owner's Representative at least three days prior to any interruption of services. The scheduling of all interruptions shall be approved by the Owner.

1.6 DEMOLITION

A. Refer to Section 260510 – Electrical Demolition for additional requirements.

B. The Contractor shall perform all demolition work as indicated on the Drawings as part of this Contract.

C. The Contractor shall cut and patch as required to perform the demolition work. All openings created must be repaired to match existing conditions.

D. All cutting and patching shall be performed by mechanics experienced in their respective line of work. If the Owner's Representative is not satisfied with the quality of work, the Contractor shall be required, at his own expense, to engage the General Contractor to replace the damaged materials with new materials.

E. Contractor shall re-establish circuit continuity to wiring devices that may be affected by the demolition process.

F. Demolition shall be accomplished in accordance with the construction phasing schedule. Where necessary the Contractor shall provide temporary circuits, supports, equipment, etc. as needed to keep equipment, building area, etc. operational or to allow relocation of the same during demolition of adjacent areas.

G. Abandoned wire, conduit, devices, and circuits in the area of demolition or individually identified shall be removed in their entirety.

H. The Owner shall be given the opportunity to retain ownership of all removed materials and equipment. All such items shall be carefully handled and protected and shall be stored by this Contractor on site as directed by the Owner. Any such materials and equipment not desired by the Owner shall become the property of the Contractor and shall be removed promptly from the

project site. Disposal shall be in accordance with the regulations of the authorities at the disposal site.

I. Discovery of any equipment and/or material which is scheduled for removal and which is suspected of containing asbestos shall require termination of demolition until the Owner is informed and proper testing can be conducted to ensure the material does not contain asbestos. Equipment and/or material found to contain asbestos shall undergo asbestos remediation by others at the cost of the Owner prior to completion of demolition.

J. Any equipment scheduled for removal found to contain PCB's shall be disposed of in accordance with the Environmental Protection Agency requirements. All disposal documentation shall be delivered to the Owner. Costs of said services shall be the responsibility of the Owner.

K. Fluorescent lamps shall be recycled and/or legally disposed of in accordance with EPA rules. Contractor shall provide documentation of legal disposal when requested. The cost of disposal shall be the responsibility of the Contractor.

1.7 OWNER FURNISHED EQUIPMENT

A. The Contractor shall install all equipment designated to be Owner furnished.

B. The Contractor shall be responsible to receive, store and enforce warranty on the Owner furnished equipment as if it were originally furnished by the Contractor.

C. The Contractor shall thoroughly inspect the Owner furnished equipment upon receipt. The Contractor shall have 24 hours after receipt to note any damage to the Owner furnished equipment. After that time, the Contractor shall be fully responsible for the condition of the Owner furnished equipment

1.8 HOODS AND SHIELDS

A. Hoods and shields shall be installed to protect important electrical equipment from sprinkler system discharge. Hoods and shields shall be constructed of non-combustible material and shall be sized to present direct contact of the discharging water and the important electrical equipment. The local authority having jurisdiction shall determine what electrical equipment will be classified "important electrical equipment".

1.9 TEMPORARY ELECTRICAL POWER

A. Refer to Section 260507 – Temporary Power and Communication for additional requirements.

B. Electrical power from the Owner's existing system shall be used without metering and without payment of use charges**.**

C. The Contractor must make arrangements with the Owner for power and provide installation of equipment, wiring, switches and outlets necessary to provide adequate supply for lighting and

power for construction purposes as well as power for construction site offices and other temporary storage and construction buildings.

D. The Contractor must provide and maintain lights and signs to prevent damage or injury and must illuminate all hazardous areas. Safety lights must be illuminated during all periods of occupancy.

E. Materials used for temporary electrical power may be new or used but must be adequate in capacity for the purpose intended and must not create unsafe conditions or violate the requirements of applicable codes

F. The Contractor shall install all work to have a neat and orderly appearance and to make it structurally sound throughout. The Contractor must maintain all temporary electrical systems to give continuous service and provide safe working conditions.

G. The Contractor must modify the service as required by the progress of this job.

H. The Contractor shall remove all temporary equipment and materials upon completion of construction, repair all damage caused by the installation and restore the area to satisfactory construction.

PART 2 - PRODUCTS (Not Used).

PART 3 - EXECUTION (Not Used).

END OF SECTION 260502

SECTION 260503 - GENERAL REQUIREMENTS FOR ELECTRICAL SYSTEMS.

PART 1 - GENERAL

1.1 SUMMARY.

A. Section includes general administrative, material, and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 01:

1. Electrical product general requirements and accesses.
2. Substitutions
3. Submittals.
4. Alternates.
5. Coordination drawings.
6. Record documents.
7. Maintenance manuals.
8. Rough-ins.
9. Electrical installations.
10. Cutting and patching

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 230501 “Basic Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.

1.2 DEFINITIONS

A. Definitions:

1. Listed: Equipment or materials included in a list published by an organization acceptable to the authority having jurisdiction and concerned with product evaluation, that maintain periodic inspection of production of listed equipment or materials, and whose listing states either that the equipment or material meets appropriate designated standards or has been tested and found suitable for use in a specified manner.
2. Labeled: Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
3. General Explanation: A substantial amount of specification language consists of definitions of terms found in other Contract Documents, including Drawings. (Drawings are recognized as being diagrammatic in nature and not completely descriptive of the

requirements indicated thereon). Certain terms used in Contract Documents are defined in this article. Definitions and explanations contained in this Section are not necessarily either complete or exclusive but are general for the Work to the extent that they are not stated more explicitly in another element of the Contract Documents.

4. General Requirements: The provisions or requirements of other Division 01 Sections apply to entire work of the Contract and where so indicated, to other elements which are included in the project.
5. Indicated: The term "indicated" is a cross-reference to graphic representations, notes or schedules on drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated," it is for purpose of helping the reader locate cross- references, and no limitation of location is intended except as specifically noted
6. Directed, Requested, etc: Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "reviewed", "required", "accepted", and "permitted" mean "directed by Architectural/Engineer", and similar phrases. However, no such implied meaning will be interpreted to extend the Architect/Engineer's responsibility into the Contractor's area of construction supervision.
7. Furnish: Except as otherwise defined in greater detail, the term "furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations, as applicable in each instance.
8. Install: Except as otherwise defined in greater detail, the term "install" is used to describe operations at the job site, including unloading, unpacking, assembly, erection, placing, anchoring, mounting, connecting, testing, protecting and cleaning, placing in working condition and similar operations, as applicable in each instance.
9. Provide: Except as otherwise defined in greater detail, the term "provide" means to furnish and install, complete and ready for intended use, as applicable in each instance.
10. Installer: The term "installer" is defined as the entity (person or firm) engaged by the contractor, its subcontractor or sub-subcontractor for performance of a particular unit of work at the project site. It is a general requirement that such entities (installers) be expert in the operation they are engaged to perform.
11. Connect: The term "connect" means to provide power sources, overcurrent devices, raceway, conductors, terminations, insulation and other materials required for the operation and control of the equipment noted by the term
12. Wiring: The term wiring means all raceways, fittings, conductors, connectors, tape, junction and outlet boxes, connectors, splices, and all other items necessary and/or required in connection with such work.
13. Conduit: The term conduit means the inclusion of all fittings, hangers, supports, sleeves, etc
14. Concealed: The term concealed means embedded in masonry or other construction, installed behind wall furring or within partitions, or installed within suspended ceilings.
15. Exposed: The term exposed means not installed underground or concealed as defined above.
16. Accessible: The term accessible means being capable of being reached without the use of ladders or without climbing or crawling under, through or over obstacles such as other mechanical or electrical equipment, building members or structure, piping, ductwork or going through doors.

1.3 SUBMITTALS.

A. General: Follow the procedures specified in Division 01 Section “Submittal Procedures” and Section 260501 “Basic Electrical Requirements.”

1. If submittals include any deviations from specified equipment/materials, these deviations must be clearly identified. The reason for the deviation must also be indicated. Exceptions must be included in/on the submittal in a separate paragraph or drawing block located below the Contractor's stamp identified by the title "Exception to Contract Documents." Exceptions cannot be part of the standard Contractor's stamp.
2. Transmit each submittal with an Engineer accepted form. Include one copy each for the Owner and the Owner's Representative in addition to copies required by the Contractor.
3. Sequentially number the transmittal forms. Resubmittals to have original number with an alphabetic suffix.
4. Identify Project, Contractor, Sub-Contractor or Supplier; pertinent drawing sheet and detail number and specification section number, as appropriate.
5. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction work and coordination of information is in accordance with the requirements of the work and Contract Documents.

B. Incomplete submittals shall not relieve the Contractor of providing a complete and functional system.

C. Schedule submittals to expedite the Project. Coordinate submission of related items.

D. Submittals by the Contractor must be in complete compliance with the Contract Documents unless exceptions are identified. Exceptions to the Contract Documents may only be made to improve the project. Exceptions cannot be taken which would provide an incomplete and/or nonfunctional system.

E. Prepare shop drawings and obtain approvals from inspection authorities for power utility company, fire alarm and life systems, and other electrical installations requiring specific approval.

F. Prepare and submit all shop drawings to governmental agencies and utility companies which are required by these agencies for their approval.

G. Submit coordination drawings for areas specified and those areas defined as “problem” coordination areas during construction.

H. Provide space for Contractor and Owner's Representative review stamps.

I. The Engineer will return shop drawings with the following designations:

1. Approved: Further submission not required.
2. Approved as Noted: Corrections must be incorporated in final installation. Further submission not required unless specifically noted.
3. Not Reviewed: Placed in project files for information only.
4. Revise and Resubmit: Make necessary changes and resubmit prior to fabrication or purchase.

5. Not Approved: Does not meet project requirements. Resubmit in accordance with Contract Documents.

J. Revise and resubmit submittals as required, identify all changes made since previous submittal.

K. Submit ¼" scaled coordination drawings in electronic PDF format of electrical equipment room layouts prior to issuing electrical equipment submittals to engineer of record. Layout shall be based on equipment being submitted for approval. In addition to electrical equipment room layouts, contractor shall also include all major conduit raceway systems 2" conduit trade size and larger for both underground and overhead including all pull and junction boxes. The contractor's electrical coordination drawings shall be fully coordinated with all trade contractor's equipment and shall bear each trade contractor's approval stamp and signature on each coordination plan drawing submittal.

L. Electronic drawing files in AutoCad of the electrical drawings for use in preparing submittals may be purchased from the engineer. These drawings will not be provided without charge to the contractor or any of the subcontractors.

M. Documents will not be accepted for review unless:

1. They comply as to number of copies and type of paper indicated in the General Requirements.
2. They include complete information pertaining to appurtenances and accessories.
3. They are submitted as a package where they pertain to related items.
4. Where they consist of standard catalog sheets displaying other items which are not applicable, they are properly marked with the electrical data, product identification and accessories as related to this specific project.
5. They indicate the project and address along with the Contractor's name, address and phone number.
6. Where they consist of standard factory assembly or field installation drawings, they are properly marked with external connection identification as related to this specific project.

N. Any materials, fixtures, apparatus, or equipment that are not in accordance with specification requirements can and will be rejected for use in this installation and construction

O. Any materials, fixtures, apparatus or equipment installed without stamped or written review will be removed by the Contractor and replaced with specified equipment at the direction of the Architect/Engineer and without recourse for additional compensation.

P. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.4 SHOP DRAWING/PRODUCT DATA

A. Submit shop drawings and/or catalog cuts for all specified materials and equipment.

B. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in a single submittal.

C. Mark dimensions and values in units to match those specified.

D. Show equipment sizes and dimensions.

E. Include wiring diagrams, hole location and sizes, and other data that could affect work by other trades.

F. Show manufacturer's names, trade names, catalog numbers, accessories, special features and rating data.

G. Indicate required clearances for operating parts, for removal and for servicing

H. Show all applicable performance data.

I. Show sound power levels of all rotating equipment.

1.5 QUALITY ASSURANCE

A. Carefully examine the contract documents, visit the site, and become thoroughly familiar with the local conditions relating to the work. Failure to do so will not relieve the contractor of the obligations of the Contract.

B. Discovery of any conflicting design information or any design intentions which are not readily interpreted shall be referred to the Architect/Engineers for further description or illustration prior to any product selection or execution of work.

C. Discovery of any materials or equipment which are damaged, unsuitable, incompatible, or non-compliant with any applicable codes, laws, ordinances or other regulations shall be brought to the direct attention of the Architect/Engineer.

D. Should there be any discrepancies or question of intent, refer the matter to the Architect/Engineer for a final decision before ordering any equipment or materials and before starting any relating work.

1. In case of conflict between project specifications and drawings, the Contractor shall assume the more expensive method for purposes of bidding, unless the Architect/Engineer rules otherwise.

E. Manufacturers of equipment shall be firms regularly engaged in manufacturing factory fabricated systems and equipment whose products have been in satisfactory use in similar service for not less than 5 years.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery product to the project properly identified with names, model numbers, types grades, compliance labels, and other information needed for identification.

1.7 RULES AND REGULATIONS

A. Work and materials shall conform to and be execute, inspected and tested in accordance with the latest edition of the governing rules and regulations of Federal, State and Local governmental agencies.

B. Other codes which will apply to this installation include the current editions of:

1. ANSI C2 – National Electrical Safety Code.
2. ASME/ANSI A17.1 - Safety Code for Elevators and Escalators.
3. ASTM - American Society for Testing and Materials.
4. ICEA - Standards for Wire and Cable.
5. IEEE Standards.
6. IESNA Standards.
7. NEMA Standards.
8. NFPA 20 - Standards.
9. OSHA Regulations.
10. Underwriters Laboratories.

C. Where governing codes indicate the Drawings and Specifications do not comply with the minimum requirements of applicable codes, the Contractor shall either notify the Architect/Engineer in writing during the bidding period identifying the revisions required to meet code requirements or provide an installation which will comply with the code requirements.

D. Where regulations of electric utility and telephone companies apply, conformance with their regulations is mandatory and any costs involved shall be included in the Contract, with the exception of extra facility and other charges which are directly paid by the Owner.

E. Where any materials, equipment or installation is not in compliance with the more stringent of the applicable codes, laws, ordinances, regulations and contract documents, they shall be entirely removed, replaced, modified or otherwise corrected at no additional cost to the Owner.

1.8 SUBSITUTION

A. The materials, products and equipment described in the Bidding Documents establish a standard of required functions, dimensions, appearance and quality to be met by any proposed substitutions.

B. No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect/Engineer at least ten (10) days prior to the date for receipt of Bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cuts, performance, test data and warranties, and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or other work than incorporation of the substitute would require shall be included. The burden of proof of the merit of the proposed substitute is upon the proposer. The Architect’s decision of approval or disapproval of a proposed substitution shall be final

C. If the Architect approved any proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. This Addendum shall then be issued to all Bidders

D. Requests for substitution shall be made only by a Bidder. Request for substitution received by the Architect from Sales representative, vendors, suppliers etc., are not acceptable.

E. Any bidder wishing to substitute "or equal" equipment may request a substitution. Manufacturer's which are submitted as substitutions for approved equal status are considered to have equipment of similar quality, however, the Contractor shall not assume that a piece of equipment by a manufacturer submitted as a "substitution" will be automatically accepted. Compliance with the Drawings and Specifications is still required. If the substituted material is considered to be unacceptable, the Contractor shall provide the equipment as originally specified.

F. Substitutions are encouraged when there is significant cost savings or improvement to the project. Submit reasons for changes with any requests for substitution. All requests for substitutions must be made within 30 days of contract award unless stated otherwise in the General Conditions.

G. Bid alternates shall be clearly defined in order to be evaluated during the bidding process.

H. By submitting an alternate or substitution, the Contractor automatically agrees to the following.

1. The Owner/Architect/Engineer shall be reimbursed by the Contractor for any additional costs incurred by the Owner's Representative to review the substituted materials, in accordance with the then current Owner's Representative's hourly rate.
2. The Owner shall be reimbursed by the Contractor for any additional costs incurred by the Owner's Representative field or office conferences caused by the substituted materials in accordance with the then current Owner's Representative's hourly rate.
3. The consideration of alternates/substitutions does not obligate the Owner's Representative to accept same

I. In the event a brand is approved and substituted, it is the responsibility of the Contractor to so coordinate his substituted material into the original work at no extra cost to the Owner or any other Contractor.

J. Refer to Division 01 Section "Substitution Procedures" for additional instructions on substitution.

1.9 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Openings: Wall, floor, ceiling, and roof openings specifically shown and identified on the Architectural and Structural or Electrical Drawing shall be provided.

B. Roof Sleeves: Electrical Contractor shall provide all roof penetrations and sleeves for all conduits serving HVAC equipment and shall be incorporated into the finished roofing and made watertight according to the roof construction type manufacturer’s recommendations.

C. Painting: Painting of all exposed-to-view conduit, pipes, unfinished hangers, supports, and equipment, insulated or not, in finished and unfinished areas, shall be provided. Furnish all manufactured equipment in factory-finished baked enamel, unless otherwise specified.

1.10 WIRING AND CONTROLS

A. Wiring and controls associated with equipment shall be furnished, installed, and wired in accordance with the manufacturer's recommendations and applicable standards and codes. Provide installation instructions, locating dimensions, and wiring diagrams for the other trades. Supervise the installation and start-up and test the equipment unless otherwise specified.

B. Equipment Furnished by Other Divisions: Equipment specified in other Divisions and requiring electrical supply shall be erected, aligned, leveled, and prepared for operation. Provided required controls and accessories along with installation instructions, diagrams, dimensions and supervision of installation and start-up. Provide the required electrical rough-ins, and confirm the electrical controls and accessories furnished under the specifications for the other Divisions. Install those controls and accessories not located in the mechanical piping and ductwork. Provide additional electrical controls, accessories, fittings, and devices not specified under the equipment but required for a finished, operating job. Make final electrical connections. Participate in the start-up and test services.

1.11 PERMIT AND INSPECTIONS

A. Permits: Obtain and pay for all permits, bonds, licenses, tap-in fees, etc., required by the City, State, or other authority having jurisdiction over the work, as a part of the work of the affected Section.

B. Inspections: Arrange and pay for all inspections required by the above when they become due as part of the work of the Sections affected. Conceal no work until approved by these governing authorities. Present the Contractor, Architect/Engineer with properly signed certificate of final inspection.

1.12 REVIEW OF MATERIALS

A. Within 21 calendar days after award of this Contract, submit a typewritten list of all items of equipment and material proposed for installation on this Project to the Architect/Engineer for review for design conformance. Set forth the specification page number, manufacturer's name, model number, size, nonstandard accessories specified or required, and any other information required to identify each item.

1.13 PROJECT SITE CONDITIONS

A. Inspect and examine the site before submitting the proposal. Note the location of any existing facilities, existing services or interference with other trades. Immediately contact Architect/Engineer indicating discrepancies. Failure to do so will not relieve the Contractor of the obligations of the Contract.

B. Visit the site or premises in order to become familiar with job conditions. No extras will be allowed for work which could have been foreseen by an examination of the site or premises.

C. Adjust work to meet actual conditions existing at the job.

D. Inspect and examine the site to determine how equipment will be transported to final mounting locations. No extra charges will be allowed for moving, hoisting or otherwise transporting equipment to final mounting location.

E. The location and routing of power and communication utility service raceway systems shown on the site plan and associated plan drawings are diagrammatic only. The contractor shall coordinate with all new and existing overhead and underground utilities (power utility service company, communication utility service company, etc.). Contractor shall verify and confirm with power and communication service utility providers the exact location and routing of proposed underground and overhead conduits prior to rough-in. Contractor shall obtain an official sign-off from such utility service providers prior to performing any work. Failure to do so shall not relieve the contractor from providing what is required by the utility service providers and shall not result in an added cost to the contract.

PART 2 - PRODUCTS.

2.1 MATERIALS.

A. All materials, unless otherwise specified, shall be new and be the standard products of the manufacturer. Seconds, rejects, or damaged materials will be rejected.

B. The equipment to be provided under these Specifications shall be essentially the standard commercial grade product of the manufacturer. Where two or more units of the same class of equipment are required, these units shall be products of a single manufacturer.

C. The listing of a manufacturer for certain equipment and systems does not indicate acceptance of a standard or catalogued item of equipment. All equipment and systems shall conform to the Specifications.

2.2 U.L. LISTING & LABELING

A. All equipment shall bear the Underwriter’s Laboratories (U.L.), or other approved agency, listing label.

B. Isolation Rail Construction.

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.

B. Refer to equipment specifications in Divisions 02 through 14, 22, 23, and 26 for rough-in requirements.

3.2 ELECTRICAL INSTALLATION.

A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:

1. The Architect shall control the placement of wall and ceiling mounted electrical devices, fixtures, and outlets. The intent is to aesthetically locate fixtures/outlets by providing rough-in hardware, boxes and/or mounting plates, as required, when stud or furring may not be readily available for direct mounting. When drawing details are not available, consult with Architect's representative for actual placement.
2. Coordinate electrical systems, equipment, and materials installation with other building components. Be responsible for any changes in openings and locations necessitated by the equipment installed.
3. Verify all dimensions by field measurements.
4. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
5. Coordinate the installation of required supporting devices and sleeves to be set in poured-in- concrete and other structural components, as they are constructed
6. 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
7. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
8. Install systems, materials, and equipment to conform with approved 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.
9. Switchgear/Switchboard/Motor Control Center Assembly Selection: The drawings indicate sizes, profiles, and dimensional requirements of assembly equipment. Equipment having equal performance characteristics and complying with indicated maximum dimensions and profiles may be considered, provided deviations do not change the design concept, intended performance, or code/future extension provision clearances. The burden of proof of equality is on the proposer a minimum of 10 days prior to bid.
10. Protect all equipment and materials from the elements, dirt and other damage from the time it is removed from the point of storage until final acceptance.
11. Equipment shall include the component parts thereof such as disconnect switches, motor starters, motors, drives, and guards necessary to the satisfactory and safe operation of the equipment.
12. Installation shall include setting equipment to accurate line and grade, leveling equipment, aligning equipment components, providing and installing couplings, bolts, guards and anchor bolts.
13. All tolerances in alignment and leveling, and the quality of workmanship for each class and stage of work shall be subject to manufacturer's installation instructions.
14. All manufacturers' finished equipment surfaces damaged during construction shall be brought to an "as new" condition by touch up or repairing. Any rust shall be completely removed and the surface primed prior to repainting.
15. Workmanship shall conform to the "Standard of Installation" published by the National Electrical Contractors Association.

16. Prior to start of utility trench work, notify the Architect of utilities that require excavations lower than the building foundations. Do not proceed with trench work without direction from the Architect to ensure the building foundations will not be compromised by the utility installation.
17. Provide all scaffolding, rigging, hoisting and services necessary for erection and delivery of equipment and apparatus furnished into the premises. These items shall be removed from the premises when no longer required
18. No electrical equipment, raceways or other work of any kind shall be covered up or hidden from view before it has been examined and approved. Any unsatisfactory work or materials shall be removed and corrected immediately.
19. Install systems, materials, and equipment level and plumbing, parallel and perpendicular to other building systems and components.
20. 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.
21. Install access panels or doors where units are concealed behind finished surfaces. Access panels and doors are specified in Division 26 Section "Basic Electrical Materials and Methods".
22. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.3 MANUFACTURER'S DIRECTIONS AND SUPERVISION.

A. Where supervision by a manufacturer is specified, follow all instructions, recommended manufacturer and specified field tests, and other recommendations of the manufacturer. The manufacturer shall supervise the installation, connection, start-up, testing, and adjustment, instruction of the Owner and final tests of such equipment or system. Where two or more manufacturer's equipment are interrelated, take responsibility to coordinate their work and provide supervision.

B. Have the manufacturer instruct the Owner in the proper operation and maintenance techniques of all equipment, systems, etc., at the time of completion of all work.

C. Prior to final acceptance by the Owner prepare and submit to the Architect for review 3 copies of operation and maintenance (O and M) instructions in printed form for each item of equipment or system installed in the building. Complete instructions for each system shall be assembled and bound in a brochure. Detailed contents of the O and M manuals are as hereinafter specified. Refer to appropriate Division 01 Sections for general requirements affecting this work.

3.4 PAINTING.

A. Provide the prime painting of all equipment and materials furnished under Division 26 specifications, unless specifically stated otherwise. In general, all equipment except raceways and galvanized boxes that are not provided with a factory-applied final finish shall be delivered to the job site with a shop-applied prime coat of paint:

3.5 TEST AND INSPECTION.

A. Upon completion of the work, notify the Architect in writing, that the entire electrical installation has been examined, inspected, tested, calibrated or adjusted as specified and that it is ready for final inspection. Work to be connected prior to final inspection and also to include all of the work specified for "Manufacturers' Directions and Supervision.". Include documentation of specified testing and inspection

B. Prior to each inspection, provide a written certification that each system or piece of equipment to be operated during that test has been tested and does meet design performance criteria of the Contract Documents.

C. On completion of work, obtain Certificates of Compliance, and approval or acceptance from all authorities having jurisdiction over the work, and deliver these certificates to the Architect. The work shall not be deemed to have reached a state of completion until the certificates have been delivered.

3.6 LOOSE EQUIPMENT.

A. Provide four keys for every different piece of electrical equipment which is equipped with a lock.

B. Provide all other loose equipment specified/supplied for use with all systems.

3.7 SHOP DRAWINGS

A. Refer to Division 01 for quantities and types of shop drawings.

B. Required shop drawings shall be submitted in groups by systems. For example, all lighting fixtures, lamps, ballasts and accessories shall be submitted simultaneously in one package.

C. Refer to individual Division 26 Sections for required shop drawings.

D. Shop drawings submitted for other than those specifically required in the appropriate Specification Section will not be reviewed or returned

3.8 OPERATION AND MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with Division 01 Section "Operating and Maintenance Data". In addition to the requirements specified in Division 01, include specific Division 26 Section requirements, and the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

B. Prior to completion of this project, the Contractor shall deliver to the Owner's Representative for approval three copies of an Operating and Maintenance Manual consisting of items outlined hereinafter.

C. The purpose of this manual is to assist the Owner in routine operation, maintenance, servicing, troubleshooting and procurement of replacement parts. All information in the manual shall be as-built and only material pertinent to the project shall be included.

D. The manual shall include the following:

1. Manuals shall be bound, 8-1/2 x 11 inch text pages and set in three-ring binders with durable covers.

E. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS," title of project and subject matter of binder when multiple binders are required. All subject matter shall be in typewritten format.

F. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab labeling clearly printed under reinforced laminated plastic tabs.

1. Contents: Prepare a Table of Contents for each volume with product or system description identified, type on white paper

2. Part 1: Directory, listing names, addresses and telephone numbers of Owner's Representative, Contractor, Sub-Contractors and major equipment suppliers.

3. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses and telephone numbers of Sub-Contractors and suppliers. Operating and start-up instructions shall be written in a concise step-by-step manner. Maintenance instructions shall include maintenance schedules, procedures, adjustments and trouble-shooting techniques. Identify the following:

a. List of equipment.
b. Parts list for each component.
c. Operating instructions.
d. Maintenance instructions for equipment and systems.

4. Part 3: Project documents and certificates, including the following:

a. Shop drawings and product data.
b. Control wiring diagrams.
c. Certificates.
d. Photocopies of warranties.
e. Electrical inspection certificate.
f. Copy directory and Schedule of loads served for each:

1) Branch circuit panel.
2) Distribution panel.
3) Switchboard.

g. Individual Characteristics for trouble shooting sequences for each item of:
1) Branch circuit panel.
2) Distribution panel.
3) Fire alarm system.
4) Individual motor starter.
5) Switchboard.
6) Transformer.
7) UPS.
8) Battery Inverter System.
9) Lighting Inverter.
10) Generator and associated transfer switch(es).

h. On-hand spare parts list and complete parts list for each:
1) Distribution panel.
2) Individual motor starter.
3) Switchboard.

i. Tap setting schedule for each:
1) Transformer

j. Bolt tightening torques and inspection intervals on each:
1) Bolted bus connection.
2) Cable connection.
3) Miscellaneous bolted electrical connections.

k. Manufacturers' recommended cleaning intervals and special procedures for each:
1) Cooling fins.
2) Dry-type transformer coil assembly.
3) Electrical equipment interior.
4) Electrical equipment ventilation opening.
5) Lighting fixture lenses, louvers and reflectors.

l. Main and arcing contact adjustment and replacement for each.
1) Contractor.
2) Circuit breaker.
3) Fused switch.
4) Interrupter switch.
5) Motor starter.

m. Calibration and exercise procedures and intervals for each:
1) Control system.
2) Emergency battery.
3) Molded case-breaker.
4) Relay.

n. "As designed" and "as left" relay settings.

o. Testing interval and target values for ground fault protection circuit relays.

p. Testing and trouble shooting procedures unique to special systems.

q. Approved special construction details that differ from the details shown on Drawings.

r. Commissioning reports for systems per 26 08 00 COMMISSIONING FOR ELECTRICAL

5. Submit one copy of completed volumes in final form 30 days prior to final inspection. This copy will be returned after final inspection, with the Owner's Representative comments. Revise content of documents as required prior to final submittal.

6. Submit final volumes revised, within ten days after the Owner's review.

3.9 COORDINATION DRAWINGS

A. In addition to the required manufacturer and "field" Shop Drawing submittals, all trades shall participate in the preparation of composite coordination drawings.

B. Each trade shall show planned mechanical/plumbing work and participate in a minimum of 15 coordination meetings initiated by the General Contractor. Meetings shall include installers of plumbing, HVAC, fire protection, insulation, and electrical work

C. Under the General Contractor's supervision, the ductwork contractor shall prepare composite utility/service drawings which overlay all trades' work

D. The completed drawings shall show interfaces of ductwork, electrical conduit and cable trays, fire protection and plumbing lines sized 1-1/2 inch and above (diameters include exterior insulation). All drain lines shall be illustrated regardless of size to insure adequate "fall" is achievable in concealed cavities.

E. Prepare drawings to show clearances for installing and maintaining insulation, breaking down equipment, pulling tubes, replacing filters and motors, valve stem movement and similar requirements.

F. Provide details and sections as needed to conclusively show successful coordination and integration of work.

G. Access door requirements to satisfy the needs of Paragraph E shall be located.

H. Professional will not supervise coordination which is the exclusive responsibility of the Contractor.

I. Prepare coordination drawings to a scale of ¼" = 1'-0" or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited to installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of major raceway systems, equipment, and materials. Include the following:

    a. Clearances for servicing equipment, including space for equipment disassembly required for periodic maintenance.
    b. Exterior wall and foundation penetrations
    c. Fire-rated wall and floor penetrations.
    d. Equipment connections and support details.

e. Sizes and location of required concrete pads and bases.

2. Coordination drawings shall be provided by Division 26 for the following:

a. Access door locations.
b. Communication rooms.
c. Electrical equipment rooms.
d. Mechanical equipment rooms.

3. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
4. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

3.10 RECORD “AS-BUILT” DOCUMENTS

A. The Contractor shall be responsible for creating and providing accurate "As Built" drawings from field data collected during the course of the project. Field data is defined as information collected on site while constructing the project that is not available from the contract documents, addenda, change orders, or site instructions. It is of importance that the Contractor record on the "As Builts" all field information relating to concealed conditions.

B. During construction, the Contractor shall maintain a record set of "red-lined" installation prints. He shall record on these prints, all deviations from the Contract Drawings in conduit and electrical conductor sizing, equipment sizing, location and details.

C. The revisions from contractor markups and field inspection notes shall be transferred to the final as-built set of drawings. The final as-built drawings include modifications during construction, field requested changes, bulletins, shop drawing modifications, and contractor designs.

D. At the completion of construction, all of the contractor’s red-lined changes shall be transferred to PDF electronic drawings format, typically using the engineer of record’s original design drawing files as the starting point. These PDF drawings shall then be considered the final “as-builts” and shall be submitted to the engineer and owner in PDF format as part of the project close out process. Hand marked-up as built drawings shall not be acceptable.

E. Prepare record “As-Built” documents/drawings in accordance with the requirements in Division 01 Section “Project Closeout.” In addition to the requirements specified in Division 01, indicate installed conditions for:

1. Plan drawings indicating major raceway systems (100 amps and greater), conduit and wire sizes, routing and location, for both exterior and interior, locations of equipment, switchboards, panelboards, control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.
2. Major equipment locations (exposed and concealed), dimensioned from prominent building lines.
3. Accurate electrical diagrams (electrical riser diagrams, wiring diagrams, etc.) reflective of all modifications during construction, field requested changes, bulletins, shop drawing modifications, and contractor designs.

4. Accurate record of all switchboard and panelboard branch circuit directories/schedules which reflect actual installed circuits.
5. Accurate branch circuit numbers and associated panelboard designations of all power receptacle outlet devices, electrical equipment, lighting fixtures and associated controls, etc.
6. Contract Modifications and actual equipment and materials installed.

F. Engage the services of a Professional Engineer registered in the State of Maryland to record the locations and invert elevations of underground raceway installations.

END OF SECTION 260503

SECTION 260505 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY.

A. Section includes the limited scope construction materials and methods for application with electrical installations as follows:

1. Excavation for underground utilities and services, including underground raceways, vaults, and equipment.
2. Miscellaneous materials for support of electrical materials and equipment
3. Concrete equipment bases.
4. Cutting and patching for electrical construction.
5. Touchup painting
6. Mounting heights.
7. Electrical equipment coordination and installation.
8. Sleeves for raceways and cables.
9. Sleeve seals.
10. Common electrical installation requirements.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 230501 “Basic Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.

1.2 DEFINITIONS

A. The following definitions apply to excavation operations:

1. Additional Excavation: Where excavation has reached required subgrade elevations, if unsuitable bearing materials are encountered, continue excavation until suitable bearing materials are reached. The Contract Sum may be adjusted by an appropriate Contract Modification.
2. Sub-base: As used in this Section refers to the compacted soil layer used in pavement systems between subgrade and the pavement base course material.
3. Subgrade: As used in this Section refers to the compacted soil immediately below the slab or pavement system.
4. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction from the Architect.

1.3 SUBMITTALS.

A. Shop drawings are not required for material and equipment specified under this Section of the specifications.

1.4 QUALITY ASSURANCE

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

B. Comply with local authorities having jurisdiction.

C. Installer Qualifications: Engage an experienced installer for the installation and application of joint sealers, access panels, and doors.

D. Qualify welding processes and welding operators in accordance with AWS D1.1 “Structural Welding Code–Steel”.

1. Certify that welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.5 PROJECT CONDITIONS

A. Conditions Affecting Excavations: The following project conditions apply:

1. Maintain and protect existing building services which transit the area affected by selective demolition.
2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by excavation operations.
3. Site Information: Subsurface conditions were investigated during the design of the Project. Reports of these investigations are available for information only; data in the reports are not intended as representations or warranties of accuracy or continuity of conditions. The Owner will not be responsible for interpretations or conclusions drawn from this information.
4. Existing Utilities: Locate existing underground utilities in excavation areas. If utilities are indicated to remain, support and protect services during excavation operations.
5. Remove existing underground utilities indicated to be removed.

    a. Uncharted or Incorrectly Charted Utilities, contact utility owner immediately for instructions.
    b. Provide temporary utility services to affected areas. Provide minimum of 48-hour notice to Architect prior to utility interruption.

6. Use of explosives is not permitted.

B. Environmental Conditions: Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do not apply joint sealers to wet substrates.

1.6 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow:

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

1. Coordinate installation and connection to exterior underground and overhead utilities and services, including provision for electricity-metering components.
2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services

C. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 08 Section "Access Doors and Frames".

PART 2 - PRODUCTS.

2.1 PRODUCTS.

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

1. Advance Products & Systems, Inc.
2. Calpico, Inc.
3. Metrafex Co.
4. Pipeline Seal and Insulator, Inc.

2.2 MISCELLANEOUS MATERIALS

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

D. Expansion Anchors: Carbon-steel wedge or sleeve type.

E. Toggle Bolts: All-steel springhead type.

F. Powder-Driven Threaded Studs: Heat-treated steel.

2.3 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

2.4 SLEEVES FOR RACEWAYS

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated “wall pipe,” equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated:

C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052 inch or 0.138 inch thickness as indicated and of length to suit application.

D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section “Penetration Firestopping”.

2.5 SLEEVE

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway.

1. Sealing Elements: EPDM interlocking links shaped to fit surface of conduit. Include type and number required for material and size of raceway.
2. Pressure Plates: Carbon steel. Include two for each sealing element.
3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION.

3.1 EXAMINATION.

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and application of access panels. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 EXCAVATION

A. Slope sides of excavations to comply with local codes and ordinances. Shore and brace as required for stability of excavation.

B. Shoring and Bracing: Establish requirements for trench shoring and bracing to comply with local codes and authorities. Maintain shoring and bracing in excavations regardless of time period excavations will be open.

1. Remove shoring and bracing when no longer required. Where sheeting is allowed to remain, cut top of sheeting at an elevation of 30 inches below finished grade elevation.

C. Install sediment and erosion control measures in accordance with local codes and ordinances.

D. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of bearing materials. Provide and maintain dewatering system components necessary to convey water away from excavations.
2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey surface water to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

E. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.

1. Locate and retain soil materials away from edge of excavations. Do not store within drip-line of trees indicated to remain.
2. Remove and legally dispose of excess excavated materials and materials not acceptable for use as backfill or fill.

F. Excavation for Underground Vaults and Electrical Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot; plus a sufficient distance to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

1. Excavate, by hand, areas within dri-line of large trees. Protect the root system from damage and dry-out. Maintain moist conditions for root system and cover exposed roots with burlap. Paint root cuts of 1 inch in diameter and larger with emulsified asphalt tree paint.
2. Take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is place.

G. Trenching: Excavate trenches for electrical installations as follows:

1. Excavate trenches to the uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches clearance on both sides of raceways and equipment.
2. Excavate trenches to depth indicated or required.
3. Limit the length of open trench to that in which installations can be made and the trench backfilled within the same day.

4. Where rock is encountered, carry excavation below required elevation and backfill with a layer of crushed stone or gravel prior to installation of raceways and equipment. Provide a minimum of 6 inches of stone or gravel cushion between rock bearing surface and electrical installations

H. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 deg F.

I. Backfilling and Filling: Place soil materials in layers to required subgrade elevations for each area classification listed below, using materials specified in PART 2 of this Section.

1. Under walls and pavements, use a combination of subbase materials and excavated or borrowed materials.
2. Under building slabs, use drainage fill materials.
3. Under piping and equipment, use subbase materials where required over rock bearing surface and for correction of unauthorized excavation.
4. For raceways less than 30 inches below surface of roadways, provide 4 inch thick concrete base slab support. After installation of raceways, provide a 4 inch thick concrete encasement (sides and top) prior to backfilling and placement of roadway subbase.
5. Other areas, use excavated or borrowed materials.

J. Backfill excavations as promptly as work permits, but not until completion of the following.

1. Inspection, testing, approval, and locations of underground utilities have been recorded.
2. Removal of concrete formwork
3. Removal of shoring and bracing, and backfilling of voids.
4. Removal of trash and debris.

K. Placement and Compaction: Place backfill and fill materials in layers of not more than 8 inches in loose depth for material compacted by heavy equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

L. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification specified below. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

M. Place backfill and fill materials evenly adjacent to structures, piping, and equipment to required elevations. Prevent displacement of raceways and equipment by carrying material uniformly around them to approximately same elevation in each lift.

N. Compaction: Control soil compaction during construction, providing minimum percentage of density specified for each area classification indicated below.

1. Percentage of Maximum Density Requirements: Company soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture-density relationship (cohesive soils), determined in accordance with ASTM D 1557 and not less than the following percentages of relative density, determined in accordance with

ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).

a. Areas Under Structures, Building Slabs and Steps, Pavements: Compact top 12 inches of subgrade and each layer of backfill or fill material to 90 percent maximum density for cohesive material, or 95 percent relative density for cohesionless material.
b. Areas Under Walkways: Compact top 6 inches of subgrade and each layer of backfill or fill material to 90 percent maximum density for cohesive material, or 95 percent relative density for cohesionless material.
c. Other Areas: Compact top 6 inches of subgrade and each layer of backfill or fill material to 85 percent maximum density for cohesive soils, and 90 percent relative density for cohesionless soils.

2. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water. Apply water in minimum quantity necessary to achieve required moisture content and to prevent water appearing on surface during, or subsequent to, compaction operations.

O. Subsidence: Where subsidence occurs at electrical installation excavations during the period 12 months after Substantial Completion, remove surface treatment (i.e., pavement, lawn, or other finish), add backfill material, compact to specified conditions, and replace surface treatment. Restore appearance, qualify, and condition of surface of finish to match adjacent areas.

3.3 ELECTRICAL EQUIPMENT INSTALLATION.

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.4 FIRESTOPPING.

A. Apply firestopping to cable and raceway penetrations of fire-rated floor, ceiling and wall assemblies to achieve fire-resistance rating of the assembly. Provide 3M™ Fire Barrier Moldable Putty Pads. MPP+ shall be a one component, ready-to-use, intumescent elastomer capable of expanding a minimum of 3 times at 1000°F. The material shall be thixotropic and shall be applicable to overhead, vertical and horizontal firestops. Under normal conditions, 3M™ Fire Barrier Moldable Putty Pads MPP+ shall be noncorrosive to metal and compatible with synthetic cable jackets. The putty shall be listed by independent test agencies such as UL, Intertek or FM. 3M™ Fire Barrier Moldable Putty Pads MPP+ shall be tested to and pass the criteria of ASTM E 814 (UL 1479) Standard Test Method for Fire Tests of Penetration Firestop Systems and

CAN/ULC S115 Standard Method of Fire Tests of Firestop Systems. 3M™ Fire Barrier Moldable Putty Pads MPP+ meets the requirements of the IBC, NFPA 5000, NEC (NFPA 70), NFPA 101.

B. Additional firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping".

C. Provide Endothermic Mat where electrical boxes, panels and equipment are installed within fire rated floors, walls and ceilings using 3M™ Instream™ Endothermic Mat products to match fire ratings.

3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways penetrate concrete slabs, concrete or masonry walls, or fire- rated floor and wall assemblies.

B. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section “Penetration Firestopping”.

C. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

D. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

E. Rectangular sleeve Minimum Metal Thickness:

1. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.
2. For sleeve cross-section rectangle perimeter equal to or greater than 50 inches, and 1 or more sides equal to or greater than 16 inches, thickness shall be 0.138 inch

F. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

G. Cut sleeves to length for mounting flush with both surfaces of walls.

H. Extend sleeves installed in floors 2 inches above finished floor level.

I. Seal space outside of sleeves with grout for penetrations of concrete and masonry with approved joint compound for gypsum board assemblies.

J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 07 Section “Joint Sealants” for materials and installation.

K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway penetration sleeves with firestop materials. Comply with Division 07 Section “Penetration Firestopping”.

L. Roof-Penetration Sleeves: Seal penetration of individual raceways with flexible boot-type flashing units applied in coordination with roofing work.

M. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

N. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.6 CUTTING AND PATCHING

A. General: Perform cutting and patching in accordance with Division 01 Section "Cutting and Patching." In addition to the requirements specified in Division 01, the following requirements apply:

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

    a. Uncover Work to provide for installation of ill-timed Work.
    b. Remove and replace defective Work.
    c. Remove and replace Work not conforming to requirements of the Contract Documents
    d. Remove samples of installed Work as specified for testing.
    e. Upon written instructions for the Architect, uncover and restore Work to provide for Architect observation of concealed work.

2. Cut, remove, and legally dispose of 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.
3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and direct to adjacent areas.
5. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
6. Patch finished surfaces and building components using new materials matching materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

3.7 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Excavation for underground utilities.
2. Concrete bases.
3. Cutting and patching for electrical construction.
4. Touchup painting.

B. Inspect installed sleeve and sleeve-seal installations and associated firestopping for damage and faulty work.

3.8 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 09 Section "Painting".

1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
2. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer

3.9 MOUNTING HEIGHTS

A. Mounting heights of electrical items shall be as listed below, unless otherwise specified, or by the Architect/Engineer's field instructions. Dimensions are above finished floor, unless otherwise indicated. In areas where code requires different mount heights, as in hazardous areas, comply with code requirements.

1. General Receptacles-18" to C.L.
2. Outdoor Receptacles-24" to C.L.
3. General Tele and Data Outlets-18" to C.L
4. General Toggle Switches-46" to C.L.
5. Fire Alarm Pull Stations-46" to C.L.
6. Security Call Stations-48" to C.L
7. General Television Outlets-18" to C.L.
8. Fire Alarm Audio Visual Devices-80" to C.L.
9. General Wall Mounted Lights-90" to C.L.
10. Corridor Wall Sconces (>4" deep)-66" to C.L.
11. Exit Signs-90" to C.L.
12. Individual Disconnects and Starters-60" to C.L.
13. Grouped Disconnects and Starters>12" to C.L.>72" to C.L.
14. Panelboard Overcurrent Devices>12" to C.L.>72" to C.L.
15. Grouped Utility Revenue Meters: >30" to C.L.>66" to C.L.

3.10 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 260505

SECTION 260507 - TEMPORARY POWER AND COMMUNICATION SYSTEMS.

PART 1 - GENERAL

1.1 SUMMARY.

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 230501 “Basic Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.
3. Section 230502 “Special Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.

1.2 SUBMITTALS.

A. Site Plan: Show temporary construction trailer and/or building facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Electrical contractor shall complete and submit a temporary electrical service meter application (load letter) to the local power utility company indicating requested electrical service size, voltage, and all associated loads. Load letter shall also include service start and completion dates.

1.3 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70, Local Building Code and Local Power utility service requirements.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.4 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use

as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities:

PART 2 - (Not Used).

PART 3 - EXECUTION.

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION.

A. Temporary overhead/underground electric power utility service shall be coordinated with local power utility company. Provide all electrical equipment infrastructure, connections and extensions of utility services and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Pay electric power service use charges for electricity used by all entities for construction operations.

1. Provide a temporary commercial AC electrical service rated not less than 400 amps at 277/480V, 3-phase, 4-wire, 60 Hz. For construction equipment and a separate temporary commercial AC electrical service rated not less than 100 amps at 120/208V, 3-phase, 4-wire, 60 Hz. For construction trailer(s).
2. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
3. Install electric power service overhead, unless otherwise indicated.
4. Connect temporary service to Owner's existing power source, as directed by Owner.

B. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, security, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign.

C. Telephone Service: Provide temporary telephone service in common-use facilities and/or contractor’s construction trailer for use by all construction personnel. Install three T1 telephone line(s) for each field office, weather it is in the contractor’s construction trailer or on-site building construction facility.

1. Provide additional telephone lines for the following:

a. Provide a dedicated telephone line for each facsimile machine and computer in each field office.
b. Provide one telephone line(s) for Owner's use.

2. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor’s home office.
d. Architect’s office.
e. Engineers’ office.
f. Owner’s office.
g. Principal subcontractors’ field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

D. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, video surveillance security systems in common-use facilities and site.

1. Provide one high speed DSL or T-1 line in primary field office.
2. Coordinate with telephone utility company a minimum of four (4) weeks prior to construction start date.

END OF SECTION 260507

SECTION 260510 – ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removal of existing electrical equipment, wiring, and conduit throughout the entire facility as indicated on drawings; removal of designated construction; dismantling, cutting and alterations for completion of the work.
2. Disposal of materials.
3. Storage of removed materials.
4. Identification of utilities.
5. Salvaged items.
6. Protection of items to remain as indicated on Drawing.
7. Relocate existing equipment to accommodate construction.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 230501 “Basic Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.
3. Section 230502 “Special Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.

1.2 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of capped utilities.

1.3 SCHEDULING

A. Schedule work to coincide with new construction.

B. Cease operations immediately when structure appears to be in danger and notify the Owner. Do not resume operations until directed.

1.4 COORDINATION

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Shut down periods:

1. Arrange timing of shut-down periods of in-service panels with the Owner. Do not shut down any utility without prior written approval.
2. Keep shut-down period to minimum or use intermittent period as directed by the Owner.
3. Maintain life-safety systems in full operation in occupied facilities, or provide notice minimum 3 days in advance.

PART 2 - PRODUCTS (Not Used).

PART 3 - EXECUTION.

3.1 EXAMINATION.

A. Verify wiring and equipment indicated to be demolished serve only abandoned facilities.

B. Verify termination points for demolished services.

3.2 PREPARATION

A. Erect, and maintain temporary safeguards, including warning signs and lights, barricades, and similar measures, for protection of the public, Contractor's employees, and existing improvements to remain.

3.3 DEMOLITION

A. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to the Owner or his representative before disturbing existing installation.

B. Remove conduit, wire, boxes, and fastening devices to avoid any interference with new installation.

C. Disconnect or shut off service to areas where electrical work is to be removed. Remove electrical fixtures, equipment, and related switches, outlets, conduit and wiring which are not part of final project.

D. Install temporary wiring and connections to maintain existing systems in service during construction.

E. Do not perform work on energized electrical equipment or circuits.

F. Remove, relocate, and extend existing installations to accommodate new construction.

G. Repair adjacent construction and finishes damaged during demolition and extension work.

H. Clean and repair existing equipment to remain or to be reinstalled.

I. Protect and retain power to existing active equipment remaining.

J. Cap abandoned empty conduit at both ends.

3.4 SALVAGE ITEMS.

A. Items of salvageable value may be removed as work progresses. Transport salvaged items from site as they are removed.

3.5 CLEANING

A. Remove demolished materials as work progresses. Legally dispose.

B. Keep workplace neat.

END OF SECTION 260510

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper building wire.
2. Metal-clad cable, Type MC.
3. Connectors and splices.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 230501 “Basic Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.
3. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
4. Section 260513 "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 601 to 35 000 V.
5. Section 260523 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2, and 3 control cables.
6. Section 271313 "Communications Copper Backbone Cabling" for twisted pair cabling used for data circuits.
7. Section 271513 "Communications Copper Horizontal Cabling" for twisted pair cabling used for data circuits.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:
1. Product Data: For each conductor and cable indicating lead content

C. Product Schedule: Indicate type, use, location, and termination locations.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. All building wiring shall be of copper material. Aluminum shall not be permitted to be used.

2.2 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

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

1. Alpha Wire Company.
2. Belden Inc.
3. Draka, a Prysmian Brand.
4. Southwire Company.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

E. Conductor Insulation:

1. Type NM: Comply with UL 83 and UL 719.
2. Type USE-2 and Type SE: Comply with UL 854.
3. Type TC-ER: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.
4. Type THHN and Type THWN-2: Comply with UL 83.
5. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
6. Type UF: Comply with UL 83 and UL 493.
7. Type XHHW-2: Comply with UL 44.
8.

2.3 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Alpha Wire Company.

2. Belden Inc.
3. General Cable Technologies Corporation.
4. Southwire Company.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Circuits:

1. Single circuit and multicircuit with color-coded conductors.
2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.

E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

F. Ground Conductor: Insulated.

G. Conductor Insulation:

1. Type TFN/THHN/THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.

H. Armor: Steel, interlocked.

I. Jacket: PVC applied over armor.

2.4 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. 3M Electrical Products.
2. AFC Cable Systems; a part of Atkore International.
3. Hubbell Power Systems, Inc.
4. Ideal Industries, Inc.
5. O-Z/Gedney; a brand of Emerson Industrial Automation.
6. Service Wire Co.

C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper.
2. Type: One hole with standard barrels.
3. Termination: Compression.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders:

1. Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
2. Copper for feeders smaller than No. 4 AWG; copper for feeders No. 4 AWG and larger. Conductors must be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits:

1. Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
2. Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

C. ASD Output Circuits Cable: Extra-flexible stranded for all sizes.

D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

E. PV Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN/THWN-2, single conductors in raceway, Type XHHW-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway, Type XHHW-2, single conductors in raceway, Armored cable.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway, Armored cable, Type AC, Metal-clad cable, Type MC.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway, Type XHHW-2, single conductors in raceway, Underground feeder cable, Type UF.

E. Feeders Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway, Armored cable, Type AC, Metal-clad cable, Type MC.

F. Feeders in Cable Tray: Type THHN/THWN-2, single conductors in raceway, Armored cable, Type AC, Metal-clad cable, Type MC.

G. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway, Armored cable, Type AC, Metal-clad cable, Type MC.

H. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway, Armored cable, Type AC, Metal-clad cable, Type MC.

I. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

J. Branch Circuits Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway, Armored cable, Type AC, Metal-clad cable, Type MC.

K. Branch Circuits in Cable Tray: Type THHN/THWN-2, single conductors in raceway, Armored cable, Type AC, Metal-clad cable, Type MC.

L. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless steel, wire-mesh, strain relief device at terminations to suit application.

M. ASD Output Circuits: Type TC-ER cable with braided shield.

3.3 INSTALLATION, GENERAL

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

G. Complete cable tray systems installation according to Section 260536 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

3.4 INSTALLATION OF FIRE-ALARM WIRE AND CABLE

A. Comply with NFPA 72.

B. Wiring Method: Install wiring in metal pathway according to Section 270528.29 "Hangers and Supports for Communications Systems."

1. Install plenum cable in environmental airspaces, including plenum ceilings.
2. Fire-alarm circuits and equipment control wiring associated with fire-alarm system must be installed in a dedicated pathway system.

    a. Cables and pathways used for fire-alarm circuits, and equipment control wiring associated with fire-alarm system, may not contain any other wire or cable.

3. Fire-Rated Cables: Use of two-hour, fire-rated fire-alarm cables, NFPA 70, Types MI and CI, is permitted.
4. Signaling Line Circuits: Power-limited fire-alarm cables must not be installed in the same cable or pathway as signaling line circuits.

C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes; cabinets; or equipment enclosures where circuit connections are made.

E. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.

F. Risers: Install at least two vertical cable risers to serve the fire-alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent receipt or transmission of signals from other floors or zones.

G. Wiring to Remote Alarm Transmitting Device: 1 inch conduit between the fire-alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.5 CONNECTIONS

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

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inch of slack.

D. Comply with requirements in Section 283111 " Digital, Addressable Fire-Alarm Systems" for connecting, terminating, and identifying wires and cables.

3.6 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.7 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.8 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.9 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
2. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors feeding the following critical equipment and services for compliance with requirements:
3. Perform each of the following visual and electrical tests:

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

        1) A low-resistance ohmmeter.
        2) Calibrated torque wrench.
        3) Thermographic survey.

    c. Inspect compression-applied connectors for correct cable match and indentation.
    d. Inspect for correct identification.
    e. Inspect cable jacket and condition.
    f. 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.

g. Continuity test on each conductor and cable.
h. Uniform resistance of parallel conductors.

4. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

   a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
   b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

5. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.

B. Cables will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION 260519

SECTION 260523 - CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Category 5e balanced twisted pair cable.
2. Category 6 balanced twisted pair cable.
3. Category 6a balanced twisted pair cable.
4. Balanced twisted pair cable hardware.
5. Control cable.
6. Control-circuit conductors.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 230501 “Basic Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Flame Travel and Smoke Density in Plenums: As determined by testing identical products according to NFPA 262, by a qualified testing agency. Identify products for installation in plenums with appropriate markings of applicable testing agency.

1. Flame Travel Distance: 60 inch (1520 mm) or less.
2. Peak Optical Smoke Density: 0.5 or less.
3. Average Optical Smoke Density: 0.15 or less.

C. Flame Travel and Smoke Density for Riser Cables in Non-Plenum Building Spaces: As determined by testing identical products according to UL 1666.

D. Flame Travel and Smoke Density for Cables in Non-Riser Applications and Non-Plenum Building Spaces: As determined by testing identical products according to UL 1685.

2.2 CATEGORY 5e BALANCED TWISTED PAIR CABLE

A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 5e cable at frequencies up to 100 MHz.

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

1. AMP NETCONNECT; a TE Connectivity Ltd. company.
2. Belden Inc.
3. Berk-Tek Leviton; a Nexans/Leviton alliance.
4. CommScope, Inc.
5. West Penn Wire.

C. Standard: Comply with ICEA S-90-661, NEMA WC 63.1, and TIA-568-C.2 for Category 5e cables.

D. Conductors: 100 ohm, No. 24 AWG solid copper.

E. Shielding/Screening: Unshielded twisted pairs (UTP), Shielded twisted pairs (FTP), Screened twisted pairs (F/UTP) and Screened and shielded twisted pairs (F/FTP).

F. Cable Rating: Plenum.

G. Jacket: Gray thermoplastic (or other color approved by Owner).

2.3 CATEGORY 6 BALANCED TWISTED PAIR CABLE

A. Description: Four-pair, balanced-twisted pair cable, with internal spline, certified to meet transmission characteristics of Category 6 cable at frequencies up to 250 MHz.

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

1. 3M.

2. AMP NETCONNECT; a TE Connectivity Ltd. company.
3. Belden CDT Networking Division/NORDX.
4. Berk-Tek Leviton; a Nexans/Leviton alliance.
5. SYSTIMAX Solutions; a CommScope Inc. brand.

C. Standard: Comply with NEMA WC 66/ICEA S-116-732 and TIA-568-C.2 for Category 6 cables.

D. Conductors: 100 ohm, No. 23 AWG solid copper.

E. Shielding/Screening: Unshielded twisted pairs (UTP), Shielded twisted pairs (FTP), Screened twisted pairs (F/UTP) and Screened and shielded twisted pairs (F/FTP).

F. Cable Rating: Plenum.

G. Jacket: Blue thermoplastic (or other color approved by Owner).

2.4 CATEGORY 6a BALANCED TWISTED PAIR CABLE

A. Description: Four-pair, balanced-twisted pair cable, with internal spline, certified to meet transmission characteristics of Category 6a cable at frequencies up to 500 MHz.

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

1. 3M.
2. AMP NETCONNECT; a TE Connectivity Ltd. company.
3. Belden CDT Networking Division/NORDX.
4. Berk-Tek Leviton; a Nexans/Leviton alliance.
5. SYSTIMAX Solutions; a CommScope Inc. brand.

C. Standard: Comply with TIA-568-C.2 for Category 6a cables.

D. Conductors: 100 ohm, No. 23 AWG solid copper.

E. Shielding/Screening: Unshielded twisted pairs (UTP), Shielded twisted pairs (FTP), Screened twisted pairs (F/UTP) and Screened and shielded twisted pairs (F/FTP).

F. Cable Rating: Plenum.

G. Jacket: Blue thermoplastic (or other color approved by Owner).

2.5 BALANCED TWISTED PAIR CABLE HARDWARE

A. Description: Hardware designed to connect, splice, and terminate balanced twisted pair copper communications cable.

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

1. 3M.
2. American Technology Systems Industries, Inc.
3. AMP NETCONNECT; a TE Connectivity Ltd. company.
4. Belden CDT Networking Division/NORDX.
5. Berk-Tek Leviton; a Nexans/Leviton alliance.
6. SYSTIMAX Solutions; a CommScope Inc. brand.

C. General Requirements for Balanced Twisted Pair Cable Hardware:

1. Comply with the performance requirements of Category 5e, Category 6 and Category 6a.
2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
3. Cables must be terminated with connecting hardware of same category or higher.

D. Source Limitations: Obtain balanced twisted pair cable hardware from same manufacturer as balanced twisted pair cable, from single source.

E. Connecting Blocks: 110-style IDC for Category 5e and 110-style IDC for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare, integral with connector bodies, including plugs and jacks where indicated.

F. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.

1. Number of Terminals per Field: One for each conductor in assigned cables.

G. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.

1. Features:

a. Universal T568A and T568B wiring labels.
b. Labeling areas adjacent to conductors.
c. Replaceable connectors.
d. 24 or 48 ports.

2. Construction: 16-gauge steel and mountable on 19 inch **(483 mm)** equipment racks.
3. Number of Jacks per Field: One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.

H. Patch Cords: Factory-made, four-pair cables in 48 inch **(1200 mm)** lengths; terminated with an eight-position modular plug at each end.

1. Patch cords must have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords must have latch guards to protect against snagging.
2. Patch cords must have color-coded boots for circuit identification.

I. Plugs and Plug Assemblies:

1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair 100 ohm unshielded or shielded balanced twisted pair cable.
2. Comply with IEC 60603-7-1, IEC 60603-7-2, IEC 60603-7-3, IEC 60603-7-4, and IEC 60603-7.5.
3. Marked to indicate transmission performance.

J. Jacks and Jack Assemblies:

1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair 100 ohm unshielded or shielded balanced twisted pair cable.
2. Designed to snap-in to a patch panel or faceplate.
3. Standards:

    a. Category 5e, unshielded balanced twisted pair cable must comply with IEC 60603-7-2.
    b. Category 5e, shielded balanced twisted pair cable must comply with IEC 60603-7-3.
    c. Category 6, unshielded balanced twisted pair cable must comply with IEC 60603-7-4.
    d. Category 6, shielded balanced twisted pair cable must comply with IEC 60603-7.5.
    e. Category 6a, unshielded balanced twisted pair cable must comply with IEC 60603-7-41.
    f. Category 6a, shielded balanced twisted pair cable must comply with IEC 60603-7.51.

4. Marked to indicate transmission performance.

K. Faceplate:

1. Four port, vertical single-gang faceplates designed to mount to single-gang wall boxes.
2. Eight port, vertical double-gang faceplates designed to mount to double-gang wall boxes.
3. Plastic Faceplate: High-impact plastic. Coordinate color with Section 262726 "Wiring Devices."
4. Metal Faceplate: Stainless steel, complying with requirements in Section 262726 "Wiring Devices."
5. For use with snap-in jacks accommodating any combination of balanced twisted pair, optical fiber, and coaxial work area cords.

    a. Flush mounting jacks, positioning the cord at a 45-degree angle.

L. Legend:

1. Machine printed, in the field, using adhesive-tape label.
2. Snap-in, clear-label covers and machine-printed paper inserts.

2.6 CONTROL CABLE

A. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. Multi-pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with NFPA 262.

2.7 CONTROL-CIRCUIT CONDUCTORS

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

1. Encore Wire Corporation.
2. General Cable; Prysmian Group North America.
3. Service Wire Co.
4. Southwire Company.

B. Class 1 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.

C. Class 2 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway, power-limited cable, concealed in building finishes or power-limited tray cable, in cable tray.

D. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway, [power-limited tray cable, in cable tray, or Type TW or Type TF, complying with UL 83, in raceway.

E. Class 2 Control Circuits and Class 3 Remote-Control and Signal Circuits That Supply Critical Circuits: Circuit Integrity (CI) cable.

1. Smoke control signaling and control circuits.

2.8 FIRE-ALARM WIRE AND CABLE

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

1. Allied Wire & Cable Inc.
2. CommScope, Inc.
3. Comtran Corporation.
4. West Penn Wire.

B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

C. Signaling Line Circuits: Twisted, shielded pair size as recommended by system manufacturer.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.

D. Non-Power-Limited Circuits: Solid-copper conductors with 600 V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.

1. Control-Voltage Circuits: No. 16 AWG, minimum, in pathway.
2. Low-Voltage Circuits: No. 12 AWG, minimum, in pathway.
3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with red identifier stripe, NTRL listed for fire-alarm and cable tray installation, plenum rated.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to evaluate cables.

B. Factory test twisted pair cables according to TIA-568-C.2.

C. Cable will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Test cables on receipt at Project site.

1. Test each pair of twisted pair cable for open and short circuits.

3.2 INSTALLATION OF RACEWAYS AND BOXES

A. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or modified in this Section.

1. Outlet boxes must be no smaller than 2 inch wide, 3 inch high, and 2-1/2 inch deep.
2. Flexible metal conduit must not be used.

B. Comply with TIA-569-D for pull-box sizing and length of conduit and number of bends between pull points.

C. Install manufactured conduit sweeps and long-radius elbows if possible.

D. Raceway Installation in Equipment Rooms:

1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed, or in the corner of the room if multiple sheets of plywood are installed around perimeter walls of the room.
2. Install cable trays to route cables if conduits cannot be located in these positions.
3. Secure conduits to backboard if entering the room from overhead.
4. Extend conduits 3 inch above finished floor.
5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

E. Backboards: Install backboards with 96 inch dimension vertical. Butt adjacent sheets tightly and form smooth gap-free corners and joints.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA-568-C Series of standards.
2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems."
3. Terminate all conductors; cable must not contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
4. Cables may not be spliced and must be continuous from terminal to terminal. Do not splice cable between termination, tap, or junction points.
5. Cables serving a common system may be grouped in a common raceway. Install network cabling and control wiring and cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
6. Secure and support cables at intervals not exceeding 30 inch and not more than 6 inch from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Install lacing bars and distribution spools.
8. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Monitor cable pull tensions.
11. Support: Do not allow cables to lie on removable ceiling tiles.
12. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
13. Provide strain relief.
14. Keep runs short. Allow extra length for connecting to terminals. Do not bend cables in a radius less than 10 times the cable OD. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.
15. Ground wire must be copper, and grounding methods must comply with IEEE C2. Demonstrate ground resistance.

C. Balanced Twisted Pair Cable Installation:

1. Comply with TIA-568-C.2.
2. Install termination hardware as specified in Section 271513 "Communications Copper Horizontal Cabling" unless otherwise indicated.
3. Do not untwist balanced twisted pair cables more than 1/2 inch at the point of termination to maintain cable geometry.

D. Installation of Control-Circuit Conductors:

1. Install wiring in raceways.
2. Use insulated spade lugs for wire and cable connection to screw terminals.
3. Comply with requirements specified in Section 260533 "Raceways and Boxes for Electrical Systems."

E. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wireway or pathway a minimum of 8 inch above ceilings by cable supports not more than 30 inch apart.
3. Cable must not be run through or on structural members or in contact with pipes, ducts, or other potentially damaging items. Do not run cables between structural members and corrugated panels.

F. Installation of Cable Routed Exposed under Raised Floors:

1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Below each feed point, neatly coil a minimum of 72 inch of cable in a coil not less than 12 inch in diameter.

G. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-D recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment must be as follows:

    a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inch.
    b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inch.
    c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inch.

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment must be as follows:

    a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inch.
    b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inch.
    c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inch.

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures must be as follows:

    a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
    b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inch.
    c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inch.

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inch.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inch.

3.4 REMOVAL OF CONDUCTORS AND CABLES

A. Remove abandoned conductors and cables. Abandoned conductors and cables are those installed that are not terminated at equipment and are not identified with a tag for future use.

3.5 CONTROL-CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits; No 14 AWG.
2. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm, and signal circuits; No 14 AWG.

3.6 FIRESTOPPING

A. Comply with requirements in Section 078413 "Penetration Firestopping."

B. Comply with TIA-569-D, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping" Chapter.

3.7 GROUNDING

A. For data communication wiring, comply with TIA-607-B and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.

B. For control-voltage wiring and cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.8 IDENTIFICATION

A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Identify data and communications system components, wiring, and cabling according to TIA-606-B; label printers must use label stocks, laminating adhesives, and inks complying with UL 969.

C. Identify each wire on each end and at each terminal with a number-coded identification tag. Each wire must have a unique tag.

3.9 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Visually inspect cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination, but not after cross-connection.

    a. Test instruments must meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in its "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in its "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

B. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.

C. End-to-end cabling will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 260523

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel slotted support systems.
2. Aluminum slotted support systems.
3. Nonmetallic slotted support systems.
4. Conduit and cable support devices.
5. Support for conductors in vertical conduit.
6. Structural steel for fabricated supports and restraints.
7. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
8. Fabricated metal equipment support assemblies.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 230501 “Basic Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.
3. Section 260548.16 "Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.
4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Delegated-Design Submittal: For hangers and supports for electrical systems.

1. Include design calculations and details of hangers.
2. Include design calculations for seismic restraints.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved.

B. Seismic Qualification Data: Certificates, for hangers and supports for electrical equipment and systems, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design hanger and support system.

B. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the supported equipment and systems will remain in place without separation of any parts when subjected to the seismic forces specified and the supported equipment and systems will be fully operational after the seismic event"
2. Component Importance Factor: 1.5.

C. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame Rating: Class 1.
2. Self-extinguishing according to ASTM D635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.

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

    a. ABB, Electrification Products Division.
    b. Allied Tube & Conduit; Atkore International.
    c. B-line; Eaton, Electrical Sector.
    d. Flex-Strut Inc.
    e. G-Strut.

2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Material for Channel, Fittings, and Accessories: Galvanized steel.
4. Channel Width: Selected for applicable load criteria.
5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

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

        1) Hilti, Inc.
        2) MKT Fastening, LLC.
        3) Simpson Strong-Tie Co., Inc.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

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

        1) B-line; Eaton, Electrical Sector.
        2) Hilti, Inc.
        3) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1. NECA 1.
2. NECA 101
3. NECA 102.
4. NECA 105.
5. NECA 111.

B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC and RMC may be supported by openings through structure members, according to NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
6. To Steel: Beam clamps complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION 260529

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Termination boxes.
3. Metal wireways and auxiliary gutters.
4. Surface raceways.
5. Boxes, enclosures, and cabinets.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 230501 “Basic Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.
3. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior duct banks, manholes, and underground utility construction.
4. Section 270528 "Pathways for Communications Systems" for conduits, wireways, surface pathways, innerduct, boxes, faceplate adapters, enclosures, cabinets, and handholes serving communications systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product:

B. Sustainable Design Submittals:

1. Product Data: For solvents and adhesives, indicating VOC content.
2. Laboratory Test Reports: For solvents and adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.

2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

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

1. Allied Tube & Conduit; a part of Atkore International.
2. Anamet Electrical, Inc.
3. O-Z/Gedney; a brand of Emerson Industrial Automation.
4. Republic Conduit.
5. Southwire Company.
6. Thomas & Betts Corporation; A Member of the ABB Group.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, bya qualified testing agency, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. ARC: Comply with ANSI C80.5 and UL 6A.

E. IMC: Comply with ANSI C80.6 and UL 1242.

F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040-inch, minimum

G. EMT: Comply with ANSI C80.3 and UL 797.

H. FMC: Comply with UL 1; zinc-coated steel or aluminum.

I. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

J. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
2. Fittings for EMT:

a. Material: Steel.
b. Type: Setscrew.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

K. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 METAL WIREWAYS AND AUXILIARY GUTTERS

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

1. Legrand, a Wiremold company.
2. B-line, an Eaton business.
3. Hoffman; a brand of Pentair Equipment Protection.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 or Type 3R unless otherwise indicated, and sized according to NFPA 70:

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.3 BOXES, ENCLOSURES, AND CABINETS

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

1. Crouse-Hinds, an Eaton business.
2. Hoffman; a brand of Pentair Equipment Protection
3. Hubbell Incorporated.
4. Hubbell Incorporated; Wiring Device-Kellems.
5. O-Z/Gedney; a brand of Emerson Industrial Automation.
6. RACO; Hubbell.
7. Thomas & Betts Corporation; A Member of the ABB Group.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A:

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover

E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

F. Metal Floor Boxes:

1. Material: Cast metal or sheet metal.
2. Type: Fully adjustable.
3. Shape: Rectangular.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application

G. Nonmetallic Floor Boxes: Nonadjustable, rectangular:

1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

H. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

I. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.

1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

J. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1:

K. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover:

L. Box extensions used to accommodate new building finishes shall be of same material as recessed box:

M. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

N. Gangable boxes are allowed.

O. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 or Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

P. Cabinets:

1. NEMA 250, Type 1 or Type 3R galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.

4. Metal barriers to separate wiring of different systems and voltage
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC, IMC, or RNC, Type EPC-40-PVC.
2. Concealed Conduit, Aboveground: GRC, IMC, EMT.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried concrete encased.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated.

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT:
3. Exposed and Subject to Severe Physical Damage: EMT. Raceway locations include the following:

    a. Loading dock.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical mezzanine.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: IMC.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations

C. Minimum Raceway Size: 1/2-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.

4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface raceways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

D. Arrange stub-ups so curved portions of bends are not visible above finished slab:

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction:

F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Support conduit within 12 inches of enclosures to which attached.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 1 inch of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from ENT to GRC or IMC before rising above floor.

I. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

N. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

O. Surface Raceways.

1. Install surface raceway with a minimum 2-inch radius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

P. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.

Q. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points.

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

R. Expansion-Joint Fittings:

1. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.

2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per degree F of temperature change for PVC conduits.
3. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
4. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

S. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC in damp or wet locations not subject to severe physical damage.

T. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

U. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.

V. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

W. Locate boxes so that cover or plate will not span different building finishes.

X. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

Y. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

Z. Set metal floor boxes level and flush with finished floor surface.

AA. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 SLEEVE AND SLEEVE SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling".

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Labels.
2. Bands and tubes.
3. Tapes and stencils.
4. Tags.
5. Signs.
6. Cable ties.
7. Miscellaneous identification products.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 230501 “Basic Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

D. Delegated-Design Submittal: For arc-flash hazard study.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Comply with NFPA 70E and Section 260573.19 "Arc-Flash Hazard Analysis" requirements for arc-flash warning labels.

F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

B. Color-Coding for Phase and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.

1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
2. Colors for 208/120-V Circuits:

    a. Phase A: Black.
    b. Phase B: Red.
    c. Phase C: Blue.

3. Colors for 480/277-V Circuits:

    a. Phase A: Brown.
    b. Phase B: Orange.
    c. Phase C: Yellow.

4. Color for Neutral: White (208/120V system) or gray (480/277V system).
5. Color for Equipment Grounds: Green.
6. Colors for Isolated Grounds: Green with two or more yellow stripes.
7. Color for 0-10V: Pink and purple.

C. Raceways and Cables Carrying Circuits at More Than 600 V:

1. Black letters on an orange field.
2. Legend: "DANGER - CONCEALED HIGH VOLTAGE WIRING."

D. Warning Label Colors:

1. Identify system voltage with black letters on an orange background.

E. Warning labels and signs shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

F. Equipment Identification Labels:

1. Black letters on a white field.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil- thick, vinyl flexible label with acrylic pressure-sensitive adhesive.

1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
2. Marker for Labels:

a. Permanent, waterproof, black ink marker recommended by tag manufacturer.
b. Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

D. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil- thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Minimum Nominal Size:

a. 1-1/2 by 6 inches for raceway and conductors.
b. 3-1/2 by 5 inches for equipment.
c. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

A. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters and that stay in place by gripping action.

B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.

2.5 TAPES AND STENCILS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.

C. Tape and Stencil: 4-inch- wide black stripes on 10-inch centers placed diagonally over orange background and are 12 inches wide. Stop stripes at legends.

D. Floor Marking Tape: 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

E. Underground-Line Warning Tape:

1. Tape:

   a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
   b. Printing on tape shall be permanent and shall not be damaged by burial operations.
   c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

2. Color and Printing:

   a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
   b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
   c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".

3. Tape Type I:

   a. Pigmented polyolefin, bright colored, continuous-printed on one side with the inscription of the utility**,** compounded for direct-burial service.
   b. Width: 3 inches.
   c. Thickness: 4 mils.
   d. Weight: 18.5 lb/1000 sq. ft.
   e. Tensile according to ASTM D882: 30 lbf and 2500 psi.

4. Tape Type II:

a. Multilayer laminate, consisting of high-density polyethylene scrim coated with pigmented polyolefin; bright colored, continuous-printed on one side with the inscription of the utility compounded for direct-burial service.
b. Width: 3 inches.
c. Thickness: 12 mils.
d. Weight: 36.1 lb/1000 sq. ft.
e. Tensile according to ASTM D882: 400 lbf and 11,500 psi.

5. Tape Type ID:

a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
b. Width: 3 inches.
c. Overall Thickness: 5 mils.
d. Foil Core Thickness: 0.35 mil
e. Weight: 28 lb/1000 sq. ft.
f. Tensile according to ASTM D882: 70 lbf and 4600 psi.

6. Tape Type IID:

a. Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
b. Width: 3 inches.
c. Overall Thickness: 8 mils.
d. Foil Core Thickness: 0.35 mil.
e. Weight: 34 lb/1000 sq. ft..
f. Tensile according to ASTM D882: 300 lbf and 12,500 psi.

2.6 TAGS

A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch,with stamped legend, punched for use with self-locking cable tie fastener.

B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch thick, color-coded for phase and voltage level, with factory printed permanent designations; punched for use with self-locking cable tie fastener.

C. Write-on Tags:

1. Polyester Tags: 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment.
2. Marker for Tags:

a. Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.7 SIGNS

A. Baked-Enamel Signs:

1. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal Size: 7 by 10 inches.

B. Metal-Backed Butyrate Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal Size: 10 by 14 inches.

C. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.
2. Thickness:

a. For signs up to 20 sq. in., minimum 1/16 inch thick.
b. For signs larger than 20 sq. in., 1/8 inch thick.
c. Engraved legend with black letters on white face.
d. Self-adhesive.
e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.8 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.

1. Minimum Width: 3/16 inch.

2. Tensile Strength at 73 Deg F according to ASTM D638: 7000 ps.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

H. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.

K. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

L. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."

M. Vinyl Wraparound Labels:

1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

N. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.

O. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.

P. Self-Adhesive Labels:

1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.

Q. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

R. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.

S. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.

T. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.

1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

U. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

V. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.

W. Underground Line Warning Tape:

1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.
2. Install underground-line warning tape for direct-buried cables and cables in raceways.

X. Metal Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using general-purpose cable ties.

Y. Nonmetallic Preprinted Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using general-purpose cable ties.

Z. Write-on Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using general-purpose cable ties.

AA. Baked-Enamel Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on minimum 1-1/2-inch- high sign; where two lines of text are required, use signs minimum 2 inches high.

BB. Metal-Backed Butyrate Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

CC. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high sign; where two lines of text are required, use labels 2 inches high.

DD. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil. Stencil legend "DANGER - CONCEALED HIGH-VOLTAGE WIRING" with 3-inch- high, black letters on 20-inch centers.

1. Locate identification at changes in direction, at penetrations of walls and floors, and at 10-foot maximum intervals.

D. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 60 A and 120 V to Ground: Identify with self-adhesive raceway labels.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

E. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."

F. Power-Circuit Conductor Identification, More Than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use nonmetallic preprinted tags colored and marked to indicate phase, and a separate tag with the circuit designation.

G. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.

H. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes with the conductor designation.

I. Conductors to Be Extended in the Future: Attach marker tape to conductors.

J. Auxiliary Electrical Systems Conductor Identification: Marker tape that is uniform and consistent with system used by manufacturer for factory-installed connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

K. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

L. Concealed Raceways and Duct Banks, More Than 600 V, within Buildings: Apply floor marking tape to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 12 inches (300 mm) of a floor that is in contact with earth or is framed above unexcavated space.
2. Wall surfaces directly external to raceways concealed within wall.
3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

M. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

N. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.

O. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.

1. Apply to exterior of door, cover, or other access.
2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

a. Power-transfer switches.
b. Controls with external control power connections.

P. Arc Flash Warning Labeling: Self-adhesive labels.

Q. Operating Instruction Signs: Self-adhesive labels.

R. Emergency Operating Instruction Signs: Laminated acrylic or melamine plastic signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.

S. Equipment Identification Labels:

1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
2. Outdoor Equipment: Stenciled legend 4 inches high.
3. Equipment to Be Labeled:

    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a engraved, laminated acrylic or melamine label.
    b. Enclosures and electrical cabinets.
    c. Access doors and panels for concealed electrical items.
    d. Switchgear.
    e. Switchboards.
    f. Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
    g. Substations.
    h. Emergency system boxes and enclosures.
    i. Motor-control centers.
    j. Enclosed switches.
    k. Enclosed circuit breakers.
    l. Enclosed controllers.
    m. Variable-speed controllers.
    n. Push-button stations.
    o. Power-transfer equipment.
    p. Contactors.
    q. Remote-controlled switches, dimmer modules, and control devices.
    r. Battery-inverter units.
    s. Battery racks.
    t. Power-generating units.
    u. Monitoring and control equipment.
    v. UPS equipment.

END OF SECTION 260553

SECTION 260800 – COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY.

A. The purpose of this section is to specify the Division 26 responsibilities and participation in the commissioning process.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 230501 “Basic Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.

C. Work under this contract shall conform to requirements of Division 01, General Requirements, Conditions of the Contract, and Supplementary Conditions. This specification covers commissioning of electrical systems which are part of this project.

D. Commissioning work shall be a team effort to ensure that all electrical equipment and systems have been completely and properly installed, function together correctly to meet the design intent, and document system performance. Commissioning shall coordinate system documentation, equipment start-up, and verification and performance testing.

E. The Commissioning Authority shall have responsibility for coordinating and directing each step of the commissioning process. The Authority shall be a true third party, not affiliated with any of the companies involved with the project design.

F. Electrical system installation, start-up, testing, preparation of O&M manuals, and operator training are the responsibility of the Division 26 Contractors, with coordination, observation, verification and commissioning the responsibility of Division 01, Section 01 9113. The 01 9113 commissioning process does not relieve Division 26 from the obligations to complete all portions of work in a satisfactory and fully operational manner.

G. Refer to Division 01, Section 01 9113, for a full list of commissioning related definitions. A few critical definitions are included below:

1. *Commissioning*. A systematic process that provides documented confirmation that specific and interconnected fire and life safety systems function according to the intended design criteria set forth in the project documents and satisfy the Owners’s operational needs, including compliance requirements of any applicable laws, regulations, codes, and standards requiring fire and life safety systems.
2. *Commissioning Authority (CxA*). The qualified person, company, or agency that plans, coordinates, and oversees the entire Cx process.

3. *Commissioning Plan*. The document prepared for each project which identifies the processes and procedures necessary for a successful Cx process.
4. *Commissioning Record*. The complete set of commissioning documentation for the project, which is turned over to the Owner at the end of the construction phase.
5. *Functional Testing.* Tests performed to verify compliance with manufacturers' specifications, applicable codes and standards, and the project BOD and OPR

1.2 RELATED SECTIONS

A. Division 01 Section 01 9113 - General Commissioning Requirements.

B. Individual Division 01 and 26 sections contain requirements related to the commissioning process.

1.3 ROLES AND RESPONSIBILITIES.

A. Refer to Section 01 9113 for Commissioning Authority, Owner, Architect, and General Contractor roles and responsibilities.

B. Electrical Contractor:

1. Include cost to complete commissioning requirements for electrical systems in the contract price.
2. Include requirements for submittal data, O&M data, and training in each purchase order or subcontract written.
3. Ensure cooperation and participation of specialty subcontractors such as communications, data, etc.
4. Ensure participation of major equipment manufacturers in appropriate training and testing activities.
5. Attend Construction Phase coordination meeting scheduled by the Commissioning Authority.
6. Conduct electrical system orientation and inspection when equipment is set.
7. Respond to (in writing) and address items documented in the Contractor Commissioning Issues Log.
8. Submit copies of all test results to the CxA
9. Complete Pre-Functional Checklists for all equipment.

    a. If no other system is agreed upon by Commissioning Team, Mechanical Contractor shall be responsible for completion of Pre-Functional Checklists for all equipment for which it issued a purchase order.
    b. Mechanical Contractor shall coordinate completion of Pre-Functional Checklists with all other contractors that have made connections to equipment for which it issued a purchase order.
    c. Remedy any deficiencies identified in Pre-Functional Checklists and notify CxA in writing that deficiencies have been addressed.

10. Assist the Commissioning Authority in all Pre-Functional Checklist verifications and Functional Performance Tests.
11. Prepare preliminary schedule for electrical system orientation and inspections, O&M manual submission, training sessions, emergency generator testing, equipment start up, and task completion for use by the Commissioning Authority. Update schedule as appropriate throughout the construction period.
12. Attend initial training session.
13. Conduct electrical system orientation and inspection at the equipment placement completion stage.
14. Update drawings to the record condition to date, and review with the Commissioning Authority.
15. Gather O&M data on all equipment and assemble in binders as required by the Commissioning Specification. Submit to Commissioning Authority for review prior to the completion of construction.
16. Notify the Commissioning Authority a minimum of two weeks in advance, so that witnessing equipment and system start-up and testing can begin.
17. Participate in, and schedule vendors and Contractors to participate in the training sessions as set up by the Commissioning Authority
18. Provide a complete set of as-built records to the Commissioning Authority

C. Equipment Suppliers and Miscellaneous Contractors:

1. Include cost for commissioning requirements in the contract price.
2. Provide submittals, and appropriate O&M manual section(s).
3. Attend initial commissioning coordination meeting scheduled by the Commissioning Authority.
4. Participate in training sessions as scheduled by the Commissioning Authority.
5. Demonstrate performance of equipment as applicable.

1.4 SCOPE OF WORK

A. Commissioning work of Division 26 shall include, but not be limited to:

1. Testing and start-up of the equipment.
2. Completion of Functional Checklists.
3. Cooperation with the Commissioning Authority.
4. Providing qualified personnel for participation in commissioning tests, including seasonal testing required after the initial testing
5. Providing equipment, materials, and labor as necessary to correct construction and/or equipment deficiencies found during the commissioning process.
6. Providing operation and maintenance manuals, and as-built drawings to the Commissioning Authority for verification
7. Providing training and demonstrations for the systems specified in this Division.

B. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems, and sub-systems. The following equipment and systems shall be evaluated:

1. Indoor lighting and controls including power transfer schemes, emergency lighting, and outdoor lighting.
2. Emergency power monitoring and operation.
3. Electrical support for mechanical equipment listed in Section 23 0800 - Commissioning of HVAC Systems.

C. System components which will not be functionally performance tested but will be included in the commissioning scope for conformance to the design documents, verification of specified Contractor testing, construction phase observation, and training verification shall include:

1. Primary switchgear.
2. Primary transformer.
3. Main switchgear.
4. Distribution switchgear.
5. Distribution switchboards.
6. Panel boards.
7. Isolation power systems.
8. Power conditioners.
9. Power factor correction

D. Timely and accurate documentation is essential for the commissioning process to be effective. Documentation required as part of the commissioning process shall include but not be limited to:

1. Commissioning Process Reports, which may include the following:

   a. Commissioning Field Reports.
   b. Design Team Issues Log.
   c. Contractor Commissioning Issues Log on the WCxs.
   d. Meeting minutes.

2. Pre-start, and start-up procedures.
3. Pre-functional Checklists.
4. Functional Test Procedures.
5. Training agenda and materials.
6. As-built records.
7. Commissioning report.
8. Operation and maintenance (O&M) manuals.
9. Mapping of reports into maintenance programs.

E. Detailed testing shall be performed on all installed equipment and systems to ensure that operation and performance conform to contract documents. All tests shall be witnessed by the Commissioning Authority. The following testing is required as part of the commissioning process:

1. Functional Checklists are comprised of a full range of checks and tests to determine that all components, equipment, systems, and interfaces between systems operate in accordance with contract documents. Verification is completed by the Division 23, 26, and 28 contractors and documented using Functional Checklists

2. Functional Performance Tests (FPT) shall determine if the electrical system is operating in accordance with the design intent. This includes all operating modes, interlocks, control responses, and specific responses to abnormal or emergency conditions.

F. Comprehensive training of O&M personnel shall be performed by the Electrical Contractor, and where appropriate, by other sub-contractors, and vendors prior to turnover of building to the Owner. The training shall include classroom instruction, along with hands-on instruction on the installed equipment and systems.

1.5 DOCUMENTATION

A. Commissioning Authority is Air Balancing Engineers Inc., 1175 N. Vine Street, Berwick, PA 18603. Phone (570) 759-1625.

PART 2 - PRODUCTS.

2.1 TEST EQUIPMENT.

A. The appropriate Contractor(s) shall furnish all special tools and equipment required for testing during the commissioning process. A list of all tools and equipment to be used during commissioning shall be submitted to the Commissioning Authority for approval. The Owner shall furnish necessary utilities for the commissioning process.

2.2 TEST EQUIPMENT - PROPRIETARY.

A. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon completion of the commissioning process.

PART 3 - EXECUTION.

3.1 GENERAL

A. A pre-construction meeting of all commissioning team members shall be held at a time and place designated by the Owner and Architect. The purpose shall be to familiarize all parties with the commissioning process, and to ensure that the responsibilities of each party are clearly understood.

B. The Contractor shall complete all phases of work so the systems can be started, tested, balanced, and commissioning procedures undertaken. This includes the complete installation of all equipment, materials, pipe, duct, wire, insulation, controls, etc., per the contract documents and related directives, clarifications, and change orders:

C. A Commissioning Plan shall be developed by the Commissioning Authority. The Contractor shall assist the Commissioning Authority in preparing the Commissioning Plan by providing all necessary information pertaining to the actual equipment and installation. If contractor-initiated system changes have been made that alter the commissioning process, the Commissioning Authority shall notify the Owner.

D. Acceptance procedures are normally intended to begin prior to completion of a system and/or sub-systems and shall be coordinated with the Division 26 contractor. Start of acceptance procedures before system completion does not relieve the contractor from completing those systems as per the schedule.

3.2 PARTICIPATION IN COMMISSIONING.

A. The Contractor shall provide skilled technicians to start-up and debug all systems within Division 26. These same technicians shall be made available to assist the Commissioning Authority in completing the commissioning program. Work schedules, time required for testing, etc., shall be requested by the Commissioning Authority and coordinated by the contractor. Contractor shall ensure that the qualified technician(s) are available and present during the agreed upon schedules and of sufficient duration to complete the necessary tests, adjustments, and/or problem resolutions.

B. System performance problems and discrepancies may require additional technician time, Commissioning Authority time, reconstruction of systems, and/or replacement of system components. The additional technician time shall be made available for subsequent commissioning periods until the required system performance is obtained.

C. The Commissioning Authority reserves the right to question the appropriateness and qualifications of the technicians relative to each item of equipment, system, and/or sub-system. Qualifications of technicians shall include expert knowledge relative to the specific equipment involved and a willingness to work with the Commissioning Authority. Contractor shall provide adequate documentation and tools to start-up and test the equipment, system, and/or sub- system.

3.3 DEFICIENCY RESOLUTION.

A. In some systems, maladjustments, misapplied equipment, and/or deficient performance under varying loads will result in additional work being required to commission the systems. This work shall be completed under the direction of the Owner, with input from the contractor, equipment supplier, and Commissioning Authority. Whereas all members shall have input and the opportunity to discuss, debate, and work out problems, the Owner have final jurisdiction over any additional work done to achieve performance:

B. Corrective work shall be completed in a timely fashion to permit the completion of the commissioning process. Experimentation to demonstrate system performance may be permitted. If the Commissioning Authority deems the experimentation work to be ineffective or untimely as it relates to the commissioning process, the Commissioning Authority shall notify the Owner, indicating the nature of the problem, expected steps to be taken, and suggested deadline(s) for completion of activities. If the deadline(s) pass without resolution of the problem, the Owner

reserves the right to obtain supplementary services and/or equipment to resolve the problem. Costs incurred to solve the problems in an expeditious manner shall be the contractor's responsibility.

C. The Owner's contract with the Commissioning Authority includes up to two tests of each piece of equipment or system included in the commissioning scope. Commissioning Authority time and expenses required for retests beyond two, if required, due to incomplete installation or otherwise, will be paid by the Owner and reimbursed by the contractor.

3.4 ADDITIONAL COMMISSIONING.

A. Additional commissioning activities may be required after system adjustments, replacements, etc., are completed. The contractor(s), suppliers, and Commissioning Authority shall include a reasonable reserve to complete this work as part of their contractual obligations.

3.5 SEASONAL COMMISSIONING.

A. Seasonal commissioning pertains to testing under full load conditions during peak heating and peak cooling seasons, as well as part load conditions in the spring and fall. Initial commissioning shall be done as soon as contract work is completed, regardless of season. Subsequent commissioning may be undertaken at any time thereafter to ascertain adequate performance during the different seasons.

B. Heating equipment shall be tested during winter design extremes. Cooling equipment shall be tested during summer design extremes with a fully occupied building. Each contractor and supplier shall be responsible to participate in the initial and the alternate peak season tests of the systems as required to demonstrate performance.

3.6 CONSTRUCTION PHASE OBSERVATION

A. Scope of Construction Phase Observation.

1. The Commissioning Authority will conduct periodic observations during the construction phase to monitor progress and compliance with the design intent and contract documents.
2. Commissioning Authority observations will coincide with design team observations and are not intended to take the place of this work.

B. Documentation and Reporting

1. Issues identified by the Commissioning Authority during construction phase will be documented on the Issues Log on the WCxS and distributed to Commissioning Team members.
2. Progress during the construction phase will also be documented by the Commissioning Authority using Commissioning Process Reports.

3.7 ACCEPTANCE PROCEDURES.

A. Pre-Functional Checklists.

1. Scope of Pre-Functional Checklists.

a. Tests and verifications included in the Pre-Functional Checklists shall determine if all components, equipment, systems, and interfaces between systems are installed and are ready to operate in accordance with contract documents.

2. Participants in Pre-Functional Checklists.

a. The Commissioning Authority shall be responsible for preparing the scope of these checklists, which will be completed by the installing contractors and then verified (via spot checking and Functional Performance Testing). Participating contractors, manufacturers, suppliers, etc. shall include all costs to do the work involved in these tests in their proposals. Following is a list of tasks and supporting information that shall be required.
b. Electrical Contractor - provide a foreman electrician familiar with the electrical interlocks, interfaces with emergency power supply, and interfaces with alarm and life-safety systems. Provide access to the contract plans, and all as-built schematics of sub-systems, interfaces, and interlocks.

3. Documentation and Reporting Requirements.

a. Pre-Functional Checklists shall be provided for each component, piece of equipment, system, and sub-system, including all interfaces, interlocks, etc. Each item to be tested shall have a different entry line with space provided for comments. The checklists will include spaces for each party to sign off on.
b. Completed checklists shall be submitted to the Commissioning Authority for acceptance and inclusion in the commissioning report.

4. Acceptance of Pre-Functional Checklists.

a. The Commissioning Authority will select, at random, 10% of the checklists for verification, 100% of the Fire Alarm checklist.
b. If 10% or more of the checklists are found to be inaccurate for each system or equipment type, all of the checklists for that system or equipment type will be rejected. Complete, accurate checklists will need to be resubmitted.

B. Functional Performance Testing.

1. Scope of Functional Performance Testing.

a. Functional performance tests shall determine if the electrical system is operating in accordance with the final design intent. This includes all operating modes, interlocks, control responses, and specific responses to abnormal or emergency conditions.

2. Submittals.

a. Detailed procedures for each series of tests will be developed by the Commissioning Authority for review and acceptance by the Owner. The procedures shall include samples of the data sheets that will be part of thereports.

3. Participants in Functional Performance Tests

a. Participants in the functional performance tests shall be the same as those listed in the Functional Checklists

4. Functional Performance Test Procedures.

a. The Commissioning Authority shall supervise and direct all functional performance tests

1) Set the system equipment into the operating mode to be tested (i.e. normal shut-down, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
2) The Commissioning Authority shall inspect and verify the position of each device and interlock identified in the test procedure. Each item shall be signed off as acceptable or failed.
3) This test shall be repeated for each operating cycle that applies to the mechanical system being tested.
4) Operating checks shall include all safety cutouts, alarms, and interlocks with smoke control and life safety systems during all modes of operation of the electrical system.
5) If during a test an operating an operating deficiency is observed, appropriate comments will be added to the web-based commissioning software.

b. If deficiencies are identified during Functional Performance Testing, the Construction Manager/General Contractor will be notified, and action taken to remedy the deficiency. The final completed functional test procedures on the WCxS will be reviewed by the Commissioning Authority to determine if testing is complete and the system is functioning in accordance with the contract documents.

5. Documentation and Reporting Requirements.

a. All measured data, data sheets, and a comprehensive summary, describing the operation of the electrical system at the time of testing shall be submitted to the Commissioning Authority.
b. A preliminary functional performance test report shall be prepared by the Commissioning Authority and submitted to the Design Professional for review. Any identified deficiencies need to be evaluated by the Design Professional and Construction Manager/General Contractor to determine if they are part of the contractor's or sub-contractor's contractual obligations. Construction deficiencies shall be corrected by the responsible contractor(s), and the specific functional performance test repeated.
c. If it is determined that the electrical system is constructed in accordance with the contract documents, and the performance deficiencies are not part of the contract documents, the Owner must decide whether any required modifications needed to

bring the performance of the electrical system up to the finalized design intent shall be implemented, or if the test shall be accepted as submitted. If corrective work is performed, the Owner shall determine if a portion or all required functional performance tests should be repeated, and a revised report submitted.

3.8 SYSTEMS MANUAL

A. The Systems Manual shall be submitted in paper AND/OR electronic format and shall contain the following major sections:

1. System Descriptions:

a. Each major system shall be described, typewritten, in general terms, including major components, interconnections, theory of operation, theory of controls, unusual features and major safety precautions. This information should correlate with information provided in the manufacturers' instructions book. This section shall include, but not be limited to, the following data.

1) Detailed description of each system and each of its components with diagrams and illustrations where applicable
2) Wiring and control diagrams with data to explain detailed operation and control of each component.
3) Control sequences describing start-up, all modes of operation, and shut down.
4) Corrected shop drawings.
5) Approved product data including all performance curves and rating data
6) Copies of approved certifications and laboratory or factory test reports (where applicable).
7) Copies of warranties.

b. System diagrams, described in the following section, shall be incorporated in the appropriate systems descriptions. These should be reduced in size or folded to usefully fit into the manual.

2. Operating Instructions.

a. Condensed, typewritten, suitable for posting, instructions shall be provided for each major piece of equipment. Where more than one (1) common unit is installed, one instruction is adequate. The instructions shall provide procedures for.

1) Starting up the equipment/system.
2) Shutting down the equipment/system.
3) Operating the equipment in emergency or unusual conditions.
4) Safety precautions
5) Trouble shooting suggestions.
6) Other pertinent data applicable to the operation of particular systems or equipment

b. The instructions shall be suitable for posting adjacent to the equipment concerned.

c. The contractor shall provide instructions for (at minimum):

1) Lighting systems.
2) Lighting control systems.

3. Ongoing and Preventive Maintenance:

a. Condensed, typewritten procedures for recommended ongoing and preventive maintenance actions shall be provided for each category of equipment/system listed above. This information shall include, but not be limited to the following:

1) Maintenance and overhaul instructions.
2) Parts list, including source of supply and recommended spare parts.
3) Name, address, and 24 hour telephone number of each subcontractor who installed equipment and systems, and local representative for each type of system.
4) Other pertinent data applicable to the maintenance of particular systems or equipment.

b. These recommended preventive maintenance actions shall be categorized by the following recommended frequencies:

1) Weekly.
2) Monthly.
3) Quarterly.
4) Semi-Annual.
5) Annual.
6) Other.

B. Posted Operating Instructions and Diagrams:

1. Operating Instructions:

a. Copies of operating instructions provided in the operating manual shall be posted in the near vicinity of each piece of applicable equipment. The instructions shall be mounted neatly in frames under Plexiglas, where they can be easily read by operating personnel. Instructions mounted outdoors shall be suitably protected from weather.

2. Posted-Systems Diagrams:

a. Simplified one-line diagrams of the systems listed shall be developed using AutoCAD and posted neatly under Plexiglas in the main or most appropriate equipment room for easy reference by operating and maintenance personnel. These drawings shall be done in a professional manner which is acceptable to the Owner**.** The diagrams shall show each component including all devices installed in the system, with name and identifying number. Explanatory notes, where needed, shall be provided.

1) Electrical one-line diagrams.
2) Other systems as applicable.
3) Emergency lighting.
4) Generators and Transfer Switches.
5) Grounding System.

b. These diagrams shall be suitable for reduction in size and use in the operating manual system descriptions previously covered.

3.9 OPERATING AND MAINTENANCE TRAINING

A. The Electrical Contractor, and appropriate sub-contractors, shall provide comprehensive operating and maintenance instruction on building systems prior to delivery. The instruction shall include classroom instruction delivered by competent instructors based upon the contents of the operating manual. Emphasis shall be placed upon overall systems diagrams and descriptions, and why systems were designed as they were. The classroom instruction shall also include detailed equipment instruction by qualified manufacturer representatives for which operating instructions are provided. The manufacturer representative training shall emphasize operating instructions, and preventive maintenance as described in the operating manual. At a minimum, the training sessions shall cover the following items:

1. Types of installed systems.
2. Theory of operation.

a. Design intent.
b. Occupied vs. unoccupied or partial occupancy.
c. Seasonal modes of operation.
d. Emergency conditions, transfers schemes, and procedures.
e. Other issues important to facility operation.

3. System operations.
4. Service, maintenance, diagnostics and repair.
5. Use of reports and logs.
6. Troubleshooting, investigation of malfunctions, and determining reasons for the problem

B. Each classroom training period shall be followed by an inspection, explanation and demonstration of the system concerned by the instructors. All equipment listed in 3.07 A shall be started up and shut down, with the exception of sprinkler systems.

C. The contractor shall be responsible for organizing, arranging, and delivering this instruction in an efficient and effective manner on a schedule agreeable to the Owner**.**

D. The contractor shall provide, at or before substantial completion, a proposed agenda and schedule of the above training for approval by the Commissioning Authority and the Owner**.**

END OF SECTION 260800

SECTION 260813 - TESTING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for Electrical Testing including, but not limited to:
   1. Testing of electrical components and systems
      a. Insulation resistance test.
      b. Continuity test.
      c. Voltage test.
      d. Phase relationship verification.
   2. Correction of defective components or systems.
   3. Retest of corrected components, systems.

B. Related Requirements:

   1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
   2. Section 260501 “Basic Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.

1.2 SUBMITTALS

A. Test reports: Submit six (6) copies of all test reports to Architect/Engineer of Record (3 copies), General Contractor (1).

   1. Type each test report on 8-1/2” x 11” paper. Include
      a. Project title and location.
      b. Test performed.
      c. Data performed.
      d. Test equipment used.
      e. Contractor’s name, address and telephone number.
      f. Testing firm’s name, address and telephone number.
      g. Names and tittles of persons:
         1) Performing the test.
         2) Observing test.
      h. Statement verifying each test.
      i. Nameplate data from each motor and equipment item tested.
      j. Test results.
      k. Retest results after correction of defective components, systems.
      l. Dates and time of test.

2. For each copy, assemble all test reports and bind them in a folder. Label each folder, “Electrical Test Reports” and include Project Number, title and location.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Furnish all equipment, manpower and casual labor to perform specified testing.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ensure that all electrical work is completed and ready for testing.

B. Disconnect all devices or equipment that may be damaged by application of test voltages, voltage or reversed phase sequence or other procedures.

3.2 TESTING

A. Conduct tests and adjust equipment to verify compliance with specified performance.

3.3 INSULATION RESISTANCE TESTS

A. Resistance measured: line-to-ground.

B. Perform testing on the following items.

Items Tested	Min. Acceptance Voltage Test	Resistance in Megohms
No. 2 and Larger Cables (600v)	1000v	50

3.4 CONTINUITY TESTS

A. Test branch circuits and control circuits to determine continuity of wiring and connection.

3.5 VOLTAGE TESTS

A. Make and record voltage tests and record at the following listed points. Conduct tests under normal load conditions.

1. Terminals of all motors.
2. Terminals of all equipment, i.e., UPS, refrigeration compressors, etc.

3.6 PHASE RELATIONSHIP

A. Examine connections to equipment for proper phase relationships. Verify proper motor rotation.

3.7 CORRECTION OF DEFECTS

A. When tests disclose any unsatisfactory workmanship or equipment furnished under this Contract, correct defects and retest. Repeat tests until satisfactory results are obtained.

B. When any wiring or equipment is damaged by tests, repairs or replace such wiring or equipment. Test repaired items to ensure satisfactory operation.

3.8 CONTRACTOR STARTUP AND REPORTING

A. Contractor shall prepare and submit a complete set of test reports as outlined in this section.

END OF SECTION 260813

SECTION 260943.23 - RELAY-BASED LIGHTING CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Lighting control panels using mechanically held relays for switching.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 230501 “Basic Electrical Requirements” for additional Project requirements applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for control modules, power distribution components, relays, manual switches and plates, and conductors and cables.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For each relay panel and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail wiring partition configuration, current, and voltage ratings.
4. Short-circuit current rating of relays.
5. Include diagrams for power, signal, and control wiring.
6. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other Sections.

1. Show interconnecting signal and control wiring, and interface devices that prove compatibility of inputs and outputs.

B. Qualification Data: For testing agency.

C. Field quality control reports.

D. Sample Warranty: For manufacturer's special warranty.

1.4 CLOSEOUT SUBMITTALS

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

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lighting Control Relays: Equal to 10 percent of amount installed, but no fewer than 2.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle and prepare panels for installation according to NECA 407.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Input signal from field-mounted manual switches, or digital signal sources, shall open or close one or more lighting control relays in the lighting control panels. Any combination of inputs shall be programmable to any number of control relays.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 916.

2.2 LIGHTING CONTROL RELAY PANELS

A. Description: Standalone lighting control panel using mechanically latched relays to control lighting and appliances.

B. Lighting Control Panel:

1. A single enclosure with incoming lighting branch circuits, control circuits, switching relays, and on-board timing and control unit.
2. A vertical barrier separating branch circuits from control wiring.

C. Control Unit: Contain the power supply and electronic control for operating and monitoring individual relays.

1. Timing Unit:

a. 365-day calendar, astronomical clock, and automatic adjustments for daylight savings and leap year.
b. Clock configurable for 12-hour (A.M./P.M.) or 24-hour format.
c. Four independent schedules, each having 24 time periods.
d. Schedule periods settable to the minute.
e. Day-of-week, day-of-month, day-of-year with one-time or repeating capability.
f. 10 special date periods.

2. Sequencing Control with Override:

a. Automatic sequenced on and off switching of selected relays at times set at the timing unit, allowing timed overrides from external switches.
b. Sequencing control shall operate relays one at a time, completing the operation of all connected relays in not more than 10 seconds.
c. Override control shall allow any relay connected to it to be switched on or off by a field-deployed manual switch or by an automatic switch, such as an occupancy sensor.
d. Override control "blink warning" shall warn occupants approximately five minutes before actuating the off sequence.

3. Nonvolatile memory shall retain all setup configurations. After a power failure, the controller shall automatically reboot and return to normal system operation, including accurate time of day and date.

D. Relays:

1. Electrically operated, mechanically held single-pole switch, rated at 20 A at 120 V for tungsten, 30 A at 277 V for ballast, 1.5 hp at 120 V, and 3 hp at 277 V. Short-circuit current rating shall be not less than 14 kA. Control shall be three-wire, 24 V ac.

E. Power Supply: NFPA 70, Class 2, sized for connected equipment, plus 20 percent spare capacity. Powered from a dedicated branch circuit of the panelboard that supplies power to the line side of the relays, sized to provide control power for the local panel-mounted relays, bus system, low-voltage inputs, field-installed occupancy sensors, and photo sensors.

F. Operator Interface:

1. Integral alphanumeric keypad and digital display, and intuitive drop-down menus to assist in programming.
2. Log and display relay on-time.
3. Connect relays to one or more time and sequencing schemes.

2.3 MANUAL SWITCHES AND PLATES

A. Push-Button Switches: Modular, momentary contact, three wire, for operating one or more relays and to override automatic controls.

1. Match color and style specified in Section 262726 "Wiring Devices."
2. Integral green LED pilot light to indicate when circuit is on.
3. Internal white LED locator light to illuminate when circuit is off.

B. Wall Plates: Single and multigang plates as specified in Section 262726 "Wiring Devices."

2.4 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cables: Multiconductor cable with copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cables: Multiconductor cable with copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store panels according to NECA 407.

B. Examine panels before installation. Reject panels that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panels for compliance with installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION OF WIRING

A. Comply with NECA 1.

B. Wiring Methods: Install cables in raceways except within cabinets. Conceal raceway and cables except in unfinished spaces

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.3 INSTALLATION OF PANELS

A. Comply with NECA 1.

B. Install panels and accessories according to NECA 407.

C. Mount top of trim 72 inches above finished floor unless otherwise indicated.

D. Mount panel cabinet plumb and rigid without distortion of box.

E. Install filler plates in unused spaces.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."

C. Create a directory to indicate loads served by each relay; incorporate Owner's final room designations. Obtain approval before installing. Use a PC or typewriter to create directory; handwritten directories are unacceptable.

D. Lighting Control Panel Nameplates: Label each panel with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. 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.

B. Acceptance Testing Preparation:

1. Test continuity of each circuit.

C. Lighting control panel will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports, including a certified report that identifies lighting control panels and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain the control unit and operator interface.

END OF SECTION 260943.23

SECTION 265100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative, material, and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 01:

1. Interior luminaires, lamps, ballasts, LED modules, internal 90-minute emergency batteries and drivers, and related accessories.
2. Luminaire support.

B. Related Requirements:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
2. Section 260926 "Lighting Control Panelboards" for panelboards used for lighting control.
3. Section 260936 "Modular Dimming Controls" for architectural dimming systems and for fluorescent dimming controls with dimming ballasts specified in interior lighting Sections.
4. Section 260943.16 "Addressable-Luminaire Lighting Controls" and Section 260943.23 "Relay-Based Lighting Controls" for manual or programmable control systems with low-voltage control wiring or data communication circuits.

1.2 DEFINITIONS

A. Average Rated Lamp Life: The period of time after which 50 percent will have failed and 50 percent will have survived under normal conditions.

B. CCT: Correlated color temperature.

C. CRI: Color Rendering Index.

D. Emergency Lighting Unit: A fixture with integral emergency battery power supply and the means for controlling and charging the battery. They are also known as emergency light set. Emergency lighting units available with and without integral heads.

E. Fixture: See "Luminaire."

F. IES (IESNA): Illuminating Engineering Society of North America.

G. IP: International Protection or Ingress Protection Rating.

H. LED: Light-emitting diode.

I. Lumen: Measured output of lamp and luminaire, or both.

J. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 SYSTEM DESCRIPTION

A. The interior lighting system shall include all lighting fixtures, lamps or LED modules, switches, mounting, wiring, control equipment, and accessories required for complete system, whether or not they are indicated or specified, as indicated in the Drawings and as specified.

B. The lighting fixture schedules in the Drawings indicate manufacturer, fixture design, appearance and performance desired.

C. Verify locations of light fixtures indicated in Drawings and coordinate with other reference data and materials as required prior to installation to ensure locations will not interfere with other work. Verify space above luminaires and confirm non-interference with other equipment, such as ducts, pipes, conduit and cabling, and openings. Alert Architect and Commission Authorized Representative in writing to non- standard modifications required for compliance with the Contract Documents and for installation to coordinate with ceiling system before proceeding with the Work.

D. Verify dimensions. Where discrepancies are found within the Contract Documents, or additional information is required, immediately contact Architect for clarifications and additional information.

E. Coordinate installation of lighting system with other trades to prevent delays in the Work and to ensure the lighting fixtures and supports will not be damaged by subsequent construction operations.

F. Lighting fixtures indicated as “EM” or specified with an emergency ballast/driver shall be provided with a UL approved integral / internal 90-minute emergency battery complete with test station and pilot indicator light. These lighting fixtures shall be controlled with normal lighting fixtures. In the event of a power outage or branch circuit failure, emergency lights shall turn on at 100% brightness via internal battery.

G. Lighting fixtures indicated as “EM” or specified with an emergency ballast/driver shall be provided with a remote test switch mounted to the underside of ceiling adjacent to fixture unless otherwise specified Owner’s Representative.

H. Lighting fixtures indicated as “EM” or specified with an emergency ballast/driver shall be rated for a temperate of at least negative thirty degrees Celsius (-30˚C) or provided with a heater to ensure battery will not freeze.

1.4 ACTION SUBMITTALS

A. General: Provide separate submittal product data/shop drawings for each fixture type clearly indicating the fixture type designation used in the Drawings and all pertinent options and accessories. Do not group similar fixture types together on a single cut sheet. Submittals that do not indicate option data where multiple selections exist will be returned without being reviewed.

B. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
6. Photometric data and adjustment factors based on laboratory tests.

    a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

C. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Luminaires.
2. Suspended ceiling components.
3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches of the plane of the luminaires.
4. Structural members to which equipment and luminaires will be attached.
5. Initial access modules for acoustical tile, including size and locations.
6. Items penetrating finished ceiling, including the following:

    a. Other luminaires.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.
    f. Ceiling-mounted projectors.

B. Qualification Data: For testing laboratory providing photometric data for luminaires.

C. Product Certificates: For each type of luminaire.

D. Product Test Reports: For each type of luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.

E. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
2. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
3. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications:

1. Electrical Components, Devices, and Accessories: Listed and labeled by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

B. Provide luminaires from a single manufacturer for each luminaire type.

C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

D. Mockups: For interior luminaires in room or module mockups, complete with power and control connections.

1. Obtain Architect's approval of luminaires in mockups before starting installations.
2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Regulatory Requirements:

1. Comply with the local authority having jurisdiction.
2. Comply with EPA and municipal regulations for proper recycling or disposal of existing lamps and ballasts removed from the Site.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect luminaires, lamps, and accessories during transit, delivery, storage, and handling to prevent damage.

B. Deliver luminaires to the Site factory-assembled and wired to the greatest extent possible and in accordance with approved submittals.

C. Store luminaires, lamps, and accessories in accordance with manufacturer's instructions in a clean, dry location, protected from weather and away from dust generating construction activities. As required, cover materials with tarpaulin or polyethylene sheeting in a manner that allows air circulation and prevents condensation beneath the covering.

D. Keep handling on site to a minimum. Exercise particular care to avoid damage to exposed finishes and materials.

1.10 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

B. Coordinate installation of lighting fixtures indicated to extend in continuous, wall to wall installation. Provide field, or established, dimensions to luminaire manufacturer in sufficient time so not to cause delays in the Work.

C. Coordinate installation of lighting fixtures to allow for the recommended "burn-in" periods for the lamps installed.

1.11 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Ambient Temperature: 5 to 104 deg F.

1. Relative Humidity: Zero to 95 percent.

2.2 MANUFACTURERS

A. Manufacturers – Luminaires: Subject to compliance with requirements indicated and the design criteria specified in the Fixture Schedule. Basis of design is Current/HLI Solutions, Inc. Acceptable alternate manufactures are Acuity and Cooper Lighting.

B. Manufacturers – Accessories: Subject to compliance with requirements.

2.3 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

    a. "USE ONLY" and include specific lamp type.
    b. Lamp diameter, shape, size, wattage, and coating.
    c. CCT and CRI.

C. Recessed luminaires shall comply with NEMA LE 4.

D. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

E. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

F. Solid State Lighting Luminaires: Comply with UL 8750.

1. Luminous flux, luminaire efficiency and chromaticity shall be tested, measured and reported in accordance with the most current versions of IES documents LM-79 and LM-80.
2. Chromaticity ranges for "white light" products, with various correlated color temperatures, shall be provided in accordance with ANSI/NEMA-C78.377.
3. Drivers and power supplies shall be provided in accordance with the requirements of ANSI/NEMA-C82.SSL1 and their maximum allowable harmonic emission limits shall be in accordance with ANSI/NEMA-C82.77.
4. Shall be provided with a U.S. Department of Energy (DOE) "Lighting Facts "label indicating their specific performance characteristics, tested and reported in accordance with the requirements of the most current version of IES LM-79.

G. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

H. Luminaire Coatings and Finishes:

1. Luminaire surfaces, components, trim, and housing shall be factory pre-treated, rustproof, primed and otherwise prepared to inhibit rust and corrosion. Exposed luminaire surfaces shall be factory pre-treated, primed and finish coated with a suitable rust and corrosion inhibiting product.
2. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:

    a. White Surfaces: 85 percent.
    b. Specular Surfaces: 83 percent.
    c. Diffusing Specular Surfaces: 75 percent.
    d. Laminated Silver Metallized Film: 90 percent.

3. Luminaries shall receive manufacturer's standard finish, unless otherwise indicated. Color shall be as indicated or, if not indicated, as selected by Architect from manufacturer's standard range.
4. Exposed finish shall be free of streaks, runs, holidays, stains, blisters, and similar defects.

I. Diffusers and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

    a. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
    b. UV stabilized.

2. Glass globes, diffusers and lenses shall be fabricated from annealed crystal glass, or tempered glass, unless otherwise indicated.

J. Louvers:

1. Provide louvers or baffles fabricated from aluminum reflector sheet free of marks including mars and indentations caused by fabrication and assembly techniques. No rivets, springs, or other hardware shall be visible after installation. Plastic louvers are not permitted.
2. Provide non-iridescent type louvers for fixtures using fluorescent lamps.
3. Provide louvers and baffles of first-quality polished, buffed, and anodized. Anodized finish shall be Alzak.

K. Reflectors and Trims:

1. Attach non-permanently affixed reflectors to housing by means of safety chains or spring clips, to prevent reflectors from falling. No part of the clip or chain shall be visible after installation, when viewed from any angle up to 45 degrees from horizontal.
2. Aluminum Reflectors:

    a. Provide reflectors and reflecting cones fabricated from aluminum reflector sheet free of marks including spinning lines, mars, and indentations caused by fabrication and assembly techniques. No rivets, springs, or other hardware shall be

visible after installation. Provide only reflectors free from blemishes, scratches, or indentations.

b. Provide reflectors of first-quality polished, buffed, and anodized. Anodized finish shall be Alzak.

c. Provide non-iridescent type louvers for fixtures using fluorescent lamps.

d. Provide polished self-flanged trim cones, color finish shall match that of the cone.

3. Painted Reflectors: Completely formed before application of primer and paint. Minimum of 87 percent reflectance white.

L. Product Description: Provide complete luminaire assemblies with features, options and accessories as scheduled and required for complete assembly, whether specified or not.

M. Provide fixtures constructed, wired, and installed in compliance with appropriate UL standards and applicable codes. Provide fixtures that are listed by UL for the applications and locations where they are shown. Provide all products with UL label.

N. Verify and provide luminaires that are appropriate for the mounting conditions and space structure.

O. All fixture components must operate within the temperature limits of their design.

2.4 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for sheet steel.

C. Stainless Steel:

1. Manufacturer's standard grade.
2. Manufacturer's standard type, ASTM A240/240M.

D. Galvanized Steel: ASTM A653/A653M.

E. Aluminum: ASTM B209.

2.5 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be assembled or installed to minimize contrast.

2.6 LUMINAIRE SUPPORT

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 12 gage.

D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

2.7 LED DRIVERS

A. LED drivers shall be factory provided by the respective luminaire manufacturers, and shall be suitable for their intended use, to operate the designated LED modules listed in the Luminaire Schedule, and as specified herein, to their full light output.

B. Comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR Part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).

C. Provide identical drivers within each luminaire type.

D. Provide UL listed and labeled drivers. Provide drivers with temperature ratings appropriate to the installation.

E. Provide complete connection to LED type luminaires through both integrally installed and remote electronic drivers.

F. Drivers shall be totally enclosed within a metallic enclosure and shall be provided with integral leads color coded per ANSI C82.11, or with poke-in style wire retaining connectors.

G. Fixtures intended to be dimmed shall have dimming driver compatible with the specified dimmer controls.

H. Remote Drivers:

1. Remote drivers are specifically not shown on the drawings. Contractor shall install remote drivers in a readily accessible, dry, indoor, concealed location, in accordance with the manufacturer's instructions.
2. Provide ventilated metal enclosures for remote drivers furnished as loose equipment. All wiring to/from remote drivers and their associated LED luminaires shall be installed in conduit.
3. Verify and comply with remote distance limitations specified by the luminaire/driver manufacturer.

2.8 GENERAL REQUIREMENTS FOR EMERGENCY LIGHTING

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Fabricate and label emergency lighting units, exit signs, and batteries to comply with UL 924.

C. Comply with NFPA 70 and NFPA 101.

D. Comply with NEMA LE 4 for recessed luminaires.

E. Comply with UL 1598 for fluorescent luminaires.

F. Lamp Base: Comply with ANSI C81.61 or IEC 60061-1.

G. Bulb Shape: Complying with ANSI C79.1.

H. Internal Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body and compatible with driver/ballast.

1. Emergency Connection: Operate two lamp(s) continuously at an output of the rated lumens each lamp upon loss of normal power. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire ballast.
2. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
3. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

    a. Ambient Temperature: Less than 0 deg F or exceeding 104 deg F, with an average value exceeding 95 deg F over a 24-hour period.
    b. Ambient Storage Temperature: Not less than minus 4 deg F and not exceeding 140 deg F.
    c. Humidity: More than 95 percent (condensing).
    d. Altitude: Exceeding 3300 feet.

4. Test Push-Button and Indicator Light: Visible and accessible without opening luminaire or entering ceiling space.

    a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

5. Battery: Sealed, maintenance-free.
6. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.

7. Remote Test: Switch in handheld remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.

2.9 EMERGENCY LIGHTING

A. General Requirements for Emergency Lighting Units: Self-contained units.

B. Emergency Luminaires:

1. Emergency Luminaires: As indicated on Fixture Schedule and Drawings, with the following additional features:

a. Operating at nominal voltage of 120 or 277 volt.
b. Internal emergency power unit.
c. Rated for installation in damp locations, and for sealed and gasketed luminaires in wet locations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

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

3.2 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.3 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaires:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaires:

1. Attached to structural members in walls.
2. Do not attach luminaires directly to gypsum board.

G. Suspended Luminaires:

1. Ceiling Mount:

   a. Two 5/32-inch-diameter aircraft cable supports adjustable to 10 feet (3 m) in length.
   b. Hook mount.

2. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
3. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
4. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of luminaire chassis, including one at each end.
5. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

H. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.

I. Air- Handling Lighting Fixtures: Install with dampers closed and ready for adjustment.

J. Adjust aimable lighting fixtures as required to provide required light intensities.

K. Adjust aimable heads of emergency lighting units as required to provide required light intensities along egress paths.

L. Connections:

1. Connect wiring according to Division 26 Section "Conductors and Cables for Electrical Systems."
2. Grounding lighting units. Tighten electrical connectors and terminals, including grounding connections, according to their manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

M. Lenses, Louvers and Reflectors:

1. Exercise particular care when installing fixtures and lamps in fixtures with specular reflector material to prevent smudging or damaging the reflector surface. Wear clean gloves as recommended by the fixture manufacturer.
2. Do not install removable reflectors, louvers, diffusers, and decorative elements of lighting fixtures until completion of wet work, plastering, painting and general cleanup in the area of the fixtures, but not more than three days before date scheduled for inspections that establish date of Preliminary Acceptance / Substantial Completion.
3. Parabolic luminaires shall be installed with protective covers, UL-listed for temporary lighting, over louvers. Upon completion of the Work, remove protective covers with clean gloves as recommended by fixture manufacturer.

N. Accessibility: Install equipment such as junction and pull boxes, fixture housings, transformers, ballasts, switches and controls, and other apparatus that requires occasional maintenance to be accessible and appropriate for mounting and ceiling conditions.

O. Install fixtures in mechanical areas after ductwork and piping installation. Locate and mount fixtures as indicated on Drawings unless mechanical equipment prohibits or makes it impractical to do so. In such cases, chain or wall mount fixtures so that serviceable equipment is illuminated.

P. Locate recessed ceiling luminaires as indicated on Drawings. Mount fixtures at heights and locations indicated. Where heights are not indicated or conflicts exist, coordinate final locations with Architect.

Q. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation. Replace or repair malfunctioning fixtures and components.

2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal. Replace or repair malfunctioning fixtures and components. Note and record the following:
   a. Duration of supply
   b. Low battery voltage shutdown.
   c. Normal transfer to battery source and retransfer to normal.
   d. Low supply voltage transfer.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

3.6 STARTUP SERVICE

A. Comply with requirements for startup specified in Section 260943.16 "Addressable-Luminaire Lighting Controls."

B. Comply with requirements for startup specified in Section 260943.23 "Relay-Based Lighting Controls."

3.7 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION 265119