CONTRACT DOCUMENTS & SPECIFICATIONS

FOR

CONTRACT NO. eDPW-040225

1724 Chester Courthouse Rehabilitation Project

JANUARY 2025

Prepared for:

The County of Delaware
Department of Public Works
Government Center
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Media, PA 19063

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Advertisement

Sealed bids will be received through PennBid™ by Delaware County for The 1724 Chester Courthouse Rehabilitation Project**, until 11:00 AM, prevailing time, on April 2, 2025.**

All documents and solicitations details are available online anytime at no cost at PennBid™ (https://pennbid.procureware.com). Note, PennBID™ assesses a fee to the bidder who is issued the award. Click on the "Solicitations" and "View" tabs.

Each bid must be accompanied by a certified check or bid bond payable to the Owner in an amount of not less than ten percent (10%) of the bid or bids. Only bonds from companies licensed to do business in the State where the Owner is located will be accepted and the bond shall so state same.

This project involves structural repairs and repointing of the exterior stone walls, exterior wood repairs to the second floor trim, fascias, soffits, eaves and the cupola; plaster repairs and painting throughout the interior of the building, second floor carpet removal, rough in plumbing for a kitchenette; Installation of an exhaust fan and louver in the attic; replacement of domestic cold water and sanitary drainage and venting for kitchenette fixtures.

Contractor shall be approved by the National Park Service (NPS) for work on a Nationally Registered Historic Property.

Bids must be submitted unconditionally. No bidder may withdraw bid within SIXTY (60) days after the scheduled closing time for receipt of bids.

The Owner reserves the right to waive any informalities, or to reject any or all bids.

CONTRACT eDPW-040225

Invitations for Bids for
1724 Chester Courthouse Rehabilitation Project

The undersigned Delaware County Council will receive sealed bids electronically through PennBid™ until **11:00am, on April 2, 2025**, for the 1724 Chester Courthouse Rehabilitation Project.

Failure to accompany this bid with an appropriate bid security noted above will automatically disqualify the bidder.

The contractor shall list related experience with appropriate references and complete the attached AIA Document A305 and submit with bid. Contractor shall be approved by the National Park Service (NPS) for work on a National Register of Historic Property. In addition, the bidder shall submit with his bid a written statement describing his Apprentice Training Program and Affirmative Action Program. **In accordance with the County of Delaware Ordinance No 2022-7.**

All documents and solicitation details are available and open to public inspection at PennBid™ (https://pennbid.procureware.com). Click on the "Solicitations" and "View" tabs. The bidder who is awarded the contract will be required to pay a fee to PennBid™. The names of those who have secured plans/specifications may be obtained at PennBid™. ***The PennBid award fee is a reimbursable expense to the awarded contractor.***

This project involves repointing of the exterior stone walls, exterior wood repairs to the second floor windows, trim, fascias, soffits, eaves and the cupola; plaster repairs and painting throughout the interior of the building, second floor carpet removal, rough in plumbing for a kitchenette; installation of an exhaust fan and louver in the attic; replacement of domestic cold water and sanitary drainage and venting for kitchenette fixtures.

The building is on the National Register of Historic Places and all work shall comply with the Secretary of the Interior's Standards for the Treatment of Historic Properties.

All workmen performing work on this project shall be paid the general minimum **Prevailing Wage Rates** supplied herein, as determined by the Secretary of the Pennsylvania Department of Labor and Industry, in accordance with the Regulations for Pennsylvania Prevailing Wage Act.

There will be a MANDATORY on-site Pre-Bid Conference on February 26, 2025 at 11:00AM at 1724 Chester Courthouse, 412 Avenue of the States, Chester, PA 19013.

Questions may be asked through the PennBID system. The final date to submit questions is 5:00pm on March 5, 2025.

If you are a person with a disability and wish to attend the bid opening, and require an auxiliary aid, service or accommodation to observe or participate in the bid opening proceedings, please contact Delaware County Department of Public Works to discuss how your needs can best be accommodated.

The Delaware County Council reserves the right to reject any and all bids or parts thereof and to determine whether the quality and type of equipment and/or service to be furnished meet the requirements for which it is intended. They further reserve the right to insist or waive any technicalities required for the best interest of the County and to consider competency and responsibility of the bidder before the award of the Contract and award bids accordingly.

Delaware County Council:

Dr. Monica Taylor, Chair
Elaine Paul Schaefer, Vice Chair
Kevin M. Madden
Christine A. Reuther
Richard R. Womack
Delaware County Council

1724 Chester Courthouse Rehabilitation Project

_____

_____

_____
Name and Address of Bidder

_____
Phone Number

Terms (if offered, list here):

_____

_____

_____

_____

_____

INSTRUCTIONS TO BIDDERS

1. PROJECT SCOPE

The complete description of the work required to complete this project is contained in the General Conditions, Standard Specifications, Special Provisions and Construction Plans.

PLEASE NOTE: Contractor must develop and submit their own COVID-19 Work Safety Plan, and have their plan approved by Delaware County, prior to any work starting. Contractor will be responsible for any/all additional Personal Protective Equipment (PPE), which their employees require, in accordance with PennDOT Publication 408, Section 107.08. The contractor is also required and expected to adhere to their own COVID-19 Safety Plan while working on-site. Violations to the approved COVID-19 Safety Plan can result in project delays or shut-downs. The project shall not restart until Delaware County approves the re-start of work.

2. TIME FOR COMPLETING WORK

The work under this contract must be completed and project closed-out by May 1, 2026. All Bidders are notified that time is of the essence of this Contract. The successful Bidder will be required to so execute the work to ensure its completion within the above number of calendar days set forth.

3. BID INFORMATION

The Owner may consider non-responsive any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities in or reject any and all bids. A bid which is incomplete, obscure, conditioned, or which contains additions not called for, or irregularities of any kind, including alterations or erasures, may be rejected. Any bid received after the time and date specified shall not be considered.

In the event that there is a tie between two or more lowest responsible and qualified bidders, and the place of business of one is located in Delaware County and the other(s) is (are) located outside of the County, the Council may in their discretion opt to award the bid to the Delaware County bidder, all other relevant factors being equal.

Requests for Information are required to be submitted in writing seven (7) calendar days prior to bid opening via Pennbid at https://pennbid.bonfirehub.com.

No bid may be withdrawn within the twenty-four (24) hours prior to the bid opening.

The Contractor shall not transfer or sublet any portion of the work covered by these bid documents without written consent of the County.

4. BID SUBMITTAL FORMS

The Bid Submittal Forms consist of the following:

- Invitation to Bid
- Proposal Form for Unit Price Contract
- Bid Guarantee
- Consent / Agreement of Surety
- Non-Collusion Affidavit
- Contractor Responsibility Certification Form
- AIA Document A305 - 1986, Contractor's Qualification Statement
- Financial Statement in accordance with A305 – 1986, Section 5.1.1
- Apprenticeship Training Program (Special Conditions No. 21)
- Affirmative Action Program (Special Conditions No. 22)

5. PREPARATION OF BIDS

Bidders will be assumed to have carefully examined **the Invitation for Bids, the Instructions to Bidders, the Form of Proposal, the Agreement, the General Conditions, Other Conditions of the Contract, the Standard Specifications, Special Provisions and the Construction Drawings 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 Proposal. The Owner will not be responsible for failure of the Contractor to properly estimate such difficulties and costs, or for overlooking any of the requirements of the Contract Documents.

If, in the Bidder's opinion, any work is specified in such a manner as would make it impossible for him to guarantee to produce the required result; or should obvious and unintentional errors or omissions appear in Contract Documents, the Bidder shall refer the same in writing to the Engineer for a decision before submitting his bid. If the Bidder fails to make such reference, no extra charge thereafter will be allowed or excuse entertained for failure to carry out the work in an acceptable manner, or to produce the required results, or to remedy defects in the workmanship because of alleged impossibilities in the production of the results specified or because of inadequate or improper Specifications.

No oral interpretations of the meaning of the Contract Documents made to any prospective Bidder by any person will be binding upon the Owner to any extent or for any purpose and may not be relied upon by any prospective Bidder.

Every request for such interpretation should be in writing via the Pennbid website (https://penbid.bonfirehub.com/login) by the posted deadline. Bidders are not permitted to directly contact the Design Professional or County Staff.

To be given consideration, each request must be received at least seven (7) calendar days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be given in the form of written Addenda to the Bid Documents which will be mailed by Certified Mail to all prospective Bidders (at the respective address furnished for such purposes) not later than three (3) calendar days prior to the date fixed for the opening of bids. Failure of any Bidder to receive any such Addenda or interpretations shall not relieve said Bidder from obligations with respect to the bid as submitted. All addenda so issued shall become part of the Contract Documents

6. CONDITIONS OF WORK

Each Bidder must inform himself 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 his obligation to furnish all material and labor necessary to carry out provisions of the Contract Documents and to complete the contemplated work for the consideration set forth in his bid.

Bidders are notified that it is obligatory upon them to obtain by their own means, information which they may require as to the existing physical conditions and, in particular, as to subsurface and groundwater conditions. Bids for all types of excavation are to be based on Unclassified Excavation which shall include all types of materials which are encountered, including, but not limited to weathered, decomposed, and sound bedrock; soil, gravel, and boulders; debris of any kind and organic matter.

7. ESTIMATED QUANTITIES

The quantities given in the Form of Proposal and attached to the Contract Documents are approximate only, being given as a basis for the uniform comparison of bids, and the Owner does not expressly or by implication warrant that the actual amount of work will correspond therewith.

8. CONTAMINATED SOILS

Should the Engineer agree that reasons exist to believe that contaminated soil is encountered in the excavation, the Owner shall, at his cost, engage the services of an environmental services company to assess the extent, if any, of the contamination of soils. If contamination is found to be present, the contaminated soils shall be separately stockpiled on and covered by plastic sheeting at the site for disposal by the Contractor.

PROPOSAL

Contract No. eDPW-040225 Date: _____

Council Members:

The undersigned hereby submits a proposal for 1724 Chester Courthouse, 412 Avenue of the States, Chester, PA 19013, Delaware County, Pennsylvania, at the following price:

Having become completely familiar with the local conditions affecting the cost of Work at the place where Work is to be executed, and having carefully examined the site conditions as they currently exist, and having carefully examined the Bidding and Contract Documents prepared for this project, together with any Addenda to such Bidding and Contract Documents as listed hereinafter, the Undersigned hereby proposes and agrees to provide all labor, materials, plant, equipment, transportation and other facilities as necessary and/or required to execute all of the Work described by the Contract Documents for the above cited Contract for the lump sum consideration of:
_____Dollars ($_____), said amount being hereinafter referred to as the Base Proposal Amount. Base proposal Amount includes Allowances listed below.

ALLOWANCES:
(The allowances supplied below are required to be indicated in both words and figures. In the event of a discrepancy between the words and figures for a given item, the price shown in words will be accepted.)

Item No.	Quantity	Item Description (Unit Price in words)	Unit Price	Total Price
1	15 LF	Replace 15 LF of sanitary piping and 15 LF of domestic water piping	_____	

UNIT PRICES:
(The unit prices supplied below are required to be indicated in both words and figures. In the event of a discrepancy between the words and figures for a given item, the price shown in words will be accepted.)

Item No.	Quantity	Item Description (Unit Price in words)	Unit Price
1	1 SF	Repointing stone	_____
2	1 LF	Domestic Water Replacement Piping	_____

BID ALTERNATES:

Alt Item No.	Quantity	Item Description (Unit Price in words)		Total Price
1	See Dwg.	Remove and replace non-historic First floor partition walls. Repair plaster walls and stone floor upon removal of partition.	_____	
2	See Dwg.	Repair the first floor – floor boards per schedule on A6.1	_____	_____
3	See Dwg.	Remove and replace storm windows on Second floor.	_____	_____
4	See Dwg.	Remove and replace existing mortar beyond base bid scope of work. See Sheets A2.1 & A2.2 Price per Priority		
		• Priority A	_____	_____
		• Priority B	_____	_____
		• Priority C	_____	_____
		• Priority D	_____	_____
		• Priority E	_____	_____

Alt Item No.	Quantity	Item Description (Unit Price in words)		Total Price
		• Priority F	_____	_____
		• Priority G	_____	_____
		• Priority H	_____	_____
		• Priority J	_____	_____
5	See Dwg.	Install kitchenette cabinetry and appliances.		_____
6	See Dwg.	Remove and replace flagstone with brick		_____
7	See Dwg.	Remove and restore second floor windows beyond base scope of work. Refer to schedules.		_____

- **All items must be bid.**
- **A performance bond and a labor and materials bond in the amount of one hundred percent (100%) of the total amount bid, and a maintenance bond must be submitted by the successful bidder within ten (10) days from the bid award date.**

It is understood that THE INSURANCE REQUIREMENTS ARE A CRITICAL PORTION OF THIS BID. THE REQUIREMENTS **AS SET FORTH IN VARIOUS SECTIONS** MUST BE SATISFIED. IT IS UNDERSTOOD THAT NO EXCEPTIONS WILL BE MADE.

It is further understood that upon notice to furnish the County with the necessary Contract and Bonds, we will execute the attached Form of Contract and Bonds with the County of Delaware within twenty (20) calendar days after receipt of such notice.

It is understood and agreed that the County Council reserves the right to reject any and all bids and that if the Successful Bidder fails to execute the attached Contract and Bond within twenty (20) calendar days after receiving notice from the County to do so, the County Council shall be free to notify the next lowest, responsible bidder. It is understood that if the Successful Bidder shall fail to execute a Contract as set forth in these General Condition, the deposit will be forfeited as liquidated damages. Award will be based on bids for the Base Bid(s) or a combination of Base Bid(s) and if and where directed.

It is understood that this Bid may not be withdrawn for a period of sixty (60) calendar days after the date of opening thereof.

It is understood that we will start work within thirty **(30)** calendar days after execution of the Contract and shall complete work in accordance with the schedule given in Section B, Instructions to Bidders, Time for Completing Work. Liquidated Damages (if any) shall be assessed as defined in the Special Conditions, Liquid Damages, for all days past this limit. It is understood that the County may, on its own decision or initiate, extend the completion date by giving notice of all parties to this Contract of its intention to extend.

Delaware County shall not be liable for any expenses, damages, or loss of profits, anticipated or otherwise.

It is understood that if our Bonding Company is not a Pennsylvania Company, the Bid Bond, Performance Bond and Payment Bond, must be countersigned by a Pennsylvania Resident Agent, with Power of Attorney so to do.

The undersigned acknowledges receipt of the foregoing Addenda and that he has prepared this bid accordingly.

Addendum No. Date

_____

_____

_____

_____

Insert the numbers of all addenda received - If none were received, insert the word "None"

It is understood that each bidder is to prepare and present satisfactory evidence of his experience, qualifications, and financial abilities to carry out the terms of the Contract. In addition, the Prime Contractor shall prepare and present satisfactory evidence of his qualification and references related to the work. The attached CONTRACTOR QUALIFICATIONS STATEMENT must be submitted with the Bid.

Material Safety Data Sheets (MSDS) must be submitted for respective products before award, in compliance with the Federal Hazard Communication Standard Act (29 CFR 1910, 1200) and various State Right-to-Know laws, as applicable.

Our signature on this proposal page signifies that we have read and agree to comply with all parts of the Invitation, Instructions, Proposal, General Conditions, Special Conditions and Specifications of this Bid and will carry out all the conditions of the above.

The undersigned hereby certifies that this bid is genuine, and not a sham or collusive, or made in the interest or in behalf of any person, firm, or corporation not herein named; that the undersigned has not directly or indirectly induced or solicited any bidder to refrain from bidding, and that the undersigned has not, in any manner, sought by collusion to secure for himself an advantage over any other bidder.

It is understood that the Proposal Page must have two (2) signatures, and if the firm is a corporation, the corporate seal must also be affixed when submitting bid.

Respectfully submitted,

FIRM NAME _____

SIGNATURE _____

TYPED NAME & TITLE _____

OFFICIAL ADDRESS _____

_____

Telephone # _____ FAX # _____

ATTEST:_____
Secretary or Assistant Secretary

Bidder will check whether the bid is by:
an individual ( ), partnership ( ), or corporation ( ).

NOTES:
If the Bidder is a partnership, the names of all members of the firm, as well as the trading name, shall be set forth. If the Bidder is a corporation, the Bid must be executed by the President or Vice-President, and attested by the Secretary or Assistant Secretary of the corporation, with the corporate seal applied. No other names will be accepted unless accompanied by the proper certification from the corporation permitting other than the President or Vice-President and Secretary to sign contracts. If the business is operated by a sole owner, only his signature is required, and it should be noted under signature that he is the sole owner.

CONTRACTOR QUALIFICATION STATEMENT

PROJECT: 1724 Chester Courthouse Rehabilitation

Qualification Submitted by: _____

Bidder: _____

Date: _____

Business Address: _____

_____

_____

Phone: _____

Email: _____

Notice: The qualification statement is to be submitted with bid.

PART 1 – BIDDER INFORMATION

1.1 GENERAL

A. How many years has your organization been in business?

B. Has the contractor ever completed work for City of Chester or the County of Delaware?
☐ Yes ☐ No

If yes, provide description of work, date and specific contract (attach additional sheets if necessary).

C. Has the contractor ever completed work for an historic building listed on the National Register of Historic Places?
☐ Yes ☐ No

D. Is the contractor familiar with the Secretary of the Interior's Standards for the Treatment of Historic Properties?
☐ Yes ☐ No

1.2 BUSINESS ORGANIZATION

A. Sole Proprietorship: If the bidder is an individual, list the proprietor's name and address:

B. Partnership: If the bidder is a partnership, provide the following information:

1. Date of Organization:

2. Partners authorized to submit proposals and sign contracts:

3. Names of all other partners:

C. Is your organization legally qualified to do business in the City of Chester, PA? ☐ Yes ☐ No

If yes, indicate register or license number:

If no, indicate if application is in process and when it was submitted:

D. Corporation: If the bidder is a corporation, provide the following information:

1. State in which incorporated:

2. If incorporated in another state, are you authorized to do business in the State of Pennsylvania?
☐ Yes ☐ No

3. Name and address of corporation's registered agent in Pennsylvania:

4. Name and titles of officers authorized to submit proposals and sign contracts:

5. Name and address of parent company, if firm is a subsidiary:

1.3 SUMMARY OF CONTRACTOR WORK EXPERIENCE

A. Provide a summary of appropriate projects completed within the last 5 years by the proposed superintendent; describe the level of responsibility for each project; provide at least two (2) Owner references. Projects completed shall be properties listed on either a local, state, or National Register of Historic Places.

Project & Location	Contract Type, & Amount	Name & Phone No. of Owner & A/E References

1.4 CONTRACTOR SUPERINTENDENT

A. Name of Proposed Superintendent _____.

1.5 KEY PERSONNEL

A. Current Number of Project Managers:

B. Current Number of Superintendents:

C. Provide Construction Experience of key individuals within your organization.

1.6 DISCLOSURE AND GENERAL QUESTIONS

A. Judgments and Claims: Are there any judgments, claims, or suits pending or outstanding against your firm? ☐ Yes ☐ No

1. If yes, will this affect ability to complete this contract? ☐ Yes ☐ No

B. Violation of Labor and Employment Laws and Regulations:

1. Is this firm currently under suspension or otherwise barred from bidding public works construction projects in the State of Pennsylvania by any such administrative commission, hearing agency, or legal tribunal?

☐ Yes ☐ No

C. Receivership: Has the firm filed for bankruptcy, receivership or reorganization within the last five years?

☐ Yes ☐ No

D. Conflict of Interest: Is any owner, partner, officer or major stockholder or spouse thereof an agent, official, or employee of the County of Delaware?

☐ Yes ☐ No

E. If the response to any of the above questions is yes, provide a detailed explanation.

1.7 CERTIFICATION OF THE REQUIRED TRAINING NOTED IN TECHNICAL SPECIFICATIONS:

A. The undersigned bidder certifies that all required training as noted in Technical Specifications of this project has been completed.

☐ Yes ☐ No

If no, the undersigned bidder certifies that they will receive the required training upon receiving an award notice of this contract.

By: _____

Date: _____

Title: _____

1.8 CERTIFICATION OF THE QUALIFICATION STATEMENT

A. The undersigned bidder certifies that all of the information provided by Bidder contained in this qualification statement is true and complete.

By: _____

Date: _____

Title: _____

1.9 RESUMES

A. Please attached resumes for key personnel, including subcontractors, to the bid form submission. All key personnel shall have experience with historic properties. Key personnel can be defined as the following, but not limited to: Owner, Project Manager, Superintendent, Foreman, Site Supervisor, Journeyman, etc.

COUNTY OF DELAWARE

VENDOR/CONTRACTOR'S INSURANCE REQUIREMENTS

COMPREHENSIVE GENERAL LIABILITY

Before the Contract is awarded, the Contractor shall take out and maintain during the life of this Contract such Public Liability and Property Damage insurance as shall protect him and any sub-contractors, if any, performing work covered by this Contract, from all claims for loss arising form Property damage, personal injury and bodily injury including accidental death. Such Insurance Policy shall include Products and Completed Operations coverage and include coverage for damages that may arise from the Operations of the Contractor or by any sub-contractor or by anyone directly or indirectly employed by either of them. The Combined Single Limit of Liability required is $3,000,000 per occurrence with a deductible of no more than $1,000.

VEHICLES

Comprehensive Business Automobile Coverage shall be maintained with a Combined Single Limit of Liability in an amount no less than $1,000,000 per occurrence with no deductible.

CATASTROPHE UMBRELLA LIABILITY

One million dollars in excess of Primary General.

WORKER'S COMPENSATION

Worker's Compensation Insurance required by Pennsylvania law covering all Owner's employees and all employees of the general contractors and all sub-contractors. A current certificate of Exempt status from the Pennsylvania Department of Labor and Industry is acceptable if the Owner is an Exempt Self-Insurer in the State of Pennsylvania.

EMPLOYER'S LIABILITY INSURANCE:

Employer's Liability Insurance with limits no less than $500,000 per accident or employee disease.

The County of Delaware shall be named as an additional insured on all policies insofar as the specified Contract is concerned. In addition, the Contractor shall furnish the County with a certificate of insurance showing the type, amount, class of operations covered, effective dates and dates of expiration. All policies should also contain a sixty (60) day notice of cancellation clause.
NOTE:

If the owner maintains a self-insurance program or a limited self-insurance program for any or all of the exposures listed above, a complete description of the program with information on excess carriers and funding arrangements should be provided. In the event that the worker's compensation is self-insured, a copy of the current exemption shall be provided.

BID GUARANTEE

KNOW ALL MEN BY THESE PRESENTS, THAT WE, the undersigned,

_____, as Principal,

and held firmly bound unto _____ 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, successors and assigns.

Signed, this _____ day of _____, 20 __.

The Condition of the above obligation is such that whereas the Principal has submitted to The Delaware County Council a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, 1724 Chester Courthouse, 412 Avenue of the States, Chester, PA 19013, Delaware County, Pennsylvania.

NOW, THEREFORE,

(a) If said BID shall be rejected, or

(b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection

therewith and shall in all other respects perform the agreement created by the acceptance of said BID,

then this obligation shall be void, otherwise the same shall remain in force and 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 stated.

The Surety, for value received, hereby stipulates and agrees that 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 there 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 above.

_____
Principal

_____
Surety

By: _____

CONSENT/AGREEMENT OF SURETY

The undersigned _____
Name of Surety Company

a corporation organized and existing under the laws of

_____ and authorized to do business

in the Commonwealth of Pennsylvania do hereby consent and agree with

The County of Delaware that if the proposal of

_____, for the project
Name of Bidder

1724 Chester Courthouse Rehabilitation Project
412 Avenue of the States, Chester, PA 19013

be accepted and a contract for said work be awarded to said bidder, it will, upon its being so awarded, become the surety for said Bidder on such surety bonds as are called for in the Bid Documents.

Signed and Sealed (Date)

_____
Name of Surety Company

By: _____
Attorney-in-fact

INSTRUCTIONS FOR NON-COLLUSION AFFIDAVIT

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

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

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

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

5. The term “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 lower than the bid of another firm, any intentionally low or noncompetitive bid, and any other form of bid submitted for the purpose of giving a false appearance of competition.

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

NON-COLLUSION AFFIDAVIT

Contract/Bid No. _____

State of _____:

County of _____:

I state that I am _____ of _____
Title Name of Firm

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

I state that:

(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 lower than this bid, or to submit any intentionally low or noncompetitive bid or other form of complementary bid.

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

(5) _____, its affiliates,
Name of my firm
Subsidiaries, officers, 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 the State or Federal law

in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as follows:

I _____state that _____
Name of firm

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

_____
Name

_____
Company Position

SWORN TO AND SUBSCRIBED
BEFORE ME THIS ____ DAY
OF _____, 20___

_____ My Commission Expires: _____
Notary Public

COUNTY OF DELAWARE PENNSYLVANIA

ORDINANCE No. 2021-2

AN ORDINANCE OF THE COUNTY OF DELAWARE, COMMONWEALTH OF PENNSYLVANIA AMENDING SECTION 6-12 OF THE ADMINISTRATIVE CODE TO INCLUDE THAT COUNTY COUNCIL MEMBERS ARE PROHIBITED FROM KNOWINGLY DERIVING A FINANCIAL INTEREST FROM COUNTY CONTRACTS AND ADDING CERTAIN OTHER CONFLICT OF INTEREST PROVISIONS.

WHEREAS, pursuant to Section 6-121 of the Administrative Code (the "Code") of the County of Delaware, Commonwealth of Pennsylvania (the "County"), the Code may be amended by ordinances of the County Council; and

WHEREAS, Section 6-12.B(2) of the Code limits elected and appointed officials, the County Executive Director and department heads, and all County employees from having a business interest that would interfere with their official duties; and

WHEREAS, Section 6-12.B(2) includes only a limited restriction of Council members from having a financial interest or other conflict that would interfere with their official duties; and

WHEREAS, County Council believes that a more expansive restriction on financial interests and other conflicts of Council members will allow Delaware County citizens to be assured that Council members will not directly or indirectly knowingly realize any financial gain through their public office other than any compensation that is provided by law;

IT IS HEREBY, ENACTED AND ORDAINED BY County Council of Delaware County, Commonwealth of Pennsylvania as follows:

SECTION 1. The Code shall be amended to add a new Section 6-12.D to read as set forth below:

§ 6-12.D **County Council Members Prohibited From Knowingly Deriving a Financial Interest From County Contracts.**

(1). Prohibition Against Knowingly Deriving Financial Gain and Conflict of Interest. In addition to the limitations imposed elsewhere in this Administrative Code, including Section 6-12.B(2), no Council member shall knowingly have a financial interest (including any immediate family member having a financial interest) in any entity that is a party to a contract with the County, approved by County Council, including subcontractors.

Notwithstanding the foregoing, there shall be no violation of this Section 6-12.D(1) if a Council member recuses her or himself from voting on a contract in which such Council member (or an immediate family member) has a minor financial interest and submits a written statement listing the reasons for such recusal. Said statement shall be submitted by the Council member to the County Clerk, Council Chairman and Vice Chairman within seven (7) days of identification of the conflict by the member but not less than one (1) day prior to the Council meeting at which a vote on the contract is scheduled. Such statement shall be read into the Council minutes at such meeting.

(2). Other Prohibitions.

(a) Council members are prohibited from receiving compensation (other than the payment of expenses) as an officer or director of (i) any entity that is a party to a contract with the County and/or (ii) any subcontractor to such an entity.

(b) Council members are prohibited from using non-public information received through public office for their own financial benefit or the financial benefit of an immediate family member.

(3). **Conflicts of Interest**. A Council member must recuse her or himself from voting on a contract if he or she knows that there is a conflict of interest (which is not a financial interest) and shall submit a written statement listing the reasons for such recusal. Such conflicts of interest shall include serving as an officer or director of a nonprofit organization that is a party to a contract with the County and/or any subcontractor to such a contract.

Said statement shall be submitted by the Council member to the County Clerk, Council Chairman and Vice Chairman within seven (7) days of identification of the conflict by the member but not less than one (1) day prior to the Council meeting at which a vote on the contract is scheduled. Such statement shall be read into the Council minutes at such meeting.

(4). **Definitions.**

A "financial interest" for purposes of this Section 6-12.D is any financial interest in a legal entity engaged in business for profit which comprises more than 5% of the equity of the business or more than 5% of the assets of the economic interest in indebtedness.

An "immediate family member" for purposes of this Section 6-12.D is defined as a parent, spouse, brother and sister (or like relative in laws), child(ren) and step-child(ren).

“Knowingly” or “Knows” means that the individual in question actually knew or, based on facts and circumstances, should have known, of the existence of a financial interest or conflict of interest, as applicable.

A “minor financial interest” for purposes of this Section 6-12.D is any financial interest from which a Council member and all immediate family members, in the aggregate, derives (or reasonably anticipates deriving) compensation, earnings, revenues and/or other payments not exceeding a total of $25,000 on an annual basis (including the effect of the contract then under consideration for approval by Council).

(5). Penalties. Any of the following penalties may be imposed for violations of the limitations in Section 6-12.D(1) as determined per Section 6-12.D (5):

a. A reprimand of the Council member in violation.

b. A censure of the Council member in violation.

c. An assessment of a fine of the Council member in violation, in an amount not to exceed the lesser of (i) ten percent (10%) of the total compensation under the contract in question or (ii) $20,000.

d. To the extent legally permitted, termination of the contract in question and/or repayment to the County of any profit made by the contractor under such contract.

e. Any entity, contractor or subcontractor which entered into a contract with the County which resulted in a violation of this section, may be banned as a contractor or subcontractor to the County for a period of two (2) years.

(6). **Determination of Penalties**. The determination of a penalty for the violation of this ordinance shall be made by a majority vote of County Council (not to include the Council member whose action is the subject of such vote) following such investigation and consideration of such evidence as County Council deems appropriate or such other entity or body as may be designated by resolution of County Council.

(7). **County Executive Director**. If the County Executive Director knows that he or she has a financial interest in a contract being considered for approval by County Council, he or she shall disclose such financial interest to County Council prior to approval of such contract by County Council, and such financial interest shall be noted in the minutes of the Council meeting at which such approval is considered. County Council may take appropriate disciplinary action for violation of this requirement by the County Executive Director, subject to the limitations elsewhere in the Administrative Code.

SECTION 2. This Ordinance shall take effect on the tenth day after its adoption.

ENACTED AND ORDAINED by County Council of the County of Delaware, Pennsylvania, this day of 2021.

COUNTY OF DELAWARE

_____
Brian P. Zidek, Chair

_____
Dr. Monica Taylor, Vice Chair

_____
Kevin M. Madden

_____
Elaine Paul Schaefer

_____
Christine A. Reuther

Attested:

_____
Sharon Scattolino
County Clerk

COUNTY OF DELAWARE
COMMONWEALTH OF PENNSYLVANIA
RESOLUTION NUMBER 2022-3

RESOLUTION REGARDING GOALS FOR DIVERSITY IN PUBLIC WORKS CONTRACTING

WHEREAS, County Council is committed to addressing the challenges it faces relating to public works projects and, to that end, is considering enactment of the revision of Chapter 29 of the County Code to protect its proprietary and financial interests and create adequate safeguards to ensure the successful delivery of such projects to the fullest extent possible; and

WHEREAS, together with the changes to the County Code in such revision of Chapter 29, County Council also desires to set forth its goals for increasing the diversity of the workforce for such public works projects;

NOW, THEREFORE, BE IT RESOLVED BY THE COUNTY COUNCIL OF DELAWARE COUNTY, PENNSYLVANIA as follows:

1. County Council hereby directs that the following provisions shall be included in any contract which is subject to the requirements of Chapter 29 of the County Code:

a. The contractor will make a good faith effort to employ local residents for completion of the project, when it has a need for new employees, in an effort to meet a goal of 10% local worker participation on the project. Good faith effort shall include, but not be limited to: hosting a public job fair prior to the commencement of the Project open to residents of Delaware County, posting of available employment opportunities with the Delaware County Workforce Development Board and its PACareerLink offices, providing employment and training services, advertisement of employment opportunities in a newspaper of general circulation throughout Delaware County, and internet advertisements.

b. The contractor will make a good faith effort to employ minority and female craftspeople for completion of the qualified project when such contractor has a need for new employees to complete the project, in an effort to meet the goal of having 10% minority and female participation on the project. Good faith effort shall include, but not be limited to: hosting a public job fair prior to the commencement of the Project open to all applicants in an attempt to identify, hire and utilize minority and female craftspeople, the posting of available employment opportunities with the Delaware County Workforce Development Board and its PACareerLink offices, providing employment and training services, advertisement of employment opportunities in a newspaper of general circulation throughout Delaware County, and internet advertisements.

c. The contractor shall, as a material condition of the contract, make a good faith effort to utilize veteran owned businesses, minority owned businesses, women owned

businesses and small business enterprises on the qualified project. "Minority owned business" shall mean that at least 51% of the business is owned by an individual who is a United States citizen or permanent resident alien who has and can demonstrate membership in one of the following groups: Black persons having origins in any of the Black African racial groups; Hispanic persons of Mexican, Puerto Rican, Dominican, Cuban, Central or South American Descent of either Indian or Hispanic origin, regardless of race; Native American or Alaskan native persons having origins in any of the original peoples of North America; Asian and Pacific Islander persons having origins in any of the Far East countries, South East Asia, the Indian subcontinent or the Pacific Islands. "Small business enterprise" shall mean a business with an annual gross income which is determined by the United States Small Business Administration to qualify it as a small business enterprise.

2. County Council hereby directs the County Executive Director to take steps to obtain a disparity study related to relevant County public works contracting in order to assess the utilization by the County of a diverse workforce for public works projects and to help direct any further actions by County Council to increase such diversity.

ADOPTED by the County Council of the County of Delaware, Pennsylvania, this 15th day of June, 2022.

BY: DELAWARE COUNTY COUNCIL

_____

Dr. Monica Taylor, Chair

ATTESTED:_____

SHARON SCATTOLINO County Clerk

COUNTY OF DELAWARE PENNSYLVANIA

ORDINANCE No. 2022-7

AN ORDINANCE OF THE COUNTY OF DELAWARE, COMMONWEALTH OF PENNSYLVANIA AMENDING AND RESTATING CHAPTER 29 OF THE COUNTY CODE RELATING TO CONTRACTORS.

WHEREAS, pursuant to § 1-10 of the Code (the "Code") of the County of Delaware, Commonwealth of Pennsylvania (the "County"), the Code may be amended by ordinances of the County Council when passed and adopted in such form as to indicate the intention of the County Council to be a part of the Code; and

WHEREAS, Chapter 29 of the Code sets forth provisions regarding the qualification of contractors for certain County public works projects; and

WHEREAS, County Council has been presented considerations regarding the current public works contract environment and the need for significant changes to its procurement standards for public works construction to address these considerations, limit project delivery risks, protect its financial and proprietary interests, and better ensure efficient procurement and successful delivery of these projects; and

WHEREAS, County Council is committed to addressing the challenges it faces relating to public works projects by enacting necessary and appropriate procurement legislation to protect its proprietary and financials interests and create adequate safeguards to ensure the successful delivery of such projects to the fullest extent possible; and

WHEREAS, Chapter 29 of the Code was last revised in 2007, and County Council desires to update and modernize the provisions of Chapter 29 of the Code;

IT IS HEREBY ENACTED AND ORDAINED BY County Council of Delaware County, Commonwealth of Pennsylvania as follows:

SECTION 1. The Code shall be amended to replace Chapter 29 of the Code in its entirety to read as set forth in Exhibit A attached hereto.

SECTION 2. Any and all other ordinances or parts of ordinances in violation or in conflict with the terms, conditions and provisions of this ordinance are hereby repealed to the extent of such irreconcilable conflict.

SECTION 3. The terms, conditions and provisions of this ordinance are hereby declared to be severable, and should any portion, part or provision of this ordinance be found by a court of competent jurisdiction to be invalid, unenforceable or unconstitutional, County Council hereby declares its intent that the ordinance shall have been enacted without regard to the invalid, unenforceable or unconstitutional portion, part or provision of this ordinance.

SECTION 4. This Ordinance shall take effect on the tenth day after its adoption.

ENACTED AND ORDAINED by County Council of the County of Delaware, Pennsylvania, this 15 day of June 2022.

COUNTY OF DELAWARE

Dr. Monica Taylor, Chair

Elaine Paul Schaefer, Vice Chair

Kevin M. Madden

Christine A. Reuther

Richard R. Womack, Jr.

Attested:

Anne M. Coogan
County Clerk

Exhibit A

Chapter 29
CONTRACTORS

§ 29-1. Purpose

A. Delaware County recognizes that there is a need to ensure that all work on public construction and maintenance contracts is performed by responsible, qualified firms that maintain the capacity, expertise, personnel and other qualifications and resources necessary to successfully perform such contracts in a timely, reliable and cost-effective manner.

B. To effectuate the purpose of selecting responsible contractors for these public contracts and to protect Delaware County's investments in such contracts, prospective contractors and sub-contractors should be required to meet pre-established, clearly defined, minimum qualification standards regarding past project performance in terms of competency, safety and law compliance, technical abilities, experience, and adequacy of resources.

C. Further, due to the critical impact that skilled craft labor has on the execution of public works projects, and the increasingly limited availability of such labor, it is necessary to require contractors and subcontractors to participate in proven apprenticeship training programs as a condition of bidding to promote successful project delivery and help ensure future workforce development.

D. Therefore, Delaware County shall require compliance with the provisions of this Chapter by business entities seeking to provide services as specified herein. The requirements of this Chapter are intended to supplement, not replace, existing contractor qualification standards or other criteria currently required by Delaware County. However, in the event that this Chapter conflicts with any law, public policy or contracting documents of Delaware County, the requirements of this Chapter shall prevail.

§ 29-2. Responsible Contractor Requirements

A. This Chapter shall apply to contracts valued at $500,000 or more for public works projects undertaken by Delaware County for construction, demolition, alteration, renovation, modernization, service or maintenance of buildings, structures or facilities. All contractors and subcontractors of any tier that perform work on such projects, regardless of value of individual contract or subcontract packages shall meet the requirements of this Chapter.

B. All firms engaged in public works contracts subject to this Chapter, including general contractors, construction managers, other lead or prime contractors, and subcontractors at any level, shall be qualified, responsible contracting firms that have sufficient capabilities in all respects to successfully perform contracts on which they are engaged, including the necessary experience, equipment, technical skills and qualifications and organizational, financial and personnel resources. Firms bidding or otherwise participating in public works contracts shall also be required to have a satisfactory past performance record and a satisfactory record of law compliance, integrity and business ethics.

C. This Chapter does not apply to work incident to the installation of specialized equipment pursuant to either warranty requirements or manufacturers' requirements.

D. Compliance with this Chapter and compliance with the provisions of Article V (Central Purchasing) of the Administrative Code are separate requirements which need to be independently satisfied.

§ 29-3. Contractor Responsibility Certifications

A. As a condition of performing work on a public works contract subject to this Chapter, a general contractor, construction manager or other lead or prime contractor seeking award of a contract shall submit a Contractor Responsibility Certification as specified herein.

B. The Contractor Responsibility Certification shall be completed on a form provided by Delaware County and reference the project for which a bid is being submitted by name and contract or project number.

C. In the Contractor Responsibility Certification the construction manager, general contractor or other lead or prime contractor shall confirm the following facts regarding its past performance and work history and its current qualifications and performance capabilities:

(1) The firm and its employees have all licenses, registrations, certificates or other credentials required by federal and state law and the laws of Delaware County

with respect to the contract work it seeks to self-perform.

(2) The firm meets the bonding requirements for the contract required by law or contract specifications, as well as applicable insurance requirements for the contract, including general liability, workers compensation and unemployment insurance.

(3) The firm has not been debarred or suspended by any federal, state or local government agency or authority in the past three years.

(4) The firm has not defaulted on any project in the past three years.

(5) The firm has not had any type of business, contracting or trade license, registration or certification revoked or suspended in the past three years.

(6) The firm and its principals/owners have not been convicted of any crime relating to its contracting business in the past ten years.

(7) Within the past three years, the firm has not been found in violation of any law applicable to its contracting business, including, but not limited, to licensing laws, tax laws, wage and hour laws, prevailing wage laws, environmental laws or others, where the result of such violation was the payment of a fine, back pay damages or any other type of penalty in the amount of $5,000) or more.

(8) The firm will employ a sufficient number of craft labor personnel required to successfully perform any project work it self-performs or shall use qualified subcontractors to meet this requirement and shall assign workers to perform only work in their respective craft or trade for which they have sufficient skills and training, or shall use qualified subcontractors to meet this requirement.

(9) The firm will pay all craft employees on the project, at a minimum, the applicable wage and fringe benefit rates, as established for the classification in which the worker is employed, in accordance with the Pennsylvania Prevailing Wage Act (43 P.S. § 165-1 et seq.).

(10) The firm will ensure that all craft labor it employs on the project will have completed, prior to working on the project the OSHA 10-hour training course for safety established by the U.S. Department of Labor. If the firm is a prime contractor, it shall also ensure that at least one person on the project has completed the OSHA 30-hour construction training course established by the U.S. Department of Labor

(11) The firm participates in a Class A Apprenticeship Training Program, as defined below, for each separate trade or classification in which it employs craft employees.

(a) For purposes of this section, a Class A Apprenticeship Program is an apprenticeship program registered with and approved by the U.S. Department of Labor or a state apprenticeship agency and has graduated apprentices to journey person status for at least three of the past five years. This may be an apprenticeship program subject to the Employee Retirement Income Security Act of 1974, 29 U.S.C. § 1001 et seq. ("ERISA"), or a non-ERISA program.

(b) To demonstrate compliance with this section, the firm shall provide, with this certification, a list of all trades or classifications of craft employees it will employ on the project and

documentation verifying it participates in a Class A Apprenticeship Program for each trade or classification listed.

(c) The requirements of this section and Section 29-3.C(12) help ensure that the bulk of the craft labor workforce employed on the project will have sufficient skills and training to correctly perform work assigned to them.

(12) The construction manager, general contractor or other lead or prime contractor responsible for the project shall ensure that at least 70 percent of the craft labor workers employed on the project shall be comprised of either journeyperson workers who have successfully completed a Class A Apprenticeship Program as defined in Section 29-3.C(10) or apprentices registered in such programs. The apprenticeship participation of specified by this section must be in the same trade or craft for which the workers are employed on the project.

(13) The firm shall assign craft labor personnel only work in the craft or trade in which they are employed.

(14) The firm has all other technical qualifications and resources, including equipment, personnel and financial resources, to successfully perform the referenced contract and shall maintain such capabilities throughout the duration of the project, or will obtain same through the use of qualified, responsible subcontractors or vendors

(15) The firm shall notify Delaware County within seven days of any material changes in its operation that relate to any matter attested to in this certification.

D. Execution of the Contractor Responsibility Certification required by this Chapter shall not establish a presumption of contractor responsibility, and Delaware County may require any additional information it deems necessary to evaluate a firm's status as a responsible contractor, including information regarding the firm's technical qualifications, financial capacity or other resources and performance capabilities. Delaware County may require that such information be included in a separate Statement of Qualifications and Experience or as an attachment to the Contractor Responsibility Certification.

E. The submitting firm shall stipulate in the Contractor Responsibility Certification that, if it receives a Notice of Intent to Award Contract, it will provide a Subcontractor List and required subcontractor information as specified in Section 29-5.

F. If the submitting firm has ever operated under another name or is controlled by another company or business entity or in the past five years controlled or was controlled by another company or business entity, whether as a parent company, subsidiary or in any other business relation, it shall attach an appendix to its Contractor Responsibility Certification that explains in detail the nature of any such relationship. Additional information may be required from such an entity if the relationship in question could potentially impact contract performance.

G. If a firm fails to provide a Contractor Responsibility Certification required by this section, it may be disqualified from bidding. No action of any nature shall lie against Delaware County because of its refusal to accept a bid for this reason.

§ 29-4. Notice of Intent to Award Contract

A. After it has received bids for a project, Delaware County shall issue a Notice of Intent to Award Contract to the firm that has submitted the lowest responsive bid.

B. Such Notice shall be issued immediately or as soon as practicable after bids are opened and shall stipulate that the contract award is conditioned on the issuance of a written Contractor Responsibility Determination for the firm as required by Section 29-6, compliance with Subcontractor Certifications required by Section 29-5, and any other qualification standards required by Delaware County.

§ 29-5. Subcontractor Responsibility Requirements

A. Within fourteen (14) days of receiving a Notice of Intent to Award Contract, the prospective awardee shall submit a Subcontractor List, which provides the name and address of the subcontractors it will use on the project, the scope of work assigned to each subcontractor, and Subcontractor Responsibility Certifications as required by this section. The Director of Public Works may extend such deadline for submission upon good justification from a prospective awardee as to the delayed response.

B. The prospective awardee shall not be permitted to use a subcontractor on any work performed for Delaware County unless it has identified the subcontractor on its Subcontractor List and provided a Subcontractor Responsibility Certification in accordance with the requirements of Section 29-5.

C. At the time a prospective awardee submits the Subcontractor List it shall also submit Subcontractor Responsibility Certifications and applicable supporting information for all listed subcontractors to Delaware County.

D. A prospective awardee shall determine whether any firm on its Subcontractor List is organized as a sole proprietorship owned and operated by a single person. This shall apply to subcontractors at any tier. For any such entity, the prospective awardee shall ensure that the sole proprietorship subcontractor is a legitimate business entity and not a misclassified employee by requiring the subcontractor to supplement its Subcontractor Certification with its Employer Identification Number and copies of any license, certificate or registration it is required to maintain in to do business in the state in which it is located.

E. Subcontractor Responsibility Certifications shall be executed by the respective subcontractors on forms prepared by Delaware County and contain the same information, representations and supporting information required in Contractor Responsibility Certifications, including verification of apprenticeship qualifications required by Section 29-3.C(11) for each trade or classification of craft workers it will employ on the project.

F. Subcontractor Responsibility Certifications shall be executed by a person having sufficient knowledge to address all matters in the certification and shall include an attestation stating, under the penalty of perjury, that all information submitted is true, complete and accurate.

G. A subcontractor listed on a firm's Subcontractor List shall not be substituted unless written authorization is obtained from Delaware County and a Subcontractor Responsibility Certification is provided for the substitute subcontractor.

H. In the event that Delaware County determines that a subcontractor fails to meet the requirements of this Chapter or is otherwise determined to be non-responsible, it may, after informing the prospective awardee, exercise one of the following options:

   (1) Permit the awardee to substitute a qualified, responsible subcontractor in accordance with the requirements of this section, upon submission of a completed Subcontractor Certification for the substitute and approval of the substitute by Delaware County.

   (2) Require the awardee to self-perform the work in question if the firm has the required experience, licenses and other qualifications to perform the work in question; or

   (3) Disqualify the prospective awardee.

I. In the event a subcontractor is disqualified under this Chapter, the general contractor, construction manager or other lead or prime contractor shall not be permitted to make any type of claim against Delaware County on the basis of a subcontractor disqualification.

§ 29-6. Contractor Responsibility Review and Determination

A. After Delaware County has issued a Notice of Intent to Award Contract to the lowest responsive bidder, it shall undertake a contractor responsibility review process to determine whether the firm is a

qualified, responsible firm in accordance with the requirements of this Chapter and other applicable laws and regulations. The time frame for conducting this review process shall be as determined by Delaware County.

B. As part of the review process, Delaware County shall ensure that the Contractor Responsibility Certification and Subcontractor Responsibility Certifications and applicable supporting information comply with the requirements of this Chapter.

C. Delaware County may conduct any additional inquiries to verify that the prospective awardee and its subcontractors have the technical qualifications and performance capabilities necessary to successfully perform the contract and that the firms have a sufficient record of law compliance and business integrity to justify the award of a public contract. In conducting such inquiries, Delaware County may seek relevant information from the firm, its prior clients or customers, its subcontractors or any other relevant source.

D. After Delaware County determines that all responsibility certifications have been properly executed and has verified that all other relevant information requested for reviews indicates that the prospective awardee and its subcontractors are qualified, responsible firms, it shall issue a written Contractor Responsibility Determination for the prospective awardee.

E. In the event a firm is determined to be non-responsible, Delaware County shall notify the firm and proceed to conduct a responsibility review of the next lowest, responsive bidder or, if necessary, rebid the project. A Responsibility Determination may be revoked at any time if Delaware County obtains relevant information warranting any such revocations.

§ 29-7. Execution of Final Contract

A. A contract subject to this Chapter shall not be executed until all requirements of this Chapter have been fulfilled and until a Contractor Responsibility Determination has been issued by Delaware County pursuant to Section 29-6.

B. Prior to the execution of a final contract under this Section, Delaware County shall publicly post the Notice of Intent to Award, Contractor and Subcontractor Responsibility Certifications, Subcontractor Lists, related supporting documentation and the Contractor Responsibility Determination on a publicly available website for public inspection for a period of ten (10) calendar days after the issuance of the Contractor Responsibility Determination.

§ 29-8. False, Incomplete or Misleading Responsibility Certifications.

A. If Delaware County determines that a Contractor Certification, Subcontractor List or Subcontractor Responsibility Certification contains false or misleading information that was provided knowingly or with reckless disregard for the truth or omits material information knowingly or with reckless disregard of the truth, the firm for which the certification was submitted shall be disqualified from the project and shall be prohibited from performing work for Delaware County for a period of three years. Delaware County may withhold payment of any monies due to the firm as damages and impose other applicable penalties and sanctions, including contract termination, as permitted by law or contract.

CONTRACTOR'S QUALIFICATION STATEMENT

Contractor shall submit AIA Document A305 – 1986, Contractor's Qualification Statement, with Bid. (See Appendix B)

Contractor will be required to be approved by the National Park Service (NPS) for working on a National Register Property. The County of Delaware will facilitate the review process by submitting the qualifications statement to NPS for review and approval.

FORM OF CONTRACT

Article of Agreement made this _____day of _____ _____, 20___ between_____

_____(hereinafter called Contractor) and the County of Delaware (hereinafter called County).

WITNESSETH:

That the Contractor covenants, promises, and agrees to and with the County to

_____
_____
_____
_____
_____

For the price or sum of _____
_____
_____
_____

as per its annexed Bid, and to in all respects comply with the terms and conditions of the Annexed Proposal, Invitation to Bidders, Instructions to Bidders, General Conditions, Specifications and Drawings and the County covenants, promises, and agrees to and with the Contractor to pay it in the price of _____
_____
_____
_____

for _____
_____
_____
_____

It is further mutually agreed by said parties, in consideration of their aforesaid mutual covenants, that the annexed Invitation to Bidders, Proposal, General Conditions and Specifications annexed thereto constitute and are a part of the Contract as though fully set forth therein.

In Witness Whereof, the Contractor and the County have hereunto caused their common of corporate Seals to be affixed hereto duly attested by their proper Officers the day and year aforesaid.

Attest: _____ _____
Secretary or Assistant Secretary

_____

_____

COUNTY OF DELAWARE

_____
Chair

Attest: _____ Date: _____
County Clerk

LABOR AND MATERIALS BOND

KNOW ALL PERSONS BY THESE PRESENTS that _____ (Principal) and _____ (Surety) are held and firmly bound unto the County of Delaware in the Commonwealth of Pennsylvania, (hereinafter called County), in the sum of: _____ lawful money of the United States of America, to which payment well and truly to be made, we do hereby jointly and severally bind and oblige ourselves, and our respective successors and assigns firmly by these presents:

Sealed with our Seals this _____ day of _____ 20 _____.

Whereas, the bounden Principal has entered into a written Contract with the County to:
_____
_____
_____

for the price or sum of_____
which Contract by reference is made a part hereof:

Now, therefore, the condition of this obligation is such that if the above bounden Principal shall and will promptly pay or cause to be paid all sums of money which may be due any person, co-partnership, association or corporation for all materials furnished and labor supplied or performed in the prosecution of the work whether or not the same material or labor enter into and become component parts of the work or improvement contemplated, then this obligation to be void and of no effect, otherwise, to continue in full force and virtue.

The Principal and Surety further and severally agree with the Obligee herein that every person, co-partnership, association or corporation who whether as sub-contractor or otherwise, has furnished material or supplied or performed labor in the prosecution of the work as above mentioned and who has not been paid therefore, may use in assumpsit on this bond in the name of the County of Delaware, Obligee for his, their or its use, prosecute the same to final judgment for such sum or sums as may be justly due him, them or it, and have execution thereon, provided, however, that Obligee shall not be liable for the payment of any costs or expense of any such suit.

Recovery by any person, co-partnership, association or corporation hereunder shall be subject to the provisions of the Act of the General Assembly No. 869 approved December 20, 1967, to the same extent as if said Provisions were fully incorporated in this Bond.

It is further agreed that any alterations which may be made in terms of the Contractor in the work to be done or materials to be furnished or labor to be supplied or performed under it or the giving of the Obligee or the Principal and the Surety or Sureties or either or any of them their prospective successors and assigns, from their liability hereunder, notice to the Surety or Sureties of any such alteration, extension or forbearance being hereby waived.

In Witness Whereof, the Principal and the Surety have hereunto caused their Common Corporate Seals to be affixed hereto duly attested by their proper Officer the day and year aforesaid.

_____
_____
_____
(Principal)

Attest: _____
(Secretary or Assistant Secretary)

Sealed and delivered in the presence of:

_____

_____
(Surety)

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS, that _____ (PRINCIPAL) and_____(SURETY) are held and firmly bound unto the County of Delaware in the Commonwealth of Pennsylvania (hereinafter called County) in the sum of: $_____, lawful money of the United States of America, to which payment well and truly to be made, we do hereby jointly and severally bind and oblige ourselves and our respective successors and assignees firmly by these presents:

Sealed with our Seals this _____day of _____ 20____.

Whereas, the above bounden Principal has entered into a written Contract with the County to:

_____

_____

for the prices set forth in said Proposal, which said Contract, is by reference made a part thereof.

Now the Condition of this obligation is such that if the above bounden Principal shall well and truly perform said Contract and fully and faithfully carry out and complete the same in all respects then this obligation shall be void and of no effect, otherwise, to continue in full force and virtue.

AND FURTHER, we do in the event of default, hereby authorize and empower any attorney of the Court of Common Pleas of the County of Delaware, Pennsylvania, or any other Court of record elsewhere, or any Prothonotary or Clerk of said Courts, to appear for us, our heirs, executors, administrators, successors or assigns, at the suit of the County of Delaware, its successors, or assigns obligee in the above obligations as of any term, after the date thereof, or hereof, and thereupon to confess judgment against us or against our heirs, executors, administrators, successors or assigns for the above sum _____ Dollars ($_____) debt, besides the cost of suite and any attorney's fee of ten percent (10%) without stay of execution and inquisition upon any levy upon real estate is hereby waived, and condemnation agreed to and the exemption of personal property from levy and sale on any execution under and by virtue of any exemption law now in force, or which may be hereafter passed, is also waived.

In Witness Whereof, the Principal and the Surety have hereunto caused their common or Corporate Seals to be affixed hereto duly attested by their Officers, the day and year aforesaid.

Attest: _____ _____
Secretary or Assistant Secretary _____
_____
Principal

Sealed and delivered in the presence of:

_____ _____
Surety

MAINTENANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT WE _____
Name and Address of Contractor

OR WE _____
Name and Address of Partnership

(or if a corporation with address and state in which incorporated) (herein after called the "Principal"), as Principal, and_____
Name of Surety and Address

a corporation of the State of _____ with offices in the Commonwealth of Pennsylvania and licensed to do business in the Commonwealth of Pennsylvania (hereinafter called "Surety"), as Surety are held and firmly bound unto the County of Delaware in said Commonwealth (hereinafter called "Owner"), in the full and just sum of _____Dollars ($_____) lawful money of the United States of America, to be paid to the said Principal and Surety bind themselves and their respective heirs, administrators, executors, successors and assigns, jointly and severally firmly by these presents.

Signed, sealed and dated this _____ day of _____ 20 ___.

WHEREAS, the Principal has entered into a certain contract with the Owner dated this _____ day of _____ A.D., 20_____, to furnish:

_____
_____
_____
_____

in said County and Commonwealth, in strict conformance with the Specifications, a copy of which is or may be hereto attached.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall remedy, without cost to the said Owner, any defect which may develop during the period of one (1) year from the date of completion, and acceptance of the work performed under said Contract, provided such defects, in the judgment of said Owner, are caused by defective or inferior materials or workmanship, then this obligation shall be null and void, otherwise remain in full force and virtue. AND FURTHER, we do in the event of default; hereby authorize and empower any attorney of the Court of Common Pleas of the County of Delaware, Pennsylvania, or any other Court of record elsewhere, or any Prothonotary or Clerk of Said Courts, to appear for us. our heirs, executors, administrators, successors or assigns, at the suit of the Owner, its successors, or

assigns oblige in the above obligations as of any term, after the date thereof or hereof and thereupon to confess judgment against us or against our heirs, executors, administrators, successors or assigns for the above sum of: _____ _____ Dollars ($ _____) debt, besides the cost of suit and an attorney's fee of ten percent (10%) without stay of execution and inquisition upon any levy upon real estate is hereby waived, and condemnation agreed to and the exemption of personal property from levy and sale on any execution under and by virtue of any exemption law now in force, or which may be hereafter be passed, is also waived.

Attest: _____ _____
Secretary or Assistant Secretary _____
_____
Principal

Sealed and delivered in the presence of:

_____ _____
Surety

WAIVER OF LIENS

WHEREAS, entered into a contract with_____

to provide materials and perform labor necessary for _____

_____

_____

upon a lot of ground located _____

NOW, THEREFORE, it is hereby stipulated and agreed by and between the said parties, as part of the said contract and for the consideration therein set forth, that neither the undersigned contractor, any sub-contractor or material man, nor any other person furnishing labor or materials to the said contractor under this contract shall file a lien, commonly called a mechanic's lien, for work done or materials furnished to remove the said bridge or any part thereof.

This stipulation is made and intended to be filed with the County Prothonotary in accordance with the requirements of Section 1402 of the Mechanics Lien Law of 1963 of the Commonwealth of Pennsylvania in such case provided.

IN WITNESS WHEREOF, the said parties hereto have hereunto set their hands and seals this ____ day of_____, 20_____.

COUNTY OF DELAWARE

By: _____
Authorized Signature

Attest:

CONTRACTOR

By: _____

By: _____
Authorized Signature

_____
Typed Name & Title

STATEMENT OF SURETY COMPANY

Delaware County Contract No. eDPW-040225

In accordance with the provisions of the Contract dated _____ between the County of Delaware, Pennsylvania, and:

_____,
the _____ company of _____Surety on the Bonds of _____,
after a careful examination of the books and records of said Contractor or after receipt of an Affidavit from Contractor, which examination or Affidavit satisfies this Company that all claims for labor and materials have been satisfactorily settled, hereby approve the final payment of the said _____ Contractor and by these presents witness that payment to the Contractor of the final payment shall not relieve the Surety Company of any of its obligations to the County of Delaware, Pennsylvania, as set forth in the said Surety Company's Bonds.

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

_____

Attest:

(SEAL) _____ BY: _____
President

NOTE: This statement, if executed by any person other than the President of the Company, must be accompanied by a certificate of even date showing authority conferred upon the person so signing to execute such instruments on behalf of the company represented. This statement must be executed and submitted by the Bonding Company, to the Engineer, before final payment can be certified.

GENERAL CONDITIONS

These General Conditions shall apply to the Contract as a whole, and to each and all branches or sub-divisions and contractors for same, should the work be divided. Approved sub-contractors should be supplied with a copy of these General Conditions and no Contract or arrangements with them shall be such as to conflict herewith.

1. DEFINITIONS

The following terms shall have the meanings indicated below:

a. The CONTRACT DOCUMENTS consist of the Agreement, the Instructions to Bidders, the General Conditions, the Proposal, the Drawings and Specifications, including all modifications thereof incorporated in the Documents before their execution.

b. The term OWNER shall mean the County of Delaware.

c. The term OFFICERS OF OWNER shall mean the County Council of the County of Delaware.

d. The term ENGINEER shall mean the Design Professional who has prepared these Specifications.

e. The term CONTRACTOR shall mean the person, firm, or corporation named in the Agreement, who will execute the work.

f. The term SUB-CONTRACTOR includes only those having a direct Contract with a Prime Contractor for the performance of the work required under the Prime Contract, and it includes one who furnished materials worked to a special design according to the Drawings or Specifications for this work, but does not include one who merely furnishes material not so worked.

g. Throughout the Contract Documents, the term OWNER, ENGINEER, CONTRACTOR, and SUB-CONTRACTOR are treated as if each were of the singular number.

h. The term WORK of the Contractor or Sub-contractor includes labor, materials, and services, or any of them.

i. Where AS SHOWN, AS DETAILED, or words of similar import are used, it shall be understood that reference to the Drawings accompanying this specification is made, unless otherwise stated.

j. Where AS DIRECTED, AS REQUIRED, AS PERMITTED, APPROVED, ACCEPTANCE or words of similar import are used, it shall be understood that the directions, requirements, permission, approval, or acceptance of the Owner is intended, unless otherwise stated.

k. As used herein, PROVIDED should be understood to mean PROVIDED COMPLETE IN PLACE, that is, FURNISHED AND INSTALLED.

l. CHANGE ORDER shall mean any changes in the work which alter the terms of conditions of the Contract, including, but not limited to, any extension of time for completion of the Contract or any additional to, or deduction from the Contract Sum for extra work or changes in the work. Change orders shall be processed on standard A.I.A. forms and shall be signed by the Owner and the Contractor prior to the start of any work affected by or included in the scope of the change.

m. The term NOTICE, as used herein, shall mean and include all written notices, demands, instructions, claims, approvals, and disapprovals required to obtain compliance with Contract requirements. Written notice by either party to the contract shall be deemed to have been duly served if delivered to or at the last known business address of the person, firm, or corporation, the other party to the Contract, or to his, their, or its duly authorized Agent, representative or Officer, or when enclosed in a postage repaid envelope addressed to such last known business address and deposited in the United States mail.

n. The words TIME OF COMPLETION, CONTRACT TIME, or similar shall be as indicated in the Contract Documents.

o. The law of the place of building shall govern the construction of this Contract.

2. ENGINEER'S INSPECTION

All work shall be subject to Engineer's inspection; he shall make all decisions regarding the work; shall interpret the contract documents and any authorized alterations in work; shall confirm in writing any oral orders, may stop work when necessary; have no authority to approve or order changes in work.

3. ENGINEER'S DECISION

All questions or disputes arising respecting any matter pertaining to the Contract or any part of it, or any breach of the Contract, or any questions and disagreements between the Owner and Contractor relating to the Meaning of the Drawings and Specifications or to kind and quality of work or materials required thereby, shall be decided by the Engineer. Reference of questions under this provision must be presented prior to the final payment.

4. INTENT OF CONTRACT DOCUMENTS

The Contract Documents are complementary. What is called for by any one of them, shall be as binding as if called for by all. The intention of the Contract Documents is

to include the Contract Price, the cost of all labor and materials, scaffold, ladders, runs centering, shoring, staging, rigging, hoists, water, fuel, tools, plant equipment, lights, power, transportation, shop drawings, samples, tests, tools, warranties, taxes, insurance and all other service and expenses necessary for and incidental to the proper execution and completion of the work, unless distinctly specified otherwise. In interpreting the Contract Documents, words describing materials or work which have a well-known technical or trade meaning, unless otherwise specifically defined in the Contract Documents, shall be construed in accordance with such well-known meaning, recognized by Architects, Engineers and Trades.

The Specifications, Drawings, Conditions, and Instruction in Directions as set forth are intended to cooperate and agree, and they shall be interpreted so that the work exhibited in the Drawings and not mentioned in the Specifications, or vice versa, shall be included the same as if it were mentioned in the Specifications and set forth in the Drawing themselves. Any such discrepancies shall be interpreted, explained and decided by the Engineer, who shall have the right to correct any errors or omissions in them as are necessary for the proper fulfillment of their intentions, either before or during the prosecution of the work, and the Contractor shall conform to and abide by whatever supplementary Drawings and explanations may be furnished by the Engineer for the purpose of illustrating the work.

Where the work is shown in complete detail on only half or a portion of a Drawing or there is indication of continuation, the remainder being shown in outline, the work drawn out in detail shall be understood to apply to other portions of the structure. On all work of additions, or alterations, it shall be the responsibility of the Contractor, by personal inspection, to satisfy himself as to correctness of any information given which may affect the quantity, size and quality of material required for a satisfactorily completed Contract, whether or not such information is indicated on the Drawings or within the Specifications.

5. <u>WORK IMPLIED</u>

Should any incidental work or materials be required but not set forth in the Specifications and Drawings, either directly or indirectly, but which is nevertheless necessary for the proper carrying out of the intent thereof, it shall be deemed to be implied and required, and the Contractor shall furnish and install all such work and materials as fully as if they were particularly delineated and described, without additional cost to the owner.

6. <u>ACTUAL MEASUREMENTS</u>

In all Cases where dimensions are governed by conditions already established, the Contractor must depend entirely upon measurements taken by himself, scale or

figured dimensions to the contrary notwithstanding, but no deviation from the specified dimensions shall be made unless duly authorized by the Engineer.

7. ERRORS AND DISCREPANCIES

If the Contractor, in the course of the work, finds any discrepancy between the Drawings or Specifications and the physical conditions of the premises, or any errors, in the Drawings or Specifications or in the layout as given by the points and instructions, it shall be his duty to immediately inform the Engineer, in writing. Should any work be undertaken after the discrepancy has been noted and prior to decision by the Engineer, it is understood that the Contractor will rectify, at his own expense, such work as may have been accomplished and which does not comply with the decision of the Engineer.

8. ASSUMPTION OF RISK

The Contractor represents that he has had an opportunity to examine, and has carefully examined all of the Specifications, Drawings, Instruction and Directions in connection with the work; that he has fully acquainted himself with the actual levels, the excavations and filling required, visible obstructions or known obstructions below the surface, and all other conditions relevant to the work, the site of the work and its surroundings; and is fully aware of any variances between the actual conditions relevant to the work and the same as shown or represented in said Specifications, Drawings and Directions, as far as such variances can be determined by an inspection of the site; that he has made all investigations essential to a full understanding of the difficulties which may be encountered in performing the work and that anything in any of said Documents or in any representation, statements, or information made or furnished by Owner or Engineer notwithstanding, the Contractor will, regardless of any such conditions relevant to the work, the site of the work or its surroundings, complete the work for the compensation agreed upon (except in the case of changes in the work made by the Owner or Engineer and conditions at the site that cannot be determined by inspection, in connection with which the Contractor will be paid as provided in the Article regarding Changes), and will assume full and complete responsibility therefore and all risk in connection therewith. In addition, thereto, the Contractor represents that he has special qualifications for doing the work and will complete the said work to the satisfaction of Owner and Engineer.

9. SIGNING OF DOCUMENTS

The Contract Documents shall be signed, in duplicate, by the Owner and the Contractor.

10. ASSIGNMENT OF CONTRACT

The Contractor shall not assign the Contract or any part thereof without the written consent of the County of Delaware. He shall not Sub-Contract without prior written approval from the County of Delaware.

11. SUB-CONTRACTS

Before awarding any sub-contracts, the Contractor shall notify the Engineer and Owner in writing of any changes to subcontractors originally included in the bid for approval by the County of Delaware and the Engineer. All subcontractors shall be qualified to complete the work they are contracted for.

The Contractor shall not sublet or sub-contract any work to be performed, or any materials to be furnished in the performance of the contract without the written consent of the Engineer or Owner.

The Contractor shall not be required to employ any sub-contractor against whom he has a reasonable objection.

If the Contractor shall sublet or sub-contract any part of the Contract, the Contractor shall be as fully responsible to the Owner of the acts and omissions of his sub-contractor as he is for the acts and omissions of persons directly employed by himself. The Engineer shall, on request, furnish to any sub-contractor, whatever practicable, evidence of the amounts certified on his account.

Nothing contained in the Contract Documents shall create any contractual relationship between any sub-contractor and the Owner. The Contractor agrees to bind every sub-contractor and every subcontractor shall agree to be bound by the terms of the Instructions to Bidders, Special Conditions, General Conditions, Drawings and Specification as far as applicable to his work.

12. OTHER CONTRACTS

The Owner reserves the right to let other Contracts in connection with this work even if of like character to the work under this Contract. The Contractor shall afford other Contractors adequate opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate his work with their work.

If any part of the Contractor's work depends for proper execution or results upon the work of any other Contractor, the Contractor shall inspect and promptly report to the Engineer and Owner, any defects in such work that render it unsuitable for such proper acceptance of the other Contractor's work as fit and proper acceptance of the

Contractor's work as fit and proper for the reception of his work, except as to defects which may develop in the other Contractor's work after the execution of subsequent work.

To ensure the proper execution of this subsequent work, the Contractor shall measure work already in place and shall at once report to the Engineer any discrepancy between the executed work and the drawings.

13. TAXES

All Federal, State and Local Taxes, including Excise Tax, Sales and Use Taxes, when applicable, shall be included in the Proposal, and shall be paid by the Contractor.

14. OWNER'S RIGHT TO OCCUPY

The Owner reserves the right to occupy any portion of the project, before it has been entirely completed, with the distinct understanding that such occupancy shall in no way constitute acceptance of the work in whole or any part thereof, or of any work performed under the Contract.

The Contractor will be held strictly to the terms of the Contract regarding the diligent prosecution of the work and the time of completion of same. In case additional work is ordered or in case of delays not the fault of the Contractor, the Owner may make an equitable extension of working time by so designating in writing.

15. DEFAULT ON PART OF CONTRACTOR

If the Engineer shall at any time be of the opinion that the Contractor is not progressing with the work as rapidly as necessary to insure its completion by the date set forth in the Contract or is neglecting to remedy any imperfections or to repair damage to public or private property; or continues to employ or re-employ negligent or careless persons; or is conducting the work in a manner disapproved by the Engineer or if the Contractor stops or abandons work on any part of the construction without the written consent of the Engineer, or is violating any of the provisions of the Contract, the Engineer shall give the Contractor written notice of the specific deficiencies and direct the Contractor to remedy same. If, at the end of seven (7) calendar days from the date of such notice, the Contractor shall have failed to comply therewith, then the Owner may withhold all payments until the provisions of such notice are carried out and may also place additional forces, equipment, tools and materials on parts of the work at the Contractor's expense as specified or it may annul the Contract.

In case the Owner should augment the Contractor's forces, equipment, etc., as herein provided, the cost incurred in carrying on such parts of the work shall be paid by the Contractor. The Owner may retain the amount of the cost of such work from any sum

or sums due or to become due the Contractor under this Contract. If such costs exceed such unpaid balance, the Contractor shall pay the difference to the Owner.

Should the Contractor be judged as bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he files any proceedings under the provisions of the Bankruptcy Act, or if he should persistently or repeatedly refuse, or should fail, except in cases for which extension of time is provided to supply enough properly skilled workmen or proper materials, or if he should fail to make prompt payment to sub-contractors or for material or labor, or persistently disregard laws, ordinances or the instruction of the Engineer or otherwise be guilty of a substantial violation of any provision of the Contract, then the Owner, upon the Certificate of the Engineer that sufficient cause exists to justify such action, may, without prejudice to any other right or remedy and after giving the Contractor, and his Surety, if any, seven (7) calendar days written notice, terminate the employment of the Contractor and take possession of the premises by whatever method he may deem expedient, including, but not limited to, contracting with another Contractor. The Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the Contract price shall exceed the expense of finishing the work, including compensation for additional engineering, managerial and administrative services, such balance shall be paid to the Contractor; should the unpaid balance be insufficient to complete the work, including compensation for engineering, managerial and administrative services, the Contractor shall pay the difference to the Owner. The expense incurred by the Owner as herein provided, and the damage incurred through the Contractor's default, shall be certified by the Engineer.

16. <u>REMOVAL OF EQUIPMENT</u>

No equipment shall be removed from the worksite by the Contractor, except as herein designated until the usefulness of such equipment on the worksite has ceased, or except with the written consent of the Engineer, otherwise such removal may be considered by the Owner as an abandonment on the part of the Contractor.

In the case of annulment or rescission, or termination of this Contract for any cause whatsoever before the completion of this Project, no equipment, material or supplies shall be removed from the site without the prior authorization in writing from the Owner. Upon written notice from the Engineer to do so, the Contractor shall promptly remove such equipment and supplies from the property of the Owner. The Contractor's failure to carry out the provisions of such notice shall give the right to the Owner to remove such equipment and supplies at the expense of the Contractor.

17. MATERIALS AND WORKMANSHIP

Unless otherwise specifically stipulated in the Specifications, all workmanship shall be of the best quality and all equipment, materials and articles incorporated in the work under the Contract shall be new and of the best grade of their respective kinds for the purpose. The Contractor shall, if required, furnish evidence as to kind and quality of materials.

Should any dispute arise as to the quality and fitness of workmanship, equipment, materials and articles, the decision shall rest strictly with the Engineer and shall be based upon the requirements of the Contract, and what is usual and customary in the execution of other work shall in no way enter any consideration or decision whatsoever.

Where equipment, materials or articles are referred to in the Specifications as equal to any particular standard, the Engineer shall decide the question of quality. The Contractor shall furnish to the Engineer for his approval, the name of the manufacturer of machinery, mechanical and other equipment that he contemplates incorporating in the work, together with their performance, capacities and other pertinent information.

Where required by the Specifications or when called for by the Engineer, the Contractor shall furnish the Engineer for approval, full information concerning the materials or articles that he contemplates incorporating in the work. Machinery, equipment, materials and articles installed or used without such approval shall be at the risk of subsequent rejection.

When the Specifications give the Contractor the option of using one of several definitely named makes or kinds of a particular item or “Approved” equal, the Contractor shall use one of the named items or submit a written request to the Engineer for approval and obtain his approval of an equal before purchasing such material.

Where the Specifications call for any stipulated items, “or equal thereto and approved” or other words to that effect, the Engineer shall be the sole judge of the equality of any article or material offered and reserves the right to demand the particular items stipulated.

18. CHANGES IN SPECIFICATIONS

The Owner reserves the right to make any change in the location of any piece of apparatus or equipment, or roughing-in dimensions up to the time of roughing-in and to make any changes in the Drawings and Specifications, should any be found desirable previous to commencing or during the progress of the work, without in any

other respect or particular invalidating the original provisions of the Contract, without additional expense to the Owner unless such changes require additional labor and/or material. If such a change requires a less amount of labor and/or material than the original work shown or specified, the Owner will be entitled to a credit equal to the difference of the cost and installation. The greater or lesser amount, if any, to be paid the Contractor by the Owner by reason of such changes, shall be as herein specified or as agreed upon between them.

No part of the work shall be altered from that shown on the Drawings or described in the Specifications, nor shall any work in the nature of additional work, or any work not contemplated by the Contract Documents be performed except on written order of the Engineer, approved by the Owner, and if any extra, additional or different work be proceeded with or executed by the Contractor without previous order given, in writing, under the hand of the Engineer, as herein provided, the Contractor shall not be entitled to charge for such extra work.

19. ADDITIONAL OR OMITTED WORK

It is understood that the Owner shall have the right during the progress of construction to make any alterations, additions or omissions of work or material herein specified or shown on the Drawings that may be desired and the same shall be carried into effect by the Contractor without in any way violating the Contract. The amount of money to be added or deducted shall be agreed to, in writing, signed by the two contracting parties before any changes in the Contract Documents will be in force.

Unless specifically directed otherwise by the Engineer, the Contractor shall promptly submit his itemized prices for additions, alterations or deductions prior to proceeding with the changes, which prices, if approved by the Owner, shall be added to or deducted from the Contract price.

When so directed, the Contractor shall submit separate unit prices on work for both additions to and deductions from the Contract price; adjustment, if any, in the amounts to be paid to the Contractor by reason of any change, addition or reduction shall be determined by one or more of the following methods:

1. By unit price contained in the Contractor's Proposal and incorporated in the Contract which unit prices include all charges.
2. By an acceptable lump sum Proposal from the Contractor. Such Proposal shall indicate costs for materials and labor and shall indicate overhead and profit.

3. By actual time and material costs, verified by the Owner's representative, to which it is agreed that an overhead charge of 10% and a profit of 10% will be added.
4. No extra work or change shall be made unless in pursuance of a written order from the Owner signed or countersigned by the Engineer.

20. SUPERVISION AND LABOR

The Contractor shall provide continuous supervision of all work embraced in the Contract, from the beginning of the work to the date of final completion, by a duly authorized and competent Superintendent who shall be acceptable to the Engineer. The Superintendent shall be at all times in charge of the work and shall be provided with such assistants as are necessary to properly carry on the individual branches of the work. The Superintendent shall represent the Contractor in his absence from the work, and all directions, instruction, or notices given to the Superintendent by the Engineer shall be as binding as if given to the Contractor.

The Contractor shall at all times enforce good order and conduct among his employees. Every employee shall be a first-class workman and competent to perform the work assigned to him. Employees shall not be permitted to trespass or conduct themselves contrary to the rules and regulations governing the Owner's premises. Any employee of the Contractor whom the Engineer considers to be detrimental to the proper carrying out of the work is to be removed promptly on the request of the Engineer, and the services of such person shall not be employed on the project site without the written consent of the Engineer.

21. ENGINEERING AND LAYOUTS

If applicable, the Contractor shall provide competent engineering and layout services, approved by the Engineer, from the beginning of the work to the date of final completion of the Contract, to execute the work in accordance with the Contract requirements.

22. RIGHTS OF VARIOUS INTERESTS

Wherever work is being done by workmen other than those employed by the Contractor, but contiguous to his work, the respective rights of the parties involved shall, if necessary, be established by the Engineer. Requests in writing for such determination shall be submitted in a timely manner by the Contractor.

23. INSPECTION OF WORK

The Contractor shall afford the Engineer every facility for observation. All materials and workmanship shall be, at all times, subject to the inspection and acceptance of the Engineer who shall have full power at any time during the progress of the work to reject any materials or workmanship which the Engineer may deem unsuitable for the purpose for which they are intended, or which are not in strict conformity with the Specifications. The Engineer shall also have the power to cause any inferior or unsafe work to be taken down and altered at the cost of the Contractor. When deemed necessary for the proper protection of materials or building, the materials must be sorted and handled as directed by the Engineer. Every part of the work shall be executed to the entire satisfaction and acceptance of the Engineer and Owner.

24. WORK MAY BE PULLED DOWN AND OPENED UP FOR EXAMINATION AND INSPECTION

If directed by the Owner and the Engineer, the Contractor shall pull down, undo or uncover any part of completed or partially completed work or make openings therein to enable the Engineer to make a proper and thorough inspection and the Contractor, after such inspection, shall repair or reconstruct such affected work to the satisfaction of the Engineer.

If, in the opinion of the Engineer, the work should be found unsatisfactory in any respect, the cost of exposing, removing, replacement and restoring it shall be defrayed by the Contractor.

Should the work thus exposed be found not faulty by the Engineer, and if adequate opportunity was afforded for inspection of the work before it was covered or completed, the cost and expense thereby incurred shall be defrayed by the Owner or the Engineer to the extent to which they mutually accept responsibility for such required corrective work.

25. ROYALTIES AND PATENTS

The Contractor shall obtain all necessary consents and shall pay all royalties, licenses, and fees for the use of any patented invention, article, composition or process in the work done or the materials furnished, or any part thereof embraced in this Contract. The Contractor guarantees to save harmless the Owner, its Officers, members, Agents and employees from the liability of any kind of nature including cost and expense on account of suits and claims of any kind for the violation or infringement of any such patent rights by the Contractor or by anyone directly or indirectly employed by him, for, by reason of the use of any art, process, method, manufacture, or

composition of matter patented or un-patented in the performance of this Contract, in violation or infringement of any such patented rights.

The Contractor shall pay for all royalties, claims, and fees for any patented invention, article, or arrangements that may be used in the work under Agreement.

26. PERMITS, LICENSES AND CERTIFICATES

The Contractor shall arrange for the issuance of all Local permits required both temporary and permanent and the Contractor shall include in his price the cost of any of these items. All other licenses, certificates, inspections, survey and/or inspection fees shall be paid by the Contractor including license to practice his trade.

The Contractor shall deliver to the Engineer certificates of inspection and certificate of occupancy where such are required.

The Contractor shall furnish to the local authorities all necessary bonds or cash deposits required as a pledge and security for the protection or maintenance of any public property.

The Contractor and each of his sub-contractors shall secure and pay for all inspections and certification of their work as required by laws and regulations in effect in the locality in which the project is built including those of the Underwriter's and other regulatory bodies.

27. BUILDING REGULATIONS

The requirements of all applicable laws, rules and regulations of Local and State Departments governing building construction and equipment, shall be followed, and all work shall be carried out in strict accordance with such requirements even though each item involved be not herein particularly mentioned or shown on the drawings.

Work required by the Drawings and Specifications above or in excess of the standards required by the above-mentioned laws and regulations shall be provided as specified.

If the Drawings and Specifications are at variance with the above-mentioned laws and regulations, the Contractor shall promptly notify the Engineer, in writing, and any necessary changes shall be made as provided in the Contract. If the Contractor performs any work contrary to such laws, rules and regulations, and without such notice to the Engineer, he shall bear all costs arising therefrom.

28. COOPERATION

The Contractor shall cooperate with the other Contractors on the work and with the Owner so that the completion of all portions of the work may proceed with all possible speed. The Contractor will be required to furnish any and all other Contractors, whose work is fitted to his, detail and erection Drawings giving full information regarding the fabrication and assembly of his work.

So far as possible, these drawings shall show checked field measurements. The Contractor shall further cooperate in timing his work to join with the work of the Contractors or the Owner.

29. MOVING MATERIALS

If it becomes necessary at any time during the execution of the work to move materials or equipment which have been temporarily placed, the Contractor or Sub-contractor furnishing said materials shall, when so directed by the Engineer, move them or cause them to be moved without additional charge.

30. RECEIVING MATERIAL FURNISHED BY OTHERS

Whenever the Contractor or any Sub-contractor shall receive items from another Contractor or the Owner for storage, erection or installations, the Contractor or Sub-contractor receiving such items shall give receipt for the items delivered, and thereafter will be held responsible for the care, storage and any necessary replacing of items received.

31. INJURY TO PROPERTY

Should any direct or indirect injury be done to any existing installation or structures, or to public or private property of any kind or to any structure, materials, or fixtures, resulting from any act or omission on the part of the Contractor, his Sub-contractor, Employees or Agents, the Contractor shall, at his own expense, restore the same equal to its condition before the said damage or injury was done by repairing, replacing, rebuilding or otherwise as may be required by the Owner, Engineer or the Owner of the damaged property.

The Contractor shall take all necessary precautions to avoid injury or damage to buildings, driveways, sidewalks, grading, pipes, conduits, etc., and shall, unless otherwise specified, restore such structures, property, materials, etc., at his own cost and expense to a condition equal to that existing before such damage was done, by repairing, rebuilding, or otherwise, as may be required by the Owner, or shall make good such injury or damage in a satisfactory manner.

The Contractor shall be responsible for any injury or damage to the property of the Owner or to the property of any Public Utility Company included in this contract by or on account of any act, omission, neglect or misconduct of the Contractor in the prosecution of the work or in the storage of materials and equipment.

The Contractor shall properly safeguard the work under this Agreement and shall make good at his own expense all injuries or damages to said work before its completion and final acceptance.

32. BONDS

Should any surety upon the bonds for the performance of the Contract and payment for materials and labor become unsatisfactory to the Owner, the Contractor shall promptly furnish such additional security as may be required from time to time to protect the interest of the Owner and of persons supplying materials and labor in the prosecution of the work required by the Contract, including any change therein.

33. CUTTING AND PATCHING

The General Contractor shall do all demolition, cutting, patching, removals, additions, adjustments and replacements of building construction and finishes necessary for the installation of work of mechanical, electrical and other separate Contractors. All work shall be performed so as to leave the buildings and structures complete and watertight and, in a condition, satisfactory to the Engineer.

The Contractor for Mechanical and Electrical construction shall furnish all labor, material and equipment and perform all operations for the demolition, removal, salvaging, disposition of materials and alterations to the installations and equipment, utilities and services of their respective trades. Any cost of cutting and fittings caused by defective or ill-timed work shall be borne by the party responsible, therefore.

The Contractor shall not endanger any work by cutting, fitting or otherwise. The Contractor shall not cut or alter the work of any other Contractor.

34. ORDER OF COMPLETION

The Contractor shall complete any portion or portions of the work in such order as may be stated in the Specifications. All work shall be so arranged, and Contractors shall so coordinate their work as to complete the work by the date as set forth in the Contract.

35. SUSPENSION OF WORK DUE TO UNFAVORABLE CONDITIONS

If, in the judgment of the Engineer, the Contractor is taking undue risk in the interruption of ongoing site operations and risk of damage to any part of the building by proceeding with the work during unfavorable weather or other conditions, the Engineer shall immediately verbally notify the Contractor or his representative on the site, confirming the same in writing, with copies to the Owner. The Owner may thereupon suspend the work temporarily either wholly or in part, for such period or periods as it may be necessary on account of unsuitable weather or other conditions unfavorable for the safe and proper prosecution of the work. In case of such suspension, no allowance will be made to the Contractor for any expense resulting therefrom. The Owner shall not be liable to the Contractor in any manner for any other charges whatsoever arising out of a suspension in the work of either this Contractor or any Contractor engaged on this Project. It shall be clearly understood that the failure of the Owner or Engineer to suspend the work shall not relieve the Contractor of his responsibility for compliance with the conditions of the Contract.

36. SUSPENSION OF WORK DUE TO FAULT OF CONTRACTOR

Should the Contractor fail to comply with any order of the Engineer relative to any particular part of the work, the Engineer shall have the right to suspend the work on any or all parts until his orders respecting the particular parts are complied with. In case of such suspension, which shall be considered due to the fault of the Contractor, it shall be at the expense of the Contractor on account of idle equipment or forces during the terms of such suspension.

37. SUSPENSION OF WORK DUE TO UNFORESEEN CAUSES

If the Contractor shall be delayed in the completion of his work by reason of unforeseeable causes beyond his control and without his fault or knowledge; such as acts of God or of a public enemy, fire, flood, epidemic, quarantine, restriction, strike, riot, civil commotion or freight embargo, the period may be extended as hereinafter provided. Suspension of work as outlined above shall not in themselves operate to extend the Contract date of completion.

38. REQUEST FOR EXTENSION

The request for extension of time shall be submitted by the Contractor to the Owner and the Engineer setting forth his reasons, therefore. In submitting such requests, the Contractor shall state the completion date as stated in the existing Contract, any changes that have been authorized, and the date he is now requesting as a new completion date. The Owner will grant or deny such request at such time as he deems proper.

The Owner shall not be liable to the Contractor in any manner for any expenses, damages, loss of profits, anticipated or otherwise, or any other charge whatsoever arising out of an extension in the completion date of the work of either this Contract or any Contractor engaged on this Project.

39. STOPPAGE OF WORK BY ENGINEER

Should conditions arise which, in the opinion of the Engineer, warrant a stoppage of work, then the engineer may so direct. If the work is stopped and the Engineer subsequently directs its resumption, the Contractor shall resume full operation within the period of ten (10) calendar days after date of written notice. The Owner shall not be liable to the Contractor in any manner for any expenses, damages, loss of profits, anticipated or otherwise, or any other charges whatsoever arising out of the stoppage of the work of either this Contract or any Contractor engaged on this project. Any work done by the Contractor during the period of suspension shall be at his sole risk and he shall receive no pay therefore, unless the construction is subsequently ordered to be and is resumed and the work during the intervals of the suspension can be utilized in the resumed work.

In the event the Owner determines that any or all of the work as outlined in the Contract shall be terminated, the Contractor shall request payment for the percentage of the work that he actually has completed under the Contract.

The Owner will then determine the percentage of such work that has been completed and the Contractor will accept as full payment the sum of money determined by applying that percentage to the sum that would have been paid under the terms of the Contract, had all of the work been completed.

40. MONTHLY ESTIMATES AND PAYMENTS

Immediately following the receipt of executed copy of Contract, the Contractor shall submit, on forms approved by the Engineer, a detailed breakdown of all items of work entering into the Contract. This detailed breakdown will show quantities of the respective items and the allowances for labor, materials and other costs entering into each item. The detailed breakdown when approved by the Engineer shall be used as a basis by the Contractor in preparing monthly estimates for payment and shall, as accurately as possible, reflect the true division of cost of the respective items entering into the Contract.

As long as the work herein contracted for its prosecuted in accordance with the provisions of this Contract and with such progress as may insure completion by the date set forth in the Contract and to the satisfaction of the Engineer and owner, then

the Owner will make payment to the Contractor for the value of the work completed at monthly intervals.

Monthly estimates shall be prepared by the Contractor on forms approved by the Engineer and will indicate the quantity and value of the work done and materials incorporated by the Contractor to the end of the monthly estimate period. The monthly estimate will be forwarded by the Contractor, for approval to the Engineer, and he shall, in turn, forward it to the Owner. Materials in reasonable quantities that are delivered and accepted for incorporation in the work but not yet so used may be included on monthly estimates for payment.

The Contractor shall submit with the monthly estimate, reflecting the unincorporated material, original and two (2) copies of itemized receipt invoices showing payment for such material by the Contractor and delivery slips certifying to the delivery of the quantities set forth on the estimate to the site of this work, upon the property of the Owner.

The Contractor shall mark or identify such material and shall be solely responsible for its safekeeping and usability of the time it is to be incorporated in the structure or project, and shall, at his own expense, care for and protect the same and take out insurance against theft, loss from any other cause, damage, destruction and/or such other risks as may be involved, which would render the aforesaid materials unfit or unavailable for incorporation in the project.

Payment for materials stored at the site shall be based on 50% of actual cost for same as shown by the receipted invoices and shall not exceed the cost of materials as indicated on the approved “Breakdown Sheet” for the particular items involved. Monthly payments to the Contractor will be made on the basis of submission prepared by the Contractor as above explained. The form will require breakdown of total work completed to date of submission. From this total will be deducted ten percent (10%). From the resultant amount will be deducted all previous payments. The remainder, as approved, will constitute current amount due. The retained ten percent (10%) will be paid when the project has been finally accepted by the Owner. No estimates given or payment made shall be conclusive of the performance of the Contract either wholly or in part and no estimates or certificates of final payment shall be construed to be an acceptance of inferior or defective work or materials.

In Contracts exceeding $50,000.00 for the construction, reconstruction, alteration or repair of any public building or other public work or public improvement, including heating or plumbing contracts, under the terms of which the Contractor is required to give a performance bond and labor and material payment bond, the Owner, in order to insure the proper performance of the Contract, shall withhold from the Contractor sums not to exceed 10% of the amount due the Contractor until 50% of the Contract

is completed. The sum or sums withheld by the Owner from the Contractor after the Contract is 50% completed shall not exceed 5% of the amount due the Contractor.

41. ACCEPTANCE AND FINAL PAYMENT

Whenever, in the opinion of the Engineer, the Contractor shall have completed his Contract in accordance with terms thereof, the Owner and the Engineer shall make a final observation of the entire work and, if satisfied that the Contractor has completely performed the Contract, the Contractor shall be instructed to submit a final estimate showing the entire amount of each class of work performed and the value thereof with such deductions as may be due the Owner under the Contracts or of such additions as may be due the Contractors. The total payments due to the Contractor cannot, however, exceed the sum authorized by the Owner under the terms of the Contract. The Engineer shall certify to the Owner the aggregate amount of said final estimates due to the Contractor and that all work in the Contract has been fully completed.

The final payment shall not become due and payable until the Contractor shall have furnished the Owner with satisfactory evidence that all labor and materials, outstanding claims and indebtedness of whatsoever nature arising out of the performance of the Contract have been paid, and until the Contractor shall have furnished a written General Release statement to such effect executed by Contractor and Sureties, which will further provide that payment to the Contractor of the final estimate shall not relieve any Surety of its obligation to the Owner as set forth in the Surety Bonds.

Where one or more claims against the Contractor, which are in controversy, appear unsatisfied, the Owner shall have the discretion to direct final payment to be withheld or a partial payment to be made from the retained percentage, should it be determined that the withholding of the entire final payment would work a hardship on the Contractor or delay the final payments to other Contractors on the project. If only partial payment is permitted under the paragraph from the retained percentage, final payment shall not be made until the Contractor shall have furnished satisfactory evidence and a statement from the Surety that all claims against the Contractor have been paid; that payment to the Contractor of the Contract balance shall not relieve any Surety of any of its obligations to the Owner as provided in the Surety Bond. The acceptance by the Contractor of the final payment made as aforesaid, shall operate as and be a release to the Owner and every member and agent thereof from all claims and liabilities to the Contractor for (1) anything done or furnished for, or relating to the work or (2) any act or neglect of the Owner, or of any person relating to or affecting the work, but his final payment shall not relieve the Contractor from his indemnity obligations under the terms of the Contract.

42. ESTOPPEL AND WAIVER OF LEGAL RIGHTS

Neither the Owner nor the Engineer shall be precluded or estopped by the measurements, estimate, or certificate, made or given by any of them or by any of their agents or employees, under any provision of the Contract, at any time, either before or after the completion and acceptance of the work and payment thereof, pursuant to any measurements, estimates, or certificate, from showing the true and correct amount or character of the work performed and materials furnished by the Contractor, nor from showing, at any time, that any such measurements, estimate or certificate is untrue or incorrectly made in any particular, or that the work or materials or any parts thereof do not conform in fact to Specifications and Contract. The Owner shall have the right to reject the whole or any part of the aforesaid work or materials should the said measurements, estimate, certificate or payments be found or be known to be inconsistent with terms of the Contract, or otherwise improperly given, and the Owner shall not be precluded or estopped notwithstanding any such measurements, estimate, or certificate or payment in accordance therewith from demands and recovering from the Contractor and/or his surety such damages as may sustain by reason of his failure to comply with the terms of the Specification and Contract, or on account of any over payments made on any estimate or certificate. Neither the acceptance by the Owner or Engineer or any of their agents or employees, nor any certificate approved for payment of money; nor any payments for, nor acceptance of, the whole or any part of the work by the Owner, nor any extension of time nor any possession taken by the Owner or its employees shall operate as a waiver of any portion of the Contract or any power therein reserved by the Owner, or any right to damages herein provided, nor shall any waiver of any breach of the Contract be held to be a waiver of any other or subsequent breach.

43. CHASES, THIMBLES, SLEEVES

The General Contractor shall construct, or have built into the building walls, floors, ceilings and partitions all chases, thimbles, sleeves, inserts, bolts, hangers and fastening devices that are necessary. All other prime or separate Contractors shall furnish to the General Contractor, for installation, all material in required locations.

If the foregoing has not been complied with within such time as may be necessary so that the work can progress along with the structure, then the Sub-contractor or separate Prime Contractor whose work is affected shall make and bear expenses for such changes incidental to the construction as may be required so that his work can be properly installed. All such work shall be undertaken only after securing the Engineer's approval.

44. HIRING, ETC.

That, in the hiring of employees for the performance of work under this Contract or any Sub-Contract hereunder, no Contractor, shall by reason of race, creed, or color or sex discriminate against any citizen of the Commonwealth of Pennsylvania who is qualified and available to perform the work to which employment relates.

45. SHOP DRAWINGS AND SAMPLES

Shop Drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by the Contractor or Sub-contractor, manufacturer, supplier or distributor and which illustrate some portion of the work; samples are physical examples furnished by the Contractor to illustrate materials, equipment or workmanship and to establish standards by which the work will be judged.

The Contractor shall review, stamp with his approval and submit, with reasonable promptness and in orderly sequence so as to cause no delay in the work or in the work of any other Contractor, all shop drawings required by the Contract Documents or subsequently by the Engineer as covered by Modifications. Shop drawings and samples shall be properly identified as specified, or as the Engineer may require, Contractor shall notify the Engineer in writing of any deviation in the shop drawings from the requirements of the Contract Documents at the time of submission.

The Contractor shall make any corrections required by the Engineer and shall resubmit the required number of corrected copies of shop drawings or new samples until approved. The Contractor shall direct specific attention in writing or on resubmitted shop drawings to revisions other than the corrections requested by the Engineer on previous submissions.

The Engineer's approval of Shop Drawings or Samples shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has informed the Engineer in writing of such deviation at the time of submission and the Engineer has given written approval to the specific deviation, nor shall the Engineer's approval relieve the Contractor from responsibility for errors or omissions in the Shop Drawings or Samples.

For each Shop Drawing required, the Contractor shall submit one copy of an acceptable, legible, reproducible print of the original tracing, along with digital version via email or pre-approved cloud-based downloadable copy. The Engineer will mark as previously specified and return corrected print to Contractor. This process shall be repeated until approved shop drawings are received. All prints will become the property of the Owner and shall be included in the As-Built documentation.

46. AS-BUILT DRAWINGS

At termination of work and before final payment, submit As-built drawings of the work completed.

After approval, submit one (1) corrected bound copy of the operations & maintenance manual for all equipment/applicances, and two (2) electronic flash (jump USB drive) in PDF Format for all drawings, submittals, and manuals.

47. REQUIRED BREAKDOWN OF PROJECT COSTS AND FORM FOR MONTHLY BILLINGS

American Institute of Architects Document G702, “Application and Certificate for Payment”, and Document G702A, “Continuation Sheet”, will be used for all monthly billings on this project.

48. PREVAILING WAGE RATES

If Prevailing Wage Rates apply, the Contractor shall conform to and be bound by the laws of the Commonwealth of Pennsylvania, relating to conditions of employment with respect to Act. No. 442. Prevailing Wage Rates apply to any project over $25,000.00

49. CONTRACTOR’S SECURITY

Upon notice to the Contractor that he is the low bidder, and before award of the Contract, the Contractor shall furnish two (2) Bonds with Surety acceptable to the County, as follows:

One in the full amount of the Contract conditioned for the faithful performance of said Contract, including the indemnification of the Owner, in all respects set forth in these General Conditions and Specifications.

And the other for the full amount of the Contract conditioned to pay for all labor and materials which may be furnished to the Contract or which may enter into the Contract with right in all persons, firms or Corporation furnishing such labor or materials to sue on said Bond in the name of the Owner, for his, their, or its use.

The Delaware County Council will also require a Maintenance Bond in the amount of ten percent (10%) of the Contract price conditioned that the Principal shall remedy, without cost to the Owner, any defects which may develop during the period of one (1) year from date of completion and acceptance of the work performed under the Contract.

To each Bond shall be attached a recent financial statement of the Surety, along with a Power of Attorney showing that the person signing the Bonds on behalf of the Surety has power to do so.

The surety Bonds are subject to the approval of County Council. No Surety Bond will be approved unless the bonding Company shall have a rating of at least "B+" in Best's Key Rating Guide and shall be approved by the United States Department of the Treasury as a surety Company acceptable on Federal Bonds. In addition, the bonding Company shall have been registered with the Office of judicial support and the Office for Recording of Deeds of the **County of Delaware**.

The bonds shall be duly executed by the successful bidder as principal and by the signers of the Agreement of Prepared Surety, or Sureties. If the Owner determines that the Sureties are not acceptable, the bidder shall replace the bond with bonds offered by Sureties, which are acceptable to the Council within ten (10) calendar days of notification by the Council.

50. STEEL PRODUCTS

In accordance with the Pennsylvania Steel Products Procurement Act #1978-3, it is required that if any steel products are to be used or supplied in the performance of the Contract only steel products as defined in said act shall be used or supplied in the performance of the Contract or any sub-contracts thereunder.

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

51. MATERIAL SAFETY DATA SHEETS (MSDS)

Material Safety Data Sheets (MSDS) must be submitted for respective products with the Bid proposal, in compliance with the Federal Hazard Communication Standard Act (29 CFR 1910, 1200) and various State Right-to-Know laws.

52. GENERAL NOTES

Contracts shall be awarded to the lowest responsible bidder. In determining "lowest responsible bidder", in addition to price, the Central Purchasing Department in its pre-award evaluation shall, in consultation with the affected department head, ascertain and consider:

a. The expertise of the bidder to perform the Contract or provide the service required;

b. Whether the bidder can perform the Contract or provide the service promptly, or within the time specified and with adequate supervisory personnel;

c. The character, integrity, reputation and judgment of the bidder;

d. The quality of performance on previous contracts and services;

e. The previous and existing compliance by the bidder with laws and ordinances relating to the Contract or service;

f. The sufficiency of the financial resources of the bidder to perform the Contract or provide the service;

g. The ready availability of supplies necessary to discharge performance in a prompt and workmanlike manner;

h. The ability of the bidder to provide future maintenance and services for the use of the subject Contract;

i. The number and scope of conditions attached to the bid.

(The acceptance of all bids for contracts is made expressly conditional upon a satisfactory rating from a pre-award investigation conducted by the Central Purchasing Department).

The following will automatically disqualify a low bidder:

a. Default on the payment of taxes, licenses, or other monies due the County.

b. Default, breach or repudiation on past contracts which reflect a course of performance deemed deleterious to the County's best interest.

When the award is not given to the lowest bidder, a full and complete statement of the reasons for placing the order elsewhere shall be prepared by the Central Purchasing Department and filed with the other papers relating to the transaction.

No verbal instructions or information will be binding. These specifications will be considered clear and complete unless attention is directed in writing to the Director of Public Works, County of Delaware, Delaware County Government Center, Media, Pennsylvania, to any apparent discrepancies or omissions thereof, before the opening of the Bids. Bidders should act promptly and allow sufficient time for replay to reach them before the submission of their Bids. Should any change in Specifications be required, an Addendum will be issued to all Bidders and receipt by the Bidders of the Form of Addendum must be acknowledged in space provided on Proposal Page.

Forms of Proposal are provided in these Specifications. This form must be used in submitting Proposal and must be signed by the Bidder.

DELAWARE COUNTY SPECIAL CONDITIONS

These General Conditions shall apply to the Contract as a whole, and to each and all branches or sub-divisions and contractors for same, should the work be divided. Sub-contractors shall have access to read a copy of these Special Conditions and no Contract or arrangements with them shall be such as to conflict herewith. Any requirements contained in the General Conditions which differ from any requirements contained in these "Special Conditions" shall be superseded by the requirements of these "Special Conditions".

1. ARRANGEMENT OF THE SPECIFICATIONS

   A. The Contractor is advised that the arrangement of the technical sections of the Specifications is furnished for his convenience only. The allocation of items of work between his Sub-contractors is entirely the responsibility of the Contractor.

   B. The Prime Contractors shall have a project foreman on-site whenever a Sub-contractor of the Prime Contractor is on-site to perform work. Sub-contractors shall submit all Owner related items to project foreman including operational and facility inquiries, building / room access. Scheduling conflicts and site coordination requests. It is the sole responsibility of the Prime Contractors to engage with Owner and Engineer, or their designated representatives to satisfy the Sub-contractors request.

   C. Materials and installation shall comply with the appropriate technical section of this specification unless otherwise indicated.

2. SAFETY DURING CONSTRUCTION

   A. The Contractor shall enforce suitable rules and provide the required guards and protective devices for the safe prosecution of the work and for the safety and health of the men employed in it and the public in general, both inside and outside the limit of Contract. The contractors are responsible for compliance with the Federal Occupational Safety and Health Act of 1970.

   B. The Prime Contractor and all Sub-contractors shall immediately report all accidents, injuries, or health hazards to the Owner and Engineer, or their designated representatives, in writing.

   C. It shall be the single and sole responsibility of the Contractor to ensure

that his activities comply with all applicable safety requirements, including, but not limited to local, state and federal regulations. Neither the Engineer nor the Owner shall owe any duty under this Contract or otherwise to the Contractor or its agents, employees or guests to inspect the work or otherwise ensure compliance by the Contractor with applicable safety requirements. No increases in the Contract price or extensions in the Contract time of completion shall be given by the Owner as the consequence of the Contractor's failure to so comply.

3. STANDARD OF QUALITY

See General Condition, Paragraph 17.

4. SUBSTITUTIONS OF MATERIAL

Bidders wishing to obtain acceptance on items other than those specified by name shall submit their request to the Engineer not less than ten (10) days before the bid opening, provided that such request is in accordance with the terms of conditions of the Contract Documents.

Acceptance by the Engineer will be in the form of an addendum to the Specifications issued to all prospective bidders indicating that the additional brand or brands are approved as equal to those specified so far as the requirements of the project are concerned. If the bidders do not elect to obtain prior approval during the time so specified, they have thereby evidenced their intention and are bound to provide all those articles and brand names stated in the Specifications.

5. CASH ALLOWANCES

In accordance with the Commonwealth of Pennsylvania Laws and Regulations, no cash allowances are included in the Project Manual and Contracts.

The Drawings and / or Specifications indicate the standard of quality and the finite quantity of materials and work, specialties, and items of work required, where such quantities can be determined prior to commencement of the work.

In those instances where it is known that quantities required may exceed those specified, as the result of conditions impossible to anticipate, the Contractor shall state in his Proposal the unit price for such additional work, but no cash allowance for such additional quantity will be permitted.

6. DAMAGE TO PROPERTY

See General Conditions, Paragraph 31.

7. CLEAN-UP

The Contractor shall be responsible for periodic cleaning up of the building and premises. He shall remove all refuse of any kind regardless as to who may have left it. No rubbish shall be burned at the site. The Contractor shall also be responsible for keeping all property outside of the immediate work areas and material storage areas clean and free from all equipment, materials, and debris. If any condition in violation of this requirement persists more than twenty-four (24) hours after notification by the Owner or Engineer, the Owner shall have the right to abate the condition (without notice to the Contractor responsible) and charge the cost of abatement to the responsible Contractor.

8. DRAWINGS AND SPECIFICATIONS FURNISHED TO CONTRACTORS

Following the execution of their respective Contracts, Contractors shall be entitled to receive from the Engineer, without charge, sets of Contract Drawings and Specifications as follows:

A. Prime Contractors – 3 sets

Should a Contractor require a greater number of copies of Drawings and Specifications than above provided, he shall arrange to obtain them from the Engineer and pay the cost involved.

9. WARRANTY

Supplementing any specific guarantee or warranties provided for in any other provision of this Contract for the work to be performed hereunder; each Contractor covenants and agrees to remedy without cost to the Owner, any defect which may develop one (1) year from the date of completion and acceptance of the work performed under this Contract, or damage which may be caused by such defects, provided such defects, in the judgment of the Owner, are caused by inferior materials and workmanship.

10. OPERATIONS AND STORAGE AREAS

All operations of the Contractor (including storage of materials) shall be confined to areas authorized or approved by the Owner. No unauthorized or unwarranted entry upon, passage through, or storage or disposal of material

shall be made upon area not so authorized or approved. The Contractor responsible shall be liable for any and all damage caused by him to such area.

11. SCAFFOLDS, LADDERS, RUNS, AND HOISTS

The Contractor shall construct and maintain such temporary scaffolds, ladders, runs, hoists, centering, shoring, and other facilities as required to construct the work under his contract.

12. TIME FOR COMMENCEMENT AND COMPLETION

See General Conditions, Paragraph 34.

13. CODES AND PERMITS

See General Conditions, Paragraphs 26 and 27.

14. GENERAL SCOPE OF WORK

See General Conditions, Paragraph 4.

15. INDEMNIFICATION AGAINST SUITS

The Contractor shall indemnify and save harmless the Owner, the Board, its members and officers, the Engineer, his assistants, and all others who may act for the Board or the Owner from all suits and actions of every kind, nature, and description brought by anyone whatsoever against them or any of them in any manner connected with the contract here proposed or the work thereunder; provided that nothing herein stated shall be construed to preclude the Contractor from maintaining an action at law for money which may be due to him under the Contract.

16. COMPETENT WORKMEN – RATES OF WAGES

No person shall be employed to do work under such Contract except competent and first-class workmen and mechanics. No workmen shall be regarded as competent and first-class, within the meaning of this clause, except those who are fully skilled in their respective branches of labor, and who shall be paid not less than such rates of wages and for such hours' work as shall be the established and current rate of wages paid for such hours by employers or organized labor in doing of similar work in the general geographical location of the project.

17. LINES, LEVELS, ETC.

The Contractor shall, at his own expense, procure datum information, grades, elevations, verify existing construction, etc., at the site, before starting work, otherwise any cost of correction shall be entirely at the contractor's expense.

18. REGULATIONS FOR PENNSYLVANIA PREVAILING WAGE ACT

A. The general prevailing minimum wage rates including contributions for employee benefits as shall have been determined by the Secretary which must be paid to the workmen employed in the performance of the contracts.

   The Contractor shall pay no less than the wage rates as determined in the decision of the Secretary of Labor and Industry and shall comply with the conditions of the Pennsylvania Prevailing Wage Act approved August 15, 1961 (No. 442), as amended August 9, 1963 (No. 342), and the Regulations issued pursuant thereto, to assure the full and proper payment of said wages.

B. The contract provisions shall apply to all work performed on the Contract by the Contractor and to all work performed on the Contract by the Sub-contractors.

C. The Contractor shall insert in each of the Sub-contracts all of the stipulations contained in these required provisions and such other stipulations as may be required.

D. The Contract shall provide that no workmen may be employed on the public work except in accordance with the classifications set forth in the decision of the Secretary. In the event that additional or different classifications are necessary the procedures set forth in Section 7 of these Regulations shall be followed.

E. The Contract shall provide that all workmen employed or working on the public work shall be paid unconditionally, regardless of whether any contractual relationship exists or the nature of any contractual relationship which may be alleged to exist between any contractor, sub-contractor and workmen, not less than once a week without deduction or rebate, on any account, either directly or indirectly, except authorized deductions, the full amounts due at the time of payment, computed at the rates applicable to the time worked in the appropriate classification. Nothing in the contract,

the Act or these Regulations shall prohibit the payment of more than the general prevailing minimum wage rates as determined by the Secretary to any workmen on public work.

F. The Contract shall provide that the Contractor and each Sub-contractor shall post for the entire period of construction the wage determination decisions of the Secretary, including the effective date of any changes thereof, in a prominent and easily accessible place or places used by them to pay workmen their wages. The posted notice of wage rates must contain the following information:

1. Name of Project.

2. Name of public body for which it is being constructed.

3. The crafts and classifications of workmen listed in the Secretary's general prevailing minimum wage rate determination for the particular project.

4. The general prevailing minimum wage rates determination for each craft and classification and the effective date of any changes.

5. A statement advising workmen that if they have been paid less than the general prevailing minimum wage rate for their job classification or that the Contractor and / or Sub-contractor are not complying with the Act or these Regulations in any manner whatsoever they may file a protest in writing with the Secretary of Labor and Industry within three months of the date of the occurrence, objecting to the payment by any contractor to the extent of the amount or amounts due or to become due to them as wages for work performed on the public work project.

   Any workman paid less than the rate specified in the Contract shall have a civil right of action for the difference between the wage paid and the wages stipulated in the contract, which right of action must be exercised within six months from the occurrence of the event creating such right.

G. The Contract shall provide that the Contractor and all Sub-contractors shall keep an accurate record showing the name, craft, and / or classification, number of hours worked per day, and the actual hourly rate of wage paid (including employee benefits) to each workman employed by him in connection with the public work and such record must include any deductions from each workman. The record shall be preserved for two

years from the date of payment and shall be open at all reasonable hours to the inspection of the public body awarding the contract and to the Secretary of his duly authorized representatives.

H. The Contract shall provide that apprentices shall be limited to such numbers as shall be in accordance with a bona fide apprenticeship program registered with and approved by the Pennsylvania Apprenticeship and Training Council and only apprentices whose training and employment are in full compliance with the provisions of the Apprenticeship and Training Act approved July 14, 1961 (No. 304) and the Rules and Regulations issued pursuant thereto shall be employed on the public work project. Any workman using the tools of a craft who does not qualify as an apprentice within the provisions of this subsection shall be paid the rate predetermined for journeyman in that particular craft and / or classification.

I. Wages shall be paid without any deductions except authorized deductions. Employers not parties to a contract requiring contributions for employee benefits which the Secretary has determined to be included in the general prevailing minimum wage rate shall pay the monetary equivalent thereof directly to the workmen.

J. Payment of compensation to workmen for work performed on public work on a lump sum basis, or a piece work system, or a price certain for the completion of a certain amount of work, or the production of a certain result shall be deemed a violation of the Act and these Regulations, regardless of the average hourly earnings resulting therefrom.

K. The Contract shall also provide that each contractor and each sub-contractor 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 of the Contract as prescribed by this Section 3 of these Regulations, or if any wages remain unpaid to set forth the amount of wages due and owing to each workman respectively.

L. The provisions of the Act and the Regulations are hereby incorporated by reference in the Contract.

19. LIQUIDATED DAMAGES

A. The Owner will suffer damages if the construction contract(s) is not complete as set forth in the Proposal Form(s).

B. The Contractor and Contractor's surety company shall be liable for and shall pay to the Owner the sum of $500.00 per day as Liquidated Damages for each calendar day of delay until the construction contract is complete.

20. PROJECT SCHEDULE

A. Provide Project Schedule in accordance with other Sections of these Specifications.

B. Include within the Project Schedule the related work activities of all trades by task / event with completion time frame, allowable slippage and critical start and finish dates. Incorporate milestones for Owner responsibilities.

C. Acceptable formats for presentation of Project Schedule include:

1. Simplified overlapping and coordinated bar charts with a timeline and activity dates and duration.

2. A network schedule using the critical path method (cpm) of plotting nodes (events) and connecting arrows (activities).

D. Update the Project Schedule as required to accommodate field and project conditions. Issue an updated Project Schedule to the Owner for review and approval every Three (3) weeks or as required to inform the Owner of deviations and revisions.

E. The project shall be complete and operational in the time frame specified in Section B, Instructions to Bidders, Time for Completing Work. The time for completing work stated in Instructions to Bidders, Time for Completing Work shall be considered the contract limit as defined in the Proposal Form in section C. It is understood that the County may, on its own decision or initiate, extend the completion date by giving notice to all parties to this contract of its intention to extend. The County shall not be liable for any expenses, damages, loss of profits, anticipated or otherwise for extending this contract.

21. APPRENTICESHIP TRAINING

A. A bidder and all sub-contractors they may eventually employ on this Project shall each be a participant in a state or federally approved Apprenticeship Training Program. Each bidder shall submit with his / her proposal a complete description of the Apprenticeship Training Program in which the bidder participates. The bidder shall also provide with his / her bid a written statement that if awarded a contract, the bidder will employ apprentices enrolled in a state or federally approved Apprenticeships Training Program under the direction of experienced supervisors.

B. If requested by the Owner, the bidder shall submit within three (3) days of the date of the request, the name, address, and telephone number of the state and federal agency which certifies the bidder's Apprentice / Training Program and the bidders identification number (if any) that would enable the Owner's representative to verify the information provided by the bidder.

C. Failure of a bidder to provide information as required under this paragraph shall be cause for disqualification of the bidder's proposal.

22. AFFIRMATIVE ACTION PROGRAM

A. Each bidder shall have a formal documented Affirmative Action Program and must provide with his / her proposal a written statement describing the exact nature, scope and history of their Affirmative Action Program in the interest of extending work opportunities to qualified minority workers.

B. Failure of a bidder to provide information as required under this paragraph shall be cause for disqualification of the bidder's proposal.

23. SUB-CONTRACTOR ON SITE

Prime Contractors shall have a project foreman on-site whenever a Sub-contractor of such Prime Contractor is on-site to perform work. Sub-contractors shall submit all Owner related items to project foreman including operational and facility inquiries, building / room access, scheduling conflicts and site coordination requests. It is the sole responsibility of the Prime Contractors to engage with Owner and Engineer, or their designated representatives to satisfy the Sub-contractor's request.

24. CRIMINAL BACKGROUND CHECK POLICY

The County will require all construction workmen working at the Facility to undergo a criminal background check. See Employee Background Requirements listed in Appendix B.

NONDISCRIMINATION/SEXUAL HARASSMENT CLAUSE

The Contactor agrees:

1. In the hiring of any employee(s) for the manufacture of supplies, performance of work, or any other activity required under the contract or any sub-contract, the Contractor, each sub-contractor, or any person acting on behalf of the Contractor or sub-contractor, shall not, discriminate in violation of the *Pennsylvania Human Relations Act* (PHRA) and applicable federal laws against any citizen, who is qualified and available to perform the work to which the employment relates.

2. Neither the Contractor nor any sub-contractor nor any person on their behalf shall in any manner discriminate in violation of the PHRA and applicable federal laws against or intimidate any employee involved in the manufacture of supplies, the performance or work, or any other activity required under the contract.

3. The Contractor and each sub-contractor shall establish and maintain a written nondiscrimination and sexual harassment policy and shall inform their employees of the policy. The policy must contain a provision that sexual harassment will not be tolerated and employees who practice it will be disciplined. Posting this Nondiscrimination/Sexual Harassment Clause conspicuously in easily-accessible and well- lighted places customarily frequented by employees at or near where the contract services are performed shall satisfy this requirement.

4. The Contractor and each sub-contractor shall not discriminate in violation of PHRA and applicable federal laws against any sub-contractor or supplier who is qualified to perform the work to which the contract relates.

5. The Contractor and each sub-contractor represents that it is presently in compliance with and will maintain compliance with all applicable federal, state and local laws and regulations relating to nondiscrimination and sexual harassment. The Contractor and each sub-contractor further represents that it has filed a Standard Form 100 Employer Information Report (“EEO-1”) with the U.S. Equal Employment Opportunity Commission (“EEOC”) and shall file an annual EEO-1 report with the EEOC as required for employers’ subject to Title VII of the Civil Rights Act of 1964, as amended, that have 100 or more employees and employers that have federal government contracts or first-tier sub-contracts and have 50 or more employees. The Contractor and each sub-contractor shall, upon request and within the time periods requested by the County, furnish all necessary employment documents and records, including EEO-1 reports and permit access to their books, records and accounts by the contracting agency and the Bureau of Small Business

Opportunities (BSBO), for purpose of ascertaining compliance with provisions of the Nondiscrimination/Sexual Harassment Clause.

6. The Contractor shall include the provisions of this Nondiscrimination/Sexual Harassment Clause in every sub-contract so those provisions applicable to sub-contractors will be binding upon each sub-contractor.

7. The Contractor's and each sub-contractor's obligation pursuant to these provisions are ongoing from and after the effective date of the contract through termination date thereof. Accordingly, the Contractor and each sub-contractor shall have an obligation to inform the County if, at any time during the term of the Contract, it becomes aware of any actions or occurrences that would result in violation of these provisions.

8. The County may cancel or terminate the Contract and all money due or to become due under the Contract may be forfeited for a violation of the terms and conditions of the Nondiscrimination/Sexual Harassment Clause.

APPLICATION AND CERTIFICATE FOR PAYMENT CONSTRUCTION MANAGER-ADVISER EDITION

AIA DOCUMENT G702/CMa (Instructions on reverse side)

TO OWNER:

PROJECT:

APPLICATION NO.:
PERIOD TO:
PROJECT NOS.:

CONTRACT DATE:

Distribution to:
☐ OWNER
☐ CONSTRUCTION MANAGER
☐ ARCHITECT
☐ CONTRACTOR

FROM CONTRACTOR:

VIA CONSTRUCTION MANAGER:

CONTRACT FOR:

VIA ARCHITECT:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract. Continuation Sheet, AIA Document G703, is attached.

1. **ORIGINAL CONTRACT SUM** . . . . . $_____
2. **Net Change By Change Orders** . . . . . $_____
3. **CONTRACT SUM TO DATE** (Line 1 ± 2) . . . . . $_____
4. **TOTAL COMPLETED & STORED TO DATE** . . . . . $_____
   (Column G on G702)
5. **RETAINAGE:**
   a. _____% of Completed Work $_____
   (Columns D + E on G703)
   b. _____% of Stored Material $_____
   (Column F on G703)
   Total Retainage (Line 5a + 5b or
   Total in Column I of G703) . . . . . $_____
6. **TOTAL EARNED LESS RETAINAGE** . . . . . $_____
   (Line 4 less Line 5 Total)
7. **LESS PREVIOUS CERTIFICATES FOR PAYMENT**
   (Line 6 from prior Certificate) . . . . . $_____
8. **CURRENT PAYMENT DUE** . . . . . $
9. **BALANCE TO FINISH, INCLUDING RETAINAGE**
   (Line 3 less Line 6) $_____

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner		
Total approved this Month		
TOTALS		
NET CHANGES by Change Order		

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:
County of:
Subscribed and sworn to before
me this day of

Notary Public:
My Commission expires:

CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Construction Manager and Architect certify to the Owner that to the best of their knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED . . . . . $_____

(Attach explanation if amount certified differs from the amount applied for. Initial all figures on this Application and on the Continuation Sheet that changed to conform to the amount certified.)

CONSTRUCTION MANAGER:

By: _____ Date: _____

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

INSTRUCTION SHEET

FOR AIA DOCUMENT G702/CMa, APPLICATION AND CERTIFICATE FOR PAYMENT
CONSTRUCTION MANAGER-ADVISER EDITION

A. GENERAL INFORMATION

AIA Document G702/CMa, Application and Certificate for Payment, Construction Manager-Adviser Edition, is to be used in conjunction with AIA Document G703, Continuation Sheet. These documents are designed to be used on a Project where a Construction Manager is employed as an adviser to the Owner, but not as a constructor, and where multiple Contractors have direct Agreements with the Owner. Procedures for their use are covered in AIA Document A201/CMa, General Conditions of the Contract for Construction, Construction Manager-Adviser Edition, 1992 Edition.

B. COMPLETING THE G702/CMa FORM:

After the Contractor has completed AIA Document G703, Continuation Sheet, summary information should be transferred to AIA Document G702/CMa, Application and Certificate for Payment, Construction Manager-Adviser Edition.

The Contractor should sign G702/CMa, have it notarized and submit it, together with G703, to the Construction Manager and Architect.

The Construction Manager and Architect should review G702/CMa and G703 and, if they are acceptable, complete the Certificate for Payment on G702/CMa. The Construction Manager and Architect may certify a different amount than that applied for, pursuant to Paragraphs 9.5 and 9.6 of A201/CMa. They should then initial all figures on G702/CMa and G703 that have been changed to conform to the amount certified and attach an explanation. The completed G702/CMa and G703 should be forwarded to the Owner.

C. COMPLETING THE G703 FORM:

Heading: This information should be completed to be consistent with similar information on AIA Document G702/CMa, Application and Certificate for Payment, Construction Manager-Adviser Edition.

Columns A, B & C: These columns should be completed by identifying the various portions of the Project and their scheduled value consistent with the schedule of values submitted to the Architect at the commencement of the Project or as subsequently adjusted. The breakdown may be by sections of the Work or by Subcontractors and should remain consistent throughout the Project. Multiple pages should be used when required.

Column C should be subtotaled at the bottom when more than one page is used and totaled on the last page. Initially, this total should equal the original Contract Sum. The total of column C may be adjusted by Change Orders during the Project.

Column D: Enter in this column the amount of completed work covered by the previous application (columns D & E from the previous application). Values from column F (Materials Presently Stored) from the previous application should not be entered in this column.

Column E: Enter here the value of Work completed at the time of this application, including the value of materials incorporated into the project which were listed on the previous application under Materials Presently Stored (column F).

Column F: Enter here the value of Materials Presently Stored for which payment is sought. The total of the column *must* be recalculated at the end of each pay period. This value covers both materials newly stored for which payment is sought and materials previously stored which are not yet incorporated into the Project. Mere payment by the Owner for stored materials does not result in a deduction from this column. Only as materials are incorporated into the Project is their value deducted from this column and incorporated into column E (Work Completed—This Period).

Column G: Enter here the total of columns D, E and F. Calculate the percentage completed by dividing column G by column C.

Column H: Enter here the difference between column C (Scheduled Value) and column G (Total Completed and Stored to Date).

Column I: This column is normally used only for contracts where variable retainage is permitted on a line-item basis. It need not be completed on projects where a constant retainage is withheld from the overall contract amount.

Change Orders: Although Change Orders could be incorporated by changing the schedule of values each time a Change Order is added to the Project, this is not normally done. Usually, Change Orders are listed separately, either on their own G703 form or at the end of the basic schedule. The amount of the original contract adjusted by Change Orders is to be entered in the appropriate location on the G702/CMa form.

Construction Change Directives: Amounts not in dispute that have been included in Construction Change Directives should be incorporated into one or more Change Orders. Amounts remaining in dispute should be dealt with according to Paragraph 7.3 in A201/CMa.

D. MAKING PAYMENT

The Owner should make payment directly to the Contractor based on the amount certified by the Construction Manager and Architect on AIA Document G702/CMa, Application and Certificate for Payment, Construction Manager-Adviser Edition. The completed form contains the name and address of the Contractor. Payment should not be made to any other party unless specifically indicated on G702/CMa.

CONTINUATION SHEET

AIA DOCUMENT G703 (Instructions on reverse side)

PAGE OF PAGES

AIA Document G702, APPLICATION AND CERTIFICATE FOR PAYMENT, containing Contractor's signed Certification, is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO.:
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO.:

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED		MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C − G)	RETAINAGE (IF VARIABLE) RATE)
			FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD					

G703-1992

INSTRUCTION SHEET

FOR AIA DOCUMENT G703

A. GENERAL INFORMATION

1. Purpose and Related Documents

AIA Document G702, Application and Certificate for Payment, is to be used in conjunction with AIA Document G703, Continuation Sheet. These documents are designed for use on Projects where the Contractor has a direct Agreement with the Owner. Procedures for their use are covered in AIA Document A201, General Conditions of the Contract for Construction, 1987 Edition.

2. Use of Current Documents

The user should consult the AIA, an AIA component chapter or a current AIA Documents List to determine the current edition of each document.

3. Limited License for Reproduction

B. COMPLETING THE G703 FORM:

Heading: This information should be completed in a manner consistent with similar information on AIA Document G702, Application and Certificate for Payment.

Columns A, B & C: These columns should be completed by identifying the various portions of the Project and their scheduled values consistent with the schedule of values submitted to the Architect at the commencement of the Project or as subsequently adjusted. The breakdown may be by sections of the Work or by Subcontractors and should remain consistent throughout the Project. Multiple pages should be used when required.

Column C should be subtotaled at the bottom when more than one page is used and totaled on the last page. Initially, this total should equal the original Contract Sum. The total of column C may be adjusted by Change Orders during the Project.

Column D: Enter in this column the amount of completed Work covered by the previous application (columns D & E from the previous application). Values from column F (Materials Presently Stored) from the previous application should not be entered in this column.

Column E: Enter here the value of Work completed at the time of this application, including the value of materials incorporated in the project that were listed on the previous application under Materials Presently Stored (column F).

Column F: Enter here the value of Materials Presently Stored for which payment is sought. The total of the column must be recalculated at the end of each pay period. This value covers both materials newly stored for which payment is sought and materials previously stored which are not yet incorporated into the Project. Mere payment by the Owner for stored materials does not result in a deduction from this column. Only as materials are incorporated into the Project is their value deducted from this column and incorporated into column E (Work Completed—This Period.)

Column G: Enter here the total of columns D, E and F. Calculate the percentage completed by dividing column G by column C.

Column H: Enter here the difference between column C (Scheduled Value) and column G (Total Completed and Stored to Date).

Column I: This column is normally used only for contracts where variable retainage is permitted on a line-item basis. It need not be completed on projects where a constant retainage is withheld from the overall contract amount.

Change Orders: Although Change Orders could be incorporated by changing the schedule of values each time a Change Order is added to the Project, this is not normally done. Usually, Change Orders are listed separately, either on their own G703 form or at the end of the basic schedule. The amount of the original contract adjusted by Change Orders is to be entered in the appropriate location on the G702 form.

Construction Change Directives: Amounts not in dispute that have been included in Construction Change Directives should be incorporated into one or more Change Orders. Amounts remaining in dispute should be dealt with according to Paragraph 7.3 in A201.

The following is an example of a Continuation Sheet for work in progress. Please note that dollar amounts shown below are for illustrative purposes only, and are not intended to reflect actual construction costs.

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED: FROM PREVIOUS APPLICATION (D + E)	WORK COMPLETED: THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
1	MOBILIZATION	5,000	5,000	0	0	5,000	100	0	NOT APPLICABLE TO CONSTANT RATE RETAINAGE
2	STUMP REMOVAL	5,000	5,000	0	0	5,000	100	0	
3	EARTH WORK	15,000	10,000	5,000	0	15,000	100	0	
4	LOWER RETAING WALL	10,000	0	5,000	0	5,000	50	5,000	
5	CURBS & MISC. CONC.	5,000	0	0	0	0	0	5,000	
6	PAVING, UPPER DRIVE	20,000	0	0	0	0	0	20,000	
7	PAVING, LOWER DRIVE	20,000	0	0	0	0	0	20,000	
8	PAVERS	20,000	0	0	10,000	10,000	50	10,000	
9	BRICK WORK	5,000	0	0	0	0	0	5,000	
		105,000	20,000	10,000	10,000	40,000		65,000	

Instruction Sheet revised 4/94 without procedural change.

CHANGE ORDER

CONSTRUCTION MANAGER-ADVISER EDITION

AIA DOCUMENT G701/CMa

(Instructions on reverse side)

OWNER ☐
CONSTRUCTION MANAGER ☐
ARCHITECT ☐
CONTRACTOR ☐
FIELD ☐
OTHER ☐

PROJECT:
(Name and address)

CHANGE ORDER NO.:

INITIATION DATE:

TO CONTRACTOR:
(Name and address)

PROJECT NOS.:

CONTRACT FOR:

CONTRACT DATE:

The Contract is changed as follows:

Not valid until signed by the Owner, Construction Manager, Architect and Contractor.

The original (Contract Sum) (Guaranteed Maximum Price) was . . . . . $
Net change by previously authorized Change Orders . . . . . $
The (Contract Sum) (Guaranteed Maximum Price) prior to this Change Order was . . . . . $
The (Contract Sum) (Guaranteed Maximum Price) will be (increased) (decreased) (unchanged) by
this Change Order . . . . . $
The new (Contract Sum) (Guaranteed Maximum Price) including this Change Order will be . . . . $
The Contract Time will be (increased) (decreased) (unchanged) by . . . . . ( ) days
The date of Substantial Completion as of the date of this Change Order therefore is . . . . . .

NOTE: This summary does not reflect changes in the Contract Sum, Contract Time or Guaranteed Maximum Price which have been authorized by Construction Change Directive.

CONSTRUCTION MANAGER	ARCHITECT
ADDRESS	ADDRESS
BY DATE	BY DATE
CONTRACTOR	OWNER
ADDRESS	ADDRESS
BY DATE	BY DATE

CAUTION: You should use an original AIA document which has this caution printed in red. An original assures that changes will not be obscured as may occur when documents are reproduced.

INSTRUCTION SHEET

FOR AIA DOCUMENT G701/CMa, CHANGE ORDER
CONSTRUCTION MANAGER-ADVISER EDITION

A. GENERAL INFORMATION

1. Purpose

This document is intended for use in implementing changes in the Work agreed to by the Owner, Construction Manager, Architect and Contractor. Execution of a completed G701/CMa form indicates agreement upon all the terms of the change, including any changes in the Contract Sum (or Guaranteed Maximum Price) and Contract Time. In contrast, AIA Document G714/CMa, Construction Change Directive, Construction Manager-Adviser Edition, should be used in situations where, for whatever reason, the Owner and Contractor have not reached agreement upon the proposed changes in Contract Sum or Contract Time, and where changes in the Work need to be implemented expeditiously in order to avoid a delay in the Project.

2. Related Documents

This document was prepared for use under the terms of AIA Document A201/CMa, General Conditions of the Contract for Construction, Construction Manager-Adviser Edition.

3. Use of Current Documents

Prior to using any AIA document, the user should consult the AIA, an AIA component chapter or a current AIA Documents List to determine the current edition of each document.

4. Limited License for Reproduction

B. COMPLETING THE G701/CMa FORM

1. Description of Change in the Contract

Insert a detailed description of the change to be made in the Contract by this Change Order, including any Drawings, Specifications, documents or other supporting data to clarify the scope of the change.

2. Determination of Costs

Insert the following information in the blanks provided, and strike out the terms in parentheses that do not apply:

a) the original Contract Sum or Guaranteed Maximum Price;
b) the net change by previously authorized Change Order (note that this does not include changes authorized by Construction Change Directive unless such a change was subsequently agreed to by the Contractor and recorded as a Change Order);
c) the Contract Sum or Guaranteed Maximum Price prior to this Change Order;
d) the amount of increase or decrease, if any, in the Contract Sum or Guaranteed Maximum Price; and
e) the new Contract Sum or Guaranteed Maximum Price as adjusted by this Change Order.

3. Change in Contract Time

Insert the following information in the blanks provided, and strike out the terms in parentheses that do not apply:

a) in number of days, the increase or decrease, if any, in the Contract Time; and
b) the date of Substantial Completion, including any adjusment effected by this Change Order.

C. EXECUTION OF THE DOCUMENT

When the Owner, Construction Manager, Architect and Contractor have reached agreement on the change to be made in the Contract, including any adjustments in the Contract Sum (or Guaranteed Maximum Price) and Contract Time, the G701/CMa document should be executed in quadruplicate by the two parties, the Construction Manager and Architect, each of whom retains an original.

Printed on Recycled Paper

Reprinted 1/94

CERTIFICATE OF SUBSTANTIAL COMPLETION

CONSTRUCTION MANAGER-ADVISER EDITION

AIA DOCUMENT G704/CMa

(Instructions on reverse side)

OWNER ☐
CONSTRUCTION MANAGER ☐
ARCHITECT ☐
CONTRACTOR ☐
FIELD ☐
OTHER ☐

PROJECT:
(Name and address)

PROJECT NOS.:

CONTRACT FOR:
CONTRACT DATE:

TO OWNER:
(Name and address)

TO CONTRACTOR:
(Name and address)

DATE OF ISSUANCE:
PROJECT OR DESIGNATED PORTION SHALL INCLUDE:

The Work performed under this Contract has been reviewed and found, to the Construction Manager's and Architect's best knowledge, information and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion thereof designated above is hereby established as

which is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:

A list of items to be completed or corrected is attached hereto. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

CONSTRUCTION MANAGER	BY	DATE
ARCHITECT	BY	DATE

The Contractor will complete or correct the Work on the list of items attached hereto within days from the above date of Substantial Completion.

CONTRACTOR	BY	DATE

The Owner accepts the Work or designated portion thereof as substantially complete and will assume full possession thereof at (time) on (date).

OWNER	BY	DATE

The responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the Work and insurance shall be as follows:

(Note—Owner's and Contractor's legal and insurance counsel should determine and review insurance requirements and coverage.)

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INSTRUCTION SHEET

FOR AIA DOCUMENT G704/CMa, CERTIFICATE OF SUBSTANTIAL COMPLETION
CONSTRUCTION MANAGER-ADVISER EDITION

A. GENERAL INFORMATION

1. Purpose

AIA Document G704/CMa, Certificate of Substantial Completion, Construction Manager-Adviser Edition, is a new document. This document was developed to include the Construction Manager in the process of establishing the date of Substantial Completion, which is established for the purpose of commencement of applicable warranties and to allow the Owner to occupy or utilize the Work or designated portion thereof.

2. Related Documents

This document was prepared for use under the terms of AIA Document A201/CMa, General Conditions of the Contract for Construction, Construction Manager-Adviser Edition.

3. Use of Current Documents

Prior to using any AIA document, the user should consult the AIA, an AIA component chapter or a current AIA Documents List to determine the current edition of each document.

4. Limited License for Reproduction

B. COMPLETING THE G704/CMa FORM

1. After the words "Project or Designated Portion shall include:", insert a detailed description of the Project or portion(s) of the Project that have been accepted as being substantially complete.

2. Determine Work to be completed.
   Provide a list of items that are to be completed or corrected.
   Determine dates for completion of the Work.
   Establish an amount to be withheld to complete the Work.

C. EXECUTION OF THE DOCUMENT

The G704/CMa document should be executed in not less than quadruplicate by the Owner, Construction Manager, Architect and Contractor, each of whom retains an original.

CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS

AIA Document G706A

(Instructions on reverse side)

OWNER ☐
ARCHITECT ☐
CONTRACTOR ☐
SURETY ☐
OTHER ☐

TO OWNER:
(Name and address)

ARCHITECT'S PROJECT NO.:

CONTRACT FOR:

PROJECT:
(Name and address)

CONTRACT DATED:

STATE OF:
COUNTY OF:

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR:
(Name and address)

BY: _____
(Signature of authorized representative)

_____
(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:

My Commission Expires:

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INSTRUCTION SHEET

FOR AIA DOCUMENT G706A, CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS

A. GENERAL INFORMATION

1. Purpose

This document is intended for use as a companion to AIA Document G706, Contractor's Affidavit of Payment of Debts and Claims.

2. Related Documents

This document may be used with most of the AIA's Owner-Contractor agreements and general conditions, such as A201 and its related family of documents. As noted above, G706A is a companion document to AIA Document G706.

3. Use of Current Documents

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B. CHANGES FROM THE PREVIOUS EDITION

A cross-reference to AIA Document A201 has been deleted to permit the use of G706A with other families of AIA documents, including construction management, interiors and design/build.

C. COMPLETING THE G706A FORM

GENERAL: The Owner-Contractor Agreement is the usual source of required information such as the contract date and the names and addresses of the Owner, Project and Contractor.

ARCHITECT'S PROJECT NO.: This information is typically supplied by the Architect and entered on the form by the Contractor.

CONTRACT FOR: This refers to the scope of the contract, such as "General Construction" or "Mechanical Work".

AFFIDAVIT: Indicate the state and county where the Affidavit is made. This is not necessarily the same location as the Project, but should be the location where the notary is authorized to administer sworn oaths. If there are any EXCEPTIONS to the statement, these should be listed in the space provided; otherwise enter as "None". It may be a stipulation of the Contract Documents that the Owner has the right to require the Contractor to furnish a bond to cover each exception listed on the Affidavit.

SUPPORTING DOCUMENTS: The AIA does not publish a "Release or Waiver of Liens" for contractors or subcontractors because of the great diversity of releases or waivers permitted by various state mechanics lien laws. Forms for such purposes may be available from local contractors' associations or may be written with the assistance of legal counsel.

D. EXECUTION OF THE DOCUMENT

The Notary Public should administer a sworn oath to the Contractor referencing the written statements appearing on G706A, and should duly sign and seal this document containing the Contractor's signature. G706A should be signed by the Contractor or the Contractor's authorized representative.

CONSENT OF SURETY TO FINAL PAYMENT

AIA Document G707

(Instructions on reverse side)

OWNER ☐
ARCHITECT ☐
CONTRACTOR ☐
SURETY ☐
OTHER ☐

TO OWNER:
(Name and address)

ARCHITECT'S PROJECT NO.:

CONTRACT FOR:

PROJECT:
(Name and address)

CONTRACT DATED:

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

, SURETY,

on bond of
(Insert name and address of Contractor)

, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to
(Insert name and address of Owner)

, OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

(Surety)

(Signature of authorized representative)

Attest:
(Seal):

(Printed name and title)

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INSTRUCTION SHEET

FOR AIA DOCUMENT G707, CONSENT OF SURETY TO FINAL PAYMENT

A. GENERAL INFORMATION

1. Purpose

This document is intended for use as a companion to AIA Document G706, Contractor's Affadavit of Payment of Debts and Claims, on construction projects where the Contractor is required to furnish a bond. By obtaining the Surety's approval of final payment to the Contractor and its agreement that final payment will not relieve the Surety of any of its obligations, the Owner may preserve its rights under the bond.

2. Related Documents

This document may be used with most of the AIA's Owner-Contractor agreements and general conditions, such as A201 and its related family of documents. As noted above, this is a companion document to AIA Document G706.

3. Use of Current Documents

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B. CHANGES FROM THE PREVIOUS EDITION

Changes in the location of various items of information were made, without revision to the substance of the document.

C. COMPLETING THE G707 FORM

GENERAL: The bond form is the usual source of required information such as the contract date and the names and addresses of the Surety, Owner, Contractor and Project.

ARCHITECT'S PROJECT NO.: This information is typically supplied by the Architect and entered on the form by the Contractor.

CONTRACT FOR: This refers to the scope of the contract, such as "General Construction" or "Mechanical Work".

D. EXECUTION OF THE DOCUMENT

The G707 form requires both the Surety's seal and the signature of the Surety's authorized representative.

Bidder Checklist

- Have you carefully read and agreed to the entire bid package?
- Have you returned complete Bid Submittal Forms (See Instructions to Bidders, Section 4)?
- Has an authorized agent of your firm signed the Signature Page of the Bid?
- Have you provided a Bid Bond, Certified or Cashier's Check or Cash equal to ten percent (10%) of the total bid with your bid?
- If you are submitting a bid bond, has it been signed by both the insurance company and an authorized official of your firm?
- Have you provided a signed Consent / Agreement of Surety with your Bid?
- Have you submitted a Non-Collusion Affidavit?
- Have you submitted AIA Document A305 – 1986, Contractor's Qualification Statement?
- Have you included a financial statement in accordance with AIA Document A305 – 1986, Section 5.1.1?
- Have you submitted your Affirmative Action Program? (Special Conditions No. 22)

AIA® Document A305™ – 1986

Contractor's Qualification Statement

The Undersigned certifies under oath that the information provided herein is true and sufficiently complete so as not to be misleading.

SUBMITTED TO:

ADDRESS:

SUBMITTED BY:

NAME:

ADDRESS:

PRINCIPAL OFFICE:

[ ] Corporation
[ ] Partnership
[ ] Individual
[ ] Joint Venture
[ ] Other

NAME OF PROJECT: *(if applicable)* Template

TYPE OF WORK: *(file separate form for each Classification of Work)*

[ ] General Construction
[ ] HVAC
[ ] Electrical
[ ] Plumbing
[ ] Other: *(Specify)*

§ 1 ORGANIZATION

§ 1.1 How many years has your organization been in business as a Contractor?

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

§ 1.2.1 Under what other or former names has your organization operated?

§ 1.3 If your organization is a corporation, answer the following:

§ 1.3.1 Date of incorporation:
§ 1.3.2 State of incorporation:
§ 1.3.3 President's name:

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This form is approved and recommended by the American Institute of Architects (AIA) and The Associated General Contractors of America (AGC) for use in evaluating the qualifications of contractors. No endorsement of the submitting party or verification of the information is made by AIA or AGC.

§ **1.3.4** Vice-president's name(s)

§ **1.3.5** Secretary's name:
§ **1.3.6** Treasurer's name:

§ **1.4** If your organization is a partnership, answer the following:
§ **1.4.1** Date of organization:
§ **1.4.2** Type of partnership (if applicable):
§ **1.4.3** Name(s) of general partner(s)

§ **1.5** If your organization is individually owned, answer the following:
§ **1.5.1** Date of organization:
§ **1.5.2** Name of owner:

§ **1.6** If the form of your organization is other than those listed above, describe it and name the principals:

§ 2 LICENSING

§ **2.1** List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable.

§ **2.2** List jurisdictions in which your organization's partnership or trade name is filed.

§ 3 EXPERIENCE

§ **3.1** List the categories of work that your organization normally performs with its own forces.

§ **3.2** Claims and Suits. (If the answer to any of the questions below is yes, please attach details.)
§ **3.2.1** Has your organization ever failed to complete any work awarded to it?

§ **3.2.2** Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?

§ **3.2.3** Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years?

§ **3.3** Within the last five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction contract? (If the answer is yes, please attach details.)

§ 3.4 On a separate sheet, list major construction projects your organization has in progress, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

§ 3.4.1 State total worth of work in progress and under contract:

§ 3.5 On a separate sheet, list the major projects your organization has completed in the past five years, giving the name of project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.

§ 3.5.1 State average annual amount of construction work performed during the past five years:

§ 3.6 On a separate sheet, list the construction experience and present commitments of the key individuals of your organization.

§ 4 REFERENCES

§ 4.1 Trade References:

§ 4.2 Bank References:

§ 4.3 Surety:

§ 4.3.1 Name of bonding company:

§ 4.3.2 Name and address of agent:

§ 5 FINANCING

§ 5.1 Financial Statement.

§ 5.1.1 Attach a financial statement, preferably audited, including your organization's latest balance sheet and income statement showing the following items:

Current Assets (e.g., cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses);

Net Fixed Assets;

Other Assets;

Current Liabilities (e.g., accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes);

Other Liabilities (e.g., capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).

§ 5.1.2 Name and address of firm preparing attached financial statement, and date thereof:

§ 5.1.3 Is the attached financial statement for the identical organization named on page one?

§ 5.1.4 If not, explain the relationship and financial responsibility of the organization whose financial statement is provided (e.g., parent-subsidiary).

§ 5.2 Will the organization whose financial statement is attached act as guarantor of the contract for construction?

§ 6 SIGNATURE

§ 6.1 Dated at this day of

Name of Organization:

By:

Title:

§ 6.2

M being duly sworn deposes and says that the information provided herein is true and sufficiently complete so as not to be misleading.

Subscribed and sworn before me this day of

Notary Public:

My Commission Expires:

Additions and Deletions Report for
AIA® Document A305™ – 1986

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 10:39:17 on 10/16/2013.

PAGE 1

NAME OF PROJECT: *(if applicable)* Template

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 10:39:17 on 10/16/2013 under Order No. 2365504816_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A305™ – 1986, Contractor's Qualification Statement, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project Name:	1724 Chester Courthouse Rehabilitation
General Description:	Exterior masonry pointing and stone repairs, second floor window repairs, interior plaster repairs, interior and exterior painting, light fixture replacements, plumbing rough-in for kitchenette, and attic ventilation system installation.
Project Locality	412 Avenue of the States, Ches
Awarding Agency:	County of Delaware
Contract Award Date:	5/1/2025
Serial Number:	24-10910
Project Classification:	Building
Determination Date:	12/23/2024
Assigned Field Office:	Philadelphia
Field Office Phone Number:	(215)560-1858
Toll Free Phone Number:	
Project County:	Delaware County

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 24-10910 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Asbestos & Insulation Workers	6/1/2023		$57.84	$43.36	$101.20
Asbestos & Insulation Workers	5/1/2024		$59.37	$46.03	$105.40
Boilermaker (Commercial, Institutional, and Minor Repair Work)	3/1/2024		$36.71	$19.13	$55.84
Boilermakers	1/1/2023		$51.27	$35.30	$86.57
Boilermakers	1/1/2024		$52.10	$35.72	$87.82
Bricklayer	5/1/2023		$47.50	$31.42	$78.92
Carpenter - Chief of Party (Surveying & Layout)	5/1/2023		$50.57	$29.02	$79.59
Carpenter - Chief of Party (Surveying & Layout)	5/1/2024		$52.58	$29.02	$81.60
Carpenter - Chief of Party (Surveying & Layout)	5/1/2025		$54.59	$29.02	$83.61
Carpenter - Instrument Person (Surveying & Layout)	5/1/2023		$43.97	$29.02	$72.99
Carpenter - Instrument Person (Surveying & Layout)	5/1/2024		$45.72	$29.02	$74.74
Carpenter - Instrument Person (Surveying & Layout)	5/1/2025		$47.47	$29.02	$76.49
Carpenter - Rodman (Surveying & Layout)	5/1/2023		$21.99	$20.62	$42.61
Carpenter - Rodman (Surveying & Layout)	5/1/2024		$22.86	$20.62	$43.48
Carpenter - Rodman (Surveying & Layout)	5/1/2025		$23.74	$20.62	$44.36
Carpenters	5/1/2023		$43.97	$29.02	$72.99
Carpenters	5/1/2024		$45.72	$29.02	$74.74
Carpenters	5/1/2025		$47.47	$29.02	$76.49
Cement Finishers & Plasterers	5/1/2022		$38.57	$32.39	$70.96
Cement Masons	5/1/2023		$44.20	$32.96	$77.16
Cement Masons	5/1/2024		$46.70	$32.46	$79.16
Dockbuilder, Pile Drivers	5/1/2023		$50.48	$37.99	$88.47
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	5/1/2023		$58.41	$41.74	$100.15
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	5/1/2023		$50.48	$37.99	$88.47
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	5/1/2023		$38.77	$31.12	$69.89
Drywall Finisher	5/1/2024		$42.25	$32.56	$74.81
Electricians	5/30/2022		$47.64	$35.14	$82.78
Electricians	5/29/2023		$49.24	$36.04	$85.28
Electricians	6/3/2024		$50.17	$38.87	$89.04
Electricians	6/2/2025		$52.71	$40.07	$92.78
Electricians	6/1/2026		$55.25	$41.28	$96.53
Elevator Constructor	1/1/2023		$66.21	$43.64	$109.85
Elevator Constructor	1/1/2024		$68.97	$44.70	$113.67
Elevator Mechanic	1/1/2025		$71.85	$45.77	$117.62
Floor Coverer	5/1/2023		$50.12	$29.21	$79.33

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 24-10910 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Floor Coverer	5/1/2024		$52.19	$29.21	$81.40
Glazier	5/1/2023		$46.68	$36.62	$83.30
Glazier	5/1/2024		$48.00	$37.50	$85.50
Interior Finish	5/1/2023		$34.60	$25.80	$60.40
Iron Workers (Bridge, Structural, Ornamental, Precast)	1/1/2023		$50.70	$39.51	$90.21
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 (Riggers)	7/1/2024		$44.64	$34.39	$79.03
Iron Workers (Rodman/Reinforcing)	7/1/2023		$45.70	$34.77	$80.47
Iron Workers (Rodman/Reinforcing)	7/1/2024		$47.70	$34.77	$82.47
Laborers (Class 01 - See notes)	5/1/2022		$33.35	$25.65	$59.00
Laborers (Class 01 - See notes)	5/1/2023		$34.60	$25.80	$60.40
Laborers (Class 01 - See notes)	5/1/2024		$35.85	$26.00	$61.85
Laborers (Class 02 - See notes)	5/1/2022		$36.70	$27.00	$63.70
Laborers (Class 02 - See notes)	5/1/2023		$37.95	$27.30	$65.25
Laborers (Class 02 - See notes)	5/1/2024		$39.40	$27.55	$66.95
Laborers (Class 03 - See notes)	5/1/2022		$33.77	$25.83	$59.60
Laborers (Class 03 - See notes)	5/1/2023		$35.02	$25.98	$61.00
Laborers (Class 03 - See notes)	5/1/2024		$36.27	$26.18	$62.45
Laborers (Class 04 - See notes)	5/1/2022		$33.77	$25.83	$59.60
Laborers (Class 04 - See notes)	5/1/2023		$35.02	$25.98	$61.00
Laborers (Class 04 - See notes)	5/1/2024		$36.27	$26.18	$62.45
Laborers (Class 05 - See notes)	5/1/2022		$33.35	$25.65	$59.00
Laborers (Class 05 - See notes)	5/1/2023		$34.60	$25.50	$60.10
Laborers (Class 05 - See notes)	5/1/2024		$35.85	$26.00	$61.85
Landscape Laborer	5/1/2023		$29.45	$23.98	$53.43
Landscape Laborer	5/1/2024		$30.70	$24.23	$54.93
Marble Finisher	5/1/2022		$38.27	$29.15	$67.42
Marble Finisher	5/1/2023		$39.52	$29.30	$68.82
Marble Mason	5/1/2023		$47.20	$31.95	$79.15
Mason Tender, Cement	5/1/2023		$35.02	$25.98	$61.00
Millwright	5/1/2023		$51.60	$35.81	$87.41
Millwright	5/1/2024		$54.67	$35.81	$90.48
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)	5/1/2023		$52.20	$32.81	$85.01
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)	5/1/2023		$55.20	$33.70	$88.90
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)	5/1/2023		$51.95	$32.74	$84.69

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 24-10910 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
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)	5/1/2023		$54.97	$33.61	$88.58
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)	5/1/2023		$47.87	$31.53	$79.40
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)	5/1/2023		$47.57	$31.44	$79.01
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)	5/1/2023		$45.85	$30.93	$76.78
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)	5/1/2023		$44.85	$30.65	$75.50
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)	5/1/2023		$63.33	$37.68	$101.01
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)	5/1/2023		$63.04	$37.59	$100.63
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)	5/1/2023		$42.32	$32.91	$75.23
Painters Class 1 (see notes)	5/1/2024		$42.97	$34.11	$77.08
Painters Class 4 (see notes)	5/1/2023		$44.41	$32.91	$77.32
Painters Class 4 (see notes)	5/1/2024		$45.06	$34.11	$79.17
Plasterers	5/1/2023		$39.32	$32.64	$71.96
Plasterers	5/1/2024		$39.88	$33.08	$72.96
plumber	5/1/2023		$64.73	$37.61	$102.34
plumber	5/1/2024		$67.53	$38.31	$105.84
Pointers, Caulkers, Cleaners	5/1/2023		$48.80	$30.70	$79.50
Roofers (Composition)	5/1/2022		$41.48	$33.87	$75.35
Roofers (Composition)	5/1/2024		$44.13	$34.77	$78.90
Roofers (Shingle)	5/1/2023		$32.85	$22.10	$54.95
Roofers (Shingle)	5/1/2024		$34.35	$22.20	$56.55

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 24-10910 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Roofers (Slate & Tile)	5/1/2023		$35.85	$22.10	$57.95
Roofers (Slate & Tile)	5/1/2024		$37.35	$22.20	$59.55
Sheet Metal Workers	5/1/2023		$57.31	$48.97	$106.28
Sheet Metal Workers	5/1/2024		$59.22	$50.56	$109.78
Sign Makers and Hangars	7/15/2022		$30.54	$24.35	$54.89
Sign Makers and Hangars	7/15/2023		$31.76	$24.63	$56.39
Sign Makers and Hangars	7/15/2024		$32.32	$25.82	$58.14
Sprinklerfitters	1/1/2023		$62.23	$31.99	$94.22
Steamfitters	5/1/2023		$67.37	$41.99	$109.36
Steamfitters	5/1/2024		$70.32	$43.09	$113.41
Stone Masons	5/1/2022		$45.90	$31.20	$77.10
Stone Masons	5/1/2023		$47.20	$31.95	$79.15
Terrazzo Finisher	5/1/2022		$42.44	$27.71	$70.15
Terrazzo Finisher	5/1/2023		$43.75	$27.86	$71.61
Terrazzo Grinder	5/1/2022		$42.71	$27.71	$70.42
Terrazzo Grinder	5/1/2023		$44.02	$27.86	$71.88
Terrazzo Mechanics	5/1/2022		$48.81	$29.46	$78.27
Terrazzo Mechanics	5/1/2023		$50.26	$29.56	$79.82
Tile Finisher	5/1/2022		$38.27	$29.15	$67.42
Tile Finisher	5/1/2023		$39.52	$29.30	$68.82
Tile Setter	5/1/2022		$48.81	$29.46	$78.27
Tile Setter	5/1/2023		$50.26	$29.56	$79.82
Truckdriver class 1(see notes)	5/1/2023		$36.29	$21.55	$57.84
Truckdriver class 1(see notes)	5/1/2024		$36.79	$22.54	$59.33
Truckdriver class 2 (see notes)	5/1/2023		$36.39	$21.55	$57.94
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: 24-10910 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Carpenter - Chief of Party (Surveying & Layout)	5/1/2023		$63.24	$29.06	$92.30
Carpenter - Chief of Party (Surveying & Layout)	5/1/2024		$65.19	$29.06	$94.25
Carpenter - Chief of Party (Surveying & Layout)	5/1/2025		$67.15	$29.06	$96.21
Carpenter - Chief of Party (Surveying & Layout)	5/1/2026		$69.10	$29.06	$98.16
Carpenter - Instrument Person (Surveying & Layout)	5/1/2023		$54.99	$29.06	$84.05
Carpenter - Instrument Person (Surveying & Layout)	5/1/2024		$56.69	$29.06	$85.75
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)	5/1/2023		$43.99	$22.41	$66.40
Carpenter - Rodman (Surveying & Layout)	5/1/2024		$45.35	$22.41	$67.76
Carpenter - Rodman (Surveying & Layout)	5/1/2025		$46.71	$22.41	$69.12
Carpenter - Rodman (Surveying & Layout)	5/1/2026		$48.07	$22.41	$70.48
Carpenter	5/1/2023		$54.99	$29.06	$84.05
Carpenter	5/1/2024		$56.69	$29.06	$85.75
Carpenter	5/1/2025		$58.49	$29.06	$87.55
Carpenter	5/1/2026		$60.19	$29.06	$89.25
Cement Masons	5/1/2023		$43.20	$32.91	$76.11
Dockbuilder, Pile Drivers	5/1/2023		$50.48	$37.99	$88.47
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	5/1/2023		$58.41	$41.74	$100.15
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	5/1/2023		$50.48	$37.99	$88.47
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	5/29/2023		$60.48	$32.77	$93.25
Electric Lineman	6/3/2024		$62.07	$33.96	$96.03
Iron Workers (Bridge, Structural, Ornamental, Precast)	1/1/2023		$50.70	$39.51	$90.21
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)	5/1/2022		$36.30	$27.20	$63.50
Laborers (Class 01 - See notes)	5/1/2023		$37.55	$27.45	$65.00
Laborers (Class 01 - See notes)	5/1/2024		$38.80	$27.65	$66.45
Laborers (Class 02 - See notes)	5/1/2022		$36.50	$27.20	$63.70
Laborers (Class 02 - See notes)	5/1/2023		$37.75	$27.45	$65.20
Laborers (Class 02 - See notes)	5/1/2024		$39.00	$27.65	$66.65
Laborers (Class 03 - See notes)	5/1/2022		$36.50	$27.20	$63.70
Laborers (Class 03 - See notes)	5/1/2023		$37.75	$27.45	$65.20
Laborers (Class 03 - See notes)	5/1/2024		$39.00	$27.65	$66.65

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 24-10910 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 04 - See notes)	5/1/2022		$31.10	$27.20	$58.30
Laborers (Class 04 - See notes)	5/1/2023		$32.35	$27.45	$59.80
Laborers (Class 04 - See notes)	5/1/2024		$33.60	$27.65	$61.25
Laborers (Class 05 - See notes)	5/1/2022		$37.15	$27.20	$64.35
Laborers (Class 05 - See notes)	5/1/2023		$38.40	$27.45	$65.85
Laborers (Class 05 - See notes)	5/1/2024		$39.65	$27.65	$67.30
Laborers (Class 06 - See notes)	5/1/2022		$37.20	$27.20	$64.40
Laborers (Class 06 - See notes)	5/1/2023		$38.40	$27.45	$65.85
Laborers (Class 06 - See notes)	5/1/2024		$39.70	$27.65	$67.35
Laborers (Class 07 - See notes)	5/1/2022		$37.05	$27.20	$64.25
Laborers (Class 07 - See notes)	5/1/2023		$38.30	$27.45	$65.75
Laborers (Class 07 - See notes)	5/1/2024		$39.55	$27.65	$67.20
Laborers (Class 08 - See notes)	5/1/2022		$36.80	$27.20	$64.00
Laborers (Class 08 - See notes)	5/1/2023		$38.05	$27.45	$65.50
Laborers (Class 08 - See notes)	5/1/2024		$39.30	$27.65	$66.95
Laborers (Class 09 - See notes)	5/1/2022		$36.65	$27.20	$63.85
Laborers (Class 09 - See notes)	5/1/2023		$37.90	$27.45	$65.35
Laborers (Class 09 - See notes)	5/1/2024		$39.15	$27.65	$66.80
Laborers (Class 10- See notes)	5/1/2022		$36.80	$27.20	$64.00
Laborers (Class 10- See notes)	5/1/2023		$38.05	$27.45	$65.50
Laborers (Class 10- See notes)	5/1/2024		$39.30	$27.65	$66.95
Laborers (Class 11 -See Notes)	5/1/2022		$36.70	$27.20	$63.90
Laborers (Class 11 -See Notes)	5/1/2023		$37.95	$27.45	$65.40
Laborers (Class 11 -See Notes)	5/1/2024		$39.20	$27.65	$66.85
Laborers (Class 12 -See Notes)	5/1/2022		$38.40	$27.20	$65.60
Laborers (Class 12 -See Notes)	5/1/2023		$39.65	$27.45	$67.10
Laborers (Class 12 -See Notes)	5/1/2024		$40.90	$27.65	$68.55
Laborers (Class 13 -See Notes)	5/1/2022		$40.43	$27.20	$67.63
Laborers (Class 13 -See Notes)	5/1/2023		$41.65	$27.45	$69.10
Laborers (Class 13 -See Notes)	5/1/2024		$42.93	$27.65	$70.58
Laborers (Class 14 -See Notes)	5/1/2022		$36.55	$27.20	$63.75
Laborers (Class 14 -See Notes)	5/1/2023		$38.25	$27.45	$65.70
Laborers (Class 14 -See Notes)	5/1/2024		$39.50	$27.65	$67.15
Laborers Utility (PGW ONLY) (Flagperson)	5/1/2023		$31.42	$19.43	$50.85
Laborers Utility (PGW ONLY) (Flagperson)	5/1/2024		$32.67	$19.63	$52.30
Laborers Utility (PGW ONLY)	5/1/2023		$38.45	$19.43	$57.88
Laborers Utility (PGW ONLY)	5/1/2024		$39.70	$19.63	$59.33
Landscape Laborer	5/1/2023		$29.03	$23.80	$52.83
Landscape Laborer	5/1/2024		$30.28	$24.05	$54.33
Millwright	5/1/2023		$51.60	$35.81	$87.41
Millwright	5/1/2024		$54.67	$35.81	$90.48
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)	5/1/2023		$52.20	$32.81	$85.01

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 24-10910 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
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)	5/1/2023		$55.20	$33.70	$88.90
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)	5/1/2023		$51.95	$32.74	$84.69
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)	5/1/2023		$54.97	$33.61	$88.58
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)	5/1/2023		$47.87	$31.53	$79.40
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)	5/1/2023		$47.57	$31.44	$79.01
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, Highway)	5/1/2023		$45.85	$30.93	$76.78
Operators Class 05 - See Notes (Building, Heavy, Highway)	5/1/2024		$47.00	$31.78	$78.78
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

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 24-10910 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators Class 06 - See Notes (Building, Heavy, Highway)	5/1/2023		$44.85	$30.65	$75.50
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)	5/1/2023		$63.33	$37.68	$101.01
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)	5/1/2023		$63.04	$37.59	$100.63
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	12/1/2023		$42.10	$27.43	$69.53
Painters Class 2 (see notes)	2/1/2023		$48.82	$32.09	$80.91
Painters Class 2 (see notes)	2/1/2024		$49.57	$33.34	$82.91
Painters Class 3 (see notes)	2/1/2023		$59.78	$32.13	$91.91
Painters Class 3 (see notes)	2/1/2024		$60.53	$33.38	$93.91
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2022		$61.34	$40.28	$101.62
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2023		$64.00	$41.68	$105.68
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2024		$66.80	$42.93	$109.73
Truckdriver class 1(see notes)	5/1/2022		$35.45	$20.74	$56.19
Truckdriver class 1(see notes)	5/1/2023		$36.14	$21.55	$57.69
Truckdriver class 1(see notes)	5/1/2024		$36.64	$22.54	$59.18
Truckdriver class 2 (see notes)	5/1/2022		$35.55	$20.74	$56.29
Truckdriver class 2 (see notes)	5/1/2023		$36.24	$21.55	$57.79
Truckdriver class 2 (see notes)	5/1/2024		$36.74	$22.54	$59.28

APPENDIX O

Delaware County
Political Contribution Disclosure Form

Background: Under Section 6-12.E of the Administrative Code of Delaware County, Contractors under certain Covered Contracts are required to provide this Disclosure Form in connection with consideration of approval of such Covered Contract by County Council. ***Definitions of Contractor, Covered Contract, and certain other terms used in this Disclosure Form, as well as additional instructions for its completion, are set forth in Exhibit A attached hereto.***

Political Contribution Disclosure: Within the past twenty-four (24) months, Contractor* has:

_____ **NOT** made any Reportable Contributions.

_____ made Reportable Contributions as set forth on Schedule A attached hereto.

Includes entities and persons related to a Contractor whose contributions are also required to be reported, as further described in the definition of "reportable contribution" on Exhibit A.

Type of Business Entity

Corporation ___ LLC ___ Sole Proprietorship ___
Limited Partnership Partnership ___ LLP ___
Other: _____(describe)

Certification: In order for this Disclosure Form to be considered validly submitted, it must be properly signed by the Contractor or an officer or employee of the Contractor that is authorized to make this certification. Disclosure Forms that are not properly signed will not be considered as responsive to the requirements of the Delaware County Administrative Code.

By executing below, you:

(1) Declare and certify that you are the Contractor or an employee or officer of the Contractor and duly authorized to execute this Disclosure Form.

(2) Represent and warrant that, to the best of your knowledge after appropriate inquiry, all of the information and disclosures provided are true and contain no material misstatement or omissions.

(3) Acknowledge and agree to comply with the provisions described in Exhibit A.

Name of Contractor: _____

By: _____
Name: _____
Title: _____
Date: _____

Exhibit A
Delaware County
Political Contribution Disclosure Form

Definitions and Instructions

Timing.

Contracts subject to an RFP/Q, Invitation to Bid or other Solicitation – the Solicitation will have explicit instructions on when and how to submit this Disclosure Form. Please follow those instructions.

Other Contracts -- Disclosure Forms must be received by the County at least eight (8) days prior to the County Council meeting at which the approval of a contract will be considered. They should be submitted by e-mail to CentralPurchasing@co.delaware.pa.us.

In either case, failure to timely provide this Disclosure Form may delay consideration of your contract by County Council.

Public Posting; Right to Know Law.

The Disclosure Form for the selected Contractor is sought will be posted on the County website prior to the County Council meeting at which approval of the Covered Contract will be considered and included in the Agenda materials for such meeting.

The County will also provide copies of Disclosure Forms (whether or not the Contractor is awarded a Covered Contract) in response to requests under the Pennsylvania Right to Know Law.

Ongoing Reporting.

By January 30 of each year, commencing January 1, 2023, each Covered Contractor under a Covered Contract with a term exceeding one year is required to provide the County Clerk with an updated Disclosure Form showing any reportable contributions in the prior year or indicating that there are none. If a Contractor does not provide the required disclosure form within thirty (30) days of written notification from the County Solicitor of its failure to timely provide such form, the applicable Covered Contract is subject to being voided by County Council.

Penalties.

Any Contractor which fails to provide the Disclosure Form or which submits a Disclosure Form which is materially inaccurate may be banned as a contractor or subcontractor to the County for a period of up to three (3) years, and/or, to the extent legally permitted, the covered contract in question may be terminated, in each case, by a majority vote of County Council following such investigation and consideration of such evidence as County Council deems appropriate or by action of such other entity or body as may be designated by resolution of County Council.

Definitions.

"Contractor" means any non-governmental person, corporation, partnership, association or other entity, whether or not for profit, and includes any subcontractor which is reasonably anticipated to receive compensation of $50,000 or more under the applicable Covered Contract**.** ***See the definition of "Reportable Contribution" below for entities and persons related to a contractor whose contributions are also required to be reported.***

"Covered Candidate" means any individual who seeks nomination or election to the following offices by vote of the electorate (whether or not such individual is nominated or elected): (1) County Council, District Attorney, Sheriff, Controller or Register of Wills in Delaware County; (2) Judge of the Court of Common Pleas of Delaware County or the Magisterial District Courts of Delaware County; (3) any seat in the Pennsylvania General Assembly which represents residents of Delaware County; or (4) any state-wide office in Pennsylvania (non federal).

An individual shall be deemed to be seeking nomination or election to an office if such individual has:

(1) received a contribution or made an expenditure or given consent for any other person or committee to receive a contribution or make an expenditure for the purpose of influencing his nomination or election to such office, whether or not the individual has announced the specific office for which he or she will seek nomination or election at the time the contribution is received or the expenditure is made; or

(2) taken the action necessary under the laws of Pennsylvania to qualify for nomination or election to such office.

The term shall include individuals nominated or elected as write-in candidates unless they resign such nomination or elected office within 30 days of having been nominated or elected.

"Covered Contract" means any contract, agreement, memorandum of understanding or other arrangement which is (i) required to be approved by County Council and (ii) under which a Covered Contractor provides or leases goods, supplies, materials, equipment, consulting, professional or other services, and/or property to the County, whether or not payments under the Covered Contract are anticipated to be made from general revenues or another specified source of funds, but does not include grant agreements under which the County is the grantee.

"Political contribution" means any advance, conveyance, deposit, distribution, transfer of funds, loan, payment, pledge, purchase of a ticket to a testimonial or similar fund-raising affair, or subscription of money or anything of value, except volunteer services, in connection with a political campaign, and any contract, agreement, promise or other obligations, whether or not legally enforceable, to make a political contribution.

"Reportable Contribution" means a political contribution, to:

(A) A Covered Candidate.

(B) Any Pennsylvania state committee of a political party, any County committee of a political party or any committee of a political party established at the municipal level for a municipality in the County.

(C) A contribution to a political action committee with the intent or expectation that some or all of such contribution will be directed to a covered candidate. This intent shall be presumed if a political action committee only supports one or more covered candidates.

(D) A contribution to a political action committee controlled by a person or entity described in clauses (1) through (5) below.

Reportable contributions include contributions by: (1) a Contractor; (2) any corporate parent, subsidiary or other affiliate of a Contractor; (3) an officer or director of a Contractor; (4) a shareholder or partner of a Contractor with a 5% or greater ownership interest; and (5) the spouse of any person or entity listed in the preceding clauses; and shall also include any contribution reimbursed by a person or entity listed in clauses (1) through (5).

Questions.

Questions regarding the Disclosure Form may be directed to CentralPurchasing@co.delaware.pa.us.

Schedule A
Delaware County
Political Contribution Disclosure Form

Reportable Contributions within Past 24 Months

Name of Contractor: _____

Date: _____

Contributor*	Candidate	Date	Amount	Relationship of Contributor to Contractor

**Reporting required for Contractor and all other entities and persons related to Contractor whose contributions are also required to be reported, as further described in the definition of "reportable contribution" on Exhibit A.*

SECTION 011000 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work by Owner.
5. Work under separate contracts.
6. Future work.
7. Purchase contracts.
8. Owner-furnished products.
9. Contractor-furnished, Owner-installed products.
10. Access to site.
11. Coordination with occupants.
12. Work restrictions.
13. Specification and Drawing conventions.
14. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: 1724 Chester Courthouse Rehabilitation Project

1. Project Location: 412 Avenue of the States Chester, PA 19013

B. Owner: COUNTY OF DELAWARE

C. Architect: J&M PRESERVATION STUDIO

1.4 WORK COVERED BY CONTRACT DOCUMENTS

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

1. This project involves patch repairs and repointing of the exterior stone walls, exterior wood repairs to the second floor trim, fascias, soffits, eaves and the cupola; plaster repairs and painting throughout the interior of the building, second floor carpet removal, rough in plumbing for a kitchenette; installation of an exhaust fan and louver in the attic; and venting for kitchenette fixtures.
2. The project includes base bid work, bid alternates, and allowances. Refer to Section 012000 for Allowances, 0122000 for Unit Prices, and 012300 for Alternates.
3. The project includes historic paint analysis by a qualified conservator for the interior wood trim work on the first floor.
   a. Recommended Conservation Firm: Heritage Conservation Collective, LLC.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 PHASED CONSTRUCTION

A. See Alternates for additional scope of work .

B. Before commencing Work, submit an updated copy of Contractor's construction schedule showing the sequence, commencement and completion dates for all phases of the Work.

1.6 WORK BY OWNER

A. Project includes the complete restoration of first floor wood window sashes, frames, jambs, and doors at Old Chester Courthouse in Chester, PA by the Owner. Minor interior plaster repairs and mechanical system upgrades also by Owner. Exterior painting at the first floor level is also by others.

1.7 WORK UNDER SEPARATE CONTRACTS

A. General: N/A

1.8 FUTURE WORK

A. N/A

1.9 PURCHASE CONTRACTS

A. N/A

1.10 OWNER-FURNISHED PRODUCTS

A. N/A

1.11 CONTRACTOR-FURNISHED, OWNER-INSTALLED PRODUCTS

A. N/A

1.12 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. 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.

C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.13 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner may occupy site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1.14 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

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

B. On-Site Work Hours: To be determined by Owner.

C. Existing Utility Interruptions: Notify Owner 24 hours in advance of any utility disruptions that will impact Owner operations.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

E. Restricted Substances: Use of tobacco products and other controlled substances within the existing building is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

1.15 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 01 General Requirements: Requirements of Sections in Division 01 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 Project Manual.

1.16 MISCELLANEOUS PROVISIONS

A. N/A

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 01 21 00

ALLOWANCES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Quantity allowances.

C. Related Requirements:

1. Section 012200 "Unit Prices" for procedures for using unit prices.

1.3 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between final measurement of work-in-place and the allowance quantity. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 SCHEDULE OF ALLOWANCES

1. Remove and replace 15 LF of sanitary piping and 15 LF of domestic water piping.

END OF SECTION

SECTION 01 22 00

UNIT PRICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administration and procedural requirements for unit prices.

1.3 DEFINITIONS

A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 PRODUCTS

Not Used.

PART 3 SCHEDULE

Unit price 1: Repoint (1) SF

Unit price 2: Replace domestic water piping (1) LF

END OF SECTION

SECTION 012300 - ALTERNATES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 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.

1.4 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. Execute accepted alternates under the same conditions as other work of the Contract.

C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 PRODUCTS

Not Used.

PART 3 SCEHDULE

Bid Alt 1.	Remove the non- historic first floor partition walls. Repair plaster and paint where partition walls intersected perimeter walls.
Bid Alt 2:	Repair the first floor -floor boards per schedule on sheet A6.1.
Bid Alt 3:	Remove and replace exterior storm windows for the second floor.
Bid Alt 4:	Remove and replace existing mortar beyond base bid scope of work. See sheets A2.1 & A2.2. Priority A Priority B Priority C Priority D Priority E Priority F Priority G Priority H Priority J
Bid Alt 5:	Install kitchenette cabinetry and appliances.
Bid Alt 6:	Remove and replace flagstone with brick.
Bid Alt 7:	Restore 2nd floor windows beyond base scope, by temp. removal, preparing re-glazing per specification. For restoration temp. Protection in window openings req while sashes are removed. Temp. Plywood protection shall not damage ex'g fabric.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

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

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit two copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include all Drawings and Specification Section numbers and titles.

1. 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 Owner 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. Detailed comparison of significant qualities of proposed substitutions shall be made to Basis-of-Design product listed, prior to comparison of acceptable manufactured products listed.

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 Design Professionals and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. 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.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. 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.
l. 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. Design Professional's Action: If necessary, the Design Professional will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Design Professional 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 Design Professional's Supplemental Instructions for minor changes in the Work.
   b. Use product specified if Design Professional does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials of Basis-of-Design product prior to compatibility of acceptable manufactured products listed. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

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: Design Professional will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, the Design Professional will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. 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: Design Professional will consider requests for substitution if received within 21 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of the Design Professional.

1. Conditions: The Design Professional will consider Contractor's request

for substitution when the following conditions are satisfied. If the following conditions are not satisfied, the Design Professional will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to the Design Professional for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.
j. 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.

PART 3 EXECUTION

Not Used.

END OF SECTION 012500

SECTION 012900 - PAYMENT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

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

B. Related Requirements:
   2. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 SCHEDULE OF VALUES

C. Schedule of Values Definition: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

D. Submit schedule on AIA Form G703. Contractor's standard form or electronic media printout will be considered, but shall be approved by the Design Professional prior to utilizing.

E. Submit Schedule of Values in duplicate within seven (7) days after date of Notice of Award.

1.3 COORDINATION OF SCHEDULE

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

B. Coordinate line items in the schedule of values with the Application for Payment continuation sheets.

1.4 FORM AND CONTENT

A. Use Project Manual 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. Provide a breakdown of the contract sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports.

B. Arrange schedule of values in tabular form per the AIA G702 and 703 form, noting the following:
   1. Description of Work
   2. Change orders (numbers) that affect value.
   3. When requested by the Design Professional, provide separate dollar values for equipment, labor, and materials.
   4. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurances.
   5. List separate allowance amounts based on a combination of Base Bid and Bid Alternates (if any).

1.5 APPLICATIONS FOR PAYMENT

A. Submit three (3) notarized copies of each application on AIA Form G702 and G703.

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment. Entries shall match data on the schedule of values and the Contractor's construction schedule. Use updated schedules if revisions are made.

C. Change Orders: Include amounts of change orders issued before the last day of the construction period covered by the application.

D. Stored Materials: Include in the Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

   1. Provide certificates of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
   2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.

E. Payment Period: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
   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. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application that is lawfully entitled to a lien.

5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.

G. 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. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
4. Schedule of unit prices.
5. Submittal schedule (preliminary if not final).
6. List of Contractor's staff assignments.
7. Copies of building permits.
8. Certificates of insurance and insurance policies.
9. Performance and payment bonds.

H. 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 Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. 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. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
3. AIA Document G707, "Consent of Surety to Final Payment."

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. General coordination procedures.
   2. Requests for Information (RFIs).
   3. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:
   1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.

   2. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 INFORMATION SUBMITTALS

A. Subcontractor 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:

   1. Name, address, and telephone number of entity performing subcontract or supplying products.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including office and cellular telephone

numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Keep list current at all times.

1.4 COORDINATION

A. Coordinate scheduling, submittals, and Work of various sections of specifications to ensure efficient and orderly sequence of installation of interdependent construction elements.

1. 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.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. 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. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.5 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. Coordinate and submit RFI's in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. RFI Content: Include a detailed, legible description of item needing information or interpretation, with the following:
1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Design Professional.
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 suggested resolution 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.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

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

1. The following Contractor-generated RFIs will be returned without action:
    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Design Professional's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Design Professional's action may include a request for additional information, in which case Design Professional's time for response will date from time of receipt of additional information.

3. Design Professional'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 Design Professional in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bi-weekly. Software log with not less than the following:
   1. Project name.
   2. Name and address of Contractor.
   3. Name and address of the Design Professional.
   4. RFI number including RFIs that were returned without action or withdrawn.
   5. RFI description.
   6. Date the RFI was submitted.
   7. Date of Design Professional's response was received.

F. On receipt of Design Professional's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify the Design Professional 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.

1.6 MEETINGS

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

   1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Design Professional of scheduled meeting dates and times.

   2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

   3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Design Professional, within seven days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Design Professional, but no later than 7 days after receipt of Notice to Proceed.

   1. Conduct the conference to review responsibilities and personnel assignments.

   2. Attendees: Authorized representatives of Owner, Design Professional, 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.

3. Agenda: Discuss items of significance that could affect progress, including the following:
   a. Tentative construction schedule and critical work sequencing and long-lead items.
   b. Designation of key personnel and their duties and lines of communications.
   c. Procedures for processing field decisions and Change Orders.
   d. Procedures for RFIs.
   e. Procedures for testing and inspecting.
   f. Procedures for processing Applications for Payment.
   g. Submittal procedures.
   h. Preparation of record documents.
   i. Use of the premises and existing building.
   j. Work restrictions and working hours.
   k. Owner's occupancy requirements.
   l. Responsibility for temporary facilities and controls.
   m. Procedures for disruptions and shutdowns.
   n. Construction waste management and recycling.
   o. Parking availability and site security
   p. Office, work, and storage areas.
   q. Equipment deliveries and priorities.
   r. Progress cleaning.

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

C. Attend meetings throughout progress of the Work as coordinated by the Design Professional. Meetings shall address the following:
   1. Interface requirements.
   2. Sequence of operations.
   3. Status of submittals.
   4. Deliveries.
   5. Access.
   6. Site utilization.
   7. Temporary facilities and controls.
   8. Progress cleaning.
   9. Quality and work standards.
   10. Status of correction of deficient items.
   11. Field observations.
   12. Status of RFIs.
   13. Status of proposal requests.
   14. Pending changes.
   15. Status of Change Orders.
   16. Pending claims and disputes.

D. Review Schedule: At each progress meeting, determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

E. Update Schedule: Submit horizontal bar chart with separate line for each major section of Work or operation, identifying first work day of each week after each progress meeting.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01300

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 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. Daily construction reports.
   3. Special reports.

B. Related Requirements:
   1. Section 013300 "Submittal Procedures" for submitting schedules and reports.

1.3 INFORMATIONAL SUBMITTALS

A. Submit required submittals in working electronic copy where indicated and/or as a PDF electronic file.

B. Schedules: Submit working electronic copy of schedule labeled to comply with requirements for submittals. Include date on each schedule and note initial or update.

1.4 REPORTING

A. Daily Construction Reports: Submit at monthly intervals when required by the Design Professional.

B. Special Reports: Submit at time of unusual event.

C. Qualification Data: For scheduling consultant.

1.5 COORDINATION

A. Contractor responsible for preparation and processing of all schedules and reports amongst their subcontractors according to the performance of all construction activities.

PART 2 PRODUCTS

2.1 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial progress schedule within seven (7) days after date of Notice of Award for Design Professional's review.

B. Submit revised schedules with each Application for Payment, identifying changes since previous version. Indicate estimated percentage of completion for each item of Work at each submission.

C. Procurement Activities: Include procurement process activities for 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.

D. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.

E. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Design Professional's administrative procedures necessary for certification of Substantial Completion.

F. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

G. 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. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

a. Submittals.

b. Mockups.

c. Deliveries.

d. Installation.

2. Construction Areas: Identify each major area of construction for each major portion of the Work.

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

I. 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.

J. Recovery Schedule: When periodic update indicates the Work is 14 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. Indicate changes to working hours, working days, crew sizes, and equipment required achieving compliance, and dating by which recovery will be accomplished.

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 15 days of date established for the Notice to Proceed. Base schedule on the startup construction schedule and additional information received since the start of Project.

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

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.

5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).

2.4 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, and response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

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 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 Design Professional, Owner, separate contractors, 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 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Related Requirements:
1. Section 013300 "Submittal Procedures" for submitting photographic documentation.
2. Section 017700 "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:
1. Preconstruction photographs.
2. Periodic construction photographs.

PART 2 PRODUCTS

2.1 INFORMATIONAL SUBMITTALS

A. Digital Photographs: Submit image files within seven days of taking photographs.
1. Digital Camera: Minimum sensor resolution of 8-bit or larger color format.
2. Format: Minimum 3200 by 2400 pixels (at least 300 ppi), in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
3. Identification: Provide the date the photograph was taken with each image description in file name tag.
4. Provide images in JPG format, RGB color mode in the resolution format noted above or better.

B. Video Recordings: Not Used.

PART 3 EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

C. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Design Professional.
   1. Flag excavation areas before taking construction photographs.

D. Periodic Construction Photographs: Take a minimum of 20 photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

E. Image Delivery: Provide images via approved cloud-based sharing/management system shared with the Owner and the Design Professional.

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

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

B. Related Requirements:
1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITION

A. Action Submittals: Written and graphic information and physical samples that require Design Professional's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Design Professional's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL PROCEDURES

A. Submit a Submittal Schedule Log within seven (7) days of Notice to Award for Design Professional to review. The log shall be in an electronic, sortable file that includes each submittal arranged by specification number and the dates required for review according to the construction schedule. The schedule shall allow 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 the Design Professional and additional time for handling and reviewing submittals required by those corrections.

B. Submittal form to identify Project, Contractor, subcontractor or supplier; and pertinent Contract Document reference to Design Professional via email or fax to their attention.

C. 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 requirements of the Work and Contract Documents.

D. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of completed Work.

E. Revise and resubmit submittals as required; identify changes made since previous submittal.

F. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

G. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

H. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Electronic digital data files of the Contract Drawings will be provided by the Design Professional for Contractor's use in preparing submittals.

1. Design Professional will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings. The Design Professional makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to the Owner and Professional.

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

1. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

a. Design Professional 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 the Design Professional'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. Design Professional 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.

4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to the Design Professional and to Professional's consultants, allow 15 days for review of each submittal. Submittal will be returned to Design Professional before being returned to Contractor.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.

2. Name file with submittal number or other unique identifier, including revision identifier.

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by the Design Professional.

E. Options: Identify options requiring selection by the Design Professional.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by the Design Professional on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

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 Design Professional's action stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, and 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 the Design Professional’s action stamp.

PART 2 PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

   1. Post electronic submittals as PDF electronic files directly to Project Web site or Contractor’s FTP site specifically established for Project. Contractor may also email files electronically to the Design Professional when this method of transmission is previously approved by the Professional and the Owner.

      a. Design Professional will return or upload the annotated file. Annotate and retain one copy of file as an electronic Project record document file.

   2. 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. Format: PDF

4. For equipment, include the following in addition to the above, as applicable:
a. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
b. Format: PDF

5. Submit Product Data before or concurrent with Samples.

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. Compliance with specified standards.
c. Notation of coordination requirements.
d. Notation of dimensions established by field measurement.
e. Relationship and attachment to adjoining construction clearly indicated.
f. Format: PDF

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.
   e. Specification paragraph number and generic name of each item.

3. 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 not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

E. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

F. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."

G. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

H. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

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 the Design Professional.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "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 DESIGN PROFESSIONAL'S ACTION

A. Action Submittals: The Design Professional will review each submittal, make marks to indicate corrections or revisions required, and return it. Each submittal will be stamped with an action stamp and will mark appropriately to indicate action.

B. Informational Submittals: The Design Professional will review each submittal and will not return it, or will return it if it does not comply with requirements. Design Professional will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from the Design Professional.

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 be returned by the Design Professional without action.

END OF SECTION 013300

SECTION 013500 - HISTORIC SITE PROJECT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general protection and treatment procedures for designated historic spaces, areas, rooms, and surfaces in Project. Work included:
   1. Preserve and protect the historic aspects of the site, structures, and finishes;
   2. Minimize cutting/patching and other disturbance of historic fabric (plaster and wood);
   3. Recognize and respect archaeological remains;
   4. Provide qualified site supervision, craft persons, and subcontractor personnel;
   5. Verify that the Work, including work by subcontractors, is complete and complies with the Contract Documents.

1.3 QUALITY ASSURANCE AND HISTORIC PRESERVATION

A. The building is on the National Register of Historic Places. Work shall follow Historic Treatment guidelines as noted below.
   1. Work shall be in compliance with the United States Secretary of the Interior's Standards for the Treatment of Historic Properties, 1995;
   2. Strict compliance with the Drawings and Specifications is required to assure compliance of the work with the Secretary of the Interior's Standards;
   3. Failure to comply with the Drawings and Specifications will result in rejection of the Work.

B. Exercise extreme care in all aspects of the work to conserve, preserve, and protect the existing site and structures:
   1. Do not use methods which will result in loss of detail or material in existing surfaces;
   2. Develop new methods and techniques where necessary to accomplish the objectives of preservation and conservation;
   3. If in doubt, contact the Design Professional for assistance.

C. Provide day to day site supervision through a site or project superintendent whose experience meets the requirements of the Project Qualification Statement.

D. Before cutting or disturbing historic fabric (plaster or wood):
   1. Mark out location and extent of proposed cuts with tape;

2. Review location and extent with the Design Professional;

3. Cut only after receiving the Design Professional's approval.

E. The site is archaeologically sensitive at, and below, the ground surface. Do not disturb the site unless specifically directed by the Drawings and Specifications, or by the Design Professional:

1. Perform excavations only in the presence of the Design Professional or an Archaeologist;

2. Protect subsurface site features from surface operations

F. Provide adequate numbers of skilled craft persons whose experience meets the requirements of the Project Qualification Statement.

G. Engage subcontractors whose experience meets the requirements of the Project Qualification Statement.

H. Assure that site supervision, craft persons, and subcontractors are knowledgeable and experienced in their portion of the work and know and understand the specified requirements and methods needed for performance of the work.

I. Fire-Prevention Plan: Prepare a plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-prevention devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.

1.4 STORAGE AND HANDLING OF HISTORIC MATERIALS

A. Salvaged Historic Materials:
1. Clean loose dirt and debris from salvaged historic items unless more extensive cleaning is indicated.
2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

B. Historic Materials for Reinstallation:
1. Repair and clean historic items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make item functional for use indicated.

C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Design Professional, items may be dismantled and taken to a suitable, protected storage

location during construction work and reinstalled in their original locations after historic treatment and construction work in the vicinity is complete.

D. Storage: Catalog and store historic items within a weather tight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.
   1. Identify each item with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
   2. Secure stored materials to protect from theft.
   3. Control humidity so that it does not exceed 85 percent.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 REVIEW REQUIREMENTS OF THE WORK

A. Plans and Specifications:

1. Review the plans and specifications to assure that the Work will comply with the Contract Document.

B. Manufacturers Procedures:

1. Review the accepted submittals for product manufacturers' installation procedures to assure compliance with their requirements and recommendations.

C. Government Agencies:

1. Investigate, review, and comply with the requirements of Government Agencies having jurisdiction over work activities and worker safety.

D. Level of Quality:

1. Review/prepare samples or mock-ups of work to establish the required level of quality with the Design Professional.

3.2 LAYOUT AND VERIFICATION OF MEASUREMENTS

A. Verify all measurements at the Site. Data indicated on the Drawings and in these Specifications are as exact as could be secured, but absolute accuracy is not warranted. The exact locations, distances, levels, and other conditions, including utilities and underground features, will be governed by existing conditions.

B. Notify the Design Professional immediately of any discrepancy between existing conditions and the Drawings or Specifications.

3.3 DESIGN PROFESSIONAL OBSERVATION POINTS

A. Observation Points:

1. Confirm with the Design Professional those activities for which Design Professional's observation is required.

2. Provide 72 hour advance notice to the Design Professional of those activities.

3.4 ARCHAEOLOGICAL REMAINS

A. Monitor excavations for significant archaeological remains, such as foundation walls:

1. If significant archaeological remains are encountered, notify the Design Professional immediately. Cease further excavation in the vicinity of the remains for 72 hours, to allow for observation of the remains by an archaeologist.

3.5 LIMITS OF SPECIFIED WORK

A. For each specification Section, with careful study of the Contract Documents and the Site, clearly identify the limits of the specified work and confirm the limits of said work.

3.6 PROTECTION, GENERAL

A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from historic treatment procedures.

1. Use only proven protection methods, appropriate to each area and surface being protected.
2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where historic treatment work is being performed.
3. Erect temporary barriers to form and maintain fire-egress routes.
4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during historic treatment work.
5. Contain dust and debris generated by historic treatment work, and prevent it from reaching the public or adjacent surfaces.
6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
8. Provide supplemental sound-control treatment to isolate removal and dismantling work from other areas of the building.

B. Temporary Protection of Historic Materials:

1. Protect existing historic materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.

2. Do not attach temporary protection to historic surfaces except as indicated as part of the historic treatment program and approved by Design Professional.

C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

D. Utility and Communications Services:

1. Notify Owner, Design Professional, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by historic treatment work before commencing operations.

2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for historic treatment work.

3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Design Professional immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.

1. Prevent solids such as stone or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from historic treatment work.

2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

3.2 PROTECTION FROM FIRE

A. General: Follow fire-prevention plan and the following:

1. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
   a. If combustible material cannot be removed, provide fire blankets to cover such materials.
2. Prohibit smoking by all persons within Project work and staging areas.

B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch- cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:

1. Obtain Owner's approval for operations involving use of welding or other high-heat equipment. Use of open-flame equipment is not permitted. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.

5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.

6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
   a. Train each fire watch in the proper operation of fire-control equipment and alarms.
   b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
   c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
   d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work at each area of Project site to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
   e. Maintain fire-watch personnel at each area of Project site until two hours after conclusion of daily work.

C. Fire Extinguishers, Fire Blankets, and Rag Buckets: Maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire- extinguisher and blanket use.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm or damage resulting from applications of chemicals and adhesives.

B. Cover adjacent surfaces with protective materials that are proved to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in historic treatment program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.

C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.

D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.

E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 GENERAL TREATMENTS TO HISTORIC SITE

A. Have historic treatment work performed only by qualified specialists.

B. Ensure that supervisory personnel are present when historic treatment work begins and during its progress.

C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs or video recordings. Comply with requirements in Section 013233 "Photographic Documentation."

D. Perform surveys of Project Site as the Work progresses to detect hazards resulting from treatment procedures.

E. Follow the procedures in subparagraphs below unless otherwise indicated:
   1. Retain as much existing material as possible; repair and consolidate rather than replace. Use reversible processes wherever possible.
   2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
   3. Use historically accurate repair and replacement materials and techniques unless otherwise indicated.
   4. Record existing work before each procedure (preconstruction) and progress during the work with digital preconstruction documentation photographs or video recordings.

F. Notify Design Professional of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.

   1. Do not proceed with the work in question until directed by Design Professional.

G. Where missing features are indicated to be repaired or replaced, provide work with appearance based on accurate duplications rather than on conjecture, subject to approval of Design Professional.

H. Where work requires existing features to be removed or dismantled and reinstalled, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.

I. Identify new and replacement materials and features with permanent marks hidden in the completed Work to distinguish them from original materials. Record a legend of identification marks and the locations of the items on record Drawings.

END OF SECTION 013500

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

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

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for 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, Design Professional, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system may be available for use without metering and without payment of use charges if it is turned on by the Owner for construction activities. Provide connections and extensions of services as required for construction operations. If water service is required to remain off by the Owner, the Contractor shall provide potable water for construction personnel and any necessary water for construction activities.

C. Electric Power Service from Existing System: Electric power from Owner'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.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

D. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste handling procedures.
5. Other dust-control measures.

1.5 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. Design Professional & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to 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 - PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8- inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42- mm-) OD top and bottom rails. Provide galvanized-steel bases for supporting posts.

B. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).

C. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Field Office: Owner will provide an area within the existing building for construction personnel office activities and to accommodate Project meetings. Keep areas clean and orderly.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

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

B. HVAC Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

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. Facilities shall be placed within the property boundaries, or as otherwise directed by the Owner.

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. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewer bypass to existing system, unless directed otherwise by authorities having jurisdiction.

C. Water Service: Owner cannot guarantee water or sanitary facilities are available until the repairs to the system are completed.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Place temporary facilities on the grassed area behind the Courthouse within the property boundaries, or as otherwise directed by the Owner. Contractor is responsible for keeping the temporary facilities clean and secure on-site.

E. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.

a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.

3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for

protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

J. Telephone Service:

1. Post a list of important telephone numbers in the field office.
   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor's home office.
   d. Contractor's emergency after-hours telephone number.
   e. Design Professional's office.
   f. Engineers' offices.
   g. Owner's office.
   h. Principal subcontractors' field and home offices.

2. Provide superintendent with cellular telephone.

K. Tele/data service from the Owner at the building is not guaranteed. Temporary service or hotspot shall be provided by the Contractor when necessary.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.

2. Maintain support facilities until Design Professional schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.

2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Use designated areas of Owner's existing parking area for construction personnel when available.

D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.

2. Remove snow and ice as required to minimize accumulations.

E. Project Signs: Existing Project sign as shall remain in place. Unauthorized signs are not permitted.

1. Contractor shall submit sign design to Owner prior to posting, if so desired to have an additional project sign added to the construction site.

F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

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. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.

2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.

4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."

E. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As indicated on Drawings.

2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

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

G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

H. 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.

2. Supervise 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.

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. Owner reserves right to take possession of Project identification signs.

2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 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.

B. Related Requirements:

1. Section 012300 "Alternates" for products selected under an alternate.

2. Section 012500 "Substitution Procedures" for requests for substitutions.

1.3 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.

1.4 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. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.

2. Design Professional's Action: If necessary, Design Professional will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Design Professional 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 Design Professional does not issue a decision on use of a comparable product request within time allocated.

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

1.5 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.

1.6 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.

B. 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.

C. 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. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

5. Protect stored products from damage and liquids from freezing.

1.7 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.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. 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. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. 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," Design Professional will make selection.

5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. 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. Products:

a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.

4. Manufacturers:

   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.

5. 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.

C. Visual Matching Specification: Where Specifications require "match Design Professional's sample", provide a product that complies with requirements and matches Design Professional's sample. Design Professional'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.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Design Professional will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Design Professional 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 Design Professionals and owners, if requested.

5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 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. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 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.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Warranty: Contractor and manufacturer’s warranties.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 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 Owner 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 01 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 closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect . Label with manufacturer's name and model number where applicable.

5. Submit test/adjust/balance records.

6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. 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.

2. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

1.8 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. Include the following information at the top of each page:
   a. Project name.
   b. Date.
   c. Name of Contractor.
   d. Page number.

4. Submit list of incomplete items in the following format:

   a. MS Excel electronic file. Architect will return annotated file.

1.9 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 Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of 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 for storage on-site.

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.

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. Remove labels that are not permanent.

j. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

k. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

l. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

1.2 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 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Product maintenance manuals.

B. Related Requirements:

   1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTAL

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.

2. Submit operations and maintenance manuals also in paper / binder hard copy format (2 copies).

   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. 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

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.

2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

2.3 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 and drawing or schedule designation or identifier where applicable.

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.

1. Include procedures to follow and required notifications for warranty claims.

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. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

C. 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.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.

E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 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.
   4. Miscellaneous record submittals.

B. Related Requirements:
   1. Section 017700 "Closeout Procedures" for general closeout procedures.
   2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit one set of mark-up record prints.
      a. Initial Submittal:
         1) Submit PDF electronic files of scanned record prints.
         2) Design Professional will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
      b. Final Submittal:
         1) Submit PDF electronic files or scanned record prints and two sets of prints.
         2) Print each drawing, whether or not changes and additional information were recorded, when requested by Owner.
         3) Provide PDF electronic files on a USB (USB-C) jump drive or an approved cloud-based program with the Owner.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal, and one set as a paper hard copy in a binder.

1. Where record Product Data are required as part of operation and maintenance manuals, submit marked-up Product Data as a component of manual.

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. Accurately record information in an acceptable drawing technique.
   c. Record data as soon as possible after obtaining it.
   d. Record and check the markup before enclosing concealed installations.
   e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:
   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations below first floor.
   d. Locations and depths of underground utilities.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Locations of concealed internal utilities.
   i. Changes made by Change Order or Construction Change Directive.
   j. Changes made following Architect's written orders.
   k. Details not on the original Contract Drawings.
   l. Field records for variable and concealed conditions.
   m. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. 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.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.

5. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. 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.

B. Format: Submit record Product Data as annotated PDF electronic file.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

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.

B. 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 SUMMARY

A. The Work of this Section Includes:

1. Demolition and removal of selected portions of exterior or interior of building or structure and site elements.
2. Removal and salvage of existing items for delivery to Owner and removal of existing items for reinstallation.

1.2 DEFINITIONS

A. Dismantle: To disassemble or detach a historic item from a surface, or a nonhistoric item from a historic surface, using gentle methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

B. Remove: Detach items from existing construction and legally dispose of off-site unless indicated to be removed and salvaged or removed and reinstalled.

C. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner as indicated.

D. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage; prepare for reuse; and reinstall where indicated.

E. Existing to Remain: Existing items of construction that are not to be removed.

F. Install Salvaged: To install items that are currently stored on site.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.5 PREINSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.
6. Review and finalize protection requirements.
7. Review procedures for noise and dust control.
8. Review storage, protection, and accounting for items to be removed for salvage or reinstallation.

1.6 INFORMATIONAL SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Temporary interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Design Professional of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials:

1. It is not expected that hazardous materials will be encountered in the Work.

    a. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Design Professional and Owner. Hazardous materials will be removed by Owner under a separate contract.
    b. In the case of asbestos, stop work in the area of potential hazard, shut off fans and other air handlers ventilating the area, and rope off area until the questionable material is identified. Resume work in the area of concern after safe working conditions are verified.

E. On-site sale of removed items or materials is not permitted.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video. Comply with Section 013233 "Photographic Documentation."

1. Inventory and record the condition of items to be removed for salvage or reinstallation. Photograph or video conditions that might be misconstrued as damage caused by removal.
2. Photograph or video existing conditions of adjoining construction including finish surfaces, that might be misconstrued as damage caused by selective demolition operations or removal of items for salvage or reinstallation.

3.2 PREPARATION

A. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

B. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Design Professional, items may be removed to a suitable, protected storage location and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.3 UTILITY SERVICES AND BUILDING SYSTEMS

A. Existing Services/Systems to Remain: Maintain utilities and building systems and equipment to remain and protect against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utilities and building systems serving areas to be selectively demolished.

1. Arrange to shut off utilities with utility companies.
2. If disconnection of utilities and building systems will affect adjacent occupied parts of the building, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to those parts of the building.
3. Demolish and remove existing building systems, equipment, and components indicated on Drawings to be removed.

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
b. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
c. Equipment to Be Removed: Disconnect and cap services and remove equipment and components.

4. Abandon existing building systems, equipment, and components indicated on Drawings to be abandoned in place.

   a. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
   b. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

5. Remove and reinstall/salvage existing building systems, equipment, and components indicated on drawings to be removed and reinstalled or removed and salvaged:

   a. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment and components; when appropriate, reinstall, reconnect, and make equipment operational.
   b. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and components and deliver to Owner.

3.4 SALVAGE/REINSTALL

A. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on-site.
5. Protect items from damage during transport and storage.

B. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least half hour after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

B. Wall Partitions: Demolish in sections to minimize any damage to adjacent surfaces and finishes. Nails or screws in flooring shall be backed out or carefully pulled out so as not to damage the existing wood flooring below.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device

that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.8 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 040342 - HISTORIC STONE MASONRY REPAIR

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes historic treatment work consisting of repairing historic stone assemblies as follows:

1. Repairing stone masonry.
2. Removing abandoned anchors.
3. Painting steel uncovered during the Work.

B. Related Requirements:

1. Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.
2. Section 040343 Historic Stone Masonry Repointing.

1.2 DEFINITIONS

A. Low-Pressure Spray:

1. Pressure: 100 to 400 psi.
2. Flow Rate: 4 gpm.

B. Face Bedding: Setting of stone with the rift or natural bedding planes (strata) vertical and parallel to the wall plane rather than horizontal or "naturally bedded," which holds bedding planes together by gravity.

C. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.

D. Rift: The most pronounced direction of splitting or cleavage of a stone.

E. Stone Terminology: ASTM C119.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference on historic masonry repair and repointing at Project site.

1. Review minutes of Preliminary Historic Treatment Conference that pertain to stone historic treatment and repair.
2. Review methods and procedures related to repairing historic stone masonry, including, but not limited to, the following:

a. Verify historic treatment specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.
c. Quality-control program.
d. Fire-protection plan.
e. Stone historic treatment program.
f. Coordination with building occupants.

1.4 SEQUENCING AND SCHEDULING

A. Order sand and gray portland cement for colored mortar immediately after approval of samples and mockups. Take delivery of and store at Project site a sufficient quantity to complete Project.

B. Work Sequence: Perform stone historic treatment work in the following sequence, which includes work specified in this and other Sections:

1. Remove plant growth.
2. Inspect stonework for open mortar joints and permanently or temporarily point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean stone.
5. Rake out mortar from joints surrounding stone to be replaced and from joints adjacent to stone repairs along joints.
6. Repair stonework, including replacing existing stone with new stone. If required, repair backup masonry.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
10. Where water repellents are to be used on or near stonework, delay application of these chemicals until after pointing and cleaning.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in stone according to Part 3 "Stone Patching" Article. Patch holes in mortar joints according to Section 040343 "Historic Stone Masonry Repointing."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include recommendations for product application and use.
3. Include test data substantiating that products comply with requirements.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of stone repair work on the structure.
2. Indicate complete dimensions for new stone units and their jointing, showing relation of existing to new units.
3. Show partial replacement stone units (dutchmen).
4. Indicate setting number of each new stone unit and its location on the structure in annotated plans and elevations.
5. Show provisions for expansion joints or other sealant joints.
6. Show provisions for flashing, lighting fixtures, conduits, and weep holes as required.
7. Show replacement and repair anchors, including drilled-in pins. Include details of anchors within individual stone units, with locations of anchors and dimensions of holes and recesses in stone required for anchors, including direction and angle of holes for pins.
8. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.

C. Samples for Initial Selection: For the following:

1. Colored Mortar: Submit sets of mortar that will be left exposed in the form of sample mortar strips, 6 inches long by 1/2 inch wide, set in aluminum or plastic channels.

    a. Have each set contain a close color range of at least three samples of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.
    b. Submit with precise measurements on ingredients, proportions, gradations, and sources of colored sands from which each sample was made.

2. Each type of sand used for mortar; minimum 8 oz. of each in plastic screw-top jars.

    a. For blended sands, provide samples of each component and blend. Identify blend ratio.
    b. Identify sources, both supplier and quarry, of each type of sand.

3. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of stone representative of the range of stone colors on the building.

    a. Have each set contain a close color range of at least three Samples of different mixes of patching compound that matches the variations in existing stone when cured and dry.

4. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For the following:

1. Each type of replacement stone. Include sets of Samples to show full range of color, texture, grain, veining, and finish to be expected. Provide sets of at least two 12-by-12-inch Samples for each type, but no fewer than necessary to indicate full range and

the proportion of variations within range.

2. Each type of patching compound in form of briquettes, at least 3 inches long by 1-1/2 inches wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material. Samples shall have cured for a minimum of 3-days.
3. Each type of adhesive.
4. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For historic treatment specialist/foreman, including field supervisors and workers.

B. Quality-control program.

1.7 QUALITY ASSURANCE

A. Historic Treatment Specialist Qualifications: A qualified historic stone repair specialist. Experience installing standard unit masonry or new stone masonry is insufficient experience for stone historic treatment work.

1. Historic Treatment Worker Qualifications: When stone units are being patched, assign at least one worker per crew who is trained and certified by the manufacturer of patching compound to apply its products.

B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising worker performance and preventing damage.

C. Stone Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of the historic treatment work, including protection of surrounding materials and Project site.

1. Include methods for keeping exposed mortar damp during curing period.
2. If materials and methods other than those indicated are proposed for any phase of historic treatment work, add to the quality-control program a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project.

D. Mockups: Prepare mockups of historic treatment to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation. Mock-ups must cure for 3-days or longer.

1. Stone Repair: Prepare sample areas for each type of stone indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 inches in least dimension. Construct sample areas in locations in existing walls where directed by Architect unless

otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:

a. Crack Injection: Apply crack injection in two separate areas, each approximately 36 inches long.
b. Patching: Three small holes at least 1 inch in diameter for each type of stone indicated to be patched, so as to leave no evidence of repair.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver stone to Project site strapped together in suitable packs or pallets or in heavy-duty crates and protected against impact and chipping.

B. Deliver each piece of stone with code mark or setting number on unexposed face, corresponding to Shop Drawings, using nonstaining paint.

C. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

E. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

F. Store lime putty covered with water in sealed containers.

G. Store sand where grading and other required characteristics can be maintained and contamination avoided.

H. Handle stone to prevent overstressing, chipping, defacement, and other damage.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit repair work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits: Repair stonework only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for stone repair

unless otherwise indicated:

1. When air temperature is below 40 deg F, heat mortar ingredients, repair materials, and existing stone to produce temperatures between 40 and 120 deg F.
2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after repair.

D. Hot-Weather Requirements: Protect stonework repairs when temperature and humidity conditions produce excessive evaporation of water from mortar and patching materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Source Limitations: Obtain each type of material for repairing historic masonry (stone, cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MASONRY MATERIALS

A. Stone Matching Existing: Natural building stone of variety, color, texture, grain, veining, finish, size, and shape that match existing stone.

1. For existing stone that exhibits a range of colors, textures, grains, veining, finishes, sizes, or shapes, provide stone that proportionally matches that range rather than stone that matches an individual color, texture, grain, veining, finish, size, or shape within that range.

2.3 MASONRY REPAIR MATERIALS

A. Jahn Restoration Mortars, distributed by Cathedral Stone Products Inc. 7266 Park Circle Drive, Hanover MD 21076; Tel: (410) 782-9150; www.cathedralstone.com

1. Products: M70, M90, or M160 – per recommended by manufacturer.

OR

B. Saint-Astier Lithomax, distributed by LimeWorks.us; 3145 State Road, Telford, PA 18969. Tel: (215) 536-6706. www.LimeWorks.us

2.4 ACCESSORY MATERIALS

A. Stone Anchors and Pins: Type and size indicated or, if not indicated, to match existing anchors in size and type. Fabricate from Type 304 stainless steel.

1. Refer to masonry repair product manufacturer's instructions for other acceptable mechanical anchors.

B. Setting Buttons and Shims: Resilient plastic, nonstaining to stone, sized to suit joint thicknesses and bed depths of stone units, less the required depth of pointing materials unless removed before pointing.

C. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

D. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could do the following:

a. Remove, alter, or harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in contract.
b. Leave residue on surfaces.

PART 3 - EXECUTION

3.1 PROTECTION

A. Prevent mortar from staining face of surrounding stone and other surfaces.

1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
2. Keep wall area wet below rebuilding and repair work to discourage mortar from adhering.
3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

B. Remove gutters and downspouts and associated hardware adjacent to immediate work area and store during stone repair work. Reinstall when repairs are complete.

1. Provide temporary rain drainage during work to direct water away from building.

3.2 STONE REPAIR, GENERAL

A. Have repair work performed only by qualified historic treatment specialist.

B. Repair Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from 10 feet away by Architect.

3.3 ABANDONED ANCHOR REMOVAL

A. Remove abandoned anchors, brackets, wood nailers, and other extraneous items no longer in use unless indicated to remain.

B. Remove items carefully to avoid spalling or cracking stone.

1. Notify Architect before proceeding if an item cannot be removed without damaging surrounding stone; do the following where directed:

   a. Cut or grind off item approximately 3/4 inch beneath surface, and core drill a recess of same depth in surrounding stone as close around item as practical.
   b. Immediately paint exposed end of item with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.

2. Patch the hole where each item was removed unless directed to remove and replace the stone unit.

3.4 STONE REMOVAL AND REPLACEMENT

A. When stone is too deteriorated to patch, remove stone that has deteriorated or is damaged beyond repair. Review with A/E is required prior to removal. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

B. Support and protect remaining masonry that was supported by removed stone.

C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

D. Notify Architect of unforeseen detrimental conditions, including voids, cracks, bulges, loose masonry units in existing stone or unit masonry backup, rotted wood, rusted metal, and other deteriorated items.

E. Remove in an undamaged condition as many whole stone units as possible.

1. Remove mortar, loose particles, and soil from stone by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to stone with a utility knife and cleaning with solvents.

3. Store stone for reuse. Store off ground, on skids, and protected from weather.
4. Deliver cleaned stone not required for reuse to Owner unless otherwise indicated.

F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for stone replacement.

G. Replace removed damaged stone with other removed stone [and salvaged stone] in good condition, where possible, [or with new stone] matching existing stone. Do not use broken units unless they can be cut to usable size.

H. Rift: Do not allow face bedding of stone. Before setting, inspect to verify that each stone has been cut so that, when it is set in final position, the rift or natural bedding planes are predominantly horizontal [except for arches, where bedding planes are predominantly radial or vertical, but perpendicular to the wall]. Reject stone with vertical bedding planes, except as required for arches, lintels, and copings.

I. Install replacement stone into bonding and coursing pattern of existing stone. If cutting is required, use a motor-driven saw designed to cut stone with clean, sharp, unchipped edges. Finish edges to blend with appearance of edges of existing stone.

1. Maintain joint width for replacement stone to match existing joints.
2. Use setting buttons or shims to set stone accurately spaced with uniform joints.

J. Set replacement stone with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter vertical joints for full width before setting and set units in full bed of mortar unless otherwise indicated. Replace existing anchors with new anchors of size and type indicated, matching existing configuration.

1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing stonework.
2. Rake out mortar used for laying stone before mortar sets according to Section 040343 "Historic Stone Masonry Repointing." Point at same time as repointing of surrounding area.
3. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.

K. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.

1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.5 PARTIAL STONE REPLACEMENT

A. Remove defective portion of existing stone unit (backing stone) when determined required with A/E. Carefully remove defective portion of stone by making vertical and horizontal saw cuts at face of backing stone and removing defective material to depth required for fitting partial replacement (dutchman).

1. Make edges of backing stone at cuts smooth and square to each other and to finished surface; essentially rectangular. Make back of removal area flat and parallel to stone face.
2. Do not overcut at corners and intersections. Hand trim to produce clean sharp corners with no rounding and no damage to existing work to remain.
3. If backing stone becomes further damaged, remove damaged area and enlarge partial replacement as required.

B. Remove mortar from joints that abut area of stone removal to same depth as stone was removed. Remove loose mortar particles and other debris from surfaces to be bonded and surfaces of adjacent stone units that will receive mortar by cleaning with stiff-fiber brush.

C. Cut and trim partial replacement to accurately fit area where material was removed from backing stone. Fabricate to size required to produce joints between partial replacement and backing stone of no more than 1/16 inch in width, and to produce joints between partial replacement and other stones that match existing joints between stones. Cut partial replacement so that, when it is set in final position, natural bedding planes match the orientation of bedding planes of the backing stone unless otherwise indicated.

D. Pinning: Before applying adhesive, prepare for mechanical anchorage consisting of 1/4-inch- diameter, threaded stainless-steel pins set into 1/4-inch- diameter holes drilled at a 45-degree downward angle through face of partial replacement and into backing stone.

1. Center and space pins between 3 and 5 inches apart and at least 2 inches from any edge. Insert pins at least 2 inches in backing stone and 2 inches in partial replacement, with end countersunk at least 3/4 inch from exposed face of partial replacement.

E. Concealed Pinning: Before applying adhesive, prepare for concealed mechanical anchorage consisting of 1/4-inch- diameter, [threaded] stainless-steel pins set into 1/4-inch- diameter holes drilled into backing stone and into, but not through, the partial replacement.

1. Center and space pins between 3 and 5 inches apart and at least 2 inches from any edge. Insert pins at least 2 inches in backing stone and 2 inches in partial replacement, but no closer than 3/4 inch from exposed face of partial replacement.

F. Apply stone-to-stone adhesive according to adhesive manufacturer's written instructions. Coat bonding surfaces of backing stone and partial replacement, completely filling all crevices and voids.

G. Apply partial replacement while adhesive is still tacky and hold securely in place until adhesive has cured. Use shims, clamps, wedges, or other devices as necessary to align face of partial replacement with face of backing stone.

H. Clean adhesive residue from exposed surfaces and patch chipped areas [and exposed drill holes] as specified in "Stone Patching" Article.

3.6 CRACK INJECTION

A. General: Comply with cementitious crack-filler manufacturer's written instructions.

B. Drill 1/4-inch- diameter injection holes as follows:

1. Transverse Cracks Less Than 3/8 inch Wide: Drill holes through center of crack at 12 to 18 inches o.c.
2. Transverse Cracks More Than 3/8 inch Wide: Drill holes through center of crack at 18 to 36 inches o.c.
3. Delaminations: Drill holes at approximately 18 inches o.c., both vertically and horizontally.
4. Drill holes 2 inches deep.

C. Clean out drill holes and cracks with compressed air and water. Remove dirt and organic matter, loose material, sealants, and failed crack repair materials.

D. Place plastic injection ports in drilled holes, and seal face of cracks between injection ports with clay or other nonstaining, removable plugging material. Leave openings at upper ends of cracks for air release.

E. Inject cementitious crack filler through ports sequentially, beginning at one end of area and working to opposite end; where possible, begin at lower end of injection area and work upward. Inject filler until it extrudes from adjacent ports. After port has been injected, plug with clay or other suitable material, and begin injecting filler at adjacent port, repeating process until all ports have been injected.

F. Clean cementitious crack filler from face of stone before it sets, by scrubbing with water.

G. After cementitious crack filler has set, remove injection ports, plugging material, and excess filler. Patch injection holes and surface of cracks as specified in "Stone Patching" Article.

3.7 STONE PATCHING

A. Patch the following stone units unless another type of repair or replacement is indicated:

1. Units indicated to be patched.
2. Units with holes.
3. Units with chipped edges or corners. Patch chipped edges or corners measuring more than 3/4 inch in least dimension.
4. Units with small areas of deep deterioration. Patch deep deteriorations measuring more than 3/4 inch in least dimension and over 1/4 inch deep.

B. Remove deteriorated material and remove adjacent material that has begun to deteriorate. Carefully remove additional material so patch does not have feathered edges but has square or slightly undercut edges on area to be patched and is at least ¼ inch thick, but not less than as recommended in writing by patching compound manufacturer.

C. Mask adjacent mortar joint or rake out for repointing if patch extends to edge of stone unit.

D. Mix patching compound in individual batches to match each stone unit being patched. Combine one or more colors of patching compound, as needed, to produce an exact match.

E. Brush-coat stone surfaces with slurry coat of patching compound according to manufacturer's written instructions.

F. Place patching compound in layers as recommended in writing by patching compound manufacturer, but not less than 1/4 inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.

1. Simple Details: Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the stone. Shape and finish surface before or after curing, as determined by testing, to best match existing stone.
2. Carved Details: Build patch up 1/4 inch above surrounding stone and carve surface to match adjoining stone after patching compound has hardened.

G. Keep each layer damp for 72 hours or until patching compound has set.

H. Remove and replace patches with hairline cracks or that show separation from stone at edges, and those that do not match adjoining stone in color or texture.

3.8 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed stone surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent non-stone surfaces. Use detergent and soft brushes or cloths.

C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

D. Remove masking materials, leaving no residues that could trap dirt.

E. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure-wash pavement surfaces to remove mortar, dust, dirt, and stains.

3.9 FIELD QUALITY CONTROL

A. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.

B. Notify Architect's Project representatives in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until Architect's Project representatives have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.10 STONE-WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess stone materials are Contractor's property.

B. Stone Waste: Remove stone waste and legally dispose of off Owner's property.

END OF SECTION 040342

SECTION 040343 - HISTORIC STONE MASONRY REPOINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes historic treatment work consisting of repointing stone masonry joints with mortar.

B. Related Requirements:

1. Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.

1.2 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."

1. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.3 DEFINITIONS

A. Low-Pressure Spray:

1. Pressure: 100 to 400 psi
2. Flow Rate: 4 to 6 gpm.

B. Rift: The most pronounced direction of splitting or cleavage of a stone. Rift may be obscure in igneous rocks such as granite. Often it is obvious, as with bedding planes in many sedimentary stones.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference on historic masonry repair and repointing at Project site.

1. Review methods and procedures related to repointing historic stone masonry including, but not limited to, the following:

a. Verify historic treatment specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.
c. Quality-control program.

d. Fire-protection plan.
e. Stone historic treatment program.
f. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

A. Work Sequence: Perform stone historic treatment work in the following sequence, which includes work specified in this and other Sections:

1. Remove plant growth.
2. Inspect for open mortar joints and permanently or temporarily point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean stone with low pressure spray.
5. Rake out mortar from joints surrounding stone to be replaced and from joints adjacent to stone repairs along joints.
6. Repair stonework, including replacing existing stone with new stone where noted on drawings or directed by A/E.
7. Rake out mortar from joints to be repointed.
8. Point mortar joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.

B. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in stone according to Section 040342 "Historic Stone Masonry Repair." Patch holes in mortar joints according to Part 3 "Repointing" Article.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include recommendations for product application and use.
3. Include test data substantiating that products comply with requirements.

B. Shop Drawings:

1. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.

C. Samples for Verification: For the following:

1. Each type, color, and texture of pointing mortar in the form of sample mortar strips, 6 inches long by 1/2 inch wide, set in aluminum or plastic channels.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For field supervisors and workers.

B. Quality-control program.

1.8 QUALITY ASSURANCE

A. Historic Treatment Specialist Qualifications: A qualified historic masonry repointing specialist. Experience in pointing or repointing only new or non-historic masonry is insufficient experience for masonry historic treatment work.

B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising worker performance and preventing damage.

C. Stone Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of the historic treatment work, including protection of surrounding materials and Project site.

1. Include methods for keeping pointing mortar damp during curing period.
2. If materials and methods other than those indicated are proposed for any phase of historic treatment work, add to the quality-control program a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project.

D. Mockups: Prepare mockups of historic treatment on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Repointing: Rake out joints in two separate areas, each approximately 36 inches high by 48 inches wide for each type of repointing required, and repoint one of the areas.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

D. Store lime putty covered with water in sealed containers.

E. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit repointing work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits: Repoint mortar joints only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for mortar-joint pointing unless otherwise indicated:

1. When air temperature is below 40 deg F, heat mortar ingredients and existing stone to produce temperatures between 40 and 120 deg F.
2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after pointing.

D. Hot-Weather Requirements: Protect mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MORTAR MATERIALS

A. Basis-of- Design: LimeWorks, Ecological mortar, SCG-Fine, **Pre-mix factory prepared lime-based mortar**.

1. LimeWorks.us; 3145 State Road, Telford, PA 18969. www.LimeWorks.us; Tel: 215-536-6706

B. Color: DGM 025, as determined by mortar analysis, prepared by Heritage Conservation Collective.

C. Water: ASTM C270, potable.

D. **DO NOT ADD** PORTLAND CEMENT, ADDITIONAL LIME, FLY ASH, POZZOLANS, ACCELERATORS OR RETARDERS.

2.2 ACCESSORY MATERIALS

A. Sealant Materials:

1. Sealant manufacturer's standard elastomeric sealant(s) of base polymer and characteristics indicated below.

   a. Type: Single-component, non-sag urethane sealant at metal flashings.

   Make/model: BASF – NP-1 Masterseal (elastomeric polyurethane sealant).

2. Colors: Provide colors of exposed sealants to match colors of mortar adjoining installed sealant unless otherwise indicated.

B. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

C. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could do the following:

   a. Remove, alter, or harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in contract.
   b. Leave residue on surfaces.

2.3 MORTAR MIXES

A. Measurement and Mixing: Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

1. Mixing Pointing Mortar: Follow manufacturer’s instruction for mixing pre-mixed mortar ingredients and potable water. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.

PART 3 - EXECUTION

3.1 EXAMINATION AND PROTECTION

A. Examine areas to receive work and stage accordingly to minimize disruption to non-work areas.

B. Prevent mortar from staining face of surrounding stone and other surfaces.

1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
3. Immediately remove mortar splatters in contact with exposed stone and other surfaces.

C. Remove gutters and downspouts and associated hardware adjacent to immediate work area and store during stone repointing work. Reinstall when repointing is complete.

1. Provide temporary rain drainage during work to direct water away from building.

3.2 STONE REPOINTING, GENERAL

A. Have repointing work performed only by qualified historic treatment specialists/workers.

B. Appearance Standard: Repointed surfaces are to have a uniform appearance as viewed from 10 feet away by Architect.

3.3 REPOINTING

A. Rake out and repoint joints to the following extent:

1. All joints in areas indicated.
2. Joints indicated as sealant-filled joints.
3. Joints at locations of the following defects:

   a. Holes and missing mortar.
   b. Cracks that can be penetrated 1/4 inch or more by a knife blade 0.027 inch thick.
   c. Cracks 1/16 inch or more in width and of any depth.
   d. Hollow-sounding joints when tapped by metal object.
   e. Eroded surfaces 1/4 inch or more deep.
   f. Deterioration to point that mortar can be easily removed by hand, without tools.
   g. Joints filled with substances other than mortar.

B. Do not rake out and repoint joints where not required or approved by A/E.

C. Rake out joints as follows, according to procedures demonstrated in approved mockup:

1. Remove mortar from joints to depth of joint width plus 2 times the joint width times but not less than not less than 3/4 inch and not less than that required to expose sound, un-weathered mortar. Do not remove unsound mortar more than 2 inches deep; consult Architect for direction.
2. Remove mortar from stone surfaces within raked-out joints to provide reveals with square backs and to expose stone for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.

3. Do not spall edges of stone units or widen joints. Replace or patch damaged stone units as directed by Architect.

    a. Cut out mortar by hand with chisel and resilient mallet. Do not use power-operated grinders without Architect's written approval based on approved quality-control program.
    b. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar in bed joints and mortar in head joints by hand with chisel and resilient mallet. Strictly adhere to approved quality-control program.

D. Notify Architect of unforeseen detrimental conditions, including voids in mortar joints, cracks, loose stone, rotted wood, rusted metal, and other deteriorated items.

E. Pointing with Mortar:

1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer thoroughly, and allow it to become thumbprint hard before applying next layer.
3. After deep areas have been filled to same depth as remaining joints, point joints by placing mortar in layers not greater than 3/8]inch. Fully compact each layer, and allow it to become thumbprint hard before applying next layer. Where existing stone has worn or rounded edges, slightly recess finished mortar surface below face of stone to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed stone surfaces or to featheredge the mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.

    a. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
    b. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.

6. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Remove mortar and repoint.

F. Where repointing work precedes cleaning of existing stone, allow mortar to harden at least 30 days before beginning cleaning work.

3.4 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed stone surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.

   1. Do not use metal scrapers or brushes.
   2. Do not use acidic or alkaline cleaners.

B. Clean adjacent non-stone surfaces. Use detergent and soft brushes or cloths.

C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

D. Remove masking materials, leaving no residues that could trap dirt.

3.5 FIELD QUALITY CONTROL

A. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.

B. Notify Architect's Project representatives in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors and Architect's Project representatives have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

END OF SECTION 040343

SECTION 060312 - HISTORIC WOOD REPAIR

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes historic treatment of wood in the form of repairing wood features as follows:

1. Repairing wood paneling, trim, floor boards, and exterior wood elements.

B. Related Requirements:

1. Section 013500 "Historic Site Project Procedures" for general historic treatment requirements.
2. Section 080352 "Historic Treatment of Wood Windows" for historic wood window repairs, including related trim.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to historic wood repair, including, but not limited to, the following:

a. Historic treatment specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.
c. Fire-protection plan.
d. Wood historic treatment program.

1.3 SEQUENCING AND SCHEDULING

A. Perform historic wood repair in the following sequence, which includes work specified in this and other Sections:

1. Before removing wood components for on-site or off-site repair, tag each component with location-identification numbers. Indicate on tags and building plans the locations of each component, such as "Baseboard on North Side of Room 101."
2. Dismantle hardware and tag with location-identification numbers.
3. In the shop, label each repaired component and whole or partial replacement with permanent location-identification number in inconspicuous location and remove site-applied tags.
4. Sort units by condition, separating those that need extensive repair.

5. Clean surfaces.
6. General Wood-Repair Sequence:

    a. Remove paint to bare wood.
    b. Repair wood by consolidation, replacement, partial replacement, and patching.
    c. Sand, prime, fill, sand again, and prime surfaces again for refinishing.

7. Repair, refinish, and replace hardware if required. Reinstall operating hardware.
8. Reinstall components.
9. Apply finish coats.
10. Install remaining hardware.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

    1. Include recommendations for product application and use. Include test data substantiating that products comply with requirements.

B. Shop Drawings:

    1. Include plans, elevations, and sections showing locations and extent of repair and replacement work, with enlarged details of replacement parts indicating materials, profiles, joinery, reinforcing, method of splicing or attaching wood members to other surfaces, accessory items, and finishes.
    2. Include field-verified dimensions and the following:

        a. Full-size shapes and profiles with complete dimensions for replacement components and their jointing, showing relationship of existing components to new components.
        b. Templates and directions for installing hardware and anchorages.
        c. Identification of each new unit and its corresponding location in the building on annotated plans and elevations.

C. Samples for Initial Selection: For each type of exposed wood and finish.

    1. Identify wood species, cut, and other features.
    2. Include Samples of hardware and accessories involving color selection.

D. Samples for Verification: Actual sample of finished products for the following products in manufacturer's standard sizes unless otherwise indicated:

    1. Replacement Wood: 12-inch- long, full-size molding sections with applied finish.
    2. Refinished Wood: Prepare Samples using existing wood removed from site, repaired, and refinished.
    3. Hardware: Full-size units with each factory-applied or restored finish.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For historic treatment workers and wood-repair-material manufacturer.

1.6 MOCKUPS

A. Prepare mockups of historic treatment repair processes to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation. Prepare mockups so they are inconspicuous.

1. 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.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Pack, deliver, and store products in suitable packs, heavy-duty cartons, or wooden crates; surround with sufficient packing material to ensure that products will not be deformed, broken, or otherwise damaged.

B. Until installed, store products inside a well-ventilated area and protect from weather, moisture, soiling, abrasion, extreme temperatures, and humidity, and where environmental conditions comply with manufacturer's requirements.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with historic wood repair only when existing and forecasted weather conditions are within environmental limits set by each manufacturer's written instructions and specified requirements.

PART 2 - PRODUCTS

2.1 WOOD-REPLACEMENT MATERIALS

A. Wood, General: Clear fine-grained lumber; kiln dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch deep by 2 inches wide.

1. Species: To match existing type of wood component, of quality grade to accept painted finish.

2.2 WOOD-REPAIR MATERIALS

A. Source Limitations: Obtain wood consolidant and wood-patching compound from single source from single manufacturer.

2.3 HARDWARE

A. Hardware, General: Provide hardware required for each type of replicated or repaired wood, including, but not limited to, hinges, pulls, latches, fasteners, and accessories indicated or required for proper operation. Hardware must smoothly operate, tightly close, and secure units appropriately for frequency of use, unit weight, and dimensions.

1. Adhesives: Polyurethane, waterproof wood glue. TiteBond Type III or approved equal.
2. Primer and Paints, see Specification 099100.
3. Wood filler: Do not use to fill holes larger than ¾" in diameter. Wood Epox by Abatron, Inc. or West System 105 Resin and 205 Hardner with 405 or 406 fillers.
4. Wood Preservative: Bora care wood preservative or approved equal.

2.4 MISCELLANEOUS MATERIALS

A. Cleaning Materials:

1. Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent that contains no ammonia, 5 quarts of 5 percent sodium hypochlorite bleach, and 15 quarts of warm water for each 5 gal. of solution required.
2. Mildewcide: Commercial, proprietary mildewcide or a solution prepared by mixing 1/3 cup of household detergent that contains no ammonia, 1 quart of 5 percent sodium hypochlorite bleach, and 3 quarts of warm water.

B. Fasteners: Use fastener metals that are noncorrosive and compatible with each material joined or as noted.

1. Fasteners: ASTM A153/A153M, hot dipped galvanized steel or stainless steel of appropriate size and type for each application.
2. Match existing fasteners in material and type of fastener unless otherwise indicated.
3. Use concealed fasteners for interconnecting wood components.
4. Use concealed fasteners for attaching items to other work unless exposed fasteners are unavoidable or the existing fastening method.
5. For fastening metals, use fasteners of same basic metal as fastened metal unless otherwise indicated.
6. For exposed fasteners, use Phillips-type machine screws of head profile flush with metal surface unless otherwise indicated.
7. Finish exposed fasteners to match finish of metal fastened unless otherwise indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify field conditions are acceptable and are ready to receive work.

B. Protect adjacent materials from damage by historic wood repair.

C. Clean wood of mildew, algae, moss, plant material, loose paint, grease, dirt, and other debris by scrubbing with bristle brush or sponge and detergent solution. Scrub mildewed areas with mildewcide. After cleaning, rinse thoroughly with fresh water. Allow to dry before repairing or painting.

D. Condition replacement wood members and replacement units to prevailing conditions at installation areas before installing.

3.2 HISTORIC WOOD REPAIR, GENERAL

A. General: In treating historic items, disturb them as minimally as possible and as follows:

1. Stabilize and repair wood to reestablish structural integrity and weather resistance while maintaining the existing form of each item.
2. Remove coatings and apply borate preservative treatment before repair. Remove coatings in accordance with Section 099000 unless otherwise indicated.
3. Repair items in place where possible.
4. Install temporary protective measures to protect wood-treatment work that is indicated to be completed later.
5. Refinish historic wood in accordance with Section 099000 unless otherwise indicated.

B. Mechanical Abrasion: Where mechanical abrasion is needed for the Work, use only the gentlest mechanical methods, such as scraping and natural-fiber bristle brushing, that will not abrade wood substrate, reducing clarity of detail. Do not use abrasive methods, such as sanding, wire brushing, or power tools, except as indicated as part of the historic treatment program and as approved by Architect.

C. Repair and Refinish Existing Hardware: Dismantle hardware; strip paint, repair, and refinish it to match finish samples; and lubricate moving parts just enough to function smoothly.

D. Repair Wood: Match existing materials and features, retaining as much original material as possible to perform repairs.

1. Unless otherwise indicated, repair wood by consolidating, patching, splicing, or otherwise reinforcing wood with new wood matching existing wood or with salvaged, sound, original wood.
2. Where indicated, repair wood by limited replacement matching existing material.

E. Replace Wood: Where indicated, duplicate and replace units with units made from

salvaged, sound, original wood or with new wood matching existing wood. Use surviving prototypes to create patterns for duplicate replacements.

1. Do not use substitute materials unless otherwise indicated.
2. Compatible substitute materials may be used.

F. Identify removed items with numbering system corresponding to item locations, to ensure reinstallation in same location. Key items to Drawings showing location of each removed unit. Permanently label units in a location that will be concealed after reinstallation.

3.3 WOOD PATCH-TYPE REPAIR

A. General: Patch wood that exhibits depressions, holes, or similar voids, and that has limited amounts of rotted or decayed wood.

1. Verify that surfaces are sufficiently clean and free of paint residue prior to patching.
2. Treat wood with wood consolidant prior to application of patching compound. Coat wood surfaces by brushing, applying multiple coats until wood is saturated and refuses to absorb more. Allow treatment to harden before filling void with patching compound.
3. Remove rotted or decayed wood down to sound wood.

B. Apply borate preservative treatment to accessible surfaces either before applying wood consolidant or after removing rotted or decayed wood. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom. Allow treatment to dry.

C. Apply wood-patching compound to fill depressions, nicks, cracks, and other voids created by removed or missing wood.

1. Prime patch area with application of wood consolidant or manufacturer's recommended primer.
2. Mix only as much patching compound as can be applied according to manufacturer's written instructions.
3. Apply patching compound in layers as recommended in writing by manufacturer until the void is completely filled.
4. Sand patch surface smooth and flush with adjacent wood, without voids in patch material, and matching contour of wood member.
5. Clean spilled compound from adjacent materials immediately.

D. Dutchman repairs to replace section of deteriorate wood with a volume of more than 4 cubic inches but extending less than one-third the length of the member to provide sound member to original surface planes and profiles. Match surrounding wood in species and orientation of grain as closely as possible. Plane/sand/shape to finished surface to restore original profile.

E. Review all patch repairs for approach with A/E prior to commencing work.

3.4 WOOD-REPLACEMENT REPAIR

A. General: Replace parts of or entire wood items at locations where damage is too extensive to patch, with approval by A/E.

1. Remove surface-attached items from wood surface before performing wood-replacement repairs unless otherwise indicated.
2. Verify that surfaces are sufficiently clean and free of paint residue prior to repair.
3. Remove broken, rotted, and decayed wood down to sound wood.
4. Custom fabricate new wood to replace missing wood; either replace entire wood member or splice new wood part into existing member.
5. Secure new wood using finger joints, multiple dowels, or splines with adhesive and nailing to ensure maximum structural integrity at each splice. Use only concealed fasteners. Fill nail holes and patch surface to match surrounding sound wood.

B. Apply borate preservative treatment to accessible surfaces after replacements are made. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom.

C. Repair remaining depressions, holes, or similar voids with patch-type repairs.

D. Clean spilled materials from adjacent surfaces immediately.

E. Reinstall items removed for repair into original locations.

3.5 ADJUSTMENT & FINISHING

A. Adjust existing and replacement operating items, hardware, and accessories for a tight fit at contact points and for smooth operation and tight closure. Lubricate hardware and moving parts.

B. Back-prime and treat site-sawn cuts with primer according to section 099000.

C. Sand work smooth and set exposed fasteners. Apply wood filler in exposed fastener installation.

3.6 CLEANING AND PROTECTION

A. Protect wood surfaces from contact with contaminating substances resulting from construction operations. Monitor wood surfaces adjacent to and below exterior concrete and masonry during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances contact wood surfaces, remove contaminants immediately.

B. Clean exposed surfaces immediately after historic wood repair. Avoid damage to coatings and finishes. Remove excess sealants, patching materials, dirt, and other substances.

END OF SECTION 060312

SECTION 080352 - HISTORIC TREATMENT OF WOOD WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes historic treatment of wood windows in the form of the following:

1. Repairing wood windows, glazing, and trim.
2. Repairing, refinishing, and replacing missing hardware.
3. Repairing shutters.
4. Replacing storm-windows units, as bid alternate.

B. Related Requirements:

1. Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.

1.2 DEFINITIONS

A. Glazing: Includes glass, glazing points, glazing tapes, glazing sealants, and glazing compounds.

B. Window: Includes window frame, sash, hardware, storm window, and exterior and interior shutters unless otherwise indicated by context.

C. Wood Window Component Terminology: Wood window components for historic treatment work include the following classifications:

1. Frame Components: Head, jambs, and sill.
2. Sash Components: Stiles and rails, parting bead, stop, and muntins.
3. Exterior Trim: Exterior casing, brick mold, and cornice or drip cap.
4. Interior Trim: Casing, stool, and apron.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at 1724 Chester Courthouse.

1. Review minutes of Preliminary Historic Treatment Conference that pertain to historic treatment of wood windows.
2. Review methods and procedures related to historic treatment of wood windows including, but not limited to, the following:

a. Historic treatment specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required

clearances.
c. Fire-protection plan.
d. Wood window historic treatment program.
e. Coordination with building occupants.

1.4 SEQUENCING AND SCHEDULING

A. Perform historic treatment of wood windows in the following sequence, which includes work specified in this and other Sections:

1. Label each window frame with permanent opening-identification number in inconspicuous location.

Base Bid: Repair Sashes in-situ
Bid Alternate: Remove and restore per the following:

2. Tag existing window sash, storm windows, and shutters with opening-identification numbers and remove for on-site or off-site repair. Indicate on tags the locations on window of each component, such as "top sash," "bottom sash," "left shutter," and "right shutter."
3. Remove window, dismantle hardware, and tag hardware with opening-identification numbers.
4. Install temporary protection and security at window openings.
5. In the shop, label each sash, storm window, shutter, and louvered blind unit with permanent opening-identification number in inconspicuous location and remove site-applied tags.
6. Sort units by condition, separating those that need extensive repair.
7. Clean surfaces.
8. General Wood-Repair Sequence:

a. Remove paint to bare wood.
b. Rack frames slightly to inject adhesive into mortise and tenon joints; square frames to proper fit before adhesive sets.
c. If thicker than original glass is required, rout existing muntins to required rebate size.
d. Repair wood by consolidation, member replacement, partial member replacement, and patching.
e. Sand, prime, fill, sand again, and prime surfaces again for refinishing.

9. Repair, refinish, and replace hardware if required. Reinstall operating hardware.
10. Install glazing.
11. Remove temporary protection and security at window openings.
12. Reinstall units.
13. Apply finish coats.
14. Install remaining hardware and weather stripping.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include recommendations for product application and use. Include test data substantiating that products comply with requirements.

B. Shop Drawings:

1. Include plans, elevations, and sections showing locations and extent of repair and replacement work, with enlarged details of replacement parts indicating materials, profiles, joinery, reinforcing, method of splicing into or attaching to existing wood window, accessory items, and finishes.
2. Include field-verified dimensions and the following:

    a. Full-size shapes and profiles with complete dimensions for replacement components and their jointing, showing relation of existing to new components.
    b. Templates and directions for installing hardware and anchorages.

C. Samples for Initial Selection: For each type of exposed wood and finish.

1. Identify wood species, cut, and other features.
2. Include Samples of hardware and accessories involving color selection.

D. Samples for Verification: For the following products in manufacturer's standard sizes unless otherwise indicated, finished as required for use in the Work:

1. Replacement Members: 12 inches long for each replacement member, including parts of frame, sash, exterior trim, and interior trim.
2. Repaired Wood Window Members: Prepare Samples using existing wood window members removed from site, repaired, and prepared for refinishing.
3. Refinished Wood Window Members: Prepare Samples using existing wood window members removed from site, repaired, and refinished.
4. Hardware: Full-size units with each factory-applied or restored finish.
5. Weather Stripping: 12-inch- long sections.
6. Glass: Full-size units of each type and appearance.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For workers and wood-repair-material manufacturer.

B. Product Data:

1. Glazing compound
2. Glass
3. Epoxy products
4. Wood glue

1.7 QUALITY ASSURANCE

A. Historic Treatment Qualifications: A qualified historic wood window specialist, experienced in repairing, refinishing, and replacing wood windows in whole and in part. Experience only in fabricating and installing new wood windows is insufficient experience for wood-window historic treatment work.

B. Wood-Repair-Material Manufacturer Qualifications: A firm regularly engaged in producing wood consolidant and wood-patching compound that have been used for similar historic wood-treatment applications with successful results, and with factory-authorized service representatives who are available for consultation and Project-site inspection and on-site assistance.

C. Mockups: Prepare mockups of historic treatment repair processes to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation. Prepare mockups so they are as inconspicuous as practicable.

1. Locate mockups on existing windows in locations that enable viewing under same conditions as the completed Work.
2. Wood Window Repair: Prepare one entire window unit to serve as mockup to demonstrate samples of each type of repair of wood window members including frame, sash, glazing, and hardware.
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.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Pack, deliver, and store products in suitable packs, heavy-duty cartons, or wooden crates; surround with sufficient packing material to ensure that products are not deformed, broken, or otherwise damaged.

B. Store products inside a well-ventilated area and protect from weather, moisture, soiling, abrasion, extreme temperatures, and humidity, and where environmental conditions comply with manufacturer's requirements.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with historic treatment of wood windows only when existing and forecasted weather conditions are within the environmental limits set by each manufacturer's written instructions and specified requirements.

PART 2 - PRODUCTS

2.1 STORM WINDOWS – (Replacement via Bid Alternate)

A. General: Custom fabricated, tight fitting, with operating and latching hardware.

1. Manufacturers:

a. Allied (HOL series), cottage style to align meeting rails.

1) HOL-OP, with screen, custom color to match existing wood windows and frames.
2) Substitutions not permitted.

2. Make storm windows removable for cleaning and storage.

2.2 SHUTTERS

A. General: Stile and rail units, with concealed fasteners, salvaged by Owner for repair and reinstallation.

2.3 INSECT SCREENS – CUPOLA WINDOWS

A. Wood Insect-Screen Frames: Custom fabricated; tight fitting and removable for Cupola windows.

1. Joint Construction: Mortise and tenon joints.
2. Wood Species: Match wood species of window.
3. Insect-Screen Members: As indicated on Drawings.

2.4 WOOD-REPLACEMENT MATERIALS

A. Wood, General: Clear fine-grained lumber; kiln dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch deep by 2 inches wide.

1. Species: Match species of each existing type of wood component or assembly.
2. Fasteners: Size and type to suit application, hot dipped galvanized steel for exterior, high humidity and treated wood locations.

2.5 WOOD-REPAIR MATERIALS

A. Source Limitations: Obtain wood consolidant and wood-patching compound from single source from single manufacturer.

1. Manufacturers and Products:

a. Abatron, Inc.

1) Liquid Wood, low viscosity epoxy resin.
2) Wood Epoxy

b. West System

1) 105 Epoxy Resin Adhesive and 205 Hardener missed with 403 Microfibers.
2) 105 Epoxy Resin and 205 hardener with 405 or 406 fillers for wood filling.

c. TiteBond Tyoe III for glue in repair joinery, exterior grade, polyurethane waterproof glue.

2.6 GLAZING MATERIALS

A. Glass:

1. Restoration glass or antique glass (repurposed), with lines and seeds to match existing adjacent panes in sash.

B. Glazing Putty: Sarco Multi-Glaze Type "M" for in-shop work Sarco Dual Glaze for on-site work.

2.7 HARDWARE

A. Window Hardware: To match existing. Refer to schedules on missing elements.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect adjacent materials from damage by historic treatment of wood windows.

B. Clean wood windows of mildew, algae, moss, plant material, loose paint, grease, dirt, and other debris by scrubbing with bristle brush or sponge and detergent solution. Scrub mildewed areas with mildewcide. After cleaning, rinse thoroughly with fresh water. Allow to dry before repairing or painting.

C. Condition replacement wood members and replacement units to prevailing conditions at installation areas before installing.

3.2 HISTORIC TREATMENT OF WOOD WINDOWS

A. General: In treating historic items, disturb them as minimally as possible and as follows:

1. Stabilize and repair wood windows to reestablish structural integrity and weather resistance while maintaining the existing form of each item.
2. Remove coatings and apply borate preservative treatment before repair.
3. Repair items in place where possible.
4. Install temporary protective measures to protect wood window work that is indicated to be completed later.

B. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use only the gentlest mechanical methods, such as scraping and natural-fiber bristle brushing, that will not abrade wood substrate, reducing clarity of detail. Do not use abrasive methods such as sanding, wire brushing, or power tools except as indicated as part of the historic treatment program and as approved by Architect.

C. Repair and Refinish Existing Hardware: Dismantle window hardware; strip paint, repair, and refinish it to match finish samples; and lubricate moving parts just enough to function smoothly.

D. Repair Wood Windows: Match existing materials and features, retaining as much original material as possible to perform repairs.

1. Unless otherwise indicated, repair wood windows by consolidating, patching, splicing, or otherwise reinforcing wood with new wood matching existing wood or with salvaged, sound, original wood.
2. Where indicated, repair wood windows by limited replacement matching existing material.
3. Sash Balance: Repair sash balances to function according to type as specified in "Hardware" Article" above. Provide missing sash balances.

E. Replace Wood Units: Where indicated, duplicate and replace units with units made from salvaged, sound, original wood or with new wood matching existing wood. Use surviving prototypes to create patterns for duplicate replacements.

1. Do not use substitute materials unless otherwise indicated.
2. Compatible substitute materials may be used.

F. Protection of Openings: Where sash or windows are indicated for removal, cover resultant openings with temporary enclosures so that openings are weathertight during repair period.

G. Identify removed windows, frames, sash, and members with numbering system corresponding to window locations to ensure reinstallation in same location. Key windows, sash, and members to Drawings showing location of each removed unit. Permanently label units in a location that will be concealed after reinstallation.

3.3 WOOD WINDOW PATCH-TYPE REPAIR

A. General: Patch wood members that exhibit depressions, holes, or similar voids, and that have limited amounts of rotted or decayed wood.

1. Verify that surfaces are sufficiently clean and free of paint residue before patching.
2. Treat wood members with wood consolidant before applying patching compound. Coat wood surfaces by brushing, applying multiple coats until wood is saturated and unable to absorb more. Allow treatment to harden before filling void with patching compound.
3. Remove rotted or decayed wood down to sound wood.

B. Apply borate preservative treatment to accessible surfaces either before applying wood consolidant or after removing rotted or decayed wood. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom. Allow treatment to dry.

C. Apply wood-patching compound to fill depressions, nicks, cracks, and other voids created by removed or missing wood.

1. Prime patch area with application of wood consolidant or manufacturer's recommended primer.
2. Mix only as much patching compound as can be applied according to manufacturer's written instructions.
3. Apply patching compound in layers as recommended in writing by manufacturer until the void is completely filled.
4. Sand patch surface smooth and flush with adjacent wood, without voids in patch material, and matching contour of wood member.
5. Clean spilled compound from adjacent materials immediately.

3.4 WOOD WINDOW MEMBER-REPLACEMENT REPAIR

A. General: Replace parts of or entire wood window members at locations where damage is too extensive to patch.

1. Verify that surfaces are sufficiently clean and free of paint residue before repair.
2. Remove broken, rotted, and decayed wood down to sound wood.
3. Custom fabricate new wood to replace missing wood; either replace entire wood member or splice new wood part into existing member.
4. Secure new wood using finger joints, multiple dowels, or splines with adhesive and nailing to ensure maximum structural integrity at each splice. Use only concealed fasteners. Fill nail holes and patch surface to match surrounding sound wood.

B. Apply borate preservative treatment to accessible surfaces after replacements are made. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom.

C. Repair remaining depressions, holes, or similar voids with patch-type repairs.

D. Clean spilled materials from adjacent surfaces immediately.

E. Glazing: Reglaze units before reinstallation.

1. Mill new and rout existing glazed members to accommodate new glass thickness.
2. Provide replacement glazing stops coordinated with glazing system indicated.
3. Provide glazing stops to match contour of sash frames.

F. Reinstall units removed for repair into original openings.

G. Weather Stripping: Replace nonfunctioning and install missing weather stripping to ensure full-perimeter[and meeting rail] weather stripping for each operable sash.

3.5 GLAZING

A. Comply with combined written instructions of manufacturers of glass, glazing systems, and glazing materials, unless more stringent requirements are indicated.

B. Remove cracked and damaged glass and glazing materials from openings and prepare surfaces for reglazing.

C. Remove existing glass and glazing where indicated on Drawings and prepare surfaces for reglazing.

D. Remove glass and glazing from openings and prepare surfaces for reglazing.

E. Size glass as required by Project conditions to provide necessary bite on glass, minimum edge and face clearances, with reasonable tolerances.

F. Apply primers to joint surfaces where required for adhesion of glazing system, as determined by preconstruction testing.

G. Install setting bead, side beads, and back bead against stop in glazing rabbets before setting glass.

H. Install glass with proper orientation so that coatings, if any, face exterior or interior as required.

I. Install glazing points.

J. Disposal of Removed Glass: Remove from Owner's property and legally dispose of it.

3.6 WOOD WINDOW UNIT REPLACEMENT – ONLY WHEN REQUIRED PER SCHEDULE IN DRAWINGS.

A. General: Replace existing wood units with new custom-fabricated units to match existing at locations indicated on Drawings.

B. Apply borate preservative treatment to accessible surfaces before finishing. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom.

C. Mill glazed members to accommodate glass thickness. Glaze units before installation.

D. Install units, hardware, weather stripping, accessories, and other components[as indicated on Drawings].

E. Install units level, plumb, square, true to line, without distortion or impeding movement;

anchored securely in place to structural support; and in proper relation to wall flashing, trim, and other adjacent construction.

F. Set sill members in bed of sealant for weathertight construction unless otherwise indicated.

G. Install window units with new anchors into existing openings.

H. Weather Stripping: Install full-perimeter[and meeting rail] weather stripping for each operable sash.

I. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

J. Disposal of Removed Units: Remove from Owner's property and legally dispose of them or salvage to Owner for storage when directed.

3.7 STORM WINDOW INSTALLATION – BID ALTERNATE

A. Install storm windows at each window jamb as indicated in drawings.

B. Install units by mounting to window frames as indicated on Drawings and according to manufacturer's written instructions.

1. Opening Preparation: Make sure that the blind stop area or other mounting surface is free of nails, staples, screws, etc.
2. Window Preparation: Holes will need to be drilled in the outer edge of storm window. With clips facing down using pencil & tape measure mark 4″ up and 4″ down on heights of window. Measure between the holes just marked and add additional holes evenly spaced 18″ or less. At head of windows 36″ and less mark 1 hole at center. Over 36″ widths divide width by 3 so spacing is 18″ or less. No holes required at sill. Once these holes have been laid out, using the 3/16″ drill bit, drill holes in outer double wall edge.
3. Installation:

    a. Mount Deep Guide channel with open channel (Deep Guide Method), towards the brickmould in front of existing stops, or directly into the casing, in front of top sash, (Eastern Casing), using the # 8 x 1 ½″ screws. This will allow space for the operating feature of the storm window and ensure that the clips on the operating bottom unit won’t interfere with the function of the top wood sash.
    b. Place H-Mull expander at sill with weep slots facing down, set storm window with glass inserts installed (this will keep window square) into expander. Tilt window into position, using the pry bar at the sill, lift the window and maintain an 1/8″ perimeter at sides and head.
    c. Apply screws, (painted Phillips head # 8 x 1″ self -cutters supplied by Allied Window)
    d. No caulking should be necessary, including the expander sill.

3.8 SHUTTER INSTALLATION

A. Install wood shutters at each window jamb as indicated in Drawings, and make repairs as required per schedules.

3.9 INSECT-SCREEN INSTALLATION

A. Install wood insect-screen frames as indicated in drawings.

B. Install insect screening to be smooth, flat, and uniformly taut.

3.10 ADJUSTING

A. Adjust existing and replacement operating sash, screens, hardware, weather stripping, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

3.11 PAINTING

A. Prime all surfaces prior to reglazing.

B. Paint interior and exterior of sash, jamb, trims, and head surfaces and stops. Refer to Painting Specification for products, preparation, and finishing.

C. Ensure that all sashes are operable after painting is complete. Any sashes that are painted-shut must be carefully cut-open without any damage to the painted finishes are wood elements.

3.12 CLEANING AND PROTECTION

A. Protect window surfaces from contact with contaminating substances resulting from construction operations. Monitor window surfaces adjacent to and below exterior concrete and masonry during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances contact window surfaces, remove contaminants immediately.

B. Clean exposed surfaces immediately after historic treatment of wood windows. Avoid damage to coatings and finishes. Remove excess sealants, glazing and patching materials, dirt, and other substances.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction.

END OF SECTION 080352

SECTION 09 22 00

PLASTERING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes lime-based plaster materials and methods for conventional plaster installations. For interior use only, using a three coat application over wood or metal lath, with smooth troweled finish to match adjacent surfaces.

1.2 REFERENCES

A. ASTM C206 - Standard Specification for Finishing Hydrated Lime

1.3 SYSTEM DESCRIPTION

A. Fabricate vertical elements to limit finish surface to 1: 180 deflection under lateral point load of 100 lbs.

1.4 SUBMITTALS

A. Samples: Submit one sample, approximately 36x36 inches in size illustrating each of the three coats needed in the total assembly.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum seven years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum seven years documented experience on National Historic Registered properties.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Lead Paint Hazard: Contractor is advised that his/her work area may contain fragments of lead-based paint on the existing plaster surfaces. Contractor shall comply with 29CFR1926,62 OSHA Lead-in Construction Standard, as well as applicable local, state, and federal requirements.

B. Interior Plaster Work: Do not apply cement plaster unless minimum temperature of 40 degrees F has been and continues to be maintained in building for minimum 48 hours prior to plaster application, during application, and until cured.

PART 2 PRODUCTS

2.1 LIME PLASTER

A. Product Manufacturers:
1. LimeWorks Ecological Plaster Topcoat Platinum (XF – Interior)
2. LimeWorks Ecological Takcoat Platinum
3. Substitutions: Permitted, with approval by Architect.

2.2 COMPONENTS:

A. Plaster Base Materials:
1. Lime: Natural Hydraulic Lime (NHL)
2. Pre-blended Plaster Mix: LimeWorks Ecological Plaster Topcoat Platinum XF-Interior.
3. Aggregate: Natural sand, meeting ASTM C144 (preblended per LimeWorks product)
4. Water: Clean, fresh, potable and free of mineral or organic matter affecting plaster.
5. Bonding Agent:
   a. Ecological Takcoat Platinum
   b. Provide colorless bonding material that produces a permanent bond not affected by freezing, heat, acid, alkali, or dampness, and producing no discoloration to finished plaster.
6. Admixtures: Not permitted.

B. Plaster Finish Materials:

1. Cement: As specified for plaster base coat, white color.
2. Lime: As specified for plaster base coat.
3. Water: Clean, fresh, potable, and free of matter affecting plaster.

C. Furring And Lathing:
1. Wood Lath: 3/8" Douglas Fir, straight grain, and free of knots, in 4'-0" lengths maximum.
2. Metal Lath: Stainless steel diamond mesh lath, 304 stainless alloy.
   a. Clark Dietrich, model SS-205, ASTM C847
      OR
   b. Fiberglass lath over wood lath in lieu of stainless steel
3. Fasteners: 3-penny (3d) SST nails, or zinc plated exterior deck screws (with neoprene washers).

2.3 MIXES

A. Mix only as much plaster as can be used prior to initial set.

B. Mix materials dry, to uniform color and consistency, before adding water.

C. Protect mixtures from freezing, frost, contamination, and excessive evaporation.

D. Do not retemper mixes after initial set has occurred.

PART 3 EXECUTION

3.1 EXAMINATION

A. Lath: Verify lath is flat and secured to substrate.

B. Verify that plaster adjacent to work area is stable prior to commencing repairs.

3.2 PREPARATION

A. Re-secure loose wood lath to substrate, or replace as necessary.

B. Clean out keys and vacuum clean.

C. Dampen existing and new wood lath installations to accept first coat of plaster.

3.3 EXISTING WORK

A. Protect existing adjacent plaster areas to remain from damage while working.

B. The exact composition of the existing substrate materials are unknown; therefore, applying a full coat of Ecological Takcoat.

3.4 INSTALLATION

A. Installation of Lathing Materials:
1. Install wood lath with specified fasteners 3/8″ apart and with lath ends ¼″ apart. Maximum lath length is 4′-0″.
2. Install replacement metal of fiberglass lath per manufacturer's instructions.
3. Dampen wood lath until surface feels damp. Do not saturate lath.

B. Plastering:
1. Apply a full coat of Ecological Takcoat to the entire existing plaster or metal lath, fiberglass lath, wood lath, or self-furring reinforcement (depending on location) surface to be worked, including immediately adjacent surface to help bridge the new to the old.
2. Embed fiberglass mesh in the Takcoat to bridge any cracks.
3. Wait 24-hours prior to applying next coats.
4. Apply base coat to nominal thickness of 0.375 inch, brown coat to nominal thickness of 0.375 inch, and finish coat to nominal thickness of 0.125 inch over the Takcoat.
5. Moist cure base and brown coats.
6. After curing, dampen previous coat prior to applying finish coat.

7. Add 12-16oz of plaster of Paris in the Ecological Plaster Topcoat Platinum XF to gauge the lime and slow the setting to avoid cracking.
8. Apply finish coat to color and texture to match adjacent.
9. Avoid excessive working of surface. Delay troweling as long as possible to avoid drawing excess fines to surface.
10. Feather all places where the new plaster meets old plaster, as well adjacent moldings, casings, and other adjoining surfaces to provide a uniform appearance. Work the plaster to match the adjacent finished surfaces.
11. Moist cure finish coat for minimum period of 48 hours.
12. Topcoat shall be allowed to cure for 28 days and appear evenly dry before priming and painting with latex products.

3.5 ERECTION TOLERANCES

A. Maximum Variation from Flat Surface: 1/8 inch in 10 feet.

3.6 ADJUSTING

A. Remove damaged or defective plaster by cutting and replace with specified materials to match adjacent plaster.

B. Touch-up small hair-line cracks that develop after plaster has set. Cut out any large cracks that develop after plaster has set; replaster.

3.7 FINAL CLEANING

A. Wipe down all newly installed surfaces with a damp cloth to remove dust/residue.

B. Clean all adjacent surfaces, including floors, moldings, trims, doors, windows, sills, etc with a damp cloth to remove surface dusting.

END OF SECTION

SECTION 099000 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Primers, finish coatings for wood elements.

B. Section Includes: Touch-up paint required for exterior plaster repairs.

C. Section Includes: Historic paint analysis requirements by a professional paint conservator for the interior trim work on the first floor.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Qualifications: Submit qualifications of painting conservator, including related work experience as outlined in this specification.

a. Recommended Conservation Firm: Heritage Conservation Collective, LLC.
b. Substitutions permitted with approval by Design Professional and Owner.

1.3 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 gal. of each material and color applied).

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 degrees F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.5 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 degrees F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 PRIMERS

A. Interior Latex Primer for Wood: Waterborne-emulsion primer formulated for resistance to extractive bleeding, mold, and microbials; for hiding stains; and for use on interior wood subject to extractive bleeding.

1. Manufacturers: One (1) coat Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. The Sherwin-Williams Company

B. Exterior, Alkyd/Oil Wood Primer: Alkyd/oil-based primer that is resistant to extractive bleeding when applied to wood substrates with less than 15 percent moisture content; formulated for sag, mold, and microbial resistance; for hiding stains; and for use on exterior wood subject to extractive bleeding.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin Williams Exterior Oil-Based Wood Primer, Stock # Y24W8020; White or comparable product by one of the following:

a. The Sherwin-Williams Company

2.2 FINISH COATINGS

A. Interior - Latex: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.

1. Manufacturers: Two (2) coats - Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. The Sherwin-Williams Company; Duration Series

2. Trim Gloss Level: Manufacturer's standard eggshell or semi-gloss finish, color to match existing.
3. Wall/Ceilings Gloss Level: Manufacturer’s standard flat finish, color to match existing.

B. Exterior Latex Paint, Semi-Gloss: Two (2) coats - Water-based, pigmented coating; formulated for alkali, mold, microbial, and water resistance and for use on exterior surfaces for primed wood.

1. Basis-of-Design Product: Two (2) coats - Subject to compliance with requirements, provide Sherwin Williams Exterior Duration Acrylic K-33W251, Custom color. See schedule for color breakdown.

2.3 CAULKS

A. Caulks shall be compatible with paint products. Consult manufacturer of appropriate caulk materials, relative to the substrate and adjoining surfaces (i.e. wood, masonry, metal, etc.). Product shall be reviewed and approved by Design Professional.

2.4 HISTORIC PAINT ANALYSIS

A. Conservator shall sample the original wainscotting on the northeast side of the building, as indicated by a brass plaque noting original woodwork.

B. Perform a site visit to take min (2) samples of historic paint from the first floor interior wood wainscotting, where indicated there is original wood.

C. Analysis of paint samples, includes:

a. Casting, sectioning, polishing, and mounting of paint samples to create cross-sections.

b. Examination of cross-section samples using reflected light and fluorescence microscopy.

c. Documentation of original and subsequent finishes using stratigraphy charts and photomicrography.

d. Not required: instrumental analysis of paint layers to determine composition (binder).

D. Report shall include methodology and equipment used for the analysis. Photographs of the stratigraphy to be provided. Recommendations of either custom color and a similar matching commercially available paint color to be provided. Munsell color system shall also be provided.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture

meter as follows:

1. Wood: 15 percent.

C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.

B. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
2. Wash all surfaces to receive work with solution of 1 Cup of bleach, with ¼ Cup of non-ammonia deterioration per gallon of warm water. Scrub all services so they are free of debris.

C. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Any peeling, blistered, cracked or heavy layers of paint shall be removed by wet scraping, using appropriated shaped scrapers cut to correspond to molding profiles as required and wet sanding. When sanding blocks are used, cut blocks to correspond with molding profiles. Do not use blow torch, open flame, burning or caustic paint strippers.
3. Where indicated, all paint shall be removed to bare wood using infrared heat, heat guns, or steam.
4. Sand surfaces that will be exposed to view, and dust off.
5. Before priming/painting, apply 1:1 solution of BoraCare and water using a brush or pump sprayer to all bare wood.
6. Prime edges, ends, faces, undersides, and backsides of wood.
7. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 CAULKING

A. Apply caulks per manufacturers instruction.

B. Caulk shall be applied sparingly and used only to prevent the ingress of water, unless otherwise directed by the A/E.

C. Caulk shall fill the entire void and finish flush and smooth with adjacent surfaces.

D. Excess or defective caulk shall be removed and replaced.

3.4 INSTALLATION

A. Apply paints according to manufacturer's written instructions.

1. A/E shall inspect prepared surfaces prior to painting.
2. Use applicators and techniques suited for paint and substrate indicated.
3. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Spraying will not be permitted unless specifically indicated.

3.5 CLEANING AND PROTECTION

A. Use drop cloths, tarps, etc. to protect floors, grounds, walks, and landscaping from paint drips or chips.

B. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

C. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 09 90 00

SECTION 123530 - CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Residential stock cabinets.

B. Related Requirements:

1. Section 123623.13 "Plastic-Laminate-Clad Countertops."

1.2 DEFINITIONS

A. Concealed Surfaces of Casework: Surfaces not usually visible after installation, including sleepers, web frames, dust panels, bottoms of drawers, and ends of casework installed directly against and completely concealed by walls or other casework, and tops of wall cabinets and utility cabinets.

B. Exposed Surfaces of Casework: Surfaces visible when doors and drawers are closed, including visible surfaces in open cabinets or behind glass doors.

C. Semiexposed Surfaces of Casework: Surfaces behind opaque doors or drawer fronts, including interior faces of doors, interiors and sides of drawers, and bottoms of wall cabinets.

1.3 COORDINATION

A. Coordinate layout and installation of blocking and reinforcement in partitions for support of casework.

1.4 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 casework.
2. Include rated capacities, operating characteristics, profiles, and finishes for hardware.

B. Shop Drawings:

1. Include plans, elevations, details, and attachments to other work.

2. Show materials, finishes, filler panels, and hardware.
3. Indicate manufacturer's catalog numbers for casework.

C. Samples: For casework and hardware finishes.

D. Samples for Initial Selection: For casework and hardware finishes.

E. Samples for Verification: For the following:

1. Casework Finishes: 8-by-10-inch Samples for each type of casework finish.
2. Hardware: One full-size Sample of each type of exposed hardware in each finish required.
3. Base Cabinet: One full-size, 15 inch wide, finished base cabinet complete with hardware, doors, and drawers but without countertop.
4. Wall Cabinet: One full-size, 15 inch wide, finished wall cabinet complete with hardware, doors, and adjustable shelves.
5. Full-Size Samples: Maintain at Project site during construction in an undisturbed condition as a standard for judging the completed Work. Unless otherwise indicated, approved sample units may become part of the completed Work if in undisturbed condition at time of Substantial Completion. Notify Architect of their exact locations.
6. Approved samples can be incorporated into the final work when approved by the Design Professional.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Product Certificates: For casework.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Provide fillers and scribes to allow for trimming and fitting.

C. Field Measurements: Where casework is indicated to fit to other construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide fillers and scribes to allow for trimming and fitting.

1. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed/concealed by construction and indicate

measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 RESIDENTIAL STOCK CABINETS

A. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. RTA Wood Cabinetry
https://www.rtacabinetstore.com/
a. Timber Toffee Kitchen Cabinets
or
b. Florence Honey Shaker Cabinets

2. Substitutions permitted with approval by A/E

B. Quality Standard: Provide cabinets that comply with KCMA A161.1.

1. KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semiexposed location of each unit and showing compliance with KCMA A161.1.

C. Regional Materials: Verify the following wood products are manufactured within 100 miles (160 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.

1. Interior trim.
2. Interior plywood paneling.
3. Shelving.

D. Certified Wood: Verify product is labeled in accordance with the AF&PA's Sustainable Forestry Initiative, certified as "FSC Pure" in accordance with FSC STD-01-001 and FSC STD-40-004, or certified and labeled in accordance with the standards of the Programme for Endorsement of Forest Certification.

E. Certified Wood: Verify product is certified in accordance with the American Tree Farm System's "ATFS 2021 Standards of Sustainability," the AF&PA's Sustainable Forestry Initiative, FSC STD-01-001 and FSC STD-40-004, or the standards of the Programme for Endorsement of Forest Certification.

F. Door and Drawer Face Style: Full Overlay.

1. Door and Drawer Fronts:

a. Solid-wood stiles and rails, 3/4 inch thick, with 1/4-inch- thick, veneer-faced plywood center panels.

G. Cabinet Style: Face frame

1. Face Frames:

a. 3/4-by-1-5/8-inch solid wood with glued dovetail.

H. Exposed Cabinet End Finish: Solid wood.

I. Cabinet End Construction: 1/2-inch- thick plywood with veneer or solid wood.

J. Cabinet Tops and Bottoms: 1/2-inch- thick plywood with veneer or solid wood

1. Fully support in rabbets in and secure to end panels, front frame, and back rail.

K. Back, Top, and Bottom Rails: 3/4-by-2-1/2-inch solid wood, interlocking with end panels and rabbeted to receive top and bottom panels. Back rails secured under pressure with glue and with mechanical fasteners.

L. Wall-Hung-Unit Back Panels: 3/16-inch- thick plywood fastened to rear edge of end panels and to top and bottom rails.

M. Base-Unit Back Panels: 3/16-inch- thick plywood fastened to rear edge of end panels and to top and bottom rails.

N. Front Frame Drawer Rails: 3/4-by-1-1/4-inch solid wood dovetail and fastened into face frame.

O. Drawers: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued dovetail joints.
2. Subfronts, Backs, and Sides: 5/8-inch- thick solid wood.
3. Bottoms: 1/4-inch- thick plywood.

P. Shelves: 3/4-inch- thick plywood.

Q. Joinery: Rabbet backs flush into end panels and secure with concealed mechanical fasteners. Connect tops and bottoms of wall cabinets and bottoms and stretchers of base cabinets to ends and dividers with mechanical fasteners. Rabbet tops, bottoms, and backs into end panels.

R. Factory Finishing: Finish cabinets at factory.

2.2 CABINET MATERIALS

A. Hardwood Lumber: Kiln dried to 7 percent moisture content.

B. Softwood Lumber: Kiln dried to 10 percent moisture content.

C. Hardwood Plywood: HPVA HP-1.

D. MDF: Medium-density fiberboard, ANSI A208.2, Grade MD.

E. Hardboard: ANSI A135.4, Class 1 tempered.

F. Exposed Materials:

1. Exposed Wood Species: Manufacturer's standard domestic hardwood species.

    a. Select materials for compatible color and grain. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
    b. Staining and Finish: As selected by Architect above in model information. From selected manufacturer.

2. Solid Wood: Clear hardwood lumber of species indicated, free of defects.

3. Plywood: Hardwood plywood with face veneer of species indicated, with Grade A faces and Grade C backs of same species as faces.

G. Semiexposed Materials: Unless otherwise indicated, provide the following:

1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects. Same species as exposed surfaces.
2. Plywood: Hardwood plywood with Grade C faces and not less than Grade 3 backs of same species as faces. Face veneers of same species as exposed surfaces.

    a. For backs of doors and drawer fronts faced with plastic laminate, provide same grade, pattern, color, and texture of plastic laminate as for faces.
    b. For face frames faced with plastic laminate, plastic-laminate edges of same grade, pattern, color, and texture of plastic laminate as for faces.
    c. For shelves faced with plastic laminate, plastic-laminate edges of similar grade, pattern, color, and texture of face of cabinets.
    d. Colors, Textures, and Patterns: As selected by Architect from cabinet manufacturer's selection noted in the make/model above.

H. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects affecting strength or utility; particleboard; MDF; or hardboard.

2.3 CABINET HARDWARE

A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and as selected by Architect from manufacturer's full range.

1. Emtek Warwick 4 Inch and 10-inch Center to Center Handle Cabinet Pull from the Modern Rectangular Collection, solid brass construction, power coated black.

B. Pulls: Back-mounted decorative pulls.

C. Hinges: Concealed butt hinges. Overlay 105-Degree Opening Soft Close Concealed Cabinet Hinge

D. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or Type B05091.

E. Door and Drawer Bumpers: Self-adhering, clear silicone rubber.

1. Doors: Provide one bumper at top and bottom of closing edge of each swinging door.
2. Drawers: Provide one bumper on the back side of drawer front at each corner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of casework.

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

3.2 INSTALLATION OF RESIDENTIAL CASEWORK

A. Install casework with no variations in adjoining surfaces; use concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match casework.

B. Install casework without distortion so doors and drawers fit the openings, are aligned, and are uniformly spaced. Complete installation of hardware and accessories as indicated.

C. Install casework level and plumb to a tolerance of 1/8 inch in 8 ft.

D. Fasten casework to adjacent units and to backing.

1. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c.

a. Fasteners: No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

3.3 ADJUSTING AND CLEANING

A. Adjust hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

B. Clean casework on exposed and semiexposed surfaces. Touch up as required to restore damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 123530

SECTION 123623.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad countertops.
2. Accessories.

B. Related Requirements:

1. Section 224100 "Residential Plumbing Fixtures" for non-integral sinks and plumbing fittings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings:

1. Plans, sections, details, edge and backsplash profiles, and attachments to other work.
2. Locations and details of joints.
3. Locations and sizes of cutouts and holes for items installed in countertop.
4. Apply AWI's Quality Certification Program label to Shop Drawings.

C. Samples for Initial Selection: Plastic laminates in each type, color, pattern, and surface finish required in manufacturer's standard size.

D. Samples for Verification:

1. Plastic Laminates: For each type, color, pattern, and surface finish required, 12 by 12 inches in size.
2. Fabrication Sample: For each type and profile of countertop required, provide one sample applied to core material with specified edge material applied to one edge.

E. Sustainable Design Submittals:

1. Laboratory Test Reports: For laminating adhesives, indicating compliance with requirements for low-emitting materials.
2. Product Data: For laminating adhesives, indicating that product contains no urea formaldehyde.

3. Laboratory Test Reports: For composite wood products, indicating compliance with the formaldehyde emissions evaluation.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Indicate locations and sizes of cutouts and holes for items installed in countertop and backsplashes.

B. Product Certificates: For the following:

1. Composite wood products.
2. High-pressure decorative laminate.
3. Chemical-resistant, high-pressure decorative laminate.

C. Quality Standard Compliance Certificates: AWI's Quality Certification Program

D. Qualification Statements: For Installer.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Shop Certification: AWI's Quality Certification Program accredited participant.

B. Installer Qualifications: AWI's Quality Certification Program accredited participant.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.

B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

C. Keep surfaces of countertops covered with protective covering during handling and installation.

1.6 FIELD CONDITIONS

A. Environmental Limitations without Humidity Control: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD COUNTERTOPS

A. Plastic-Laminate-Clad Countertop.

B. Fabricators: Subject to compliance with requirements, provide products by the following:

1. Wilsonart Engineered Surfaces.

C. Quality Standard: Unless otherwise indicated, comply with ANSI/AWI 1236 for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.

1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that countertops comply with requirements of grade specified.
2. The Contract Documents contain requirements that are more stringent than that of the referenced quality standard. Comply with requirements of the Contract Documents in addition to those of referenced quality standard.

D. Grade: Economy.

1. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.

E. Certified Wood: Verify product is certified as "FSC Mixed Credit" in accordance with FSC STD-01-001 and FSC STD-40-004.

F. Certified Wood: Verify product is labeled in accordance with the AF&PA's Sustainable Forestry Initiative, certified as "FSC Pure" in accordance with FSC STD-01-001 and FSC STD-40-004, or certified and labeled in accordance with the standards of the Programme for Endorsement of Forest Certification.

G. Certified Wood: Verify product is certified in accordance with the American Tree Farm System's "ATFS 2021 Standards of Sustainability," the AF&PA's Sustainable Forestry

Initiative, FSC STD-01-001 and FSC STD-40-004, or the standards of the Programme for Endorsement of Forest Certification.

H. High-Pressure Decorative Laminate: ISO 4586-3, Grade HGS.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following:

a. Wilsonart LLC
b. Substitutions permitted with approval of A/E.

I. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from manufacturer's full range in the following categories:

a. Solid colors, Fine Velvet Texture, moderate reflective value. Nominal Glossometer Reading = 14.
b. Solid colors with core same color as surface, matte finish.
c. Wood grains matte finish with grain running parallel to length of countertop.
d. Patterns, Fine Velvet Texture, moderate reflective value. Nominal Glossometer Reading = 14.

J. Edge Treatment: Same as laminate cladding on horizontal surfaces.

K. Core Material: As selected by fabricator to comply with quality standard. Kraft paper core sheets impregnated with phenolic resin.

L. Core Material at Sinks As selected by fabricator to comply with quality standard. Kraft paper core sheets impregnated with phenolic resin.

M. Core Thickness: 1 inch.

1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

N. Backer Sheet: Provide plastic-laminate backer sheet, ISO 4586-3, grade to match exposed surface, on underside of countertop substrate.

O. Paper Backing: Provide paper backing on underside of countertop substrate.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.

B. Composite Panel Products: Provide materials that comply with requirements of referenced quality standard for each type of countertop and quality grade specified unless otherwise indicated.

1. Composite Wood Products: Verify products are made using ultra-low-emitting formaldehyde resins, as defined in CARB 93120, "Airborne Toxic Control Measure (ATCM) for Formaldehyde Emissions from Composite Wood Products," or are made with no added formaldehyde.
2. Composite Wood Products: Verify formaldehyde emission rates are not greater than the following when tested in accordance with ASTM D6007 or ASTM E1333:

    a. Hardwood Plywood: 0.05 ppm.
    b. Particleboard: 0.09 ppm.
    c. MDF More Than 5/16 Inch (8 mm) Thick: 0.11 ppm.

3. Product Data: For recycled content, indicating percentage of postconsumer and pre-consumer recycled content and cost.
4. Medium-Density Fiberboard (MDF): ANSI A208.2, MR 10.

    a. Grade 130 or better; complying with performance requirements specified.

5. Veneer-Core Hardwood Plywood: ANSI/HPVA HP-1.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products in accordance with test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

B. Fire-Retardant-Treated Plywood: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 ft beyond the centerline of the burners at any time during the test.

1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.

C. Fire-Retardant Particleboard: Made from softwood particles and fire-retardant chemicals mixed at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less when tested in accordance with ASTM E84.

1. For panels 3/4 inch thick and less, comply with ANSI A208.1 for Grade M-2 except

for the following minimum properties: modulus of rupture, 1600 psi; modulus of elasticity, 300,000 psi; internal bond, 80 psi; and screw-holding capacity on face and edge, 250 and 225 lbf, respectively.

2. For panels 13/16 to 1-1/4 inches thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: modulus of rupture, 1300 psi; modulus of elasticity, 250,000 psi; linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf, respectively.

D. Fire-Retardant MDF: MDF panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less in accordance with ASTM E84.

2.4 MISCELLANEOUS MATERIALS

A. Adhesives: Use adhesives that comply with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Adhesives: Do not use adhesives that contain urea formaldehyde.

C. Adhesive for Bonding Plastic Laminate Type II water-resistant type as selected by fabricator to comply with requirements.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified by manufacture for faces.

D. Installation Adhesive: Manufacturer's standard product that is recommended for application indicated.

1. Verify adhesives have a VOC content of 20> g/L or less.
2. Verify adhesive complies with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
3. Verify adhesive complies with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions do not exceed 9 mcg/cu. m or 7 ppb, whichever is less.
4. Verify adhesive complies with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify building concentration of formaldehyde does not exceed half of the indoor recommended exposure limit, or 33 mcg/cu. m, and that of acetaldehyde does not exceed 9 mcg/cu. m.

2.5 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:

1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.

C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of dates and times countertop fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended, and check measurements of assemblies against field measurements before disassembling for shipment.

D. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of cutouts by saturating with varnish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

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

3.2 PREPARATION

A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.

B. Examine shop-fabricated work for completion and complete work as required, including removal of packing.

3.3 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to extent that it was not completed in the shop.

1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
2. Seal edges of cutouts by saturating with varnish.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where indicated on Shop Drawings.

1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten in accordance with manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical-treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

E. Countertop Installation:

1. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
3. Anchor wall cleating necessary for proper setting for countertops not supported by casework.
4. Install countertops level and true in line. Use concealed shims as required to maintain not more than 1/8-inch-in-96-inch variation from a straight, level plane.
5. Secure backsplashes [to tops with concealed metal brackets at 16 inches o.c.][and][to walls with adhesive].
6. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.4 FIELD QUALITY CONTROL

A. Inspections: Provide inspection of installed Work through AWI's Quality Certification Program certifying that woodwork, including installation, complies with requirements of the referenced standard for the specified grade.

1. Inspection entity is to prepare and submit report of inspection.

3.5 ADJUSTING AND CLEANING

A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where impossible to repair, replace countertops. Adjust joinery for uniform appearance.

B. Clean countertops on exposed and semiexposed surfaces.

C. Protection: Provide kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 123623.13

SECTION 22 05 00 - BASIC PLUMBING REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements applicable to all Division 22 Sections. Also refer to Division 1 - General Requirements.

B. All materials and installation methods shall conform to the applicable standards, guidelines and codes referenced herein and within each specification section.

1.2 SCOPE OF WORK

A. This Specification and the associated drawings govern the furnishing, installing, testing and placing into satisfactory operation the Mechanical Systems.

B. Each Contractor shall provide all new materials indicated on the drawings and/or in these specifications, and all items required to make the portion of the Mechanical Work a finished and working system.

C. All work will be awarded under a single General Contract. The division of work listed below is for the Contractor's convenience and lists normal breakdown of the work.

D. Scope of Work:

1. Plumbing Work shall include, but is not necessarily limited to:

   a. Furnish and install all items listed in the Plumbing Material List.
   b. Extend existing domestic water piping system including cold, hot, and hot water circulating piping within the building. Insulate all piping as specified.
   c. Furnish and install water heaters.
   d.
   e. Extend existing sanitary sewer and vent system.
   f. Complete all applicable tests, certifications, forms, and matrices.

2. Heating Work: Refer to Section 23 05 00 "Basic HVAC Requirements".
3. Air Conditioning and Ventilating Work: Refer to Section 23 05 00 "Basic HVAC Requirements".
4. Temperature Control Work: Refer to Section 23 05 00 "Basic HVAC Requirements".
5. Testing, Adjusting, and Balancing Work: Refer to Section 23 05 00 "Basic HVAC Requirements".

1.3 ALTERNATES

A. Refer to section 01 23 00.

1.4 UNIT PRICES

A. Refer to section 01 22 00.

1.5 DIVISION OF WORK BETWEEN MECHANICAL, ELECTRICAL & CONTROL CONTRACTORS

A. Definitions:

1. "Mechanical Contractors" refers to the following:

   a. Plumbing Contractor.
   b. Heating Contractor.
   c. Air Conditioning and Ventilating Contractor.
   d. Temperature Control Contractor.
   e. Fire Protection Contractor.
   f. Testing, Adjusting, and Balancing Contractor.

2. Motor Control Wiring: The wiring associated with the remote operation of the magnetic coils of magnetic motor starters or relays, or the wiring that permits direct cycling of motors by means of devices in series with the motor power wiring. In the latter case the devices are usually single phase and are usually connected to the motor power wiring through a manual motor starter having "Manual-Off-Auto" provisions.
3. Control devices such as start-stop push buttons, thermostats, pressure switches, flow switches, relays, etc., generally represent the types of equipment associated with motor control wiring.
4. Motor control wiring is single phase and usually 120 volts. In some instances, the voltage will be the same as the motor power wiring. Generally, where the motor power wiring exceeds 120 volts, a control transformer is used to give a control voltage of 120 volts.
5. Temperature Control Wiring: The wiring associated with the operation of a motorized damper, solenoid valve or motorized valve, etc., either modulating or two-position, as opposed to wiring which directly powers or controls a motor used to drive equipment such as fans, pumps, etc.

   a. This wiring will be from a 120 volt source and may continue as 120 volt, or be reduced in voltage (24 volt) in which case a control transformer shall be furnished as part of the temperature control wiring.

6. Control Motor: An electric device used to operate dampers, valves, etc. It may be two-position or modulating. Conventional characteristics of such a motor are 24 volts, 60 cycles, 1 phase, although other voltages may be encountered.
7. Voltage is generally specified and scheduled as distribution voltage. Motor submittals may be based on utilization voltage if it corresponds to the correct distribution voltage.

Distribution/Nominal Voltage	Utilization Voltage
120	115
208	200
240	230

277	265
480	460

B. General:

1. The purpose of these Specifications is to outline the Electrical and Mechanical Contractor's responsibilities related to electrical work required for items such as temperature controls, mechanical equipment, fans, chillers, compressors and the like. The exact wiring requirements for much of the equipment cannot be determined until the systems have been selected and submittals reviewed. Therefore, the electrical drawings show only known wiring related to such items. All wiring not shown on the electrical drawings, but required for mechanical systems, is the responsibility of the Mechanical Contractor.
2. Where the drawings require the Electrical Contractor to wire between equipment furnished by the Mechanical Contractor, such wiring shall terminate at terminals provided in the equipment. The Mechanical Contractor shall provide complete electrical power/controls wiring diagrams and supervision to the Electrical Contractor and designate the terminal numbers for correct wiring.
3. All electrical work shall conform to the National Electrical Code. All provisions of the Electrical Specifications concerning wiring, protection, etc., apply to wiring provided by the Mechanical Contractor unless noted otherwise.
4. Control low (24V) and control line (120V) voltage wiring, conduit, and related switches and relays required for the automatic control and/or interlock of motors and equipment, including final connection, are to be furnished and installed under Divisions 21, 22 and 23. Materials and installation to conform to Class 1 or 2 requirements.
5. All Contractors shall establish utility elevations prior to fabrication and shall coordinate their material and equipment with other trades. When a conflict arises, priority is as follows:

    a. Light fixtures.
    b. Gravity flow piping, including steam and condensate.
    c. Electrical busduct.
    d. Sheet metal.
    e. Electrical cable trays, including access space.
    f. Sprinkler piping and other piping.
    g. Electrical conduits and wireway.

C. Mechanical Contractor's Responsibility:

1. Assumes responsibility for internal wiring of all equipment provided by the Mechanical Contractor, for example:

    a. Boiler Feed Pumps.
    b. Burners.
    c. Chillers.
    d. Computer Room Air Conditioning Units.
    e. Condensate Return Stations.
    f. Condensing Units.

g. Makeup Air Units.
h. Electric Humidifiers.
i. Gas Trains.
j. Package Air Handling Units.
k. Packaged Rooftop Units.

2. Assumes all responsibility for the Temperature Control wiring, when the Temperature Control Contractor is a Subcontractor to the Mechanical Contractor.
3. Shall verify all existing equipment sizes and capacities where units are to be modified, moved or replaced. Contractor shall notify Architect/Engineer of any discrepancies prior to ordering new units or replacement parts, including replacements of equipment motors.
4. Temperature Control Subcontractor's Responsibility:

   a. Wiring of all devices needed to make the Temperature Control System functional.
   b. Verifying any control wiring on the electrical drawings as being by the Electrical Contractor. All wiring required for the Control System, but not shown on the electrical drawings, is the responsibility of the Temperature Control Subcontractor.
   c. Coordinating equipment locations (such as relays, transformers, etc.) with the Electrical Contractor, where wiring of the equipment is by the Electrical Contractor.

5. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

D. Electrical Contractor's Responsibility:

1. Provides all combination starters, manual starters and disconnect devices shown on the Electrical Drawings or indicated to be by the Electrical Contractor on the Mechanical Drawings or Specifications.
2. Installs and wires all remote control devices furnished by the Mechanical Contractor or Temperature Control Subcontractor when so noted on the Electrical Drawings.
3. Provides motor control and temperature control wiring, where so noted on the drawings.
4. Coordinate with the Mechanical Contractor for size of motors and/or other electrical devices involved with repair or replacement of existing equipment.
5. Furnishes, installs and connects all relays, etc., for automatic shutdown of certain fans upon actuation of the Fire Alarm System as indicated and specified in Division 28.
6. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

1.6 QUALITY ASSURANCE

A. Contractor's Responsibility Prior to Submitting Pricing Data:

1. The Contractor is responsible for constructing complete and operating systems. The Contractor acknowledges and understands that the Contract Documents are a two-dimensional representation of a three-dimensional object, subject to human interpretation. This representation may include imperfect data, interpreted codes, utility guidelines, three-dimensional conflicts, and required field coordination items. Such deficiencies can be corrected when identified prior to ordering material and starting installation. The Contractor agrees to carefully study and compare the individual Contract Documents and report at once in writing to the Design Team any deficiencies the Contractor may discover. The Contractor further agrees to require each subcontractor to likewise study the documents and report at once any deficiencies discovered.
2. The Contractor shall resolve all reported deficiencies with the Architect/Engineer prior to awarding any subcontracts, ordering material, or starting any work with the Contractor's own employees. Any work performed prior to receipt of instructions from the Design Team will be done at the Contractor's risk.

B. Compliance with Codes, Laws, Ordinances:

1. Conform to all requirements of the City of Chester, PACodes, Laws, Ordinances and other regulations having jurisdiction.
2. Conform to all State Codes.
3. Conform to Federal Act S.3874 requiring the reduction of lead in drinking water.
4. If there is a discrepancy between the codes and regulations and these specifications, the Architect/Engineer shall determine the method or equipment used.
5. If the Contractor notes, at the time of bidding, that any parts of the drawings or specifications do not comply with the codes or regulations, Contractor shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time for this procedure, Contractor shall submit with the proposal a separate price to make the system comply with the codes and regulations.
6. All changes to the system made after letting of the contract, to comply with codes or requirements of Inspectors, shall be made by the Contractor without cost to the Owner.
7. If there is a discrepancy between manufacturer's recommendations and these specifications, the manufacturer's recommendations shall govern.
8. All rotating shafts and/or equipment shall be completely guarded from all contact. Partial guards and/or guards that do not meet all applicable OSHA standards are not acceptable. Contractor is responsible for providing this guarding if it is not provided with the equipment supplied.

C. Permits, Fees, Taxes, Inspections:

1. Procure all applicable permits and licenses.
2. Abide by all laws, regulations, ordinances, and other rules of the State or Political Subdivision where the work is done, or as required by any duly constituted public authority.
3. Pay all charges for permits or licenses.
4. Pay all fees and taxes imposed by the State, Municipal and/or other regulatory bodies.
5. Pay all charges arising out of required inspections by an authorized body.
6. Pay all charges arising out of required contract document reviews associated with the project and as initiated by the Owner or authorized agency/consultant.

7. Where applicable, all fixtures, equipment and materials shall be approved or listed by Underwriter's Laboratories, Inc.

D. Examination of Drawings:

1. The drawings for the plumbing work are completely diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment, outlets, etc., and the approximate sizes of equipment.
2. Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of pipes and ducts to best fit the layout of the job.
3. Scaling of the drawings is not sufficient or accurate for determining these locations.
4. Where job conditions require reasonable changes in indicated arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.
5. Because of the scale of the drawings, certain basic items, such as fittings, boxes, valves, unions, etc., may not be shown, but where required by other sections of the specifications or required for proper installation of the work, such items shall be furnished and installed.
6. If an item is either on the drawings or in the specifications, it shall be included in this contract.
7. Determination of quantities of material and equipment required shall be made by the Contractor from the documents. Where discrepancies arise between drawings, schedules and/or specifications, the greater number shall govern.
8. Where used in mechanical documents, the word "furnish" shall mean supply for use, the word "install" shall mean connect complete and ready for operation, and the word "provide" shall mean to supply for use and connect complete and ready for operation.

    a. Any item listed as furnished shall also be installed, unless otherwise noted.
    b. Any item listed as installed shall also be furnished, unless otherwise noted.

E. Field Measurements:

1. Verify all pertinent dimensions at the job site before ordering any materials or fabricating any supports, pipes or ducts.

F. Electronic Media/Files:

1. Construction drawings for this project have been prepared utilizing Revit.
2. Contractors and Subcontractors may request electronic media files of the contract drawings and/or copies of the specifications. Specifications will be provided in PDF format.
3. Upon request for electronic media, the Contractor shall complete and return a signed "Electronic File Transmittal" form provided by IMEG.
4. If the information requested includes floor plans prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.
5. The electronic contract documents can be used for preparation of shop drawings and as-built drawings only. The information may not be used in whole or in part for any other project.

6. The drawings prepared by IMEG for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.
7. The use of these CAD documents by the Contractor does not relieve them from their responsibility for coordination of work with other trades and verification of space available for the installation.
8. The information is provided to expedite the project and assist the Contractor with no guarantee by IMEG as to the accuracy or correctness of the information provided. IMEG accepts no responsibility or liability for the Contractor's use of these documents.

1.7 WEB-BASED PROJECT SOFTWARE

A. The General Contractor shall provide a web-based project software site for the purpose of hosting and managing project communication and documentation until completion of the warranty phase.

B. The web-based project software shall include, at a minimum, the following features: construction schedule, submittals, RFIs, ASIs, construction change directives, change orders, drawing management, specification management, payment applications, contract modifications, meeting minutes, construction progress photos.

C. Provide web-based project software user licenses for use by the Architect/Engineer. Access will be provided from the start of the project through the completion of the warranty phase.

D. At project completion, provide digital archive of entire project in format that is readable by common desktop software applications in format acceptable to Architect/Engineer. Provide data in locked format to prevent further changes.

1.8 SUBMITTALS

A. Submittals shall be required for the following items, and for additional items where required elsewhere in the specifications or on the drawings.

1. Submittals List:

Referenced Specification Section	Submittal Item
22 05 00	Owner Training Agenda
22 05 29	Hangers and Supports
22 07 19	Plumbing Pipe Insulation
22 10 00	Plumbing Piping Systems and Valves
22 30 00	Plumbing Equipment
22 40 00	Plumbing Fixtures

B. General Submittal Procedures: In addition to the provisions of Division 1, the following are required:

1. Transmittal: Each transmittal shall include the following:

a. Date
b. Project title and number
c. Contractor's name and address
d. Division of work (e.g., plumbing, heating, ventilating, etc.)
e. Description of items submitted and relevant specification number
f. Notations of deviations from the contract documents
g. Other pertinent data

2. Submittal Cover Sheet: Each submittal shall include a cover sheet containing:

a. Date
b. Project title and number
c. Architect/Engineer
d. Contractor and subcontractors' names and addresses
e. Supplier and manufacturer's names and addresses
f. Division of work (e.g., plumbing, heating, ventilating, etc.)
g. Description of item submitted (using project nomenclature) and relevant specification number
h. Notations of deviations from the contract documents
i. Other pertinent data
j. Provide space for Contractor's review stamps

3. Composition:

a. Submittals shall be submitted using specification sections and the project nomenclature for each item.
b. Individual submittal packages shall be prepared for items in each specification section. All items within a single specification section shall be packaged together where possible. An individual submittal may contain items from multiple specifications sections if the items are intimately linked (e.g., pumps and motors).
c. All sets shall contain an index of the items enclosed with a general topic description on the cover.

4. Content: Submittals shall include all fabrication, erection, layout, and setting drawings; manufacturers' standard drawings; schedules; descriptive literature, catalogs and brochures; performance and test data; electrical power criteria (e.g., voltage, phase, amps, horsepower, kW, etc.) wiring and control diagrams; Short Circuit Current Rating (SCCR); dimensions; shipping and operating weights; shipping splits; service clearances; and all other drawings and descriptive data of materials of construction as may be required to show that the materials, equipment or systems and the location thereof conform to the requirements of the contract documents.
5. Contractor's Approval Stamp:

a. The Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. The Contractor shall stamp, date and sign each submittal certifying it has been reviewed.
b. Unstamped submittals will be rejected.

c. The Contractor's review shall include, but not be limited to, verification of the following:

1) Only approved manufacturers are used.
2) Addenda items have been incorporated.
3) Catalog numbers and options match those specified.
4) Performance data matches that specified.
5) Electrical characteristics and loads match those specified.
6) Equipment connection locations, sizes, capacities, etc. have been coordinated with other affected trades.
7) Dimensions and service clearances are suitable for the intended location.
8) Equipment dimensions are coordinated with support steel, housekeeping pads, openings, etc.
9) Constructability issues are resolved (e.g., weights and dimensions are suitable for getting the item into the building and into place, sinks fit into countertops, etc.).

d. The Contractor shall review, stamp and approve all subcontractors' submittals as described above.

e. The Contractor's approval stamp is required on all submittals. Approval will indicate the Contractor's review of all material and a complete understanding of exactly what is to be furnished. Contractor shall clearly mark all deviations from the contract documents on all submittals. If deviations are not marked by the Contractor, then the item shall be required to meet all drawing and specification requirements.

6. Submittal Identification and Markings:

a. The Contractor shall clearly mark each item with the same nomenclature applied on the drawings or in the specifications.
b. The Contractor shall clearly indicate the size, finish, material, etc.
c. Where more than one model is shown on a manufacturer's sheet, the Contractor shall clearly indicate exactly which item and which data is intended.
d. All marks and identifications on the submittals shall be unambiguous.

7. Schedule submittals to expedite the project. Coordinate submission of related items.
8. Identify variations from the contract documents and product or system limitations that may be detrimental to the successful performance of the completed work.
9. Reproduction of contract documents alone is not acceptable for submittals.
10. Incomplete submittals will be rejected without review. Partial submittals will only be reviewed with prior approval from the Architect/Engineer.
11. Submittals not required by the contract documents may be returned without review.
12. The Architect/Engineer's responsibility shall be to review one set of shop drawing submittals for each product. If the first submittal is incomplete or does not comply with the drawings and/or specifications, the Contractor shall be responsible to bear the cost for the Architect/Engineer to recheck and handle the additional shop drawing submittals.
13. Submittals shall be reviewed and approved by the Architect/Engineer before releasing any equipment for manufacture or shipment.

14. Contractor's responsibility for errors, omissions or deviation from the contract documents in submittals is not relieved by the Architect/Engineer's approval.
15. Schedule shall allow for adequate time to perform orderly and proper review of submittals, including time for consultants and Owner if required, and resubmittals by Contractor if necessary, and to cause no delay in Work or in activities of Owner or other contractors.

    a. Allow at least two weeks for Architect's/Engineer's review and processing of each submittal.

16. Architect/Engineer reserves the right to withhold action on a submittal which, in the Architect/Engineer's opinion, requires coordination with other submittals until related submittals are received. The Architect/Engineer will notify the Contractor, in writing, when they exercise this right.

C. Electronic Submittal Procedures:

1. Distribution: Email submittals as attachments to all parties designated by the Architect/Engineer, unless a web-based submittal program is used.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.

    a. Submittal file name: 22 XX XX.description.YYYYMMDD
    b. Transmittal file name: 22 XX XX.description.YYYYMMDD

5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.

1.9 CHANGE ORDERS

A. A detailed material and labor takeoff shall be prepared for each change order, along with labor rates and markup percentages. Change orders shall be broken down by sheet or associated individual line item indicated in the change associated narrative, whichever provides the most detailed breakdown. Change orders with inadequate breakdown will be rejected.

B. Itemized pricing with unit cost shall be provided from all distributors and associated subcontractors.

C. Change order work shall not proceed until authorized.

1.10 PRODUCT DELIVERY, STORAGE, HANDLING & MAINTENANCE

A. Exercise care in transporting and handling to avoid damage to materials. Store materials on the site to prevent damage. Keep materials clean, dry and free from harmful conditions. Immediately remove any materials that become wet or that are suspected of becoming contaminated with mold or other organisms.

B. Protect equipment, components, and openings with airtight covers and exercise care at every stage of storage, handling, and installation of equipment to prevent airborne dust and dirt from entering or fouling equipment to include, but not limited to:

1. Motor windings and ventilation openings.
2. Bearings.
3. Equipment Pipe and Accessories connection openings. (e.g. boiler connections, coil connections, etc.)
4. Starter and control cabinets.
5. Heat transfer coils.
6. Pump Seals.
7. Combustion burner and blower equipment (e.g. combustion air intake, combustion vent/flue, etc.)

C. Equipment and components that are visibly damaged or have been subject to environmental conditions prior to building turnover to Owner that could shorten the life of the component (for example, water damage, humidity, dust and debris, excessive hot or cold storage location, etc.) shall be repaired or replaced with new equipment or components without additional cost to the building owner.

D. Keep all bearings properly lubricated and all belts properly tensioned and aligned.

E. Coordinate the installation of heavy and large equipment with the General Contractor and/or Owner. If the Mechanical Contractor does not have prior documented experience in rigging and lifting similar equipment, he/she shall contract with a qualified lifting and rigging service that has similar documented experience. Follow all equipment lifting and support guidelines for handling and moving.

F. Contractor is responsible for moving equipment into the building and/or site. Contractor shall review site prior to bid for path locations and any required building modifications to allow movement of equipment. Contractor shall coordinate the work with other trades.

1.11 WARRANTY

A. Provide one-year warranty, unless otherwise noted, to the Owner for all fixtures, equipment, materials, and workmanship.

B. The warranty period for all work in this Division of the specifications shall commence on the date of final acceptance, unless a whole or partial system or any separate piece of equipment or component is put into use for the benefit of any party other than the installing contractor with prior written authorization. In this instance, the warranty period shall commence on the date when such whole system, partial system or separate piece of equipment or component is placed in operation and accepted in writing by the Owner.

C. Warranty requirements shall extend to correction, without cost to the Owner, of all Work found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage resulting from defects or nonconformance with contract documents.

1.12 INSURANCE

A. Contractor shall maintain insurance coverage as set forth in Division 0 of these specifications.

1.13 MATERIAL SUBSTITUTION

A. Where several manufacturers' names are given, the first manufacturer is the basis for job design and establishes the quality.

B. Equivalent equipment manufactured by the other listed manufacturers may be used. Contractor shall ensure that all items submitted by these other manufacturers meet all requirements of the drawings and specifications and fits in the allocated space. When using other listed manufacturers, the Contractor shall assume responsibility for any and all modifications necessary (including, but not limited to structural supports, electrical connections, piping and ductwork connections and arrangement, plumbing connections and rough-in, and regulatory agency approval, etc.) and coordinate such with other contractors.

C. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used if approval is secured in writing from the Architect/Engineer not later than ten days prior to the bid opening.

D. This Contractor assumes all costs incurred as a result of using the offered material, article or equipment, on the Contractor's part or on the part of other Contractors whose work is affected.

E. This Contractor may list voluntary add or deduct prices for alternate materials on the bid form. These items will not be used in determining the low bidder.

F. All material substitutions requested later than ten (10) days prior to bid opening must be listed as voluntary changes on the bid form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 JOBSITE SAFETY

A. Neither the professional activities of the Architect/Engineer, nor the presence of the Architect/Engineer or the employees and subconsultants at a construction site, shall relieve the Contractor and other entity of their obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Architect/Engineer and personnel have no authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions. The Contractor is solely responsible for jobsite safety. The Architect/Engineer and the Architect/Engineer's consultants shall be indemnified and shall be made additional insureds under the Contractor's general liability insurance policy.

3.2 ARCHITECT/ENGINEER OBSERVATION OF WORK

A. The Contractor shall provide seven (7) calendar days' notice to the Architect/Engineer prior to:

1. Placing fill over underground and underslab utilities.
2. Covering exterior walls, interior partitions and chases.
3. Installing hard or suspended ceilings and soffits.

B. The Architect/Engineer will have the opportunity to review the installation and provide a written report noting deficiencies requiring correction. The Contractor's schedule shall account for these reviews and show them as line items in the approved schedule.

C. Above-Ceiling Final Observation

1. All work above the ceilings must be complete prior to the Architect/Engineer's review. This includes, but is not limited to:

a. Pipe insulation is installed and fully sealed.
b. Pipe wall penetrations are sealed.
c. Pipe identification and valve tags are installed.

2. In order to prevent the Above-Ceiling Final Observation from occurring too early, the Contractor shall review the status of the work and certify, in writing, that the work is ready for the Above-Ceiling Final Observation.
3. It is understood that if the Architect/Engineer finds the ceilings have been installed prior to this review and prior to 7 days elapsing, the Architect/Engineer may not recommend further payments to the contractor until such time as full access has been provided.

3.3 PROJECT CLOSEOUT

A. The following paragraphs supplement the requirements of Division 1.

B. Final Jobsite Observation:

1. In order to prevent the Final Jobsite Observation from occurring too early, the Contractor is required to review the completion status of the project and certify that the job is ready for the final jobsite observation.
2. Attached to the end of this section is a typical list of items that represent the degree of job completeness expected prior to requesting a review.
3. Upon Contractor certification that the project is complete and ready for a final observation, the Contractor shall sign the attached certification and return it to the Architect/Engineer so that the final observation can be scheduled.
4. It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineer's additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.

C. Before final payment is authorized, this Contractor must submit the following:

1. Operation and maintenance manuals with copies of approved shop drawings.
2. Record documents including marked-up or reproducible drawings and specifications.
3. A report documenting the instructions given to the Owner's representatives complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of This Contractor and shall be signed by the Owner's representatives.
4. Start-up reports on all equipment requiring a factory installation inspection or start-up.
5. Provide spare parts, maintenance, and extra materials in quantities specified in individual specification sections. Deliver to project site and place in location as directed; receipt by Architect/Engineer required prior to final payment approval.

3.4 OPERATION AND MAINTENANCE MANUALS

A. General:

1. Provide an electronic copy of the O&M manuals as described below for Architect/Engineer's review and approval. The electronic copy shall be corrected as required to address the Architect/Engineer's comments. Once corrected, electronic copies and paper copies shall be distributed as directed by the Architect/Engineer.
2. Approved O&M manuals shall be completed and in the Owner's possession prior to Owner's acceptance and at least 10 days prior to instruction of operating personnel.

B. Electronic Submittal Procedures:

1. Distribution: Email the O&M manual as attachments to all parties designated by the Architect/Engineer.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.

3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.

    a. O&M file name: O&M.div22.contractor.YYYYMMDD
    b. Transmittal file name: O&Mtransmittal.div22.contractor.YYYYMMDD

5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.
6. Provide the Owner with an approved copy of the O&M manual on compact discs (CD), digital video discs (DVD), or flash drives with a permanently affixed label, printed with the title "Operation and Maintenance Instructions", title of the project and subject matter of disc/flash drive when multiple disc/flash drives are required.
7. All text shall be searchable.
8. Bookmarks shall be used, dividing information first by specification section, then systems, major equipment and finally individual items. All bookmark titles shall include the nomenclature used in the construction documents and shall be an active link to the first page of the section being referenced.

C. Operation and Maintenance Instructions shall include:

1. Title Page: Include title page with project title, Architect, Engineer, Contractor, all subcontractors, and major equipment suppliers, with addresses, telephone numbers, website addresses, email addresses and point of contacts. Website URLs and email addresses shall be active links in the electronic submittal.
2. Table of Contents: Include a table of contents describing specification section, systems, major equipment, and individual items.
3. Copies of all final approved shop drawings and submittals. Include Architect's/Engineer's shop drawing review comments. Insert the individual shop drawing directly after the Operation and Maintenance information for the item(s) in the review form.
4. Copy of final approved test and balance reports.
5. Copies of all factory inspections and/or equipment startup reports.
6. Copies of warranties.
7. Schematic electrical power/controls wiring diagrams of the equipment that have been updated for field conditions. Field wiring shall have label numbers to match drawings.
8. Dimensional drawings of equipment.
9. Capacities and utility consumption of equipment.
10. Detailed parts lists with lists of suppliers.
11. Operating procedures for each system.
12. Maintenance schedule and procedures. Include a chart listing maintenance requirements and frequency.
13. Repair procedures for major components.
14. List of lubricants in all equipment and recommended frequency of lubrication.
15. Instruction books, cards, and manuals furnished with the equipment.

16. Owner and Contractor attendance list for domestic water systems operation, maintenance, and flushing training.

3.5 INSTRUCTING THE OWNER'S REPRESENTATIVES

A. Adequately instruct the Owner's designated representatives in the maintenance, care, and operation of all systems installed under this contract.

B. Provide verbal and written instructions to the Owner's representatives by FACTORY PERSONNEL in the care, maintenance, and operation of the equipment and systems.

C. The Owner has the option to make a video recording of all instructions. Coordinate schedule of instructions to facilitate this recording.

D. The instructions shall include:

1. Explanation of all system flow diagrams.
2. Maintenance of equipment.
3. Start-up procedures for all major equipment.
4. Explanation of seasonal system changes.
5. Explanation of Owner’s Responsibilities to operate, maintain, and flush domestic water system (i.e., ASHRAE Standard 188).

E. Notify the Architect/Engineer of the time and place for the verbal instructions to be given to the Owner's representative so a representative can attend if desired.

F. Minimum hours of instruction for each item shall be:

1. Domestic Hot Water System - two hours

G. The Contractor shall prepare a detailed, written training agenda and submit it to the Architect/Engineer a minimum of two weeks prior to the formal training for approval. The written agenda shall include specific training points within the items described above. For example: how to adjust setpoints, troubleshooting, proper start-up, proper shut-down, seasonal changes, draining, venting, changing filters, changing belts, etc. Failure to provide and follow an approved training agenda may result in additional training required at the expense of the Contractor.

H. Operating Instructions:

1. Contractor is responsible for all instructions to the Owner's representatives for the mechanical and control systems.
2. If the Contractor does not have staff that can adequately provide the required instructions the Contractor shall include in the bid an adequate amount to reimburse the Owner for the Architect/Engineer to perform these services.

3.6 SYSTEM STARTING AND ADJUSTING

A. The plumbing systems shall be complete and operating. System startup, testing, adjusting, and balancing to obtain satisfactory system performance is the responsibility of the Contractor. This includes calibration and adjustments of all controls, noise level adjustments and final adjustments as required.

B. Complete all manufacturer-recommended startup procedures and checklists to verify proper motor rotation, electrical power voltage is within equipment limitations, equipment controls maintain pressures and temperatures within acceptable ranges, all filters and protective guards are in-place, acceptable access is provided for maintenance and servicing, and equipment operation does not pose a danger to personnel or property.

C. Contractor shall adjust the plumbing systems and controls at season changes during the one year warranty period, as required, to provide satisfactory operation and to prove performance of all systems in all seasons.

D. All operating conditions and control sequences shall be tested during the start-up period. Test all interlocks, safety shutdowns, controls, and alarms.

E. The Contractor, subcontractors, and equipment suppliers shall have skilled technicians to ensure that all systems perform properly. If the Architect/Engineer is requested to visit the job site for trouble shooting, assisting in start-up, obtaining satisfactory equipment operation, resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period, through no fault of the design; the Contractor shall reimburse the Owner on a time and materials basis for services rendered at the Architect/Engineer's standard hourly rates in effect when the services are requested. The Contractor shall pay the Owner for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

3.7 RECORD DOCUMENTS

A. The following paragraphs supplement Division 1 requirements.

B. Maintain at the job site a separate and complete set of plumbing drawings and specifications with all changes made to the systems clearly and permanently marked in complete detail.

C. Mark drawings to indicate revisions to piping size and location, both exterior and interior; including locations devices, requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned from column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located; Change Orders; concealed control system devices.

D. Before completion of the project, a set of reproducible plumbing drawings will be given to the Contractor for transfer of all as-built conditions from the paper set maintained at the job site. All marks on reproducibles shall be clear and permanent.

E. Mark specifications to show approved substitutions; Change Orders, and actual equipment and materials used.

F. Record changes daily and keep the marked drawings available for the Architect/Engineer's examination at any normal work time.

G. Upon completing the job, and before final payment is made, give the marked-up drawings to the Architect/Engineer.

3.8 PAINTING

A. Paint all equipment that is marred or damaged prior to the Owner's acceptance. Paint and color shall match original equipment paint and shall be obtained from the equipment supplier if available.

B. Equipment cabinets, casings, covers, metal jackets, etc., in equipment rooms or concealed spaces, shall be furnished in standard or prime finish, free from scratches, abrasions, chips, etc.

3.9 ADJUST AND CLEAN

A. Thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project. Clean all foreign paint, grease, oil, dirt, labels, stickers, and other foreign material from all equipment.

B. Clean all areas where moisture is present. Immediately report any mold, biological growth, or water damage.

C. Remove all rust, scale, dirt, oils, stickers and thoroughly clean exterior of all exposed piping, hangers, and accessories.

D. Remove all rubbish, debris, etc., accumulated during construction from the premises.

3.10 SPECIAL REQUIREMENTS

A. Contractor shall coordinate the installation of all equipment, valves, dampers, operators, etc., with other trades to maintain clear access area for servicing.

B. All equipment shall be installed in such a way to maximize access to parts needing service or maintenance. Review the final field location, placement, and orientation of equipment with the Owner's designated representative prior to setting equipment.

C. Installation of equipment or devices without regard to coordination of access requirements and confirmation with the Owner's designated representative will result in removal and reinstallation of the equipment at the Contractor's expense.

READINESS CERTIFICATION PRIOR TO FINAL JOBSITE OBSERVATION

To prevent the final job observation from occurring too early, we require that the Contractor review the completion status of the project and, by copy of this document, certify that the job is indeed ready for the final job observation. The following is a typical list of items that represent the degree of job completeness expected prior to your requesting a final job observation.

1. Penetrations fire sealed and labeled in accordance with specifications.
2. All pumps operating and balanced.
3. All plumbing fixtures installed and caulked.
4. Pipe insulation complete, pipes labeled and valves tagged.
5. Owner and Contractor attendance list for domestic water systems operation, maintenance, and flushing training.

Accepted by:

Prime Contractor _____

By _____ Date _____

Upon Contractor certification that the project is complete and ready for a final job observation, we require the Contractor to sign this agreement and return it to the Architect/Engineer so that the final observation can be scheduled.

It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineers for additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.

END OF SECTION

SECTION 22 05 29 - PLUMBING SUPPORTS AND ANCHORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Hangers, Supports, and Associated Anchors.

B. Sleeves and Seals.

C. Flashing and Sealing of Equipment and Pipe Stacks.

D. Cutting of Openings.

E. Escutcheon Plates and Trim.

1.2 REFERENCES

A. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

B. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.

C. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices

D. MSS SP-127 - Bracing for Piping Systems Seismic-Wind-Dynamic Design, Selection, Application.

1.3 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 22 05 00. Include plastic pipe manufacturers' support spacing requirements.

1.4 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

A. Furnish sleeves and hanger inserts to General Contractor for placement into formwork.

PART 2 - PRODUCTS

2.1 HANGER RODS

A. Hanger rods for single rod hangers shall conform to the following:

1. Steel, Cast Iron, and Glass Pipe:

a. Hanger Rod Diameter:

1) 2-1/2" and smaller: 3/8"
2) 3" through 3-5/8": 3/8"
3) 4" through 6": 1/2"
4) 8": 5/8"
5) 10": 3/4"
6) 12": 7/8"
7) 14" and 16": 1"
8) 18" and 24": 1-1/4")

2. Copper and Plastic Pipe:

a. Hanger Rod Diameter:

1) 2-1/2" and smaller: 3/8"
2) 3") through 3-5/8": 3/8"
3) 4") through 6": 1/2"
4) 8": 5/8"
5) 10": 3/4"
6) 12": 7/8"
7) 14" and 16": 1"
8) 18" and 24": 1-1/4"

B. Rods for double rod hangers may be reduced one size. Minimum rod diameter is 3/8 inches.

C. Hanger rods and accessories used in mechanical spaces or otherwise dry areas shall have ASTM B633 electro-plated zinc finish.

2.2 PIPE AND STRUCTURAL SUPPORTS

A. General:

1. Pipe hangers, clamps, and supports shall conform to Manufacturers Standardization Society MSS SP-58, 69, 89, and 127 (where applicable).
2. On all insulated piping, provide at each support an insert of same thickness and contour as adjoining insulation, between the pipe and insulation jacket, to prevent insulation from sagging and crushing. Refer to insulation specifications for materials and additional information.
3. Copper piping located in an exposed area, including indirect waste piping in [kitchens][and][janitor's closets], shall use split ring standoff hangers for copper tubing. Support shall include plastic pipe insert similar to Unistrut Cush-A-Clamp, Hydra-Zorb, nVent Cushion Clamp or Eaton Vibra-Clamp. Use electro-galvanized or more corrosion resistant and threaded rod for floor applications. Use anchors applicable to the wall type with corrosion resistant threaded rod for wall applications.

a. Products:

1) nVent/M-Co Model #456
2) Eaton Fig. 3198HCT

3) Anvil Fig. CT138R

B. Hangers and Clamps:

1. Oversize all hangers, clamps, and supports on insulated piping to allow insulation and jacket to pass through unbroken. This applies to both hot and cold pipes.
2. Hangers in direct contact with bare copper pipe shall include plastic pipe insert similar to Unistrut Cush-A-Clamp, Hydra-Zorb, nVent Cushion Clamp or Eaton Vibra-Clamp within their temperature limits of -65°°F to +275°°F.
3. Vertical cold pipe drops and rough-ins to fixtures shall be supported by insulated pipe clamps to prevent thermal bridging and condensation.
4. On all insulated piping, provide a semi-cylindrical metallic shield and vapor barrier jacket.

5. Unless otherwise indicated, hangers shall be as follows:

a. Clevis Type: Bare Metal Pipe, Rigid Plastic Pipe, Insulated Cold Pipe, Insulated Hot Pipe - 3 inches & Smaller

1) Products: Bare Steel Plastic or Insulated Pipe:

a) Anvil Fig. 260
b) Eaton Fig. 3100
c) nVent Model 400

2) Products: Bare Copper Pipe Felt or PVC Coated:

a) Eaton Fig. B3104F or B3100CTC
b) Anvil Fig. CT65
c) nVent Fig. 402

b. Adjustable Swivel Ring Type: Bare Metal Pipe - 4 inches and Smaller

1) Products: Bare Steel Pipe:

a) Anvil Fig. 69
b) Eaton Fig. B3170NF
c) nVent Model 115

2) Products: Bare Copper Pipe:

a) Eaton Fig. B3170CTC
b) nVent 102A0 Series
c) Anvil Fig. CT-69

C. Upper (Structural) Attachments:

1. Unless otherwise shown, upper attachments for hanger rods or support struts shall be as follows:

a. Wood Anchors: Tension wood rod hanger for suspending 3/8" threaded rod. Zinc plated carbon steel.

1) Minimum allowable tension loads for Douglass Fir/Southern Pine:

a) 3/8" diameter rod; 2-1/2" shank: 600 lb/590 lb.
b) Load values are based on full shank penetration into wood member. Minimum edge distance 3/4". Minimum end distance 3-1/4".

2) Limitations:

a) Truss: Do not hang from wood trusses without truss manufacturer or Structural Engineer™™s approval.
b) Sheetrock/Gypsum Ceiling: When drilling through non-wood materials (e.g., sheet rock, gypsum, etc.), increase shank length by depth of non-wood materials.
c) Plywood Flooring/Roofing: Do not hang from plywood floor or roofing.
d) Spacing: Refer to wood structure spacing of hangers.

3) Products:

a) Simpson RWV
b) DeWALT
c) ITI Sammys GT25

2.3 OPENINGS IN FLOORS, WALLS AND CEILINGS

A. Exact locations of all openings for the installation of materials shall be determined by the Contractor and given to the General Contractor for installation or construction as the structure is built.

B. Coordinate all openings with other Contractors.

C. Hire the proper tradesman and furnish all labor, material and equipment to cut openings in or through existing structures, or openings in new structures that were not installed, or additional openings. Repair all spalling and damage to the satisfaction of the Architect/Engineer. Make saw cuts before breaking out concrete to ensure even and uniform opening edges.

D. Said cutting shall be at the complete expense of each Contractor. Failure to coordinate openings with other Contractors shall not exempt the Contractor from providing openings at Contractor's expense.

E. Do not cut structural members without written approval of the Architect or Structural Engineer.

2.4 SLEEVES AND LINTELS

A. Each Contractor shall provide sleeves and lintels for all duct and pipe openings required for the Contractor's work in masonry walls and floors, unless specifically shown as being by others.

B. Fabricate all sleeves from standard weight black steel pipe or as indicated on the drawings. Provide continuous sleeve. Cut or split sleeves are not acceptable.

C. Fabricate all lintels for masonry walls from structural steel shapes or as indicated on the drawings. Have all lintels approved by the Architect or Structural Engineer.

D. Sleeves through the floors on exposed risers shall be flush with the ceiling, with planed squared ends extending 1" above the floor in unfinished areas, and flush with the floor in finished areas, to accept spring closing floor plates.

E. Sleeves shall not penetrate structural members or masonry walls without approval from the Structural Engineer. Sleeves shall then comply with the Architect/Engineer's design.

F. Openings through unexcavated floors and/or foundation walls below the floor shall have a smooth finish with sufficient annular space around material passing through opening so slight settling will not place stress on the material or building structure.

G. Install all sleeves concentric with pipes. Secure sleeves in concrete to wood forms. This Contractor is responsible for sleeves dislodged or moved when pouring concrete.

H. Where pipes rise through concrete floors that are on earthen grade, provide 3/4" resilient expansion joint material (e.g., foam, rubber, asphalt-coated fiber, bituminous-impregnated felt, or cork) wrapped around the pipe, the full depth of concrete, at the point of penetration. Secure to prevent shifting during concrete placement and finishing.

I. Size sleeves large enough to allow expansion and contraction movement. Provide continuous insulation wrapping.

2.5 ESCUTCHEON PLATES AND TRIM

A. Fit escutcheons to all insulated or uninsulated exposed pipes passing through walls, floors, or ceilings of finished rooms.

B. Escutcheons shall be heavy gauge, cold rolled steel, copper coated under a chromium plated finish, heavy spring clip, rigid hinge and latch.

C. Install galvanized steel (unless otherwise indicated) trim strip to cover vacant space and raw construction edges of all rectangular openings in finished rooms. This includes pipe openings.

2.6 PIPE PENETRATIONS

A. Seal all pipe penetrations. Seal non-rated walls and floor penetrations with grout or caulk. Backing material may be used.

B. Seal fire rated wall and floor penetrations with fire seal system as specified.

2.7 PIPE ANCHORS

A. Provide all items needed to allow adequate expansion and contraction of all piping. All piping shall be supported, guided, aligned, and anchored as required.

B. Repair all piping leaks and associated damage. Pipes shall not rub on any part of the building.

PART 3 - EXECUTION

3.1 PLUMBING SUPPORTS AND ANCHORS

A. General Installation Requirements:

1. Install all items per manufacturer's instructions.
2. Coordinate the location and method of support of piping systems with all installations under other Divisions and Sections of the Specifications.
3. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
4. Supports shall extend directly to building structure. Do not support piping from duct hangers unless coordinated with Sheet Metal Contractor prior to installation. Do not allow lighting or ceiling supports to be hung from piping supports.

B. Supports Requirements:

1. Where building structural steel is fireproofed, all hangers, clamps, auxiliary steel, etc., which attach to it shall be installed prior to application of fireproofing. Repair all fireproofing damaged during pipe installation.
2. Set all concrete inserts in place before pouring concrete.
3. Furnish, install and prime all auxiliary structural steel for support of piping systems that are not shown on the Drawings as being by others.
4. Install hangers and supports complete with lock nuts, clamps, rods, bolts, couplings, swivels, inserts and required accessories.
5. Hangers for horizontal piping shall have adequate means of vertical adjustment for alignment.

C. Pipe Requirements:

1. Support all piping and equipment, including valves, strainers, traps and other specialties and accessories to avoid objectionable or excessive stress, deflection, swaying, sagging or vibration in the piping or building structure during erection, cleaning, testing and normal operation of the systems.
2. Do not, however, restrain piping to cause it to snake or buckle between supports or to prevent proper movement due to expansion and contraction.
3. Support piping at equipment and valves so they can be disconnected and removed without further supporting the piping.
4. Piping shall not introduce strains or distortion to connected equipment.
5. Parallel horizontal pipes may be supported on trapeze hangers made of structural shapes and hanger rods; otherwise, pipes shall be supported with individual hangers.
6. Trapeze hangers may be used where ducts interfere with normal pipe hanging.
7. Provide additional supports where pipe changes direction, adjacent to flanged valves and strainers, at equipment connections and heavy fittings.
8. Provide at least one hanger adjacent to each joint in grooved end steel pipe with mechanical couplings.

D. Provided the installation complies with all loading requirements of truss and joist manufacturers, the following practices are acceptable:

1. Loads of 100 lbs. or less may be attached anywhere along the top or bottom chords of trusses or joists with a minimum 3' spacing between loads.
2. Loads greater than 100 lbs. must be hung concentrically and may be hung from top or bottom chord, provided one of the following conditions is met:

    a. The hanger is attached within 6" from a web/chord joint.
    b. Additional L2x2x1/4 web reinforcement is installed per manufacturer's requirements.

3. It is prohibited to cantilever a load using an angle or other structural component that is attached to a truss or joist in such a fashion that a torsional force is applied to that structural member.
4. If conditions cannot be met, coordinate installation with truss or joist manufacturer and contact Architect/Engineer.

E. After piping and insulation installation are complete, cut hanger rods back at trapeze supports so they do not extend more than 3/4" below bottom face of lowest fastener and blunt any sharp edges.

F. Do not exceed 25 lbs. per hanger and a minimum spacing of 2'-0" on center when attaching to metal roof decking (limitation not required with concrete on metal deck). This 25 lbs. load and 2'-0" spacing include adjacent electrical and architectural items hanging from deck. If the hanger restrictions cannot be achieved, supplemental framing off steel framing will need to be added.

G. Do not exceed the manufacturer's recommended maximum load for any hanger or support.

H. Wood Structure: Spacing of hangers shall not exceed the compressive strength of the insulation inserts, and in no case shall exceed the following:

1. Steel and Fiberglass (Std. Weight or Heavier - Liquid Service):

   a. Maximum Spacing:

      1) 1-1/4" & under: 7'-0"
      2) 1-1/2": 9'-0"
      3) 2": 10'-0"
      4) 2-1/2": 11'-0"
      5) 3": 12'-0"
      6) 4" through 6": 12'-0"
      7) 8": 9'-0"
      8) 10": 6'-0"
      9) 12": 4'-0"

2. Steel (Std. Weight or Heavier - Vapor Service):

   a. Maximum Spacing:

      1) 1-1/4" and under: 9'-0"
      2) 1-1/2": 12'-0"
      3) 2" & larger: 12'-0"
      4) 2-1/2": 11'-0"
      5) 3": 12'-0"
      6) 4" through 8": 12'-0"
      7) 10": 9'-0"
      8) 12": 6'-0"

3. Hard Drawn Copper & Brass (Liquid Service):

   a. Maximum Spacing:

      1) 3/4" and under: 5'-0"
      2) 1": 6'-0"
      3) 1-1/4": 7'-0"
      4) 1-1/2" 8'-0"
      5) 2": 8'-0"
      6) 2-1/2": 9'-0"
      7) 3": 10'-0"
      8) 4": 12'-0"
      9) 6": 12'-0"

4. Hard Drawn Copper & Brass (Vapor Service):

   a. Maximum Spacing:

1) 3/4" & under: 7'-0"
2) 1": 8'-0"
3) 1-1/4": 9'-0"
4) 1-1/2": 10'-0"
5) 2": 11'-0"
6) 2-1/2" & larger: 12'-0"

I. Installation of hangers shall conform to MSS SP-58, 69, 89 and the applicable Plumbing Code.

END OF SECTION

SECTION 22 07 19 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Piping Insulation.

B. Insulation Jackets.

1.2 QUALITY ASSURANCE

A. Applicator: Company specializing in piping insulation application with five years minimum experience.

B. Materials: Listed and labeled for flame spread/smoke developed rating of no more than 25/50 when tested per ASTM E84 or UL 723 as required by code. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

C. Products shall not contain asbestos, lead, mercury, or mercury compounds.

D. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

1.3 REFERENCES

A. ANSI/ASHRAE/IES Standard 90.1 (latest published edition) - Energy Standard for Buildings Except Low-Rise Residential Buildings.

B. ANSI/ASTM C534 - Elastomeric Foam Insulation.

C. ASTM E84 - Surface Burning Characteristics of Building Materials.

D. NFPA 255 - Surface Burning Characteristics of Building Materials.

E. UL 723 - Surface Burning Characteristics of Building Materials.

F. National Commercial & Industrial Insulation Standards - 1999 Edition - as published by Midwest Insulation Contractors Association and endorsed by National Insulation Contractors Association.

1.4 SUBMITTALS

A. Submit shop drawings per Section 22 05 00. Include product description, list of materials and thickness for each service, and locations.

PART 2 - PRODUCTS

2.1 INSULATION

A. Type A: Glass fiber; ANSI/ASTM C547; 0.24 maximum 'K' value at 75°°F; non-combustible. All-purpose polymer or polypropylene service jacket, listed and labeled at no more than 25/50 when tested per ASTM E84 or UL 723 as required by code.

B. Type B: Flexible elastomeric foam insulation; closed-cell, sponge or expanded rubber (polyethylene type is not permitted); ANSI/ASTM C534 Grade 1 Type I for tubular materials; flexible plastic; 0.25 maximum 'K' value at 75°°F, listed and labeled at no more than 25/50 when tested per ASTM E84 or UL 723 as required by code. Maximum 1" thick per layer where multiple layers are specified.

C. Type C: Molded rigid cellular glass; ANSI/ASTM C-552; 0.29 maximum 'K' value at 75°°F; density 7.3lb/ft; minimum compressive strength 90 psi parallel to rise; moisture resistant, non-combustible; suitable for -100°°F to +900°°F. For below grade installations, use asphaltic mastic paper vapor barrier jacket. Use self-seal all-purpose polymer or polypropylene service jacket for above grade installations.

2.2 VAPOR BARRIER JACKETS

A. All-purpose polymer or polypropylene service jacket vapor barrier with self-sealing adhesive joints. Beach puncture resistance ratio of at least 50 units. Tensile strength: 35 psi minimum. Single, self-seal acrylic adhesive on longitudinal jacket laps and butt strips.

2.3 JACKET COVERINGS

A. Plastic Jackets and Fitting Covers: High impact, glossy whit, [0.020" thick, self-extinguishing plastic. Suitable for use indoors or outdoors with ultraviolet inhibitors. Suitable for -40°°F to 150°°F. Listed and labeled at no more than 25/50 when tested per ASTM E84 or UL 723 as required by code.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install insulation after piping has been tested. Pipe shall be clean, dry and free of rust before applying insulation.

3.2 INSTALLATION

A. General Installation Requirements:

1. Install materials per manufacturer's instructions, building codes and industry standards.
2. Continue insulation with vapor barrier through penetrations. This applies to all insulated piping. Maintain fire rating of all penetrations.

B. Insulated Piping Operating Below 60°°F:

1. Insulate fittings, valves, unions, flanges, strainers, flexible connections, flexible hoses, and expansion joints. Seal all penetrations of vapor barrier.
2. On piping operating below 60°°F in locations that are not mechanically cooled (e.g., penthouses, mechanical rooms, tunnels, chases at exterior walls, etc.), Type B insulation shall be used.
3. All balance valves with fluid operating below 60°°F shall be insulated with a removable plug wrapped with vapor barrier tape to allow reading and adjusting of the valve.

C. Insulated Piping Operating Between 60°°F and 140°°F:

1. Do not insulate flanges and unions, but bevel and seal ends of insulation at such locations. Insulate all fittings, valves and strainers.

D. Insulated Piping Operating Above 140°°F:

E. Exposed Piping:

1. Locate and cover seams in least visible locations.
2. Where exposed insulated piping extends above the floor, provide a sheet metal guard around the insulation extending 12" above the floor. Guard shall be 0.016" cylindrical smooth or stucco aluminum and shall fit tightly to the insulation.
3. On exposed piping serving kitchen equipment or plumbing fixtures, the piping shall be insulated unless local code allows it to be uninsulated. In no instance should the uninsulated portion of the piping be more than 4ft in developed length.

3.3 SUPPORT PROTECTION

A. Provide a shield on all insulated piping at each support between the insulation jacket and the support.

B. On all insulated piping greater than 1-1/2", provide shield with insulation insert of same thickness and contour as adjoining insulation at each support, between the pipe and insulation jacket, to prevent insulation from sagging and crushing. Inserts shall be as follows:

1. The insert shall be suitable for planned temperatures, be suitable for use with specific pipe material, and shall be a minimum 180° cylindrical segment the same length as metal shields. Inserts shall be:

a. Cellular glass (Type C) (for all temperature ranges) with a minimum compressive strength of 90 psi is acceptable for pipe sizes 14" and below. For pipe sizes larger than 14", provide rolled steel plate in addition to the shield.
b. As an alternative to separate pipe insulation insert and saddle, properly sized manufactured integral rigid insulation insert and shield assemblies may be used.

    1) Products:

        a) Buckaroo CoolDry
        b) Cooper/B-Line Fig. B3380 through B3384
        c) Pipe Shields A1000, A2000

c. Insulation Couplings:

    1) Molded thermoplastic slip coupling, -65°F to 275°F, sizes up to 4-1/8" OD, and receive insulation thickness up to 1". Suitable for use indoors or outdoors with UV stabilizers. Vertical insulation riser clamps shall have a 1,000lb vertical load rating. On cold pipes operating below 60°F, cover joint and coupling with vapor barrier mastic to ensure continuous vapor barrier.
    2) PET thermoplastic foam load bearing core with elastomeric foam ends and lap-seal jacket.
    3) Horizontal Strut Mounted Insulated Pipe Manufacturers:

        a) Klo-Shure or equal
        b) Armafix Ecolight

    4) Vertical:

        a) Manufacturers: Klo-Shure Titan or equal

d. Rectangular blocks, plugs, or wood material are not acceptable.
e. Temporary wood blocking may be used by the Piping Contractor for proper height; however, these must be removed and replaced with proper inserts by the Insulation Contractor. Refer to Supports and Anchors specification section for additional information.

C. Neatly finish insulation at supports, protrusions, and interruptions.

D. Install metal shields between all hangers or supports and the pipe insulation. Shields shall be galvanized sheet metal, half-round with flared edges. Adhere shields to insulation. On cold piping, seal the shields vapor-tight to the insulation as required to maintain the vapor barrier, or add separate vapor barrier jacket.

E. Shields shall be at least the following lengths and gauges:

Pipe Size	Shield Size
1/2" to 3-1/2"	12" long x 18 gauge
4"	12" long x 16 gauge

5” to 6"	18" long x 16 gauge
8” to 14"	24" long x 14 gauge
16” to 24"	24" long x 12 gauge

F. Elastomeric foam insulation shields/saddle; molded thermoplastic rigid pipe saddle sized for insulation outside diameter. Length as indicated above.

3.4 INSULATION

A. Type A Insulation:

1. All Service Jackets: Seal all longitudinal joints with self-seal laps using a single pressure sensitive adhesive system. Do not staple.
2. Insulation without self-seal lap may be used if installed with Benjamin Foster 85-20 or equivalent Chicago Mastic, 3M or Childers lap adhesive.
3. Apply insulation with laps on top of pipe.
4. Fittings, Valve Bodies and Flanges: For 4" and smaller pipes, insulate with 1 lb. density insulation wrapped under compression to a thickness equal to the adjacent pipe insulation. For pipes over 4", use mitered segments of pipe insulation. Finish with preformed plastic fitting covers. Secure fitting covers with pressure sensitive tape at each end. Overlap tape at least 2" on itself. For pipes operating below 60°°F seal fitting covers with vapor retarder mastic in addition to tape.

B. Type B Insulation:

1. Install per manufacturer's instructions or ASTM C1710.
2. Elastomeric Cellular Foam: Where possible, slip insulation over the open end of pipe without slitting. Seal all butt ends, longitudinal seams, and fittings with adhesive. At elbows and tees, use mitered connections. Do not compress or crush insulation at cemented joints. Joints shall be sealed completely and not pucker or wrinkle. Exterior installations shall contain factory applied polymeric, moisture, and UV resistant covering with ends sealed with adhesive and similar cover; or Contractor shall paint the outside of outdoor insulation with two coats of latex enamel paint recommended by the manufacturer.
3. Insulation Installation on Straight Pipes and Tubes:

    a. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
    b. Insulation must be installed in compression to allow for expansion and contraction. Insulation shall be pushed onto the pipe, never pulled. Stretching of insulation may result in open seams and joints.

4. Insulation Installation on Valves and Pipe Specialties:

    a. Install preformed sections of same material as straight segments of pipe insulation when available.

b. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
c. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

C. Type C Insulation:

1. Seal all longitudinal joints with manufacturer approved adhesive. Secure butt joint strips in a similar manner.
2. Insulate fittings with prefabricated fittings.

3.5 JACKET COVER INSTALLATION

A. Plastic Covering:

1. Provide vapor barrier as specified for insulation type. Cover with plastic jacket covering. Position seams to shed water.
2. Solvent weld all joints with manufacturer recommended cement.
3. Overlap all laps and butt joints 1-1/2" minimum. Repair any loose ends that do not seal securely. Solvent weld all fitting covers in the same manner. Final installation shall be watertight.
4. Use plastic insulation covering on all exposed pipes including, but not limited to:

a. All exposed piping in mechanical rooms that is subject to damage from normal operations. (Example: Piping that must be stepped over routinely.)

5. Elastomeric piping insulation may have two coats of latex paint instead of plastic jacket.

3.6 SCHEDULE

A. Refer to drawings for insulation schedule.

END OF SECTION

SECTION 22 10 00 - PLUMBING PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pipe and Pipe Fittings.

B. Valves.

C. Check Valves.

1.2 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure rating marked on valve body. Remanufactured valves are not acceptable.

B. Piping, Fittings, Valves, and Flux for Potable Water Systems: All components shall be lead free per Federal Act S.3874, Reduction of Lead in Drinking Water Act.

1.3 REFERENCES

A. ANSI/ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings.

B. ANSI/ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.

C. ANSI/ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.

D. ANSI/ASTM B32 - Solder Metal.

E. ASTM B88 - Seamless Copper Water Tube.

F. ASTM B306 - Copper Drainage Tube (DWV).

G. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

H. ASTM C1540 - Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.

I. AWWA C651 - Disinfecting Water Mains.

J. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.

K. CISPI 310 - Joints for Hubless Cast Iron Sanitary Systems.

L. FM 1680 - Couplings Used in Hubless Cast Iron Systems.

M. NSF - National Sanitation Foundation

1.4 SUBMITTALS

A. Submit shop drawings per Section 22 05 00.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with labeling in place.

1.6 COORDINATION DRAWINGS

A. Reference Coordination Drawings article in Section 22 05 00 for required plumbing systems electronic CAD drawings to be provided to Coordinating Contractor for inclusion into composite coordination drawings.

PART 2 - PRODUCTS

2.1 CAST IRON PIPE

A. Cast Iron; Standard Weight; No-Hub Sleeve Gaskets:

1. Pipe: Standard weight no-hub cast iron soil pipe, bituminous corrosion protective coating inside and outside, CISPI 301 and CISPI Trademark.
2. Design Pressure: Gravity Maximum Design Temperature: 180°°F
3. Joints: ASTM C1540, FM 1680, and ASTM C-564.

   a. Heavy Duty, Shielded Stainless Steel Couplings: Neoprene sleeve gasket, 0.010" thick 304 stainless steel shield , stainless steel 5/16" screw type clamps, minimum of four clamps for 1-1/2" to 4" and six clamps for 5" and larger pipe sizes. Clamps shall be tightened to minimum 80 inch pounds or as manufacturer requires. Husky HD-2000 or equal.

4. Restraints: Install pipe and fittings per the Cast Iron Soil Pipe Institute's Designation 310. Restrain pipe and fittings using an engineered and tested product manufactured for restraining no-hub cast iron soil pipe. Install per manufacturer's recommendations.
5. Adapters: Transition from cast iron soil pipe to other pipe materials with manufactured adapters specifically for the application. Adapter must meet the same requirements as the joints listed above. ASTM C1460. Sticker identifying transition fitting application must be visible to view. For example, the most commonly used transition fitting from cast iron no-hub to PVC would be the Husky SD-4200 series.

2.2 COPPER PIPE

A. Copper Pipe; Type L; Solder Joints:

1. Pipe: Type L hard drawn seamless copper tube, ASTM B88.
2. Design Pressure: 175 psi; Maximum Design Temperature: 200°°F.
3. Joints: Solder with 100% lead-free solder and flux, ASTM B32.

4. Fittings: Wrought copper solder joint, ANSI B16.22.

B. Copper Pipe: Type DWV; Solder Joints:

1. Pipe: Type DWV hard temper seamless copper drainage tube, ASTM B306.
2. Design Pressure: Gravity Maximum Design Temperature: 180°°F
3. Joints: Solder with 100% lead-free solder and flux, ASTM B32.
4. Fittings: Cast brass solder joint drainage type, ANSI B16.23 or wrought copper solder joint drainage type, ANSI B16.29.

2.3 VALVES

A. Shutoff Valves:

1. For pipe systems where mechanical press connections are allowed, shutoff valves with mechanical press connections are acceptable subject to the requirements in the paragraphs below.

2. Ball Valves:

a. BA-1: 3" and under, 150 psi saturated steam, 600 psi CWP, full port, threaded or solder ends (acceptable only if rated for soldering in line with 470°°F melting point of lead-free solder), stainless steel ball and trim, Teflon seats and seals.

1) Body: Lead free NSF-372, two-piece bronze of a copper alloy containing less than 15% zinc. Apollo Valves; a division of Aalberts““IPS #77CLF140/240 Series, Milwaukee #UPBA450S, Watts #LFB6080G2-SS, NIBCO #T-585-66-LF, Jomar T-200CSSG.
2) Body: Dezincification resistant brass alloy, lead free NSF-372. Jomar T-100CSSG.
3) Provide solid extended shaft for all insulated piping. (For example, Apollo adds option -04 Stem Extension, NIBCO Nib-Seal Handle-NS, and Jomar modifies valve part number with -IH for insulated handle.)
4) Provide lock out trim for all valves opening to atmosphere installed in domestic water piping over 120°°F, heating water piping over 120°°F, steam, condensate, boiler feed water piping, and gasoline/kerosene piping, and as indicated on the drawings. Solid extended shaft is not required on valves with lockout trim. (For example, Jomar and NIBCO modify valve part number with -LH for locking handle.)

2.4 VALVE CONNECTIONS

A. Provide all connections to match pipe joints. Valves shall be same size as pipe unless noted otherwise.

2.5 CONNECTIONS BETWEEN DISSIMILAR METALS

A. Connections between dissimilar metals shall be insulating dielectric types that provide a water gap between the connected metals, and that either allow no metal path for electron transfer or that provide a wide water gap lined with a non-conductive material to impede electron transfer through the water path.

B. Joints shall be rated for the temperature, pressure, and other characteristics of the service in which they are used, including testing procedure.

C. Aluminum, iron, steel, brass, copper, bronze, galvanized steel and stainless steel are commonly used and require isolation from each other with the following exceptions:

1. Iron and steel connected to each other.
2. Brass, copper, and bronze connected to each other.
3. Brass or bronze valves and specialties connected in closed systems with steel, iron, or stainless steel on both sides of the brass or bronze valves and specialties. Where two or more brass or bronze items occur together, they shall be connected with brass nipples. Brass or bronze valves and specialties cannot be used as a dielectric separation between pipe materials.

D. Dielectric protection is required at connections to equipment of a material different than the piping.

E. Screwed and/or Grooved Joints (acceptable up to 4" size):

1. Dielectric waterway rated for 300 psi CWP and 225°°F.
2. Optional: Copper-silicon casting conforming to UNS C87850 with grooved and/or threaded ends.
3. UL classified in accordance with ANSI / NSF-61 for potable water service.
4. Manufacturers:

   a. Elster Group ClearFlow fittings
   b. Victaulic Series 647
   c. Grinnell Series 407
   d. Matco-Norca

PART 3 - EXECUTION

3.1 PREPARATION

A. Install all products per manufacturer's recommendations.

B. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

C. Remove scale and dirt, on inside and outside, before assembly.

D. Remove all scale, rust, dirt, oils, stickers and thoroughly clean exterior of all bare metal exposed piping, hangers, and accessories in preparation to be painted.

E. Connect to equipment with flanges or unions. Unions or flanges for servicing and disconnect are not required in installations using grooved joint couplings.

F. Use only piping materials rated for the maximum temperature of the application, e.g., do not use PVC for dishwasher drainage or piping that receives boiler blowdown.

G. Existing building sewers or building drains which are shown on the documents to be reused shall be inspected and recorded by closed circuit television for their condition. Report findings back to the Architect, Engineer, and Owner before proceeding with work so any necessary rework can take place if needed.

3.2 SYSTEM, PIPING AND VALVE SCHEDULE

A. Cold Water, Hot Water, Tempered Water, Reclaimed Water - Potable and Non-Potable (Above Ground):

1. Copper Pipe; Type L; Solder Joints: All Sizes
2. Shutoff Valves:, BA-1

B. Sanitary Waste and Vent, Gravity (Above Ground):
1. Cast Iron; Standard Weight; No-Hub Sleeve Gaskets: 1-1/2" to 15"Copper Pipe: Type DWV; Solder Joints: 1-1/4" to 4"

3.3 TESTING PIPING

A. Sanitary Drainage, Sanitary Vent:

1. Test all piping with water to prove tight.
2. Test piping before insulation is applied.
3. Hydrostatically test all soil, waste, and vent piping inside of building with 10 feet head of water for 15 minutes. Inspect before fixtures are connected. If leaks appear, repair them and repeat the test.
4. Hydrostatically test interior downspouts with 10 feet head of water for 15 minutes with no leaks.
5. A smoke/air test at the same pressure may be used in lieu of the hydrostatic water test. Exception: Smoke/air test shall not be performed on plastic piping.
6. Test force mains with water at 105% of the operating pump discharge pressure for 15 minutes.
7. Test pressures stated above shall be as listed or as required by the Authority Having Jurisdiction, whichever is most stringent.

B. Hot Water - Potable and Non-Potable, Cold Water - Potable and Non-Potable:

1. Test pipes underground or in chases and walls before piping is concealed.

2. Test all pipes before the insulation is applied. If insulation is applied before the pipe is tested and a leak develops which ruins the insulation, replace damaged insulation.
3. Test the pipe with 100 psig water pressure or equal inert gas such as nitrogen. Exception: Inert gas test shall not be used to test plastic piping.
4. Hold test pressure for at least 2 hours.
5. Test to be witnessed by the Architect/Engineer's representative, if requested by the Architect/Engineer.

C. All Other Piping:

1. Test piping at 150% of normal operating pressure.
2. Piping shall hold this pressure for one hour with no drop in pressure.
3. Test piping using water, nitrogen, or air as compatible with the final service of the pipe. Do not use combustible fluids.
4. Drain and clean all piping after testing is complete.

3.4 CLEANING PIPING

A. All Water Piping:

1. Flush all piping using faucets, flush valves, etc. until the flow is clean.
2. After flushing, thoroughly clean all inlet strainers, aerators, and other such devices.
3. If necessary, remove valves to clean out all foreign material.

3.5 INSTALLATION

A. General Installation Requirements:

1. Provide dielectric connections between dissimilar metals.
2. Route piping in orderly manner and maintain gradient. Install to conserve building space.
3. Group piping whenever practical at common elevations.
4. Install piping to allow for expansion and contraction without stressing pipe, joints, or equipment.
5. Slope water piping and arrange to drain at low points.
6. All vertical pipe drops to sinks or other equipment installed below the ceiling shall be routed within a wall cavity, unless specifically noted otherwise to be surface mounted. For renovation projects, this Contractor is responsible for opening and patching existing walls for installation of piping. Wall patching shall match existing condition.

B. Installation Requirements in Electrical Rooms:

1. Do not install piping or other equipment above electrical switchboards or panelboards. This includes a dedicated space extending 25 feet from the floor to the structural ceiling with width and depth equal to the equipment.

C. Valves/Fittings and Accessories:

1. Provide clearance for installation of insulation and access to valves and fittings.
2. Provide access doors for concealed valves and fittings.

3. Install valve stems upright or horizontal, not inverted.

D. Sanitary and Storm Piping:

1. Install all sanitary and storm piping inside the building with a slope as shown on the drawings.
2. Sway Bracing: Where horizontal sanitary and/or storm pipes 4 inches and larger change flow direction greater than 45°, rigid bracing or thrust restraints shall be installed to resist movement of the upstream pipe in the direction of pipe flow. The rigid bracing or thrust restraint shall be connected to structure. A change of flow direction from horizontal into a vertical pipe does not require the upstream pipe to be braced.
3. Starter fittings with internal baffles are not permitted.

3.6 PIPE ERECTION AND LAYING

A. Carefully inspect all pipe, fittings, valves, equipment and accessories before installation. Any items that are unsuitable, cracked or otherwise defective shall be removed from the job immediately.

B. All pipe, fittings, valves, equipment and accessories shall have factory applied markings, stampings, or nameplates with sufficient data to determine their conformance with specified requirements.

C. Exercise care at every stage of storage, handling, laying and erecting to prevent entry of foreign matter into piping, fittings, valves, equipment and accessories. Do not install any item that is not clean.

D. Until system is fully operational, all openings in piping and equipment shall be kept closed except when actual work is being performed on that item or system. Closures shall be plugs, caps, blind flanges or other items specifically designed and intended for this purpose.

E. Run pipes straight and true, parallel to building lines with minimum use of offsets and couplings. Provide only offsets required to provide needed headroom or clearance and to provide needed flexibility in pipe lines.

F. Make changes in direction of pipes only with fittings or pipe bends. Changes in size only with fittings. Do not use miter fittings, face or flush bushings, or street elbows. All fittings shall be of the long radius type, unless otherwise shown on the drawings or specified.

G. Provide flanges or unions at all final connections to equipment, traps and valves.

H. Arrange piping and connections so equipment served may be totally removed without disturbing piping beyond final connections and associated shutoff valves.

I. Use full and double lengths of pipe wherever possible.

J. Unless otherwise indicated, install all piping, including shutoff valves and strainers, to coils, pumps and other equipment at line size with reduction in size being made only at control valve or equipment.

K. Cut all pipe to exact measurement and install without springing or forcing except in the case of expansion loops where cold springing is indicated on the drawings.

L. Unless otherwise indicated, branch take-offs shall be from top of mains or headers at either a 45° or 90° angle from the horizontal plane for air lines, and from top, bottom or side for liquids.

3.7 DRAINING AND VENTING

A. Unless otherwise indicated on the drawings, all horizontal water lines, including branches, shall pitch 1" in 40 feet to low points for complete drainage, removal of condensate and venting.

B. Maintain accurate grade where pipes pitch or slope for venting and drainage. No pipes shall have pockets due to changes in elevation.

C. Provide drain valves at all low points of water piping systems for complete or sectionalized draining.

D. Use eccentric reducing fittings on horizontal runs when changing size of pipes for proper drainage and venting. Install gravity drain pipes with bottom of pipe and eccentric reducers in a continuous line; all other liquid lines with top of pipe and eccentric reducers in a continuous line.

E. Provide air vents at high points and wherever else required to eliminate air in all water piping systems.

F. Install air vents in accessible locations. If necessary to trap and vent air in a remote location, install an 1/8" pipe from the tapping location to an accessible location and terminate with a venting device.

G. All vent and drain piping shall be of same materials and construction for the service involved.

3.8 BRANCH CONNECTIONS

A. For domestic water and vent systems only, make branch connections with standard tee or cross fittings of the type required for the service.

B. Reducers are generally not shown. Where pipe sizes change at tee, the tee shall be the size of the largest pipe shown connecting to it.

C. Do not use double wye or double combination wye and eighth bend DWV fittings in horizontal piping.

3.9 JOINING OF PIPE

A. Solder Joints (Copper Pipe):

1. Make up joints with 100% lead-free solder, ASTM B32. Cut tubing so ends are perfectly square and remove all burrs inside and outside. Thoroughly clean sockets of fittings and ends of tubing to remove all oxide, dirt and grease just prior to soldering. Apply flux evenly, but sparingly, over all surfaces to be joined. Heat joints uniformly so solder will flow to all mated surfaces. Wipe excess solder, leaving a uniform fillet around cup of fitting.
2. Flux shall be non-acid type.
3. Solder end valves may be installed directly in the piping system if the entire valve is suitable for use with 470°°F melting point solder. Remove discs and seals during soldering if they are not suitable for 470°°F.

B. No-Hub Sleeve Gaskets (No-Hub) (Cast Iron Pipe):

1. Gasket shall be heavy weight class, conforming to ASTM C564.
2. The gasket shall have an internal center stop.
3. The gasket shall be covered by a stainless steel band secured with a minimum of four stainless steel bands per fitting/joint.
4. Sleeve gaskets shall be installed in accordance with the manufacturer's installation instructions.

C. Couplings: Assemblies with combinations of clamps, gaskets, sleeves, and threaded or flanged parts; compatible with piping and system liquid; and made by piping manufacturer for joining system piping.

D. Adapters and Transition Fittings: Assemblies with combinations of clamps, couplings, adapters, gaskets, and threaded or flanged parts; compatible with piping and system liquid; and made for joining different piping materials.

E. Flanges: Assemblies of companion flanges and gaskets complying with ASME B16.21 and compatible with system liquid, and bolts and nuts.

3.10 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Disinfection of the domestic water piping shall be completed within three (3) weeks prior to building occupancy. Contractor is responsible for disinfecting water piping if used by workers during construction; disinfection during construction does not eliminate the requirement for final disinfection prior to occupancy. Flushing of piping shall be completed within two (2) weeks prior to building occupancy.

B. Provide necessary connections at the start of individual sections of mains for adding chlorine.

C. Before starting work, verify system is complete, flushed and clean.

D. Follow the disinfection of potable water procedure outlined in this project’s applicable plumbing code. For example: IPC 610.1, UPC 609.10, CPC 609.9, and Illinois 890.1180. Where local codes do not outline a disinfection procedure, follow the International Plumbing Code procedure 610.1.

E. Bleed water from all outlets to ensure chlorine distribution throughout the entire domestic water system.

F. Take water samples, no sooner than 24 hours after flushing, from 2% of outlets and from water entry. Obtain, analyze, and test samples in accordance with AWWA C651, Section 5 - Verification.

END OF SECTION

SECTION 22 30 00 - PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Water Heaters.

1.2 QUALITY ASSURANCE

A. Products and installation of specified products shall conform to recommendations and requirements of the following organizations:

1. American Gas Association (AGA).
2. National Sanitation Foundation (NSF).
3. American Society of Mechanical Engineers (ASME).
4. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
5. National Electrical Manufacturers' Association (NEMA).
6. Underwriters' Laboratories (UL).

B. Water Heater Performance Requirements: Equipment efficiency not less than prescribed by ASHRAE 90.1 when tested in accordance with DOE 10 CFR, ANSI Z21.10.1 and ANSI Z21.10.3.

C. Conform to ASME Section VIII for construction of water heaters and heat exchangers. Provide boilers registered with National Board of Boiler and Pressure Vessel Inspectors.

1.3 REFERENCES

A. ANSI/ASHRAE/IES Standard 90.1 (latest published edition) - Energy Standard for Buildings Except Low-Rise Residential Buildings.

B. ANSI/ASME Section 8D - Pressure Vessels.

C. ANSI/NFPA 70 - National Electrical Code.

D. ANSI/UL 1453 - Electric Booster and Commercial Storage Tank Water Heaters.

E. ASSE 1005 - Water Heater Drain Valves, 3/4" Iron Pipe Size.

F. UL 174 - Household Electric Storage Tank Water Heaters.

1.4 SUBMITTALS

A. Submit shop drawings under provisions of Section 22 05 00.

B. Include dimension drawings of water heaters indicating components and connections to other equipment and piping.

C. Include heat exchanger dimensions, size of tappings, and performance data.

D. Include dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.

E. For equipment connected to an electric power source, submit short circuit rating (SCCR) of integrated unit.

F. Submit manufacturer's installation instructions including control and electrical power/controls wiring diagrams.

G. Submit manufacturer's certificate that pressure vessels meet or exceed specified requirements.

H. Submit operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.6 REGULATORY REQUIREMENTS

A. Water heaters shall conform to AGA, ANSI/NFPA 54, ANSI/NFPA 70, ANSI/UL 1453 as applicable.

B. Conform to ANSI/ASME Section 8 Division 1 for fabrication of steel pressure vessels.

C. Conform to ANSI/ASME Section 10 for manufacture of fiber-reinforced plastic pressure vessels.

PART 2 - PRODUCTS

2.1 WATER HEATERS

A. All water heaters shall be as scheduled on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all items in accordance with manufacturer's instructions.

3.2 WATER HEATER INSTALLATION

A. Install water heaters level and plumb, according to drawings, manufacturer's instructions, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

B. Install combination temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend drain piping full size from relief valve and discharge by positive air gap onto closest floor drain. Discharge pipe material shall be same as domestic water piping.

END OF SECTION

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. All plumbing fixtures.

1.2 REFERENCES

A. ANSI A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.

B. ANSI A112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use).

C. Americans with Disabilities Act (ADA), Title III.

D. The Energy Policy Act (EPAct) of 2005.

1.3 SUBMITTALS

A. Submit product data under provisions of Section 22 05 00. Submittals shall include fixture carriers for record purposes only. Architect/Engineer does not review or approve carriers except for manufacturer.

B. Include fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. For fixtures and trim requiring electrical connections, submit product data indicating general assembly, components, electrical power/controls wiring diagrams, and service connections.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All fixtures shall be as shown on the drawings and as scheduled in the plumbing material list. Additional requirements below:

B. All lavatory and sink trim shall be from the same manufacturer where possible.

C. All fixtures shall be lead free. Faucets, traps, stops, and other fixture accessories shall not contain more lead than allowed per the latest State or Federal Act.

D. P-Traps and Tailpieces:

1. Sinks:

a. Accessible Type: 1-1/2" chrome plated 17-gauge cast brass offset tailpiece and p-trap with cleanout on bottom of trap.

b. Non-Accessible Type: Offset not required for tailpiece, otherwise same.

2. Acceptable Manufacturers:

a. McGuire
b. Keeney
c. Dearborn Brass
d. Zurn
e. Chicago Faucet

E. Angle Stops and Supplies:

1. Lavatories, Sinks and Tank Type Water Closets:

a. Lead-free, 3/8" chrome plated brass, quarter turn ball valve type with loose key stops, solder connection type.
b. Lead-free, 3/8" chrome plated soft copper risers .
c. Acceptable Manufacturers:

1) McGuire
2) BrassCraft
3) Keeney
4) Zurn
5) Chicago Faucet

PART 3 - EXECUTION

3.1 INSTALLATION

A. General Installation Requirements:

1. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.
2. Install each fixture with trap easily removable for servicing and cleaning. Use screwed tailpiece couplings. Connect fixture waste to stack with slip fitting.
3. Provide fixtures with supply lines, stop valves, reducers, escutcheons, and any other items required for a complete and operational plumbing fixture assembly.
4. Install components level and plumb.
5. Where there is a possibility of water following pipe brackets, etc., into a wall; caulk escutcheons, space around brackets, etc., to exclude water. Refer to DIVISION 7 for "Caulking" requirements.
6. Refer to architectural drawings for fixture mounting heights.

B. Exposed or Inside Accessible Cabinets Traps, Valve and Pipe Requirements:

1. All water or waste piping for plumbing fixtures that is exposed or inside cabinets shall be chrome plated.

3.2 ADJUSTING AND CLEANING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

B. At completion, clean plumbing fixtures, equipment, and faucet aerator screens.

3.3 FIXTURE ROUGH-IN SCHEDULE

A. Rough-in fixture piping connections in accordance with table on plumbing drawings of minimum sizes for particular fixtures.

END OF SECTION

SECTION 23 05 00 - BASIC HVAC REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements applicable to all Division 23 Sections. Also refer to Division 01 - General Requirements.

B. All materials and installation methods shall conform to the applicable standards, guidelines and codes referenced herein and within each specification section.

1.2 SCOPE OF WORK

A. This Specification and the associated drawings govern the furnishing, installing, testing and placing into satisfactory operation the Mechanical Systems.

B. Each Contractor shall provide all new materials indicated on the drawings and/or in these specifications, and all items required to make the portion of the Mechanical Work a finished and working system.

C. All work will be awarded under a single General Contract. The division of work listed below is for the Contractor's convenience and lists normal breakdown of the work.

D. Scope of Work:

1. Plumbing Work: Refer to Section 22 05 00 "Basic Plumbing Requirements".
2. Air Conditioning and Ventilating Work shall include, but is not necessarily limited to:

    a. Furnish and install complete exhaust ductwork systems including all fittings, insulation, inlets, and fans.
    b. Furnish and install mechanical room ventilation systems including louvers, ductwork, insulation, fans, and controls.
    c. Complete all applicable tests, certifications, forms, and matrices.

3. Testing, Adjusting, and Balancing Work shall include, but is not necessarily limited to:

    a. Furnish complete testing, adjusting, and balancing as specified in Section 23 05 93, including, but not limited to, air systems, hydronic systems, plumbing systems, and verification of control systems.
    b. Complete all applicable tests, certifications, forms, and matrices

1.3 ALTERNATES

A. Refer to section 01 23 00.

1.4 UNIT PRICES

A. Refer to section 01 22 00.

1.5 DIVISION OF WORK BETWEEN MECHANICAL, ELECTRICAL & CONTROL CONTRACTORS

A. Definitions:

1. "Mechanical Contractors" refers to the following:

   a. Plumbing Contractor.
   b. Heating Contractor.
   c. Air Conditioning and Ventilating Contractor.
   d. Temperature Control Contractor.
   e. Testing, Adjusting, and Balancing Contractor.

2. Motor Control Wiring: The wiring associated with the remote operation of the magnetic coils of magnetic motor starters or relays, or the wiring that permits direct cycling of motors by means of devices in series with the motor power wiring. In the latter case the devices are usually single phase and are usually connected to the motor power wiring through a manual motor starter having "Manual-Off-Auto" provisions.
3. Control devices such as start-stop push buttons, thermostats, pressure switches, flow switches, relays, etc., generally represent the types of equipment associated with motor control wiring.
4. Motor control wiring is single phase and usually 120 volts. In some instances, the voltage will be the same as the motor power wiring. Generally, where the motor power wiring exceeds 120 volts, a control transformer is used to give a control voltage of 120 volts.
5. Temperature Control Wiring: The wiring associated with the operation of a motorized damper, solenoid valve or motorized valve, etc., either modulating or two-position, as opposed to wiring which directly powers or controls a motor used to drive equipment such as fans, pumps, etc.

   a. This wiring will be from a 120 volt source and may continue as 120 volt, or be reduced in voltage (24 volt) in which case a control transformer shall be furnished as part of the temperature control wiring.

6. Control Motor: An electric device used to operate dampers, valves, etc. It may be two-position or modulating. Conventional characteristics of such a motor are 24 volts, 60 cycles, 1 phase, although other voltages may be encountered.
7. Voltage is generally specified and scheduled as distribution voltage. Motor submittals may be based on utilization voltage if it corresponds to the correct distribution voltage.

Distribution/Nominal Voltage	Utilization Voltage
120	115
208	200
240	230
277	265

480	460

B. General:

1. The purpose of these Specifications is to outline the Electrical and Mechanical Contractor's responsibilities related to electrical work required for items such as temperature controls, mechanical equipment, fans, chillers, compressors and the like. The exact wiring requirements for much of the equipment cannot be determined until the systems have been selected and submittals reviewed. Therefore, the electrical drawings show only known wiring related to such items. All wiring not shown on the electrical drawings, but required for mechanical systems, is the responsibility of the Mechanical Contractor.
2. Where the drawings require the Electrical Contractor to wire between equipment furnished by the Mechanical Contractor, such wiring shall terminate at terminals provided in the equipment. The Mechanical Contractor shall provide complete electrical power/controls wiring diagrams and supervision to the Electrical Contractor and designate the terminal numbers for correct wiring.
3. All electrical work shall conform to the National Electrical Code. All provisions of the Electrical Specifications concerning wiring, protection, etc., apply to wiring provided by the Mechanical Contractor unless noted otherwise.
4. Control low (24V) and control line (120V) voltage wiring, conduit, and related switches and relays required for the automatic control and/or interlock of motors and equipment, including final connection, are to be furnished and installed under Divisions 21, 22 and 23. Materials and installation to conform to Class 1 or 2 requirements.
5. All Contractors shall establish utility elevations prior to fabrication and shall coordinate their material and equipment with other trades. When a conflict arises, priority is as follows:

    a. Light fixtures.
    b. Gravity flow piping, including steam and condensate.
    c. Electrical busduct.
    d. Sheet metal.
    e. Electrical cable trays, including access space.
    f. Sprinkler piping and other piping.
    g. Electrical conduits and wireway.

C. Mechanical Contractor's Responsibility:

1. Assumes responsibility for internal wiring of all equipment provided by the Mechanical Contractor, for example:

    a. Boiler Feed Pumps.
    b. Burners.
    c. Chillers.
    d. Computer Room Air Conditioning Units.
    e. Condensate Return Stations.
    f. Condensing Units.
    g. Makeup Air Units.

h. Electric Humidifiers.
i. Gas Trains.
j. Package Air Handling Units.
k. Packaged Rooftop Units.

2. Assumes all responsibility for the Temperature Control wiring, when the Temperature Control Contractor is a Subcontractor to the Mechanical Contractor.
3. Shall verify all existing equipment sizes and capacities where units are to be modified, moved or replaced. Contractor shall notify Architect/Engineer of any discrepancies prior to ordering new units or replacement parts, including replacements of equipment motors.
4. Temperature Control Subcontractor's Responsibility:

   a. Wiring of all devices needed to make the Temperature Control System functional.
   b. Verifying any control wiring on the electrical drawings as being by the Electrical Contractor. All wiring required for the Control System, but not shown on the electrical drawings, is the responsibility of the Temperature Control Subcontractor.
   c. Coordinating equipment locations (such as relays, transformers, etc.) with the Electrical Contractor, where wiring of the equipment is by the Electrical Contractor.

5. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

D. Electrical Contractor's Responsibility:

1. Provides all combination starters, manual starters and disconnect devices shown on the Electrical Drawings or indicated to be by the Electrical Contractor on the Mechanical Drawings or Specifications.
2. Installs and wires all remote control devices furnished by the Mechanical Contractor or Temperature Control Subcontractor when so noted on the Electrical Drawings.
3. Provides motor control and temperature control wiring, where so noted on the drawings.
4. Coordinate with the Mechanical Contractor for size of motors and/or other electrical devices involved with repair or replacement of existing equipment.
5. Furnishes, installs and connects all relays, etc., for automatic shutdown of certain fans upon actuation of the Fire Alarm System as indicated and specified in Division 28.
6. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

1.6 QUALITY ASSURANCE

A. Contractor's Responsibility Prior to Submitting Pricing Data:

1. The Contractor is responsible for constructing complete and operating systems. The Contractor acknowledges and understands that the Contract Documents are a two-dimensional representation of a three-dimensional object, subject to human interpretation. This representation may include imperfect data, interpreted codes, utility guidelines, three-dimensional conflicts, and required field coordination items. Such deficiencies can be corrected when identified prior to ordering material and starting installation. The Contractor agrees to carefully study and compare the individual Contract Documents and report at once in writing to the Design Team any deficiencies the Contractor may discover. The Contractor further agrees to require each subcontractor to likewise study the documents and report at once any deficiencies discovered.
2. The Contractor shall resolve all reported deficiencies with the Architect/Engineer prior to awarding any subcontracts, ordering material, or starting any work with the Contractor's own employees. Any work performed prior to receipt of instructions from the Design Team will be done at the Contractor's risk.

B. Qualifications:

1. Only products of reputable manufacturers are acceptable.
2. All Contractors and subcontractors shall employ only workers skilled in their trades.

C. Compliance with Codes, Laws, Ordinances:

1. Conform to all requirements of the City of Chester, PA Codes, Laws, Ordinances and other regulations having jurisdiction.
2. Conform to all State Codes.
3. If there is a discrepancy between the codes and regulations and these specifications, the Architect/Engineer shall determine the method or equipment used.
4. If the Contractor notes, at the time of bidding, that any parts of the drawings or specifications do not comply with the codes or regulations, Contractor shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time for this procedure, Contractor shall submit with the proposal a separate price to make the system comply with the codes and regulations.
5. All changes to the system made after letting of the contract, to comply with codes or requirements of Inspectors, shall be made by the Contractor without cost to the Owner.
6. If there is a discrepancy between manufacturer's recommendations and these specifications, the manufacturer's recommendations shall govern.
7. All rotating shafts and/or equipment shall be completely guarded from all contact. Partial guards and/or guards that do not meet all applicable OSHA standards are not acceptable. Contractor is responsible for providing this guarding if it is not provided with the equipment supplied.

D. Permits, Fees, Taxes, Inspections:

1. Procure all applicable permits and licenses.
2. Abide by all laws, regulations, ordinances, and other rules of the State or Political Subdivision where the work is done, or as required by any duly constituted public authority.
3. Pay all charges for permits or licenses.

4. Pay all fees and taxes imposed by the State, Municipal and/or other regulatory bodies.
5. Pay all charges arising out of required inspections by an authorized body.
6. Pay all charges arising out of required contract document reviews associated with the project and as initiated by the Owner or authorized agency/consultant.
7. Where applicable, all fixtures, equipment and materials shall be approved or listed by Underwriter's Laboratories, Inc.

E. Examination of Drawings:

1. The drawings for the mechanical work are completely diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment, outlets, etc., and the approximate sizes of equipment.
2. Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of pipes and ducts to best fit the layout of the job.
3. Scaling of the drawings is not sufficient or accurate for determining these locations.
4. Where job conditions require reasonable changes in indicated arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.
5. Because of the scale of the drawings, certain basic items, such as fittings, boxes, valves, unions, etc., may not be shown, but where required by other sections of the specifications or required for proper installation of the work, such items shall be furnished and installed.
6. If an item is either on the drawings or in the specifications, it shall be included in this contract.
7. Determination of quantities of material and equipment required shall be made by the Contractor from the documents. Where discrepancies arise between drawings, schedules and/or specifications, the greater number shall govern.
8. Where used in mechanical documents, the word "furnish" shall mean supply for use, the word "install" shall mean connect complete and ready for operation, and the word "provide" shall mean to supply for use and connect complete and ready for operation.

    a. Any item listed as furnished shall also be installed, unless otherwise noted.
    b. Any item listed as installed shall also be furnished, unless otherwise noted.

F. Field Measurements:

1. Verify all pertinent dimensions at the job site before ordering any materials or fabricating any supports, pipes or ducts.

G. Electronic Media/Files:

1. Construction drawings for this project have been prepared utilizing Revit.
2. Contractors and Subcontractors may request electronic media files of the contract drawings and/or copies of the specifications. Specifications will be provided in PDF format.
3. Upon request for electronic media, the Contractor shall complete and return a signed "Electronic File Transmittal" form provided by IMEG.
4. If the information requested includes floor plans prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.

5. The electronic contract documents can be used for preparation of shop drawings and as-built drawings only. The information may not be used in whole or in part for any other project.
6. The drawings prepared by IMEG for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.
7. The use of these CAD documents by the Contractor does not relieve them from their responsibility for coordination of work with other trades and verification of space available for the installation.
8. The information is provided to expedite the project and assist the Contractor with no guarantee by IMEG as to the accuracy or correctness of the information provided. IMEG accepts no responsibility or liability for the Contractor's use of these documents.

1.7 WEB-BASED PROJECT SOFTWARE

A. The General Contractor shall provide a web-based project software site for the purpose of hosting and managing project communication and documentation until completion of the warranty phase.

B. The web-based project software shall include, at a minimum, the following features: construction schedule, submittals, RFIs, ASIs, construction change directives, change orders, drawing management, specification management, payment applications, contract modifications, meeting minutes, construction progress photos.

C. Provide web-based project software user licenses for use by the Architect/Engineer. Access will be provided from the start of the project through the completion of the warranty phase.

D. At project completion, provide digital archive of entire project in format that is readable by common desktop software applications in format acceptable to Architect/Engineer. Provide data in locked format to prevent further changes.

1.8 SUBMITTALS

A. Submittals shall be required for the following items, and for additional items where required elsewhere in the specifications or on the drawings.

1. Submittals List:

Referenced Specification Section	Submittal Item
23 05 00	Owner Training Agenda
23 05 13	Motors
23 05 48	Vibration Isolation Equipment
23 05 93	Testing, Adjusting, and Balancing
23 07 13	Duct Insulation
23 31 00	Ductwork
23 31 00	Ductwork Layout Drawings
23 31 00	Duct Specialties (such as Turning Vanes)
23 34 16	Centrifugal Fans
23 37 00	Grilles, Registers, and Diffusers

23 37 00 Louvers

B. General Submittal Procedures: In addition to the provisions of Division 01, the following are required:

1. Transmittal: Each transmittal shall include the following:

   a. Date
   b. Project title and number
   c. Contractor's name and address
   d. Division of work (e.g., plumbing, heating, ventilating, etc.)
   e. Description of items submitted and relevant specification number
   f. Notations of deviations from the contract documents
   g. Other pertinent data

2. Submittal Cover Sheet: Each submittal shall include a cover sheet containing:

   a. Date
   b. Project title and number
   c. Architect/Engineer
   d. Contractor and subcontractors' names and addresses
   e. Supplier and manufacturer's names and addresses
   f. Division of work (e.g., plumbing, heating, ventilating, etc.)
   g. Description of item submitted (using project nomenclature) and relevant specification number
   h. Notations of deviations from the contract documents
   i. Other pertinent data
   j. Provide space for Contractor's review stamps

3. Composition:

   a. Submittals shall be submitted using specification sections and the project nomenclature for each item.
   b. Individual submittal packages shall be prepared for items in each specification section. All items within a single specification section shall be packaged together where possible. An individual submittal may contain items from multiple specifications sections if the items are intimately linked (e.g., pumps and motors).
   c. All sets shall contain an index of the items enclosed with a general topic description on the cover.

4. Content: Submittals shall include all fabrication, erection, layout, and setting drawings; manufacturers' standard drawings; schedules; descriptive literature, catalogs and brochures; performance and test data; electrical power criteria (e.g., voltage, phase, amps, horsepower, kW, etc.) wiring and control diagrams; Short Circuit Current Rating (SCCR); dimensions; shipping and operating weights; shipping splits; service clearances; and all other drawings and descriptive data of materials of construction as may be required to show that the materials, equipment or systems and the location thereof conform to the requirements of the contract documents.

5. Contractor's Approval Stamp:

    a. The Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. The Contractor shall stamp, date and sign each submittal certifying it has been reviewed.
    b. Unstamped submittals will be rejected.
    c. The Contractor's review shall include, but not be limited to, verification of the following:

        1) Only approved manufacturers are used.
        2) Addenda items have been incorporated.
        3) Catalog numbers and options match those specified.
        4) Performance data matches that specified.
        5) Electrical characteristics and loads match those specified.
        6) Equipment connection locations, sizes, capacities, etc. have been coordinated with other affected trades.
        7) Dimensions and service clearances are suitable for the intended location.
        8) Equipment dimensions are coordinated with support steel, housekeeping pads, openings, etc.
        9) Constructability issues are resolved (e.g., weights and dimensions are suitable for getting the item into the building and into place, sinks fit into countertops, etc.).

    d. The Contractor shall review, stamp and approve all subcontractors' submittals as described above.
    e. The Contractor's approval stamp is required on all submittals. Approval will indicate the Contractor's review of all material and a complete understanding of exactly what is to be furnished. Contractor shall clearly mark all deviations from the contract documents on all submittals. If deviations are not marked by the Contractor, then the item shall be required to meet all drawing and specification requirements.

6. Submittal Identification and Markings:

    a. The Contractor shall clearly mark each item with the same nomenclature applied on the drawings or in the specifications.
    b. The Contractor shall clearly indicate the size, finish, material, etc.
    c. Where more than one model is shown on a manufacturer's sheet, the Contractor shall clearly indicate exactly which item and which data is intended.
    d. All marks and identifications on the submittals shall be unambiguous.

7. Schedule submittals to expedite the project. Coordinate submission of related items.
8. Identify variations from the contract documents and product or system limitations that may be detrimental to the successful performance of the completed work.
9. Reproduction of contract documents alone is not acceptable for submittals.
10. Incomplete submittals will be rejected without review. Partial submittals will only be reviewed with prior approval from the Architect/Engineer.
11. Submittals not required by the contract documents may be returned without review.

12. The Architect/Engineer's responsibility shall be to review one set of shop drawing submittals for each product. If the first submittal is incomplete or does not comply with the drawings and/or specifications, the Contractor shall be responsible to bear the cost for the Architect/Engineer to recheck and handle the additional shop drawing submittals.
13. Submittals shall be reviewed and approved by the Architect/Engineer before releasing any equipment for manufacture or shipment.
14. Contractor's responsibility for errors, omissions. or deviation from the contract documents in submittals is not relieved by the Architect/Engineer's approval.
15. Schedule shall allow for adequate time to perform orderly and proper review of submittals, including time for consultants and Owner if required, and resubmittals by Contractor if necessary, and to cause no delay in Work or in activities of Owner or other contractors.

    a. Allow at least two weeks for Architect's/Engineer's review and processing of each submittal.

16. Architect/Engineer reserves the right to withhold action on a submittal which, in the Architect/Engineer's opinion, requires coordination with other submittals until related submittals are received. The Architect/Engineer will notify the Contractor, in writing, when they exercise this right.

C. Electronic Submittal Procedures:

1. Distribution: Email submittals as attachments to all parties designated by the Architect/Engineer, unless a web-based submittal program is used.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.

    a. Submittal file name: 23 XX XX.description.YYYYMMDD
    b. Transmittal file name: 23 XX XX.description.YYYYMMDD

5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.

1.9 CHANGE ORDERS

A. A detailed material and labor takeoff shall be prepared for each change order, along with labor rates and markup percentages. Change orders shall be broken down by sheet or associated individual line item indicated in the change associated narrative, whichever provides the most detailed breakdown. Change orders with inadequate breakdown will be rejected.

B. Itemized pricing with unit cost shall be provided from all distributors and associated subcontractors.

C. Change order work shall not proceed until authorized.

1.10 PRODUCT DELIVERY, STORAGE, HANDLING & MAINTENANCE

A. Exercise care in transporting and handling to avoid damage to materials. Store materials on the site to prevent damage. Keep materials clean, dry and free from harmful conditions. Immediately remove any materials that become wet or that are suspected of becoming contaminated with mold or other organisms.

B. Protect equipment, components, and openings with airtight covers and exercise care at every stage of storage, handling, and installation of equipment to prevent airborne dust and dirt from entering or fouling equipment to include, but not limited to:

1. Motor windings and ventilation openings.
2. Bearings.
3. Equipment Pipe and Accessories connections openings. (e.g. boiler connections, coil connections, etc.)
4. Equipment Duct and Accessories connections openings. (e.g. AHU/RTU duct connections; Terminal Air Boxes, etc.)
5. Starter and control cabinets.
6. Heat transfer coils.
7. Pump Seals.
8. Combustion burner and blower equipment (e.g. combustion air intake, combustion vent/flue, etc.)

C. Equipment and components that are visibly damaged or have been subject to environmental conditions prior to building turnover to Owner that could shorten the life of the component (for example, water damage, humidity, dust and debris, excessive hot or cold storage location, etc.) shall be repaired or replaced with new equipment or components without additional cost to the building owner.

D. Keep all bearings properly lubricated and all belts properly tensioned and aligned.

E. Coordinate the installation of heavy and large equipment with the General Contractor and/or Owner. If the Mechanical Contractor does not have prior documented experience in rigging and lifting similar equipment, he/she shall contract with a qualified lifting and rigging service that has similar documented experience. Follow all equipment lifting and support guidelines for handling and moving.

F. Contractor is responsible for moving equipment into the building and/or site. Contractor shall review site prior to bid for path locations and any required building modifications to allow movement of equipment. Contractor shall coordinate the work with other trades.

1.11 WARRANTY

A. Provide one-year warranty, unless otherwise noted, to the Owner for all fixtures, equipment, materials, and workmanship.

B. The warranty period for all work in this Division of the specifications shall commence on the date of final acceptance, unless a whole or partial system or any separate piece of equipment or component is put into use for the benefit of any party other than the installing contractor with prior written authorization. In this instance, the warranty period shall commence on the date when such whole system, partial system or separate piece of equipment or component is placed in operation and accepted in writing by the Owner.

C. Warranty requirements shall extend to correction, without cost to the Owner, of all Work found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage resulting from defects or nonconformance with contract documents.

1.12 INSURANCE

A. Contractor shall maintain insurance coverage as set forth in Division 0 of these specifications.

1.13 MATERIAL SUBSTITUTION

A. Where several manufacturers' names are given, the scheduled manufacturer is the basis for job design and establishes the quality required.

B. Equivalent equipment manufactured by the other listed manufacturers may be used. Contractor shall ensure that all items submitted by these other manufacturers meet all requirements of the drawings and specifications and fits in the allocated space. When using other listed manufacturers, the Contractor shall assume responsibility for any and all modifications necessary (including, but not limited to structural supports, electrical connections, piping and ductwork connections and arrangement, plumbing connections and rough-in, and regulatory agency approval, etc.) and coordinate such with other contractors.

C. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used if approval is secured in writing from the Architect/Engineer not later than ten days prior to the bid opening.

D. This Contractor assumes all costs incurred as a result of using the offered material, article or equipment, on the Contractors part or on the part of other Contractors whose work is affected.

E. This Contractor may list voluntary add or deduct prices for alternate materials on the bid form. These items will not be used in determining the low bidder.

F. All material substitutions requested later than ten (10) days prior to bid opening must be listed as voluntary changes on the bid form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 JOBSITE SAFETY

A. Neither the professional activities of the Architect/Engineer, nor the presence of the Architect/Engineer or the employees and subconsultants at a construction site, shall relieve the Contractor and other entity of their obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Architect/Engineer and personnel have no authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions. The Contractor is solely responsible for jobsite safety. The Architect/Engineer and the Architect/Engineer's consultants shall be indemnified and shall be made additional insureds under the Contractor's general liability insurance policy.

3.2 ARCHITECT/ENGINEER OBSERVATION OF WORK

A. The Contractor shall provide seven (7) calendar days' notice to the Architect/Engineer prior to:

1. Placing fill over underground and underslab utilities.
2. Covering exterior walls, interior partitions and chases.
3. Installing hard or suspended ceilings and soffits.

B. The Architect/Engineer will have the opportunity to review the installation and provide a written report noting deficiencies requiring correction. The Contractor's schedule shall account for these reviews and show them as line items in the approved schedule.

C. Above-Ceiling Final Observation

1. All work above the ceilings must be complete prior to the Architect/Engineer's review. This includes, but is not limited to:

a. Pipe insulation is installed and fully sealed.
b. Pipe and duct wall penetrations are sealed.
c. Pipe identification and valve tags are installed.
d. Main, branch and flexible ducts are installed.
e. Diffusers, registers and grilles are installed and connected to ductwork.
f. Terminal air box reheat coil piping or wiring is complete.
g. Terminal air box control wiring is complete and all control boxes are closed.

2. In order to prevent the Above-Ceiling Final Observation from occurring too early, the Contractor shall review the status of the work and certify, in writing, that the work is ready for the Above-Ceiling Final Observation.

3. It is understood that if the Architect/Engineer finds the ceilings have been installed prior to this review and prior to 7 days elapsing, the Architect/Engineer may not recommend further payments to the contractor until such time as full access has been provided.

3.3 PROJECT CLOSEOUT

A. The following paragraphs supplement the requirements of Division 01.

B. Final Jobsite Observation:

1. In order to prevent the Final Jobsite Observation from occurring too early, the Contractor is required to review the completion status of the project and certify that the job is ready for the final jobsite observation.
2. Attached to the end of this section is a typical list of items that represent the degree of job completeness expected prior to requesting a review.
3. Upon Contractor certification that the project is complete and ready for a final observation, the Contractor shall sign the attached certification and return it to the Architect/Engineer so that the final observation can be scheduled.
4. It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineer's additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.

C. Before final payment is authorized, this Contractor must submit the following:

1. Operation and maintenance manuals with copies of approved shop drawings.
2. Record documents including marked-up or reproducible drawings and specifications.
3. A report documenting the instructions given to the Owner's representatives complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of This Contractor and shall be signed by the Owner's representatives.
4. Start-up reports on all equipment requiring a factory installation inspection or start-up.
5. Provide spare parts, maintenance, and extra materials in quantities specified in individual specification sections. Deliver to project site and place in location as directed; receipt by Architect/Engineer required prior to final payment approval.

3.4 OPERATION AND MAINTENANCE MANUALS

A. General:

1. Provide an electronic copy of the O&M manuals as described below for Architect/Engineer's review and approval. The electronic copy shall be corrected as required to address the Architect/Engineer's comments. Once corrected, electronic copies and paper copies shall be distributed as directed by the Architect/Engineer.
2. Approved O&M manuals shall be completed and in the Owner's possession prior to Owner's acceptance and at least 10 days prior to instruction of operating personnel.

B. Electronic Submittal Procedures:

1. Distribution: Email the O&M manual as attachments to all parties designated by the Architect/Engineer.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.

    a. O&M file name: O&M.div23.contractor.YYYYMMDD
    b. Transmittal file name: O&Mtransmittal.div23.contractor.YYYYMMDD

5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.
6. Provide the Owner with an approved copy of the O&M manual on compact discs (CD), digital video discs (DVD), or flash drives with a permanently affixed label, printed with the title "Operation and Maintenance Instructions", title of the project and subject matter of disc/flash drive when multiple disc/flash drives are required.
7. All text shall be searchable.
8. Bookmarks shall be used, dividing information first by specification section, then systems, major equipment and finally individual items. All bookmark titles shall include the nomenclature used in the construction documents and shall be an active link to the first page of the section being referenced.

C. Operation and Maintenance Instructions shall include:

1. Title Page: Include title page with project title, Architect, Engineer, Contractor, all subcontractors, and major equipment suppliers, with addresses, telephone numbers, website addresses, email addresses and point of contacts. Website URLs and email addresses shall be active links in the electronic submittal.
2. Table of Contents: Include a table of contents describing specification section, systems, major equipment, and individual items.
3. Copies of all final approved shop drawings and submittals. Include Architect's/Engineer's shop drawing review comments. Insert the individual shop drawing directly after the Operation and Maintenance information for the item(s) in the review form.
4. Copy of final approved test and balance reports.
5. Copies of all factory inspections and/or equipment startup reports.
6. Copies of warranties.
7. Schematic electrical power/controls wiring diagrams of the equipment that have been updated for field conditions. Field wiring shall have label numbers to match drawings.
8. Dimensional drawings of equipment.
9. Capacities and utility consumption of equipment.
10. Detailed parts lists with lists of suppliers.
11. Operating procedures for each system.

12. Maintenance schedule and procedures. Include a chart listing maintenance requirements and frequency.
13. Repair procedures for major components.
14. List of lubricants in all equipment and recommended frequency of lubrication.
15. Instruction books, cards, and manuals furnished with the equipment.

3.5 INSTRUCTING THE OWNER'S REPRESENTATIVES

A. Adequately instruct the Owner's designated representatives in the maintenance, care, and operation of all systems installed under this contract.

B. Provide verbal and written instructions to the Owner's representatives by FACTORY PERSONNEL in the care, maintenance, and operation of the equipment and systems.

C. The Owner has the option to make a video recording of all instructions. Coordinate schedule of instructions to facilitate this recording.

D. The instructions shall include:

1. Explanation of all system flow diagrams.
2. Explanation of all air handling systems.
3. Temperature control system operation including calibration, adjustment and proper operating conditions of all sensors.
4. Maintenance of equipment.
5. Smoke control systems.
6. Stairwell pressurization systems.
7. Start-up procedures for all major equipment.
8. Explanation of seasonal system changes.
9. Description of emergency system operation.

E. Notify the Architect/Engineer of the time and place for the verbal instructions to be given to the Owner's representative so a representative can attend if desired.

F. Minimum hours of instruction for each item shall be:

1. Exhaust System(s) - two hours.

G. The Contractor shall prepare a detailed, written training agenda and submit it to the Architect/Engineer a minimum of two weeks prior to the formal training for approval. The written agenda shall include specific training points within the items described above. For example: how to adjust setpoints, troubleshooting, proper start-up, proper shut-down, seasonal changes, draining, venting, changing filters, changing belts, etc. Failure to provide and follow an approved training agenda may result in additional training required at the expense of the Contractor.

H. Operating Instructions:

1. Contractor is responsible for all instructions to the Owner's representatives for the mechanical and control systems.

2. If the Contractor does not have staff that can adequately provide the required instructions the Contractor shall include in the bid an adequate amount to reimburse the Owner for the Architect/Engineer to perform these services.

3.6 SYSTEM STARTING AND ADJUSTING

A. The mechanical systems shall be complete and operating. System startup, testing, adjusting, and balancing to obtain satisfactory system performance is the responsibility of the Contractor. This includes calibration and adjustments of all controls, noise level adjustments and final comfort adjustments as required.

B. Complete all manufacturer-recommended startup procedures and checklists to verify proper motor rotation, electrical power voltage is within equipment limitations, equipment controls maintain pressures and temperatures within acceptable ranges, all filters and protective guards are in-place, acceptable access is provided for maintenance and servicing, and equipment operation does not pose a danger to personnel or property.

C. Operate all HVAC systems continuously for at least one week prior to occupancy to bring construction materials to suitable moisture levels.

D. Contractor shall adjust the mechanical systems and controls at season changes during the one year warranty period, as required, to provide satisfactory operation and to prove performance of all systems in all seasons.

E. All operating conditions and control sequences shall be tested during the start-up period. Test all interlocks, safety shutdowns, controls, and alarms.

F. The Contractor, subcontractors, and equipment suppliers shall have skilled technicians to ensure that all systems perform properly. If the Architect/Engineer is requested to visit the job site for trouble shooting, assisting in start-up, obtaining satisfactory equipment operation, resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period, through no fault of the design; the Contractor shall reimburse the Owner on a time and materials basis for services rendered at the Architect/Engineer's standard hourly rates in effect when the services are requested. The Contractor shall pay the Owner for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

3.7 RECORD DOCUMENTS

A. The following paragraphs supplement Division 01 requirements.

B. Maintain at the job site a separate and complete set of mechanical drawings and specifications with all changes made to the systems clearly and permanently marked in complete detail.

C. Mark drawings to indicate revisions to piping and ductwork, size and location, both exterior and interior; including locations of coils, dampers, other control devices, filters, and other units requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned from column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (e.g., traps, strainers, expansion compensators, tanks, etc.); Change Orders; concealed control system devices.

D. Mark specifications to show approved substitutions; Change Orders, and actual equipment and materials used.

E. Record changes daily and keep the marked drawings available for the Architect/Engineer's examination at any normal work time.

F. Upon completing the job, and before final payment is made, give the marked-up drawings to the Architect/Engineer.

3.8 PAINTING

A. Paint all equipment that is marred or damaged prior to the Owner's acceptance. Paint and color shall match original equipment paint and shall be obtained from the equipment supplier if available.

B. Equipment cabinets, casings, covers, metal jackets, etc., in equipment rooms or concealed spaces, shall be furnished in standard or prime finish, free from scratches, abrasions, chips, etc.

3.9 ADJUST AND CLEAN

A. Thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project. Clean all foreign paint, grease, oil, dirt, labels, stickers, and other foreign material from all equipment.

B. Clean all drain pans and areas where moisture is present. Immediately report any mold, biological growth, or water damage.

C. Remove all rust, scale, dirt, oils, stickers and thoroughly clean exterior of all exposed bare metal ductwork, piping, hangers, and accessories.

D. Remove all rubbish, debris, etc., accumulated during construction from the premises.

3.10 SPECIAL REQUIREMENTS

A. Contractor shall coordinate the installation of all equipment, valves, dampers, operators, etc., with other trades to maintain clear access area for servicing.

B. All equipment shall be installed in such a way to maximize access to parts needing service or maintenance. Review the final field location, placement, and orientation of equipment with the Owner's designated representative prior to setting equipment.

C. Installation of equipment or devices without regard to coordination of access requirements and confirmation with the Owner's designated representative will result in removal and reinstallation of the equipment at the Contractor's expense.

3.11 MAINTAINING CLEAN DUCTWORK THROUGHOUT CONSTRUCTION

A. Throughout the duration of construction, all ductwork shall be capped or sealed with sheet metal caps, polyethylene film, or other airtight protective to keep dust, dirt, and construction debris out of ducts. Similar means shall be used to seal air-side connections of HVAC equipment to include, but not limited to, air handling units, fans, terminal air boxes, fan coil units, cabinet heaters, blower coils, and the like.

B. When air terminal devices are installed, contractors shall seal all supply, return, and exhaust grilles with polyethylene film or other airtight protective to keep dust, dirt, and construction debris out of ducts.

C. Should HVAC equipment be started during construction, Contractor shall remove airtight protectives and shall install one-inch thick MERV 8 filter media over all return and exhaust grilles to prevent dust, dirt, and construction debris from entering ductwork. Filter media shall cover the entire grille face and shall be secured such that air cannot bypass filter media.

D. Should filter media become laden with dust and dirt, Contractor shall replace filter media with new media to prevent damage to air distribution system and equipment.

E. The following steps shall be taken during testing, adjusting, and balancing of each air system:

1. All construction activities in all spaces served by the air system shall stop.
2. All airtight protectives and temporary filter media shall be removed from all portions of the air system.
3. Testing, adjusting, and balancing work shall not commence until all construction activity is stopped and all airtight protectives and temporary filter media is removed.
4. Once testing, adjusting, and balancing work is complete for the air system, airtight protectives or temporary filter media shall be installed over all ductwork openings and air terminals on the air system prior to resuming construction activities in any spaces served by the air system.

F. The Owner shall agree the building is sufficiently clean prior to the removal of any filtration media and airtight protectives from air terminal devices.

READINESS CERTIFICATION PRIOR TO FINAL JOBSITE OBSERVATION

To prevent the final job observation from occurring too early, we require that the Contractor review the completion status of the project and, by copy of this document, certify that the job is indeed ready for the final job observation. The following is a typical list of items that represent the degree of job completeness expected prior to your requesting a final job observation.

1. Penetrations fire sealed and labeled in accordance with specifications.
2. All air handling units operating and balanced.
3. All fans shall be operating and balanced.
4. All pumps, boilers and chillers operating and balanced.
5. All miscellaneous mechanical systems (unit heaters, fan coil units, cabinet heaters, etc.) operating.
6. All temperature control systems operating, programmed and calibrated.
7. Pipe insulation complete, pipes labeled and valves tagged.
8. Fire damper and fire/smoke damper access doors labeled in accordance with specifications.

Accepted by:

Prime Contractor _____

By _____ Date _____

Upon Contractor certification that the project is complete and ready for a final job observation, we require the Contractor to sign this agreement and return it to the Architect/Engineer so that the final observation can be scheduled.

It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineers for additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.

END OF SECTION

SECTION 23 05 13 - MOTORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Single Phase and Three Phase Electric Motors.

1.2 REFERENCES

A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

B. AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

C. ANSI/ASHRAE/IES Standard 90.1 (latest published edition) - Energy Standard for Buildings Except Low-Rise Residential Buildings.

D. ANSI/IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.

E. ANSI/NEMA MG 1 - Motors and Generators.

F. ANSI/NFPA 70 - National Electrical Code.

G. Energy Independence and Security Act of 2007.

1.3 SUBMITTALS

A. Submit shop drawings under provisions of Section 23 05 00. Include nominal efficiency and power factor for all premium efficiency motors. Efficiencies must meet or exceed the nominal energy efficiency levels presented below.

B. Submit shop drawings for all three phase motors.

C. Submit motor data with equipment when motor is installed by the manufacturer at the factory.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weatherproof coverings. For extended outdoor storage, follow manufacturer's recommendations for equipment and motor.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data including assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in the manufacture of commercial and industrial motors and accessories, with a minimum of three years documented manufacturing experience.

PART 2 - PRODUCTS

2.1 MOTORS - GENERAL CONSTRUCTION AND REQUIREMENTS

A. Refer to the drawings for required electrical characteristics. Voltage is generally specified and scheduled as distribution voltage. Motor submittals may be based on utilization voltage if it corresponds to the correct distribution voltage.

Distribution/Nominal Voltage	Utilization Voltage
120	115
208	200
240	230
277	265
480	460

B. Design motors for continuous operation in 40ºC environment, and for temperature rise in accordance with ANSI/NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.

C. Visible Nameplate: Indicating horsepower, voltage, phase, hertz, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, insulation class.

D. Electrical Connection: Boxes, threaded for conduit. For fractional horsepower motors where connection is made directly, provide conduit connection in end frame.

E. Unless otherwise indicated, motors 3/4 HP and smaller shall be single phase, 60 hertz, open drip-proof or totally enclosed fan-cooled type.

F. Unless otherwise indicated, motors 1 HP and larger shall be three phase, 60 hertz, squirrel cage type, NEMA Design Code B (low current in-rush, normal starting torque), open drip-proof or totally enclosed fan-cooled type.

G. Each contractor shall set all motors furnished by him.

H. All motors shall have a minimum service factor of 1.15.

I. All motors shall have ball or roller bearings with a minimum L-10 fatigue life of 150,000 hours in direct-coupled applications and 50,000 hours for belted applications. Belted rating shall be based on radial loads and pulley sizes called out in NEMA MG1-14.43.

J. Bearings shall be sealed type for 10 HP and smaller motors. Bearings shall be regreasable type for larger motors.

K. Aluminum end housings are not permitted on motors 15 HP or larger.

L. Motor Driven Equipment:

1. No equipment shall be selected or operate above 90% of its motor nameplate rating. Motor size may not be increased to compensate for equipment with efficiency lower than that specified.
2. If a larger motor than specified is required on equipment, the contractor supplying the equipment is responsible for all additional costs due to larger starters, wiring, etc.

M. Provide all belted motors with a means of moving and securing the motor to tighten belts. Motors over 2 HP shall have screw type tension adjustment. Motors over 40 HP shall have dual screw adjusters. Slide bases shall conform to NEMA standards.

N. Motors for fans and pumps 1/12 HP or greater and less than 1 HP shall be electronically-commutated motors or shall have a minimum motor efficiency of 70% when rated in accordance with DOE 10 CFR 431. These motors shall also have the means to adjust motor speed for either balancing or remote control. Belt-driven fans may use sheave adjustments for airflow balancing in lieu of varying motor speed.

2.2 ELECTRONICALLY COMMUTATED MOTORS (ECM)

A. Motor shall be variable speed, constant torque, brushless DC motor for direct-drive applications. Electronics shall be encapsulated for moisture protection and shall integral surge protection. Motor shall be pre-wired for specific voltage and phase.

B. Motor frame shall be NEMA 48; UL recognized components shall be provided for the motor construction.

C. All EC motors shall be a minimum of 85% efficient at all speeds.

D. Motors shall be permanently lubricated; utilize ball bearings to match with the connected driven equipment.

E. Provide motor with on-board motor control module. Motor speed shall be limited to provide electronic over current protection. Starter shall provide soft start to reduce inrush current and shall be controllable from 20% to 100% of full rated speed.

F. Operational mode shall be as scheduled and shall be one of the following:

1. Constant Flow
2. Constant Temperature
3. Constant Pressure

2.3 PREMIUM EFFICIENCY MOTORS (INCLUDING MOST 3-PHASE GENERAL PURPOSE MOTORS)

A. All motors, unless exempted by EPAct legislation that became federal law on December 19, 2010, shall comply with the efficiencies listed in that standard, which are reprinted below. These match the 2010 NEMA premium efficiency ratings. All ratings listed are nominal full load efficiencies, verified in accordance with IEEE Standard 112, Test Method B. Average expected (not guaranteed minimum) power factors shall also be at least the following:

	Full-Load Efficiencies %					
	Open Drip-Proof			Totally Enclosed Fan Cooled		
HP	1200 rpm	1800 rpm	3600 rpm	1200 rpm	1800 rpm	3600 rpm
1.0	82.5	85.5	77.0	82.5	85.5	77.0
1.5	86.5	86.5	84.0	87.5	86.5	84.0
2.0	87.5	86.5	85.5	88.5	86.5	85.5
3.0	88.5	89.5	85.5	89.5	89.5	86.5
5.0	89.5	89.5	86.5	89.5	89.5	88.5
7.5	90.2	91.0	88.5	91.0	91.7	89.5
10.0	91.7	91.7	89.5	91.0	91.7	90.2
15.0	91.7	93.0	90.2	91.7	92.4	91.0
20.0	92.4	93.0	91.0	91.7	93.0	91.0
25.0	93.0	93.6	91.7	93.0	93.6	91.7
30.0	93.6	94.1	91.7	93.0	93.6	91.7
40.0	94.1	94.1	92.4	94.1	94.1	92.4
50.0	94.1	94.5	93.0	94.1	94.5	93.0
60.0	94.5	95.0	93.6	94.5	95.0	93.6
75.0	94.5	95.0	93.6	94.5	95.4	93.6
100.0	95.0	95.4	93.6	95.0	95.4	94.1
125.0	95.0	95.4	94.1	95.0	95.4	95.0
150.0	95.4	95.8	94.1	95.8	95.8	95.0
200.0	95.4	95.8	95.0	95.8	96.2	95.4
250.0	95.4	95.8	95.0	95.8	96.2	95.8
300.0	95.4	95.8	95.4	95.8	96.2	95.8
350.0	95.4	95.8	95.4	95.8	96.2	95.8
400.0	95.8	95.8	95.8	95.8	96.2	95.8
450.0	96.2	96.2	95.8	95.8	96.2	95.8
500.0	96.2	96.2	95.8	95.8	96.2	95.8

B. Motor nameplate shall be noted with the above ratings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All rotating shafts and/or equipment shall be completely guarded from all contact. Partial guards and/or guards that do not meet all applicable OSHA standards are not acceptable. Contractor is responsible for providing this guarding if it is not provided with the equipment supplied.

B. For flexible coupled drive motors, mount coupling to the shafts in accordance with the coupling manufacturer's recommendations. Align shafts to manufacturer's requirements or within 0.002 inch per inch diameter of coupling hub.

C. For belt drive motors, mount sheaves on the appropriate shafts per manufacturer's instructions. Use a straight edge to check alignment of the sheaves. Reposition sheaves as necessary so the straight edge contacts both sheave faces squarely. After sheaves are aligned, loosen the adjustable motor base so the belt(s) can be added, and tighten the base so the belt tension is in accordance with the drive manufacturer's recommendations. Frequently check belt tension and adjust if necessary during the first day of operation and again after 80 hours of operation.

END OF SECTION

SECTION 23 05 48 - HVAC VIBRATION ISOLATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Vibration Isolation.

1.2 SUBMITTALS

A. Submit shop drawings per Section 23 05 00.

B. Vibration isolation submittals may be included with equipment being isolated, but must comply with this section.

C. Isolator submittals shall include:

1. Equipment served
2. Type of Isolator
3. Load in Pounds per Isolator
4. Recommended Maximum Load for Isolator
5. Spring Constants of Isolators (for Spring Isolators)
6. Load vs. Deflection Curves (for Neoprene Isolators)
7. Specified Deflection
8. Deflection to Solid (at least 150% of calculated deflection)
9. Loaded (Operating) Deflection
10. Free Height
11. Loaded Height
12. Kx/Ky (horizontal to vertical stiffness ratio - for spring isolators)
13. Materials and Coatings
14. Spring Diameters

D. Make separate calculations for each isolator on equipment where the load is not equally distributed.

PART 2 - PRODUCTS

2.1 BASIC CONSTRUCTION AND REQUIREMENT

A. Vibration isolators shall have either known undeflected heights or other markings so deflection under load can be verified.

B. All isolators shall operate in the linear portion of their load versus deflection curve. The linear portion of the deflection curve of all spring isolators shall extend 50% beyond the calculated operating deflection (e.g., 3" for 2" calculated deflection). The point of 50% additional deflection shall not exceed the recommended load rating of the isolator.

C. The lateral to vertical stiffness ratio (Kx/Ky) of spring isolators shall be between 0.8 and 2.0.

D. All neoprene shall have UV resistance sufficient for 20 years of outdoor service.

E. All isolators shall be designed or treated for corrosion resistance. Steel bases shall be cleaned of welding slag and primed for interior use, and hot dip galvanized after fabrication for exterior use. All bolts and washers over 3/8" diameter located outdoors shall be hot dip galvanized per ASTM A153. All other bolts, nuts and washers shall be zinc electroplated. All ferrous portions of isolators, other than springs, for exterior use shall be hot dip galvanized after fabrication. Outdoor springs shall be neoprene dipped or hot dip galvanized. All damage to coatings shall be field repaired with two coats of zinc rich coating.

F. All isolators shall have provision for leveling.

2.2 HANGERS

A. Type H1:

1. Vibration hangers shall consist of a double-deflection neoprene element with a projecting bushing or oversized opening to prevent steel-to-steel contact.
2. Static deflection shall be at least 0.15" at calculated load and 0.35" at maximum rated load.
3. Provide hangers with end connections as required for hanging ductwork or piping.
4. Manufacturers:

    a. Mason "HD"
    b. Kinetics "RH"
    c. Aeroflex "RHD"
    d. Vibration Eliminator Co. "IC/3C/3CTD"
    e. Vibro Acoustics "RH"

B. Type H2:

1. Vibration hangers shall contain a steel spring in a neoprene cup with a grommet to prevent short circuiting the hanger rod.
2. The cup shall have a steel washer to distribute load on the neoprene and prevent its extrusion.
3. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30°° arc before contacting the grommet and short circuiting the spring.
4. Provide end connections for hanging ductwork or piping.
5. Manufacturers:

    a. Mason "30"
    b. Kinetics "SRH"
    c. VMC/Amber-Booth "BSRA"
    d. Aeroflex "RSH"
    e. Vibration Eliminator Co. "SNC"

f. Vibro Acoustics "SH/SHC"

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Install all products per manufacturer's recommendations.

B. Provide vibration isolation as indicated on the drawings and as described herein.

C. Clean the surface below all mountings that are not bolted down and apply adhesive cement equal to Mason Type WG between mounting and floor. If movement occurs, bolt mountings down. Isolate bolts from baseplates with neoprene washers and bushings.

D. All static deflections listed in the drawings and specifications are the minimum acceptable actual deflection of the isolator under the weight of the installed equipment - not the maximum rated deflection of the isolator.

E. Support equipment to be mounted on structural steel frames with isolators under the frames or under brackets welded to the frames. Where frames are not needed, fasten isolators directly to the equipment.

F. Where a specific quantity of hangers is noted in these specifications, it shall mean hanger pairs for support points that require multiple hangers, such as rectangular ducts or pipes supported on a strut rack.

3.2 VIBRATION ISOLATION OF DUCTWORK

A. The first three hangers on all fan systems shall be Type H1 with at least 0.20" minimum static deflection.

B. Provide flexible duct connections as described in Section 23 33 00 at all fan inlets and outlets and on the mechanical room side of all locations where ducts penetrate mechanical room walls.

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Testing, adjusting, and balancing of air systems.

B. Measurement of final operating condition of HVAC systems.

1.2 QUALITY ASSURANCE

A. Agency shall be a company specializing in the adjusting and balancing of systems specified in this section with minimum three years' experience. Perform work under supervision of AABC Certified Test and Balance Engineer, NEBB Certified Testing, Balancing and Adjusting Supervisor, SMARTA Certified Air and Hydronic Balancer, or TABB Certified Supervisor.

B. Work shall be performed in accordance with the requirements of the references listed at the start of this section.

1.3 REFERENCES

A. AABC - National Standards for Total System Balance, Seventh Edition.

B. ADC - Test Code for Grilles, Registers, and Diffusers.

C. AMCA - Publication 203-90; Field Performance Measurement of Fan Systems.

D. ASHRAE - 2019 HVAC Applications Handbook; Chapter 39, Testing, Adjusting and Balancing.

E. ASHRAE/ANSI - Standard 111-2008; Practices for Measurement, Testing, Adjusting and Balancing of Building HVAC&R Systems.

F. NEBB - Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems, Ninth Edition, 2019.

G. SMACNA - HVAC Systems; Testing, Adjusting and Balancing (latest edition).

H. TABB - International Standards for Environmental Systems Balance.

1.4 SUBMITTALS

A. Submit copies of report forms, balancing procedures, and the name and qualifications of testing and balancing agency for approval within 30 days after award of Contract.

B. Electronic Copies:

1. Submit a certified copy of test reports to the Architect/Engineer for approval. Electronic copies shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Copies that are not legible will be returned to the Contractor for resubmittal. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
2. Electronic file size shall be limited to a maximum of 10MB. Larger files shall be divided into files that are clearly labeled as "1 of 2", "2 of 2", etc.
3. All text shall be searchable.
4. Bookmarks shall be used. All bookmark titles shall be an active link to the index page and index tabs.

1.5 REPORT FORMS

A. Submit reports on AABC, SMACNA or NEBB forms. Use custom forms approved by the Architect/Engineer when needed to supply specified information.

B. Include in the final report a schematic drawing showing each system component, including balancing devices, for each system. Each drawing shall be included with the test reports required for that system. The schematic drawings shall identify all testing points and cross-reference these points to the report forms and procedures.

C. Refer to PART 4 for required reports.

1.6 SCHEDULING

A. Coordinate schedule with other trades. Provide a minimum of seven days' notice to all trades and the Architect/Engineer prior to performing each test.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. All procedures must conform to a published standard listed in the References article of this section. All equipment shall be adjusted in accordance with the manufacturer's recommendations. Any system not listed in this specification but installed under the contract documents shall be balanced using a procedure from a published standard listed in the References article.

B. The Balancing Contractor shall incorporate all pertinent documented construction changes (e.g. submittals/shop drawings, change orders, RFIs, ASIs, etc.) and include in the balancing report.

C. Recorded data shall represent actual measured or observed conditions.

D. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing is complete, close probe holes and patch insulation with new materials as specified. Restore vapor barrier and finish as specified.

E. Permanently mark setting of valves, dampers, and other adjustment devices allowing for settings to be restored. Set and lock memory stops.

F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, plugging test holes, and restoring thermostats to specified settings.

G. Installations with systems consisting of multiple components shall be balanced with all system components operating.

3.2 EXAMINATION

A. Before beginning work, verify that systems are complete and operable. Ensure the following:

1. General Equipment Requirements:

a. Equipment is safe to operate and in normal condition.
b. Equipment with moving parts is properly lubricated.
c. Temperature control systems are complete and operable.
d. Proper thermal overload protection is in place for electrical equipment.
e. Direction of rotation of all fans and pumps is correct.
f. Access doors are closed and end caps are in place.

2. Duct System Requirements:

a. All filters are clean and in place. If required, install temporary media.
b. Duct systems are clean and free of debris.
c. Fire/smoke and manual volume dampers are in place, functional and open.
d. Air outlets are installed and connected.
e. Duct system leakage has been minimized.

B. Report any defects or deficiencies to Architect/Engineer.

C. Promptly report items that are abnormal or prevent proper balancing.

D. If, for design reasons, system cannot be properly balanced, report as soon as observed.

E. Beginning of work means acceptance of existing conditions.

3.3 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to the Architect/Engineer for spot checks during testing.

B. Instruments shall be calibrated within six months of testing performed for project, or more recently if recommended by the instrument manufacturer.

3.4 INSTALLATION TOLERANCES

A. ± 10% of scheduled values:

1. Adjust air inlets and outlets to ± 10% of scheduled values.

B. Adjust supply, return, and exhaust air-handling systems to +10% / -5% of scheduled values.

3.5 ADJUSTING

A. After adjustment, take measurements to verify balance has not been disrupted or that disruption has been rectified.

B. Once balancing of systems is complete, at least one damper or valve must be 100% open.

C. After testing, adjusting and balancing are complete, operate each system and randomly check measurements to verify system is operating as reported in the report. Document any discrepancies.

D. Contractor responsible for each motor shall also be responsible for replacement sheaves. Coordinate with contractor.

3.6 SUBMISSION OF REPORTS

A. Fill in test results on appropriate forms.

PART 4 - SYSTEMS TO BE TESTED, ADJUSTED AND BALANCED

4.1 VERIFICATION OF EXISTING SYSTEMS.

A. Perform a pre-balance of systems serving the area of construction prior to the start of any other work. Do not make adjustments to the systems. If the systems are not operating at maximum capacity, temporarily drive system to maximum and take readings for the system. Return the system to its original state when measurements are complete.

1. Exhaust Fan

a. Drawing symbol.
b. Location.
c. Manufacturer and model.
d. Flow rate (cfm).
e. Total static pressure. (Indicate measurement locations).
f. Inlet pressure.
g. Discharge pressure.

h. Fan RPM.

2. Air Terminal (Inlet or Outlet):

a. Room number/location.
b. Terminal type and size.
c. Velocity.
d. Flow rate (cfm)
e. Percent of design flow rate.

B. Report findings to Architect/Engineer on standard forms. Provide one (1) copy of report.

4.2 GENERAL REQUIREMENTS

A. Title Page:

1. Project name.
2. Project location.
3. Project Architect.
4. Project Engineer (IMEG Corp.).
5. Project General Contractor.
6. TAB Company name, address, phone number.
7. TAB Supervisor's name and certification number.
8. TAB Supervisor's signature and date.
9. Report date.

B. Report Index

C. General Information:

1. Test conditions.
2. Nomenclature used throughout report.
3. Notable system characteristics/discrepancies from design.
4. Test standards followed.
5. Any deficiencies noted.
6. Quality assurance statement.

D. Instrument List:

1. Instrument.
2. Manufacturer, model, and serial number.
3. Range.
4. Calibration date.

4.3 AIR SYSTEMS

A. Air Moving Equipment:

1. General Requirements:

a. Drawing symbol.
b. Location.
c. Manufacturer, model, arrangement, class, discharge.
d. Fan RPM.
e. Multiple RPM fan curve with operating point marked. (Obtain from equipment supplier).
f. Final frequency of motor at maximum flow rate (on fans driven by VFD).

2. Flow Rate:

a. Supply flow rate (cfm): specified and actual.
b. Return flow rate (cfm): specified and actual.
c. Outside flow rate (cfm): specified and actual.
d. Exhaust flow rate (cfm): specified and actual.

3. Pressure Drop and Pressure:

a. Filter pressure drop: specified and actual.
b. Total static pressure: specified and actual. (Indicate if across fan or external to unit).
c. Inlet pressure.
d. Discharge pressure.

B. Fan Data:

1. Drawing symbol.
2. Location.
3. Manufacturer and model.
4. Flow rate (cfm): specified and actual.
5. Total static pressure: specified and actual. (Indicate measurement locations).
6. Inlet pressure.
7. Discharge pressure.
8. Fan RPM.

C. Electric Motors:

1. Drawing symbol of equipment served.
2. Manufacturer, Model, Frame.
3. Nameplate: HP, phase, service factor, RPM, operating amps, efficiency.
4. Measured: Amps in each phase.

D. Duct Traverse:

1. System zone/branch/location.
2. Duct size.
3. Free area.
4. Velocity: specified and actual.
5. Flow rate (cfm): specified and actual.

6. Duct static pressure.
7. Air temperature.
8. Air correction factor.

E. Air Terminal (Inlet or Outlet):

1. Drawing symbol.
2. Room number/location.
3. Terminal type and size.
4. Velocity: specified and actual.
5. Flow rate (cfm): specified and actual.
6. Percent of design flow rate.

END OF SECTION

SECTION 23 07 13 - DUCTWORK INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Ductwork Insulation.

B. Insulation Jackets.

1.2 QUALITY ASSURANCE

A. Applicator: Company specializing in ductwork insulation application with five years minimum experience. When requested, installer shall submit manufacturer's certificate indicating qualifications.

B. Materials:

1. Listed and labeled for flame spread/smoke developed rating of no more than 25/50 when tested per ASTM E84 or UL 723 as required by code.
2. Fungal Resistance: No growth when tested in accordance with ASTM G21 (antifungal test).

C. Adhesives: UL listed, meeting NFPA 90A/90B requirements.

1.3 REFERENCES

A. ANSI/ASHRAE/IES Standard 90.1 (latest published edition) - Energy Standard for Buildings Except Low-Rise Residential Buildings.

B. ANSI/ASTM C553 - Mineral Fiber Blanket and Felt Insulation.

C. ANSI/ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.

D. ASTM E84 - Surface Burning Characteristics of Building Materials.

E. ASTM E136 - Standard Test Method for the Behavior of Materials in a Vertical Tube Furnace at 750°C.

F. ASTM E814 - Fire Tests of Through Penetrations Firestops.

G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

H. National Commercial & Industrial Insulation Standards - 1999 Edition - as published by Midwest Insulation Contractors Association and endorsed by National Insulation Contractors Association.

I. NFPA 255 - Surface Burning Characteristics of Building Materials.

J. UL - XHEZ - Through Penetration Firestop Systems.

K. UL 263 - Full Scale External Fire Tests with Hose Stream.

L. UL 723 - Surface Burning Characteristics of Building Materials.

M. UL 1479 - Fire Tests of Through Penetrations Firestops.

1.4 SUBMITTALS

A. Submit shop drawings per Section 23 05 00. Include product description, list of materials and thickness for each service, and location.

B. Submit manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Type A: Flexible Fiberglass - Outside Wrap; ANSI/ASTM C553; commercial grade; 0.28 / 0.26 (Out-Of-Package/Installed-Compressed 25%) maximum 'K' value at 75°F; foil scrim Kraft facing, 1.0 lb./cu. ft. density. Submit both "Out of Package" and "Installed-Compressed 25%" K and R-values.

B. Type B: Semi-rigid Fiberglass Board Wrap - Outside Application; ANSI/ASTM C612, Class 1; 0.25 maximum 'K' value at 75°F; foil scrim Kraft facing, 3 lb./cu. ft. density.

		R-VALUE PER THICKNESS							
	THICKNESS	0.5	1	1.5	2	2.5	3	4	5
TYPE	K-FACTOR	R-VALUE							
Flexible Fiberglass Outside Wrap	0.28			5.4	7.1	8.9	10.7	14.3	17.9
Semi-Rigid Fiberglass Board Wrap	0.25			6.0	8.0	10.0	12.0	16.0	20.0
Flexible Fiberglass Liner	0.28	1.8	3.6	5.4	7.1	8.9	10.7	14.3	17.9
Rigid fiberglass liner	0.23		4.3	6.5	8.7	10.9	13.0	17.4	21.7
Double Wall Ductwork	0.27		3.7	5.6	7.4	9.3	11.1	14.8	18.5
Flexible High Temp Rigid Preformed Fiberglass Acoustical Liner	0.23		4.3	6.5	8.7	10.9	13.0	17.4	21.7

2.2 JACKETS

A. Vapor Barrier Jackets: Kraft reinforced foil scrim vapor barrier with self-sealing adhesive joints. Beach puncture resistance ratio of at least 25 units. Tensile strength: 35 psi minimum. Single, self-seal acrylic adhesive on longitudinal jacket laps and butt strips.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install materials in accordance with manufacturer's instructions, codes, and industry standards.

B. Install materials after ductwork has been tested.

C. Clean surfaces for adhesives.

D. Provide insulation with vapor barrier when air conveyed may be below ambient temperature.

E. Exterior Duct Wrap - Flexible, Type A:

1. Apply with edges tightly butted.
2. Cut slightly longer than perimeter of duct to insure full thickness at corners. Do not wrap excessively tight.
3. Seal joints with adhesive backed tape.
4. Apply so insulation conforms uniformly and firmly to duct.
5. Seal all penetrations of the vapor barrier by strap hangers or slip cable hangers with adhesive backed tape.
6. Provide high-density insulation inserts on rectangular ducts at trapeze duct hangers to prevent crushing of insulation. Provide high-density insulation inserts with clamp-on round ducts requiring two (2) rods or straps to prevent crushing of insulation. Maintain continuous vapor barrier through the hanger.
7. Tape all joints with Royal Tapes #RT 350 (216-439-7229), Venture Tape 1525CW, or Compac Type FSK. No substitutions will be accepted without written permission from the Architect/Engineer.
8. Press tape tightly to the duct covering with a squeegee for a tight continuous seal. Fish mouths and loose tape edges are not acceptable.
9. Staples may be used, but must be covered with tape.
10. Vapor barrier must be continuous.
11. Mechanically fasten on 12" centers at bottom of ducts over 24" wide and on all sides of vertical ducts.

F. Semi Rigid Fiberglass Board Wrap - Type B (Indoor Use):

1. Impale on pins welded to the duct and secured with speed clips. Clip pins off close to speed clips.
2. Space pins as needed to hold insulation firmly against duct, but not less than one pin per square foot. Pins must be long enough to avoid compressing the insulation.

3. Seal all joints and speed clips with glass fabric set in adhesive or a 3" wide strip of Royal Tapes #RT 350 (216-439-7229), Venture Tape 1525CW, or Compac Type FSK facing tape.
4. For small areas, secure insulation with adhesive over the entire surface of the duct. Use adhesive in addition to pins as needed to prevent sagging on horizontal surfaces.

G. Continue insulation with vapor barrier through penetrations unless code prohibits.

H. Provide 2" wide, 24" high, 26 gauge, galvanized sheet metal corner protection angles for all externally insulated ductwork extending to a floor or curb.

3.2 SCHEDULE

A. Refer to Section 23 31 00 for scheduling of insulation.

END OF SECTION

SECTION 23 31 00 - DUCTWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Galvanized Ductwork

B. Ductwork Reinforcement

C. Ductwork Sealants

D. Rectangular Ductwork

E. Round and Flat Oval Ductwork

F. Flexible Duct

G. Leakage Testing

H. Ductwork Penetrations

1.2 REFERENCES: Conform to all applicable requirements of the following publications:

A. ADC Flexible Duct Performance and Installation Standards, 3rd Edition 1996.

B. ANSI/ASHRAE/IES Standard 90.1 (latest published edition) - Energy Standard for Buildings Except Low-Rise Residential Buildings.

C. ASHRAE - Handbook 2020 Systems and Equipment; Chapter 19 - Duct Construction.

D. ASHRAE - Handbook 2021 Fundamentals; Chapter 21 - Duct Design.

E. ASTM A90 - Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

F. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) or zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

G. ASTM A924 - Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

H. IECC - International Energy Conservation Code (latest published edition)

I. NFPA 90A - Installation of Air-Conditioning and Ventilating Systems.

J. NFPA 90B - Installation of Warm Air Heating and Air- Conditioning Systems.

K. SMACNA - Air Duct Leakage Test Manual.

L. SMACNA - HVAC Duct Construction Standards.

M. UL 181 - Factory-Made Air Ducts and Air Connectors.

N. UL 181A - Closure Systems for Use with Rigid Air Ducts and Air Connectors

O. UL 181B - Closure Systems for Use with Flexible Air Ducts and Air Connectors.

1.3 SUBMITTALS

A. Submit shop drawings per Section 23 05 00.

B. Duct Layout Drawings: Submit detailed duct layout drawings at 1/4" minimum scale complete with the following information:

1. Actual duct routing, ductwork fittings, actual sheet metal dimensions including insulation liner and wrap, duct hanger and support types, ductwork accessories, etc. with lengths and weights noted.
2. Differentiate ducts that are wrapped. Include insulation thickness, type of insulation, and acoustical lagging.
3. Room names and numbers, ceiling types, and ceiling heights.
4. Indicate location of all beams, bar joists, etc. along with bottom of steel elevations for each member.
5. Verify clearances and interferences with other trades prior to preparing drawings. IMEG will provide electronic copies of ventilation drawings for contractor's use if the contractor signs and returns the "Electronic File Transfer" waiver. IMEG will not consider blatant reproductions of original file copies an acceptable alternative for this submittal. Refer also to Section 23 05 00.

C. Duct Leakage Test Summary Report: Upon completion of the pressure test described in Part 3, the Contractor shall submit an air duct leakage test summary report as outlined in the SMACNA HVAC Duct Leakage Test Manual.

1.4 DEFINITIONS

A. Duct Sizes shown on drawings are inside clear dimensions. Maintain clear dimensions inside any lining.

B. Transitions are generally not shown in single-line ductwork. Where sizes change at a divided flow fitting, the larger size shall continue through the fitting.

C. Exterior Duct: Ductwork located outside the conditioned envelope including exposed ductwork above the roof, outside exterior walls, in attics above insulated ceilings, inside parking garages, and crawl spaces.

D. Interior Duct: Ductwork located within the conditioned envelope including return air plenums and indirectly conditioned spaces.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS AND SUPPORTS

A. Rectangular Duct - Single Wall:

1. General Requirements:

a. All ductwork gauges and reinforcements shall be as listed in SMACNA Duct Construction Standards Chapter 2. Where necessary to fit in confined spaces, furnish heaviest duct gauge and least space consuming reinforcement.
b. Transitions shall not exceed the angles in Figure 4-7.

2. Exceptions and modifications to the 2005 HVAC Duct Construction Standards are:

a. All ducts shall be cross-broken or beaded.
b. Snap lock seams are not permitted.
c. Turning vanes shall be used in all 90°° mitered elbows, unless clearly noted otherwise on the drawings. Vanes shall be as follows:

1) Type 1:

a) Description: Single wall type with 22-gauge (0.029") or heavier vanes, 3-1/4" blade spacing, and 4" to 4-1/2" radius. Vanes hemmed if recommended by runner manufacturer. Runners shall have extra-long locking tabs. C-value independently tested at below 0.26. EZ Rail II by Sheet Metal Connectors or equal.
b) Usage: Limited to 3,000 fpm and vane lengths 36" and under.

2) Type 2:

a) Description: Double wall type with 3-1/4" blade spacing, 4-1/2" radius, 24-gauge minimum, and SMACNA Type 1 runners. C-value below 0.27.
b) Usage: No limits other than imposed by the manufacturer. Provide intermediate support for vanes over 48" long.

3) Turning vanes shall operate quietly. Repair or replace vanes that rattle or flutter.
4) Runners must be installed at a 45°° angle. Elbows with different size inlet and outlet must be radius type.
5) Omitting every other vane is prohibited.

d. Where smooth radius rectangular elbows are shown, they shall be constructed per SMACNA Figure 4-2. Type RE1 shall be constructed with a centerline duct radius R/W of 1.0. Where shown on drawings, Type RE3 elbows with 3 vanes shall be used with centerline duct radius R/W of 0.6 (SMACNA r/W=0.1). RE1 or RE3 elbows may be used where mitered elbows are shown if space permits. Mitered elbows (with or without turning vanes) may not be substituted for radius elbows. Do not make branch takeoffs within 4 duct diameters on the side of the duct downstream from the inside radius of radius elbows.

e. Rectangular branch and tee connections in ducts over 1" pressure class shall be 45°° entry type per Figs. 4-5 and 4-6. Rectangular straight taps are not acceptable above 1" pressure class.

f. Bellmouth fittings shown on return duct inlets shall expand at a 60-degree total angle horizontally and vertically (space permitting) and have length of at least 25% of the smallest duct dimension.

g. Round taps off rectangular unlined ducts shall be flanged conical or bellmouth type (equal to Buckley Bellmouth or Sheet Metal Connectors E-Z Tap), or 45°° rectangular with transition to round (equal to Sheet Metal Connectors Inc. High Efficiency Takeoff). Straight taps are acceptable if pressure class is 1" or less, round duct is 12" diameter or less, and the tap is not located between fans and TAB devices.

h. Duct offsets shall be constructed as shown on drawings. Additional offsets required in the field shall be formed of mitered elbows without turning vanes for offsets up to 30°° maximum angle in accordance with SMACNA offset Type 2. Offsets of greater than 30°° angle shall be formed of radius elbows with centerline radius R/W=1.0 or greater. SMACNA Type 1 offsets are not permitted.

i. All lined duct shall utilize dovetail joints where round or conical taps occur. The dovetail joints shall extend past the liner before being folded over.

j. Cushion heads are acceptable only downstream of TAB devices in ducts up to ± 2" pressure class, and must be less than 6" in length.

k. Slide-on flanged transverse joint systems are acceptable provided they are a manufactured product that has been tested for conformance with Chapter 2 of the SMACNA HVAC Duct Construction Standards for sheet and joint deflection at the specified pressure class.

1) Apply sealant to all inside corners. Holes at corners are not acceptable.

2) Manufacturers:

a) Ductmate Industries - 25/35/45

b) Nexus

c) Mez

d) WDCI

e) Other manufacturers must submit test data and fabrication standards and receive Architect/Engineer's approval before any fabrication begins.

B. Round and Flat Oval Spiral Seam Ductwork - Single Wall:

1. Conform to applicable portions of Rectangular Duct Section. Round or flat oval ductwork may be substituted for rectangular ductwork where approved by the Architect/Engineer. The spiral seam ductwork shall meet the standards set forth in this specification. The ductwork shall meet or exceed the specified cross-sectional area and insulation requirements. The substitution shall be coordinated with all other trades prior to installation.
2. Flat oval duct in negative pressure applications shall have flat sides reinforced as required for rectangular ducts of the same gauge with dimensions equal to the flat span of the oval duct.
3. 90°° elbows shall be smooth radius or have a minimum of five sections with mitered joints and R/D of at least 1.5.
4. Duct and fittings shall meet the required minimum gauges listed in chapter 3 of the SMACNA requirements for the specified pressure class. Ribbed and lightweight duct are not permitted.
5. Ductwork shall be suitable for velocities up to 5,000 fpm.
6. Divided flow fittings may be made as separate fittings or factory installed taps with sound, airtight, continuous welds at intersection of fitting body and tap.
7. Spot weld and bond all fitting seams in the pressure shell. Coat galvanizing damaged by welding with corrosion resistant paint to match galvanized duct color.
8. Ducts with minor axis less than 22" shall be spiral seam type. Larger ducts may be rolled, longitudinal welded seam type. SMACNA seams RL-2 and RL-3 are not permitted.
9. Reinforce flat oval ducts with external angles. Internal tie rods are permitted only as indicated for rectangular ductwork.
10. Transverse Joint Connections:

    a. Crimped joints are not permitted.
    b. Ducts and fittings 36" in diameter and smaller shall have slip joint connections. Size fitting ends to slip inside mating duct sections with minimum 2-inch insertion length and a stop bead. Use inside slip couplings for duct-to-duct joints, and outside slip couplings for fitting-to-fitting joints.
    c. Ducts and fittings larger than 36" shall have flanged connections.
    d. Secure all joints with at least 3 sheet metal screws before sealing.
    e. Manufacturers, Slide-on Flanges:

        1) Ductmate Industries - SpiralMate
        2) Accuflange
        3) Sheet Metal Connectors are acceptable.

    f. Manufacturers, Self-Sealing Duct Systems:

        1) Lindab
        2) Ward "Keating Coupling"

C. Round Snap-Lock Seam Ductwork - Single Wall:

1. Factory sealed snap-lock pipe. Transverse and longitudinal seams shall contain factory-applied self-sealing EPDM and co-polymer gasket. Snap-lock shall conform to SMACNA RL-8. Duct and gasket material shall meet the flame/smoke spread rating of 25/50 per ASTM-E84.
2. G-60 galvanized coating meeting ASTM A653 and ASTM A90 G-90 galvanized steel aluminum meeting ASTM B209 Alloy 3003 Temper H14 304 stainless steel meeting ASTM A480 2B Finish.
3. Snap-lock seams are only permitted on systems between -1"w.c. and 2"w.c. pressure class.
4. 90°° elbows shall be smooth radius or have a minimum of five sections with mitered joints and R/D of at least 1.5.
5. Duct and fittings shall meet the required minimum gauges listed in Chapter 3 of the SMACNA requirements for the specified pressure class.
6. Divided flow fittings may be made as separate fittings or factory installed taps with sound, airtight, continuous welds at intersection of fitting body and tap.
7. Spot weld and bond all fitting seams in the pressure shell. Coat galvanizing damaged by welding with corrosion resistant paint to match galvanized duct color.
8. Manufacturers:

    a. GreenSeam Industries.

D. Hangers and Supports General Requirements:

1. Hanger and support materials shall be as defined within Materials and Application Specific section below.
2. Strap Hangers: Strap hanger shall be a minimum of 1 inch, 18 gauge attached to the bottom of ducts with spacing as required by SMACNA.
3. Integral Corner Connector Hanger: Integral hanger and corner assembly for use with TDC/TDF style duct flanges. Die stamped offset hanger connects to the flanged corner assembly. For use with aircraft cable or 1/4" or 3/8" diameter threaded rods. Tested to hold up to 1,400 lbs.. Install per manufacturer’s ratings and instructions.

    a. Manufacturers; Supports:

        1) EZ Hanger

2.2 MATERIAL AND APPLICATION SPECIFIC

A. Galvanized Steel:

1. General Requirements:

    a. Duct and reinforcement materials shall conform to ASTM A653 and A924.
    b. Interior Ductwork and reinforcements: G60 galvanized (0.60 ounces per square foot total zinc coating for two sides per ASTM A90) unless noted otherwise.
    c. Exterior Ductwork: G90 galvanized (0.90 ounces per square foot total zinc coating for two sides per ASTM A90) unless noted otherwise. G60 is not acceptable for exterior use.

d. Ductwork reinforcement shall be of galvanized steel.

2. Duct Hangers and Support Material:

a. Ductwork hangers and supports shall be of galvanized or painted steel.
b. All fasteners shall be galvanized or cadmium plated.

B. Duct Hangers and Support Material:

1. Ductwork hangers and supports shall be of galvanized or painted steel.
2. All fasteners shall be galvanized or cadmium plated.

2.3 DUCTWORK REINFORCEMENT

A. All reinforcement shall be external to the duct except that tie rods may be used with the following limitations.

1. Ducts must be over 18" wide.
2. Duct dimensions must be increased 2" in one dimension (h or w) for each row of tie rods installed.
3. Tie rods must not exceed 1/2" diameter.
4. Manufacturer of tie rod system must certify pressure classifications of various arrangements, and this must be in the shop drawings.

2.4 DUCTWORK SEALANTS

A. One-part joint sealers shall be water-based mastic systems that meet the following requirements: maximum 48-hour cure time, service temperature of -20°F to +175°F, resistant to mold, mildew and water, flame spread rating below 25 and smoke-developed rating below 50 when tested in accordance with ASTM E84, suitable for all SMACNA seal classes and pressure classes. Mastic used to seal flexible ductwork shall be marked UL 181B-M.

B. Pressure sensitive tape used for sealing ductwork shall be minimum 2.5-inch wide, listed and marked UL 181A-P, having minimum 60 oz/inch peel adhesion to steel, and service temperature range from -20°F to +250°F.

C. Where pressure sensitive tape is called for on drawings and specifications for sealing flexible ductwork, tape shall be minimum 2.5-inch wide, UL 181 B-FX listed, and marked tape having minimum 60 oz/inch peel adhesion to steel and service temperature range from -20°F to +250°F.

1. Manufacturers, Pressure-Sensitive Tape:

a. Venture Tape 1581A
b. Compac #340
c. Scotch Foil Tape 3326
d. Polyken 339

2.5 FLEXIBLE DUCT

A. Flexible duct shall be listed and labeled as UL 181 Class 1 Air Duct Material, and shall comply with NFPA 90A and 90B, and meet GSA, FHA and other U.S. Government agency standards. Flexible duct shall bear the ADC Seal of Certification.

B. Flame Spread/Smoke Developed: Not over 25/50.

C. Stretch all flexible duct to prevent sags and reduce air friction. Shorten and reinstall all sagging or loose flexible duct. Avoid sharp elbows. Elbows shall maintain 1.5 diameter centerline turning radius.

D. Install per the SMACNA Flexible Duct Manual. Secure inner layer with draw band. Wrap with pressure sensitive tape for protection prior to installing draw band. Pressure sensitive tape alone is not acceptable.

E. Acoustic:

1. Flexible duct shall be acoustic rated in accordance with ASTM E477 and ADC Test Code FD 72-RI by ETL. Insertion loss values noted below are for flow velocities less than 2,500 fpm. Submittals shall include insertion losses ratings per sizes and lengths listed below regardless of sizes shown on the drawings.
2. Flexible have corrosion-resistant wire helix, bonded to a nylon fabric core inner liner that prevents air from contacting the insulation, covered with minimum 1-1/2", 3/4 lb/cf density fiberglass insulation blanket, sheathed in a vapor barrier of metalized polyester film laminated to glass mesh. [Usage: All areas unless noted otherwise].
3. Inner liner shall be airtight and suitable for 6" WC static pressure through 16" diameter. Outer jacket shall act as a vapor barrier only with permeance not over 0.1 perm per ASTM E96, Procedure A. "R" value shall not be less than 4.0 ft2*ºF*hr/Btuh. Temperature range of at least 0-180ºF. Maximum velocity of 4,000 fpm. "R" value shall not be less than 4.0 ft2*°F*hr/Btuh. Ducts in unconditioned spaces and ventilated attics: "R" value shall not be less than 6.0 ft2*°F*hr/Btuh.
4. Minimum Acoustic Insertion Losses per octave band:

a. Straight Duct:

Dia	Length	63hz	125hz	250hz	500hz	1000hz	2000hz	4000hz
6" ø	6 ft	4.0	13	15	15	16	17	16
6" ø	3 ft	2.3	4.9	5.3	5.3	5.5	5.8	5.4
8" ø	6 ft	5.7	14	13	15	16	18	16
8" ø	3 ft	2.9	5.0	4.9	5.7	5.6	5.8	5.6
12" ø	6 ft	5.5	13	12	15	15	18	13
12" ø	3 ft	2.8	4.8	4.7	5.3	5.3	5.8	4.9

b. 90deg Elbow:

Dia	Length	63hz	125hz	250hz	500hz	1000hz	2000hz	4000hz
6" ø	6 ft	10	15	16	17	18	17	18
6" ø	3 ft	3.8	5.4	5.5	5.7	5.9	5.8	5.9
8" ø	6 ft	10	15	16	17	16	18	18
8" ø	3 ft	2.4	5.3	5.6	5.8	5.6	5.9	6.0
12" ø	6 ft	11	14	15	16	15	16	15
12" ø	3 ft	4.4	5.1	5.3	5.5	5.4	5.6	5.3

5. Usage:

   a. Take-offs from supply ducts to inlets of terminal air boxes. Do not exceed 36" in length.
   b. Connections to air inlets and outlets. Do not exceed 5'-0" in length.
   c. Acceptable Manufacturers:

      1) Flexmaster USA - Type 6
      2) Thermaflex M-Ke

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide openings in ducts for thermometers and controllers.

B. Locate ducts with space around equipment for normal operation and maintenance.

C. Do not install ducts or other equipment above electrical switchboards or panelboards. This includes a dedicated space extending 25 feet from the floor to the structural ceiling with width and depth equal to the electrical equipment. Unless intended to serve these rooms, do not install any ductwork or equipment in electrical rooms, transformer rooms, electrical closets, telephone rooms or elevator machine rooms.

D. Provide temporary closures of metal or taped polyethylene on open ducts to prevent dust from entering ductwork.

E. Supply ductwork shall be free of construction debris, and shall comply with Level "B" of the SMACNA Duct Cleanliness for New Construction Guidelines.

F. Repair all duct insulation and liner tears.

G. Install manual volume dampers in branch supply ducts so all outlets can be adjusted. Do not install dampers at air terminal device or in outlets, unless specifically shown.

H. Install flexible duct in accordance with the ADC Flexible Duct Performance and Installation Standards.

I. Flexible duct shall NOT be joined to flat-oval connections. Provide sheet metal oval-to-round transitions where required, to include, but not limited to, all connections to air inlets, air outlets, and terminal air boxes.

J. Support all duct systems in accordance with the SMACNA HVAC Duct Construction Standards: Metal and Flexible and the SMACNA Seismic Restraint Manual: Guidelines for Mechanical Systems, where applicable. Refer to Section 23 05 50 for seismic requirements.

K. Adhesives, sealants, tapes, vapor retarders, films, and other supplementary materials added to ducts, plenums, housing panels, silencers, etc. shall have flame spread/smoke developed ratings of under 25/50 per ASTM E84, NFPA 255, or UL 723.

L. All duct support shall extend directly to building structure. Do not support ductwork from pipe hangers unless coordinated with piping contractor prior to installation. Do not allow lighting or ceiling supports to be hung from ductwork or ductwork supports.

3.2 DUCTWORK APPLICATION SCHEDULE

A. Refer to Ductwork Application Schedule on drawings for specific requirements for system, material, shape, pressure class, seal class and insulation application.

3.3 DUCTWORK SEALING

A. General Requirements:

1. Openings, such as rotating shafts, shall be sealed with bushings or similar.
2. Pressure sensitive tape shall not be used as the primary sealant unless it has been certified to comply with UL-181A or UL-181B by an independent testing laboratory and the tape is used in accordance with that certification.
3. All connections shall be sealed including, but not limited to, taps, other branch connections, access doors, access panels, and duct connections to equipment. Sealing that would void product listings is not required. Spiral lock seams need not be sealed.
4. Mastic-based duct sealants shall be applied to joints and seams in minimum 3 inch wide by 20 mil thick bands using brush, putty knife, trowel, or spray, unless manufacturer's data sheet specifies other application methods or requirements.

B. All ducts systems, regardless of pressure class, shall be Seal Class A as defined by Section 5-1 of SMACNA HVAC Air Duct Leakage Test Manual per the Energy Code, unless specifically noted otherwise. Seal Class A shall include sealing of all transverse joints, longitudinal seams, and duct wall penetrations with welds, gaskets, mastics, or fabric-embedded mastic system. Joints are inclusive of, but not limited to, girth joints, branch and sub-branch intersections, duct collar tap-ins, fitting subsections, louver and air terminal connections to ducts, access door and access panel frames and jambs, duct, plenum, and casing abutments to building structures.

3.4 TESTING

A. Interior Duct - Less than 3" WG (positive or negative):

1. Leak testing of these pressure classes is not normally required for interior ductwork (inside the building envelope). However, leak tests will be required if, in the opinion of the Architect/Engineer, the leakage appears excessive. All exterior ductwork shall be tested. If duct has outside wrap, testing shall be done before it is applied.
2. Leak test shall be at the Contractor's expense and shall require capping and sealing all openings.
3. Seal ducts to bring the air leakage into compliance.
4. Contractor shall notify the Architect/Engineer five business days prior to pressurizing ductwork for testing.

B. Test Procedure:

1. Testing shall be as listed in the latest edition of the SMACNA HVAC Duct Leakage Manual, with the following additional requirements:

   a. The required leakage class for Seal Class A, rectangular ducts, shall be 4; round shall be 2.
   b. Test pressure shall be the specified duct pressure class. Testing at reduced pressures and converting the results mathematically is not acceptable. This is required to test the structural integrity of the duct system.
   c. If any leak causes discernible noise at a distance of 3 feet, that leak shall be eliminated, regardless of whether that section of duct passed the leakage test.
   d. All joints shall be felt by hand, and all discernible leaks shall be sealed.
   e. Totaling leakage from several tested sections and comparing them to the allowable leakage for the entire system is not acceptable. Each section must pass the test individually.
   f. Contractor shall notify the Architect/Engineer five business days prior to pressurizing ductwork for testing. Failure to notify the Architect/Engineer of pressure testing may require the contractor to repeat the duct pressure test after proper notification.
   g. Upon completion of the pressure test, the contractor shall submit an air duct leakage test summary report as outlined in the SMACNA HVAC Duct Leakage Test Manual.
   h. All access doors, taps to terminal air boxes, and other accessories and penetrations must be installed prior to testing. Including terminal air boxes in the test is not required.
   i. Positive pressure leakage testing is acceptable for negative pressure ductwork.

3.5 DUCTWORK PENETRATIONS

A. All duct penetrations of firewalls shall have fire or fire/smoke dampers where required by code.

B. Dampers shall be compatible with fire rating of wall assembly. Verify actual rating of any wall being penetrated with Architect/Engineer.

C. Seal all duct penetrations of walls that are not fire rated by caulking or packing with fiberglass. Install trim strip to cover vacant space and raw construction edges of all openings in finished rooms. Install escutcheon ring at all round duct openings in finished rooms. Trim strips and rings shall be same material and finish as exposed duct.

END OF SECTION

SECTION 23 33 00 - DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manual Volume Dampers.

B. Backdraft Dampers.

C. Fabric Connectors.

D. Duct Access Doors.

E. Duct Test Holes.

F. Temperature Control Dampers.

1.2 REFERENCES

A. SMACNA - HVAC Duct Construction Standards (latest edition).

1.3 SUBMITTALS

A. Submit shop drawings under provisions of Section 23 05 00.

B. Submit manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 MANUAL VOLUME DAMPERS

A. Fabricate in accordance with SMACNA Duct Construction Standards, and as indicated.

B. Fabricate single blade dampers for duct sizes to 9-1/2 x 30 inches.

C. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12" x 72". Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

D. Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide molded synthetic or oil-impregnated nylon or sintered bronze bearings.

E. Provide locking quadrant regulators on single and multi-blade dampers.

F. On insulated ducts, mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

G. If blades are in open position and extend into the main duct, mount damper so blades are parallel to airflow.

H. Contractor assembled modular manual dampers are acceptable as long as it contains the components listed above.

2.2 BACKDRAFT DAMPERS

A. Gravity backdraft dampers, size 18 inches x 18 inches or smaller, furnished with air moving equipment, may be air moving equipment manufacturer's standard construction.

B. Fabricate multi-blade, parallel action gravity balanced backdraft dampers of extruded aluminum, with blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90°° stop, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

C. Models:

1. Ruskin CBD4
2. Arrow 655
3. Safe-Air/Dowco BRL
4. Greenheck EM.

2.3 FABRIC CONNECTORS

A. Fabric connectors shall be installed between all fans or fan units and metal ducts or casings to prevent transfer of fan or motor vibration.

B. The fabric connectors shall be completely flexible material which shall be in folds and not drawn tight.

C. Fabric connectors shall be of glass fabric double coated with neoprene, with UL approval. Weight = 30 oz. per square yard minimum. Fabric shall not be affected by mildew and shall be absolutely waterproof, airtight and resistant to acids, alkalis, grease and gasoline, and shall be noncombustible.

D. Fabric connections shall not exceed 6" in length on ductwork that has a positive pressure. On ductwork that has a negative pressure, the length shall not exceed 2" in length.

E. All corners shall be folded, sealed with mastic and stapled on 1" centers.

F. Fabric connectors shall not be painted.

G. Unless otherwise shown on the drawings, the fabric connection at the inlet to centrifugal fans shall be at least one duct diameter from the fan to prevent inlet turbulence.

H. Materials:

1. Durodyne MFN-4-100
2. Vent Fabrics, Inc.
3. "Ventglas"
4. Proflex PFC3NGA

2.4 DUCT ACCESS DOORS

A. Fabricate per Fig. 7-2 and 7-3 of the SMACNA HVAC Duct Construction Standards and as indicated.

B. Review locations prior to fabrication. Install access doors at fire dampers, smoke dampers, motorized dampers, fan bearings, filters, automatic controls, humidifiers, louvers, duct coils and other equipment requiring service inside the duct.

C. Construction shall be suitable for the pressure class of the duct. Fabricate rigid, airtight, and close-fitting doors of materials identical to adjacent ductwork with sealing gaskets butt or piano hinges, and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover.

D. Access doors with sheet metal screw fasteners are not acceptable.

E. Minimum size for access doors shall be 24" x 16" or full duct size, whichever is less.

2.5 DUCT TEST HOLES

A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.6 DUCTWORK ACCESSORY SEALANTS

A. Ductwork accessory sealants and adhesives shall conform to Section 23 31 00.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General Installation Requirements:

1. Install accessories in accordance with manufacturer's instructions.
2. Where duct access doors are located above inaccessible ceilings, provide ceiling access doors. Coordinate location with the Architect/Engineer.
3. Coordinate and install access doors provided by others.
4. Provide access doors for all equipment requiring maintenance or adjustment above an inaccessible ceiling. Minimum size shall be 24" x 24".
5. Provide duct test holes where indicated and as required for testing and balancing purposes.

B. Manual Volume Damper:

1. Provide manual volume dampers at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts where indicated on drawings and as required for air balancing.
2. Provide ceiling access doors for manual volume dampers. When manual volume dampers are located above an inaccessible ceiling and an access door cannot be installed, provide a remote-controlled volume control device for operation of the damper. Coordinate location with the Architect/Engineer.

END OF SECTION

SECTION 23 34 16 - CENTRIFUGAL FANS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. In-line Centrifugal Fans.

B. Fabrication: Conform to AMCA 99.

C. Fan Energy Index (FEI): Fans shall meet or exceed the minimum FEI scheduled at the specified airflow, pressure, and air density (duty point). In no case shall the FEI at the specified duty point fall below 1.0.

1.2 REFERENCES

A. AMCA 99 - Standards Handbook.

B. AMCA 208 - Calculation of the Fan Energy Index (FEI).

C. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.

D. AMCA 300 - Test Code for Sound Rating Air Moving Devices.

E. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices.

F. ANSI/AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

G. ANSI/AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

H. SMACNA - HVAC Duct Construction Standards (latest edition).

1.3 SUBMITTALS

A. Submit shop drawings per Section 23 05 00. Include data on all fans and accessories. Submit sound power levels for both fan inlet and outlet at rated capacity. Submit motor ratings and electrical characteristics, plus motor and electrical accessories. Submit multi-speed fan curves including minimum and maximum fan speed with specified operating points clearly plotted. Submit the Fan Energy Index (FEI) at the selected duty point.

B. Submit operation and maintenance data. Include instructions for lubrication, motor and drive replacement, and spare parts list.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect motors, shafts, and bearings from weather and construction dust.

PART 2 - PRODUCTS

2.1 IN-LINE CENTRIFUGAL FAN

A. Fan Description: In-Line Single inlet, single width. backward inclined wheel.

B. Construction:

1. Wheel: Backward inclined, non-overloading, all aluminum wheel and hub. Dynamically balanced.
2. Housing: Galvanized steel construction with stainless steel or cadmium plated fasteners .
3. Drive: Direct drive with motor mounted within fan housing.
4. Support: Steel or aluminum mounting frame with baked enamel finish. Steel mounting brackets suitable for any mounting position.

C. Motor (as scheduled on the drawings):

1. Electronically Commutated Motor (ECM): Motor shall be variable speed, constant torque, brushless permanent magnet (PM) motor for belt drive applications. Electronics shall be encapsulated for moisture protection and shall include integral surge protection. Motor and controller shall be pre-wired for specific voltage and phase. Motor frame shall be NEMA 48; All EC motors shall be a minimum of 85% efficient at all speeds. Provide motor with onboard motor control module. Motor speed shall be limited to provide electronic overcurrent protection. Provide non-fused, with thermal overload protection, factory mounted and wired disconnect switch mounted inside fan housing. Starter shall provide soft start to reduce inrush current and shall be controllable from 20% to 100% of full rated speed. Operational mode shall be as follows:

a. ECM with reverse acting thermostat control.

D. Speed Controller: For single phase shaded pole or permanent split capacity motor fans, furnish solid-state dial speed controller factory mounted inside fan unless shown otherwise on the drawings. Provide permanent marking at balanced point.

E. Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.

F. Manufacturers:

1. Jenco Fan
2. Carnes
3. Cook
4. PennBarry
5. Greenheck

PART 3 - EXECUTION

3.1 INSTALLATION

A. General Installation Requirements:

1. Prime all fan parts after cleaning, but prior to assembly. Apply a second finish coat to all exterior surfaces and all accessible interior surfaces after assembly. Apply rust preventative coating to shafts.
2. Do not operate fans for any purpose until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.
3. Install flexible connections between fan and ductwork. Install metal bands of connectors parallel with minimum 1" flex between ductwork and fan while running.
4. Provide safety screen where inlet or outlet is exposed. Screens shall meet OSHA regulations for size of openings.

END OF SECTION

SECTION 23 37 00 - AIR INLETS AND OUTLETS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Grilles And Registers.

B. Louvers.

1.2 QUALITY ASSURANCE

A. Test and rate performance of air inlets and outlets per ASHRAE 70.

B. Test and rate performance of louvers per AMCA 500L-99.

C. All air handling and distribution equipment mounted outdoors shall be designed to prevent rain intrusion into the airstream when tested at design airflow and with no airflow, using the rain test apparatus described in Section 58 of UL 1995.

1.3 REFERENCES

A. AMCA 500-L-12 - Laboratory Methods of Testing Louvers for Rating.

B. ANSI/ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Inlets and Outlets.

C. ANSI/ASHRAE/IES Standard 90.1 (latest published edition) - Energy Standard for Buildings Except Low-Rise Residential Buildings.

D. SMACNA - Duct Construction Standards.

1.4 SUBMITTALS

A. Submit product data under provisions of Section 23 05 00.

B. Submit schedule of inlets and outlets indicating type, size, location, application, and noise level.

C. Review requirements of inlets and outlets as to size, finish, and type of mounting prior to submitting product data and schedules of inlets and outlets.

D. Submit manufacturer's installation instructions.

1.5 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 90A.

B. Conform to ASHRAE 90.1.

PART 2 - PRODUCTS

2.1 AIR TERMINALS - GRILLES AND REGISTERS

A. Reference to a grille means an air supply, exhaust or transfer device without a damper.

B. Reference to a register means an air supply, exhaust or transfer device with a damper.

C. The type of unit, margin, material, finish, etc., shall be as shown on the drawing schedule and suitable for the intended use.

D. All margins shall be compatible with ceiling types specified (including 'Thin-Line' T-bar lay-in grid system). Any discrepancies in contract documents shall be brought to the attention of the Architect/Engineer, in writing, prior to Bid Date. Submission of Bid indicates ceiling and air inlet and outlet types have been coordinated.

E. The capacity and size of the unit shall be as shown on the drawings.

F. All units shall handle the indicated cfm as shown on the drawings while not exceeding an NC level of 25, referenced to 10-12 watts with a 10 dB room effect. .

G. Refer to the drawings for construction material, color and finish, margin style, deflection, and sizes of grilles and registers.

H. Provide with 3/4" blade spacing. Blades shall have steel friction pivots to allow for blade adjustment, plastic pivots are not acceptable.

I. Corners of steel grilles and registers shall be welded and ground smooth before painting. Aluminum grilles and registers shall have staked corners.

J. Where specified to serve registers, provide opposed blade volume dampers operable from the face of the register.

K. Screw holes for surface fasteners shall be countersunk for a neat appearance. Provide concealed fasteners for installation in lay-in ceilings and as specified on the drawings.

L. Manufacturers:

1. Titus
2. Price
3. Nailor
4. Krueger
5. Anemostat

2.2 LOUVERS - FIXED - ALUMINUM

A. Louvers shall be minimum 4" deep and constructed of extruded aluminum. Blade, jamb and sill thickness shall be minimum 0.081". Blades shall be spaced at a maximum of 5.1" apart.

B. Louvers shall be of the drainable blade design with water collected on the leading edge of the blade and diverted to the jamb.

C. Louvers shall be furnished with aluminum bird screen mounted on the inside surface.

D. Size, cfm, finish and pressure drop for louvers shall be as scheduled on the drawings.

E. AMCA Certified performance for 48" x 48" samples with intake airflow of 8,000 cfm shall not exhibit more than 0.19" pressure drop. Maximum water penetration shall be 0.01 ounces per square foot at the scheduled intake velocity based on 15 minute test duration when subjected to a water flow rate of 0.25 gal/min as described under the Water Penetration Test in AMCA 500-L-07.

F. Contractor shall provide the General Contractor with the correct sizes and locations of all louvers required in masonry walls.

G. Louvers shall be sealed around perimeter to avoid moisture penetration between the louver frame and wall.

H. Louvers shall be suitable for duct connection.

I. Manufacturers:

1. Ruskin - "ELF375DX"
2. Greenheck - ESD "403"
3. Pottorff - EFD

PART 3 - EXECUTION

3.1 INSTALLATION

A. General Installation Requirements:

1. Install items in accordance with manufacturers' instructions.
2. Check location of inlets and outlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.
3. Install diffusers to ductwork with air tight connections.
4. Flexible ducts shall NOT be joined to flat-oval connections. Provide sheet metal oval-to-round transitions where required.
5. Supply grille and register blades shall be aimed in the field to provide adequate air distribution in the space. All return grilles and registers blades shall be oriented to minimize sight distance beyond installed device.

B. Volume Damper:

1. Provide manual volume dampers on duct take-off to diffusers when there are multiple connections to a common duct. Locate volume dampers as far as possible from the air inlet or outlet.

C. Maintaining Duct Cleanliness:

1. When grilles, registers, and diffusers are installed, Contractor shall prevent construction dust, dirt, and debris from entering ductwork as required by Section 23 05 00.

END OF SECTION

SECTION 26 05 00 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements applicable to all Division 26 Sections. Also refer to Division 1 - General Requirements. This section is also applicable to Interior Communications Pathways Section 27 05 28. This section is also applicable to Fire Alarm and Detection Systems Section 28 31 00.

B. All materials and installation methods shall conform to the applicable standards, guidelines and codes referenced herein and within each specification section.

1.2 REFERENCES

A. NFPA 70 - National Electrical Code (NEC)

1.3 SCOPE OF WORK

A. This Specification and the associated drawings govern furnishing, installing, testing and placing into satisfactory operation the Electrical Systems.

B. The Contractor shall furnish and install all new materials as indicated on the drawings, and/or in these specifications, and all items required to make the portion of the Electrical Work a finished and working system.

C. All work will be awarded under a single General Contract. The division of work listed below is for the Contractor's convenience and lists normal breakdown of the work.

D. Description of Systems shall be as follows:

1. Electrical power system to and including luminaires, equipment, motors, devices, etc.
2. Grounding system.
3. Fire alarm system.
4. Lightning protection system.
5. Wiring of equipment furnished by others.
6. Removal work and/or relocation and reuse of existing systems and equipment.
7. Telecommunications rough-in, as shown on drawings, for installation of telecommunications equipment by others under separate contract.

1.4 QUALITY ASSURANCE

A. Contractor's Responsibility Prior to Submitting Pricing/Bid Data:

1. The Contractor is responsible for constructing complete and operating systems. The Contractor acknowledges and understands that the Contract Documents are a two-dimensional representation of a three-dimensional object, subject to human interpretation. This representation may include imperfect data, interpreted codes, utility guides, three-dimensional conflicts, and required field coordination items. Such deficiencies can be corrected when identified prior to ordering material and starting installation. The Contractor agrees to carefully study and compare the individual Contract Documents and report at once in writing to the Architect/Engineer any deficiencies the Contractor may discover. The Contractor further agrees to require each subcontractor to likewise study the documents and report at once any deficiencies discovered.
2. The Contractor shall resolve all reported deficiencies with the Architect/Engineer prior to awarding any subcontracts, ordering material, or starting any work with the Contractor's own employees. Any work performed prior to receipt of instructions from the Architect/Engineer will be done at the Contractor's risk.

B. Qualifications:

1. Only products of reputable manufacturers as determined by the Architect/Engineer are acceptable.
2. All Contractors and subcontractors shall employ only workmen who are skilled in their trades. At all times, the number of apprentices at the job site shall be less than or equal to the number of journeymen at the job site.

C. Compliance with Codes, Laws, Ordinances:

1. Conform to all requirements of the City of Chester Codes, Laws, Ordinances and other regulations having jurisdiction.
2. If there is a discrepancy between the codes and regulations and these specifications, the Architect/Engineer shall determine the method or equipment used.
3. If the Contractor notes, at the time of bidding, that any parts of the drawings or specifications do not comply with the codes or regulations, Contractor shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time for this procedure, Contractor shall submit with the proposal a separate price to make the system comply with the codes and regulations.
4. All changes to the system made after the letting of the contract to comply with codes or the requirements of the Inspector, shall be made by the Contractor without cost to the Owner.
5. If there is a discrepancy between manufacturer's recommendations and these specifications, the manufacturer's recommendations shall govern.
6. If there are no local codes having jurisdiction, the current issue of the National Electrical Code shall be followed.

D. Examination of Drawings:

1. The drawings for the electrical work are completely diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment, outlets, etc., and the approximate sizes of equipment.

2. Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of raceways to best fit the layout of the job. Conduit entry points for electrical equipment including, but not limited to, panelboards, switchboards, switchgear and unit substations, shall be determined by the Contractor unless noted in the contract documents.
3. Scaling of the drawings will not be sufficient or accurate for determining these locations.
4. Where job conditions require reasonable changes in arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.
5. Because of the scale of the drawings, certain basic items, such as junction boxes, pull boxes, conduit fittings, etc., may not be shown, but where required by other sections of the specifications or required for proper installation of the work, such items shall be furnished and installed.
6. If an item is either shown on the drawings or called for in the specifications, it shall be included in this contract.
7. The Contractor shall determine quantities and quality of material and equipment required from the documents. Where discrepancies arise between drawings, schedules and/or specifications, the greater and better-quality number shall govern.
8. Where used in electrical documents the word "furnish" shall mean supply for use, the word "install" shall mean connect up complete and ready for operation, and the word "provide" shall mean to supply for use and connect up complete and ready for operation.
9. Any item listed as furnished shall also be installed unless otherwise noted.
10. Any item listed as installed shall also be furnished unless otherwise noted.

E. Field Measurements:

1. Verify all pertinent dimensions at the job site before ordering any conduit, conductors, wireways, bus duct, fittings, etc.

1.5 PRODUCT DELIVERY, STORAGE, HANDLING and MAINTENANCE

A. Exercise care in transporting and handling to avoid damage to materials. Store materials on the site to prevent damage.

B. Protect equipment, components, and openings with airtight covers and exercise care at every stage of storage, handling, and installation of equipment to prevent airborne dust and dirt from entering or fouling equipment to include, but not limited to:

1. Lighting luminaires and lighting control systems.

C. Equipment and components that are visibly damaged or have been subject to environmental conditions prior to building turnover to Owner that could shorten the life of the component (for example, water damage, humidity, dust and debris, excessive hot or cold storage location, etc.) shall be repaired or replaced with new equipment or components without additional cost to the building owner.

D. Keep all materials clean, dry and free from damaging environments.

E. Coordinate the installation of heavy and large equipment with the General Contractor and/or Owner. If the Electrical Contractor does not have prior documented experience in rigging and lifting similar equipment, he/she shall contract with a qualified lifting and rigging service that has similar documented experience. Follow all equipment lifting and support guidelines for handling and moving.

F. Contractor is responsible for moving equipment into the building and/or site. Contractor shall review site prior to bid for path locations and any required building modifications to allow movement of equipment. Contractor shall coordinate the work with other trades.

PART 2 - PRODUCTS

2.1 GENERAL

A. All items of material having a similar function (e.g., safety switches, panelboards, switchboards, contactors, motor starters, dry type transformers) shall be of the same manufacturer unless specifically stated otherwise on drawings or elsewhere in specifications.

PART 3 - EXECUTION

3.1 OPERATION AND MAINTENANCE MANUALS

A. General:

1. Provide an electronic copy of the O&M manuals as described below for Architect/Engineer's review and approval. The electronic copy shall be corrected as required to address the Architect/Engineer's comments. Once corrected, electronic copies and paper copies shall be distributed as directed by the Architect/Engineer.
2. Approved O&M manuals shall be completed and in the Owner's possession prior to Owner's acceptance and at least 10 days prior to instruction of operating personnel.

B. Electronic Submittal Procedures:

1. Distribution: Email the O&M manual as attachments to all parties designated by the Architect/Engineer.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.

    a. O&M file name: O&M.div26.contractor.YYYYMMDD

b. Transmittal file name: O&Mtransmittal.div26.contractor.YYYYMMDD

5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.
6. Provide the Owner with an approved copy of the O&M manual on compact discs (CD), digital video discs (DVD), or flash drives with a permanently affixed label, printed with the title "Operation and Maintenance Instructions", title of the project and subject matter of disc/flash drive when multiple disc/flash drives are required.
7. All text shall be searchable.
8. Bookmarks shall be used, dividing information first by specification section, then systems, major equipment and finally individual items. All bookmark titles shall include the nomenclature used in the construction documents and shall be an active link to the first page of the section being referenced.

C. Operation and Maintenance Instructions shall include:

1. Title Page: Include title page with project title, Architect, Engineer, Contractor, all subcontractors, and major equipment suppliers, with addresses, telephone numbers, website addresses, email addresses and point of contacts. Website URLs and email addresses shall be active links in the electronic submittal.
2. Table of Contents: Include a table of contents describing specification section, systems, major equipment, and individual items.
3. Copies of all final approved shop drawings and submittals. Include Architect's/Engineer's shop drawing review comments. Insert the individual shop drawing directly after the Operation and Maintenance information for the item(s) in the review form.
4. Copies of all factory inspections and/or equipment startup reports.
5. Copies of warranties.
6. Schematic wiring diagrams of the equipment that have been updated for field conditions. Field wiring shall have label numbers to match drawings.
7. Dimensional drawings of equipment.
8. Detailed parts lists with lists of suppliers.
9. Operating procedures for each system.
10. Maintenance schedule and procedures. Include a chart listing maintenance requirements and frequency.
11. Repair procedures for major components.
12. Replacement parts and service material requirements for each system and the frequency of service required.
13. Instruction books, cards, and manuals furnished with the equipment.
14. Include record drawings of the one-line diagrams for each major system. The graphic for each piece of equipment shown on the one-line diagram shall be an active link to its associated Operation & Maintenance data.
15. Copies of all panel schedules in electronic Microsoft Excel spreadsheet (.xlsx) file. Each panelboard shall be a separate tab in the workbook.

3.2 INSTRUCTING THE OWNER'S REPRESENTATIVE

A. Adequately instruct the Owner's designated representatives in the maintenance, care, and operation of the complete systems installed under this contract.

B. The instructions shall include:

1. Maintenance of equipment.
2. Start-up procedures for all major equipment.
3. Description of emergency system operation.

C. Notify the Architect/Engineer of the time and place for the verbal instructions to be given to the Owner's representative so a representative can be present if desired.

D. Minimum hours of instruction time for each item and/or system shall be as indicated in each individual specification section.

E. Operating Instructions:

1. Contractor is responsible for all instructions to the Owner's representatives for the electrical and specialized systems.
2. If the Contractor does not have staff that can adequately provide the required instructions, the Contractor shall include in the bid an adequate amount to reimburse the Owner for the Architect/Engineer to perform these services.

3.3 RECORD DOCUMENTS

A. The following paragraphs supplement Division 1 requirements.

B. Maintain at the job site a separate and complete set of electrical drawings and specifications with all changes made to the systems clearly and permanently marked in complete detail.

C. Mark drawings and specifications to indicate approved substitutions; Change Orders, and actual equipment and materials used. All Change Orders, RFI responses, Clarifications and other supplemental instructions shall be marked on the documents. Record documents that merely reference the existence of the above items are not acceptable. Should this Contractor fail to complete Record Documents as required by this contract, this Contractor shall reimburse Architect/Engineer for all costs to develop record documents that comply with this requirement. Reimbursement shall be made at the Architect/Engineer's hourly rates in effect at the time of work.

D. Record changes daily and keep the marked drawings available for the Architect/Engineer's examination at any normal work time.

E. Upon completing the job, and before final payment is made, give the marked-up drawings to the Architect/Engineer.

F. Record actual routing of conduits exceeding 2 inches.

3.4 ADJUST AND CLEAN

A. Thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project.

B. Clean all foreign paint, grease, oil, dirt, labels, stickers, etc. from all equipment.

C. Remove all rubbish, debris, etc., accumulated during construction from the premises.

3.5 FIELD QUALITY CONTROL

A. General:

1. Conduct all tests required during and after construction. Submit test results in NETA format, or equivalent form, that shows the test equipment used, calibration date, tester's name, ambient test conditions, humidity, conductor length, and results corrected to 40°C.
2. Supply necessary instruments, meters, etc., for the tests. Supply competent technicians with training in the proper testing techniques.
3. All cables and wires shall be tested for shorts and grounds following installation and connection to devices. Replace shorted or grounded wires and cables.
4. Any wiring device, electrical apparatus or luminaire, if grounded or shorted on any integral "live" part, shall have all defective parts or materials replaced.
5. If the results obtained in the tests are not satisfactory, make adjustments, replacements, and changes as needed. Then repeat the tests, and make additional tests, as the Architect/Engineer or authority having jurisdiction deems necessary.

B. Ground-Fault Equipment Performance Testing:

1. Test: Perform ground-fault performance testing when system is installed. The test process shall use primary current injection per manufacturer instruction and procedures. Perform test for the following:

   a. Code required.

2. Report: Provide copy of test result report with Operation and Maintenance manuals. Provide report to Authority Having Jurisdiction when requested.

C. Other Equipment:

1. Give other equipment furnished and installed by the Contractor all standard tests normally made to assure that the equipment is electrically sound, all connections properly made, phase rotation correct, fuses and thermal elements suitable for protection against overloads, voltage complies with equipment nameplate rating, and full load amperes are within equipment rating.

D. If any test results are not satisfactory, make adjustments, replacements and changes as needed and repeat the tests and make additional tests as the Architect/Engineer or authority having jurisdiction deem necessary.

E. Report shall include color printouts, in binder, of pictures taken to use as a baseline reading after building is occupied.

F. Upon completion of the project, the Contractor shall provide amperage readings for all panelboards and switchboards and turn the results over to the Owner for "benchmark" amperages.

END OF SECTION

SECTION 26 05 13 - WIRE AND CABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Building wire

B. Cabling for remote control, signal, and power limited circuits

C. Metal-clad cable (MC)

1.2 RELATED WORK

A. Section 26 05 53 - Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

1.3 REFERENCES

A. NEMA WC 70 - Power Cables Rated 2,000V or Less for the Distribution of Electrical Energy

B. NFPA 70 - National Electrical Code (NEC)

C. UL 44 - Thermoset-Insulated Wires and Cables

D. UL 83 - Thermoplastic-Insulated Wires and Cables

E. UL 1581 - Standard for Electrical Wires, Cables, and Flexible Cords

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Feeders and Branch Circuits 8 AWG and larger: Copper, stranded conductor, 600-volt insulation, THHN/THWN or XHHW-2.

B. Feeders and Branch Circuits 10 AWG and Smaller: Copper, solid or stranded conductor, 600-volt insulation, THHN/THWN, unless otherwise noted on the drawings.

C. Control Circuits: Copper, stranded conductor 600-volt insulation, THHN/THWN.

D. Each branch circuit shall have a dedicated neutral conductor. Neutral conductors shall be considered current-carrying conductors for wire derating.

2.2 CABLING FOR REMOTE CONTROL, SIGNAL, AND POWER LIMITED CIRCUITS

A. Wire for the following specialized systems shall be as designated on the drawings, or elsewhere in these specifications. If not designated on the drawings or specifications, the system manufacturer's recommendations shall be followed.

1. Fire alarm

B. Plenum Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300-volt insulation, rated 60°C, individual conductors twisted together, shielded, and covered with a nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts, and plenums.

2.3 METAL-CLAD CABLE (MC)

A. Conductors shall be copper, 600-volt insulation, THHN. Metal clad cable shall be constructed in strict accordance with Underwriters Laboratories, Inc. Standard for Metal-Clad Cables, UL 15694, exterior of metal interlocked armor.

B. Minimum conductor size for branch circuit wiring shall be 12 AWG, with larger wires used where specified.

C. Metal-clad cables may be used for branch circuit wiring as defined in the Electrical Code, subject to acceptance by State and local codes.

PART 3 - EXECUTION

3.1 WIRE AND CABLE INSTALLATION SCHEDULE

A. Exposed and concealed in exising and new partitions and ceilings: Metal clad cable, Type MC 1/2" size with minimum #12 conductors and ground.

B. Low Voltage Cable (less than 100 volts): Low voltage cable shall be installed concealed in free air.

3.2 CONTRACTOR CHANGES

A. The basis of design is copper conductors installed in raceway based on ambient temperature of 30°C, NEC Table 310.16 (2011 - 2017 edition 310.15(B)(16)). Service entrance conductors are based on copper conductor installed in underground electrical ducts, NEC Table B.2(7) (2011 - 2017 edition Table B310.15(B)(2)(7); 2008 or later edition B.301.7) or calculated in accordance with Annex B Application Information for Ampacity Calculation.

B. The Contractor shall be responsible for derating and sizing conductors and conduits to equal or exceed the ampacity of the basis of design circuits, if he/she chooses to use methods or materials other than the basis of design.

C. Underground electrical duct ampacity rating shall be in accordance with NEC Table 310.16 (2011 - 2017 edition 310.15(B)(16)) or calculated in accordance with Annex B Application Information for Ampacity Calculation. The calculations and a sketch of the proposed installation shall be submitted prior to any conduit being installed.

D. Conductor length(s) listed on plans and schedules. The drawings are diagrammatic with intent to convey the components of the electrical distribution system. Conductor length(s) when listed on plans and schedules are for engineering calculation purposes. Conductor length(s) shall NOT be used for bidding purposes.

E. Record drawing shall include the calculations and sketches.

3.3 GENERAL WIRING METHODS

A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.

B. Use no wire smaller than 18 AWG for low voltage control wiring below 100 volts.

C. Use 10 AWG conductor for 20 ampere, 120-volt branch circuit home runs longer than 75 feet.

D. The ampacity of multiple conductors in one conduit shall be derated per the Electrical Code. In no case shall more than 4 conductors be installed in one conduit to such loads as motors larger than 1/4 HP, panelboards, motor control centers, etc.

E. Splice only in junction or outlet boxes.

F. Neatly train and lace wiring inside boxes, equipment, and panelboards.

G. All conductors shall be continuous in conduit from last outlet to their termination.

H. Cables or wires shall not be laid out on the ground before pulling.

I. Cables or wires shall not be dragged over earth or paving.

J. Care shall be taken so as not to subject the cable or wire to high mechanical stresses that would cause damage to the wire and cable.

K. At least six (6)-inch loops or ends shall be left at each outlet for installation connection of luminaires or other devices.

L. All wires in outlet boxes not connected to fixtures or other devices shall be rolled up, spliced if continuity of circuit is required, and insulated.

3.4 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricant for pulling 4 AWG and larger wires.

B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

C. Pulling shall be continuous without unnecessary stops and starts with wire or cable only partially through raceway.

D. Where reels of cable or wire are used, they shall be set up on jacks close to the point where the wire or cable enters the conduit or duct so that the cable or wire may be unreeled and run into the conduit or duct with a minimum of change in the direction of the bend.

E. Conductors shall not be pulled through conduits until plastering or masonry work is completed and conduits are free from moisture. Care shall be taken so that long pulls of wire or pulls around several bends are not made where the wire may be permanently stretched and the insulation damaged.

F. Only nylon rope shall be permitted to pull cables into conduit and ducts.

G. Completely and thoroughly swab raceway system before installing conductors.

3.5 WIRING CONNECTIONS AND TERMINATIONS

A. Splice and tap only in accessible junction boxes.

B. Use solderless, tin-plated copper, compression terminals (lugs) applied with circumferential crimp for conductor terminations, 8 AWG and larger.

C. Use solderless, tin-plated, compression terminals (lugs) applied with indenter crimp for copper conductor terminations, 10 AWG and smaller.

D. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.

E. Use compression connectors applied with circumferential crimp for conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor.

F. Thoroughly clean wires before installing lugs and connectors.

G. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

H. Use antioxidant joint compound on all aluminum conductor terminations. Apply antioxidant joint compound per manufacturer's recommendations.

3.6 MC CABLE INSTALLATION

A. Cable shall be supported by an approved means every 4.5' and within 12" of outlet boxes, junction boxes, cabinets, or fittings.

B. Cable may be unsupported in the following conditions:

1. Cable is no longer than 2' in length at terminals where flexibility is necessary.
2. Cable is not more than 4.5' from the last point of support for connections within an accessible ceiling to light fixtures or equipment.

C. Conductor ampacity shall be derated as required by the Electrical Code where more than three current carrying conductors are used.

D. Each 120-volt circuit shall have a dedicated neutral conductor. Neutral conductors shall be considered current-carrying conductors for cable derating.

E. Cables shall be cut using a rotary cutter as recommended by the manufacturer to eliminate nicking and cutting of the conductors.

F. Bending radius shall comply with the requirements listed in the Electrical Code for the type and size of cable being installed, but shall not be less than 5-times the diameter of the cable in any case.

G. At cable terminations, a fitting shall be provided to protect wires from abrasion, unless the design of the outlet boxes or fittings is such as to afford equivalent protection, and, in addition, an insulating bushing or its equivalent protection shall be provided between the conductors and the armor.

3.7 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 1.

B. Building Wire and Power Cable Testing: Perform an insulation-resistance test on each conductor with respect to ground and adjacent conductors. Test shall be made by means of a low-resistance ohmmeter, such as a "Megger". The applied potential shall be 500 volts dc for 300 volt rated cable and 1000 volts dc for 600 volt rated cable. The test duration shall be one minute. Insulation resistance must be greater than 100 mega-ohm for 600 volt and 25 mega-ohm for 300 volt rated cables per NETA Acceptance Testing Standard. Verify uniform resistance of parallel conductors.

C. Inspect wire and cable for physical damage and proper connection.

D. Torque test conductor connections and terminations to manufacturer's recommended values.

E. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

F. Protection of wire and cable from foreign materials:

1. It is the Contractor's responsibility to provide adequate physical protection to prevent foreign material application or contact with any wire or cable type. Foreign material is defined as any material that would negatively impact the validity of the manufacturer's performance warranty. This includes, but is not limited to, overspray of paint (accidental or otherwise), drywall compound, or any other surface chemical, liquid, or compound that could come in contact with the cable, cable jacket, or cable termination components.

G. Overspray of paint on any wire or cable will not be accepted. It shall be the Contractor's responsibility to replace any component containing overspray, in its entirety, at no additional cost to the project. Cleaning of the cables with harsh chemicals is not allowed.

END OF SECTION

SECTION 26 05 26 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Equipment grounding system

B. Bonding system

C. Grounding electrode system

1.2 QUALITY ASSURANCE

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

B. Comply with UL 467 Grounding and Bonding Equipment.

C. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

D. Comply with Electrical Code; for overhead-line construction and medium-voltage underground construction, comply with IEEE/ANSI C2 National Electrical Safety Code (NESC).

1.3 REFERENCES

A. NFPA 70 - National Electrical Code (NEC)

1.4 SUBMITTALS

A. Submit shop drawings under provisions of Section 26 05 00.

B. Product Data: For the following:

1. Ground rods.

C. Product Data: For each type of product indicated.

D. Field Test Reports: Submit written test reports to include the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

E. Indicate layout of ground field, location of system grounding electrode connections, and routing of grounding electrode conductor and ground ring.

1.5 SUMMARY

A. This section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

PART 2 - PRODUCTS

2.1 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 26 Section 26 05 13 "Wire and Cable".

B. Material: Copper.

C. Equipment Grounding Conductors: Insulated. Refer to Section 26 05 53 for insulation color.

D. Grounding Electrode Conductors: Stranded cable.

E. Copper Bonding Conductors: As follows:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.
2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTOR PRODUCTS

A. Comply with UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

C. Bolted Connectors: Bolted-pressure-type connectors.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Sectional type; copper-clad steel.

1. Size: 3/4" in diameter by 120 inches per section.

PART 3 - EXECUTION

3.1 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

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

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

D. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

E. Underground Connections: Exothermic-welded connections. Use for underground connections, except those at test wells.

F. Connections at back boxes, junction boxes, pull boxes, and equipment terminations: The equipment grounding conductor(s) associated with all circuits in the box shall be connected together and to the box using a suitable grounding screw. The removal of the respective receptacle, luminaire, or other device served by the box shall not interrupt the grounding continuity.

G. Tighten screws and bolts for grounding and bonding 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.

H. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.2 INSTALLATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage. Each grounding conductor that passes through a below grade wall must be provided with a waterstop.

C. In raceways, use insulated equipment grounding conductors.

3.3 EQUIPMENT GROUNDING SYSTEM

A. Comply with Electrical Code, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by Electrical Code are indicated.

B. Install equipment grounding conductors in all feeders and circuits. Terminate each end on a grounding lug or bus.

C. Install insulated equipment grounding conductor with circuit conductors for the following items, in addition to those required by Electrical Code:

1. Lighting and receptacle circuits. Terminate each end on a grounding lug or bus.
2. Motor and appliance branch circuits.
3. Metal-clad cable runs.

3.4 BONDING SYSTEM

A. At building expansion joints, provide flexible bonding jumpers to connect to columns or beams on each side of the expansion joint.

B. Exterior Metallic Pull and Junction Box Covers, Metallic Hand Rails: Bond to grounding system using flexible grounding conductors.

C. Connect bonding conductors to metal water pipe using a suitable ground clamp. Make connections to flanged piping at street side of flange. Provide bonding jumper around water meter.

D. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 6 AWG minimum insulated bonding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location. Leave 10 feet of slack conductor at terminal board.

E. Telecom Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch grounding bar.

F. Industrial Control Panels, Terminal Cabinets, and Similar Installation: Terminate bonding conductor on cabinet grounding terminal. Provide an equipment grounding conductor and bond adjacent and associated control panels together.

G. Equipment Ground Conductor Continuity: All spliced equipment grounding conductors in junction boxes, cabinets, and distribution equipment shall be connected together and bonded to the metal enclosure.

H. Remote control, signaling, and fire alarm circuits shall be bonded in accordance with the most recent version of the National Electric Code.

I. Common Ground Bonding with Lightning Protection System: Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

3.5 GROUNDING ELECTRODE SYSTEM

A. Supplementary Grounding Electrode: Use driven ground rod on exterior of building.

B. Ground Rods: Install at least two rods spaced at least 20 feet from each other and located at least the same distance from other grounding electrodes.

1. Drive ground rods until tops are 12 inches below finished floor or final grade, unless otherwise indicated.
2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.

3.6 FIELD QUALITY CONTROL

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

1. Measure ground resistance from system neutral connection at service entrance to convenient ground reference points using suitable ground testing equipment. Resistance shall not exceed 5 ohms.
2. Testing: Owner will engage a qualified testing agency to perform the following field quality-control testing:
3. Testing: Engage a qualified testing agency to perform the following field quality-control testing:

3.7 GRADING AND PLANTING

A. Restore surface features, including vegetation, at areas disturbed by Work of this Section. Reestablish original grades, unless otherwise indicated. If sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition. Include application of topsoil, fertilizer, lime, seed, sod, sprig, and mulch. Comply with Division 2. Maintain restored surfaces. Restore disturbed paving.

END OF SECTION

SECTION 26 05 33 - CONDUIT AND BOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Rigid metallic conduit and fittings (RMC)

B. Electrical metallic tubing and fittings (EMT)

C. Flexible metallic conduit and fittings (FMC)

D. Wall and ceiling outlet boxes

E. Electrical connection

F. Pull and junction boxes

G. Rough-ins

1.2 RELATED WORK

A. Section 26 05 53 - Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

1.3 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated
2. ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated and Fittings
3. ANSI C80.4 - Fittings for Rigid Metal Conduit and Electrical Metallic Tubing
4. ANSI/NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports

B. Federal Specifications (FS):

1. A-A-50553A - Fittings for Conduit, Metal, Rigid, (Thick-Wall and Thin-Wall (EMT) Type
2. A-A-55810 - Specification for Flexible Metal Conduit

C. NECA "Standards of Installation"

D. National Electrical Manufacturers Association (NEMA):

1. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable

E. NFPA 70 - National Electrical Code (NEC)

F. Underwriters Laboratories (UL): Applicable Listings

1. UL 1 - Flexible Metal Conduit
2. UL 6 - Rigid Metal Conduit
3. UL514-B - Conduit Tubing and Cable Fittings
4. UL797 - Electrical Metal Tubing

G. Definitions:

1. Fittings: Conduit connection or coupling.
2. Body: Enlarged fittings with opening allowing access to the conductors for pulling purposes only.
3. Mechanical Spaces: Enclosed areas, usually kept separated from the general public, where the primary use is to house service equipment and to route services. These spaces generally have exposed structures, bare concrete and non-architecturally emphasized finishes.
4. Finished Spaces: Enclosed areas where the primary use is to house personnel and the general public. These spaces generally have architecturally emphasized finishes, ceilings and/or floors.
5. Concealed: Not visible by the general public. Often indicates a location either above the ceiling, in the walls, in or beneath the floor slab, in column coverings, or in the ceiling construction.
6. Above Grade: Not directly in contact with the earth. For example, an interior wall located at an elevation below the finished grade shall be considered above grade but a wall retaining earth shall be considered below grade.
7. Slab: Horizontal pour of concrete used for a floor or sub-floor.

1.4 SUBMITTALS

A. Include fittings and conduits 1.5" and larger in coordination files. Include all in--floor and underfloor conduit in coordination files. Refer to Section 26 05 00 for coordination drawing requirements.

PART 2 - PRODUCTS

2.1 RIGID METALLIC CONDUIT (RMC) AND FITTINGS

A. Manufacturers:

1. Atkore Allied Tube & Conduit
2. NUCORNUCOR
3. Electroline
4. Western Tube
5. Wheatland Tube Co
6. or approved equal.

B. Manufacturers of RMC Conduit Fittings:

1. ABB/Thomas & Betts
2. Eaton/Crouse-Hinds
3. Electroline
4. Emerson Appleton & OZ Gedney
5. Hubbell Raco and Killark
6. NSI Bridgeport
7. Orbit Industries
8. Wesco Regal
9. or approved equal.

C. Minimum Size Galvanized Steel: 3/4 inch, unless otherwise noted.

D. Fittings and Conduit Bodies:

1. End Bell Fittings: Malleable iron, hot dip galvanized, threaded flare type with provisions for mounting to form.
2. Expansion Joints: Malleable iron and hot dip galvanized providing a minimum of 4 inches of movement. Fitting shall be watertight with an insulating bushing and a bonding jumper.
3. Conduit End Bushings: Malleable iron type with molded-on high impact phenolic thermosetting insulation. Where required elsewhere in the contract documents, bushing shall be complete with ground conductor saddle and clamp. High impact phenolic threaded type bushings are not acceptable.
4. All other fittings and conduit bodies shall be of malleable iron construction and hot dip galvanized.

2.2 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

A. Minimum Size Electrical Metallic Tubing: 3/4 inch, unless otherwise noted.

B. Manufacturers of EMT Conduit:

1. Allied Tube & Conduit
2. Calbond Calpipe
3. NUCORNUCOR
4. Electroline
5. Western Tube
6. Wheatland Tube Co
7. or approved equal.

C. Fittings and Conduit Bodies:

1. 2" Diameter or Smaller: Compression or steel set screw type of steel designed for their specific application.
2. Larger than 2": Compression type of steel designed for their specific application.
3. Manufacturers of EMT Conduit Fittings:

   a. ABB/Thomas & Betts

b. Eaton/Crouse-Hinds
c. Electroline
d. Emerson Appleton & OZ Gedney
e. Hubbell Raco and Killark
f. NSI Bridgeport
g. Orbit Industries
h. Wesco Regal
i. or approved equal.

2.3 FLEXIBLE METALLIC CONDUIT (FMC) AND FITTINGS

A. Minimum Size Galvanized Steel: 3/4 inch, unless otherwise noted. Lighting branch circuit wiring to an individual luminaire may be a manufactured, UL listed 3/8" flexible metal conduit and fittings with #14 AWG THHN conductors and an insulated ground wire. Maximum length of 3/8" FMC shall be six (6) feet.

B. Manufacturers:

1. ABB/Thomas & Betts
2. Anamet Electrical
3. Atkore American Flex AFC and Flexicon
4. Electri-Flex Co
5. Electroline
6. Southwire Alflex
7. or approved equal.

C. Construction: Flexible steel, approved for conduit ground, zinc coated, threadless type formed from a continuous length of spirally wound, interlocked zinc coated strip steel. Provide a separate equipment grounding conductor when used for equipment where flexibility is required.

D. Fittings and Conduit Bodies:

1. Threadless hinged clamp type, galvanized zinc coated cadmium plated malleable cast iron or screw-in type, die-cast zinc.
2. Fittings and conduit bodies shall include plastic or cast metal inserts supplied by the manufacturer to protect conductors from sharp edges.
3. Manufacturers:

a. ABB/Thomas & Betts
b. Eaton/Crouse-Hinds
c. Electroline
d. Emerson Appleton & OZ Gedney
e. Hubbell Raco and Killark
f. NSI Bridgeport
g. Orbit Industries
h. Wesco Regal
i. or approved equal.

2.4 OUTLET BOXES

A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1; galvanized steel, 16 gauge (approximately 0.0625 inches), with 1/2-inch male fixture studs where required.

B. Cast Boxes: NEMA FB1, Type FD, Aluminum, cast feralloy, or stainless steel deep type, gasketed cover, threaded hubs.

C. Outlet boxes for luminaires to be not less than 1-1/2" deep, deeper if required by the number of wires or construction. The box shall be coordinated with surface luminaires to conceal the box from view or provide a finished trim plate.

D. Switch outlet boxes for local light control switches, dimmers and occupancy sensors shall be 4 inches square by 2-1/8 inches deep, with raised cover to fit flush with finish wall line. Multiple gang switch outlets shall consist of the required number of gang boxes appropriate to the quantity of switches comprising the gang. Where walls are plastered, provide a plaster raised cover. Where switch outlet boxes occur in exposed concrete block walls, boxes shall be installed in the block cavity with a raised square edge tile cover of sufficient depth to extend out to face of block or masonry boxes.

E. Outlet boxes for telephone substations in walls and columns shall be 4 inches square and 2-1/8 inches deep with single gang raised cover to fit flush with finished wall line equipped with flush telephone plate.

F. Wall or column receptacle outlet boxes shall be 4 inches square with raised cover to fit flush with finished wall line. Boxes in concrete block walls shall be installed the same as for switch boxes in block walls.

2.5 ECONN; ELECTRICAL CONNECTION

A. Electrical connection to equipment and motors, sized per Electrical Code. Coordinate requirements with contractor furnishing equipment or motor. Refer to specifications and general installation notes for terminations to motors.

2.6 JB; PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: ANSI/NEMA OS 1; galvanized steel.

B. Sheet metal boxes larger than 12 inches in any dimension that contain terminations or components: Continuous hinged enclosure with 1/4 turn latch and white back panel for mounting terminal blocks and electrical components.

C. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast iron box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

D. Cast Metal Boxes for Underground Installations: NEMA 250; Type 4, inside flanged, recessed cover box for flush mounting, UL listed as raintight. Galvanized cast iron box and plain cover with neoprene gasket and stainless steel cover screws.

E. Flanged type boxes shall be used where installed flush in wall.

2.7 ROUGH-IN

A. Provide with one (1) flush mount double gang box with single gang plaster ring and appropriate cover plate,

PART 3 - EXECUTION

3.1 CONDUIT INSTALLATION SCHEDULE AND SIZING

A. In the event the location of conduit installation represents conflicting installation requirements as specified in the following schedule, a clarification shall be obtained from the Architect/Engineer. If this Contractor is unable to obtain a clarification as outlined above, concealed rigid galvanized steel conduit installed per these specifications and the Electrical Code shall be required.

B. Installation Schedule: Refer to drawings.

C. Size conduit as shown on the drawings and specifications. Where not indicated in the contract documents, conduit size shall be according to the Electrical Code. Conduit and conductor sizing shall be coordinated to limit conductor fill to less than 40%, maintain conductor ampere capacity as required by the Electrical Code (to include enlarged conductors due to temperature and quantity derating values) and to prevent excessive voltage drop and pulling tension due to long conduit/conductor lengths.

D. Minimum Conduit Size (Unless Noted Otherwise): 3/4 inch.

E. Conduit sizes shall change only at the entrance or exit to a junction box, unless specifically noted on the drawings.

3.2 CONDUIT ARRANGEMENT

A. In general, conduit shall be installed concealed in walls, in finished spaces and where possible or practical, or as noted otherwise. Conduit shall be installed parallel or perpendicular to walls, ceilings, and exposed structural members. In unfinished spaces, mechanical and utility areas, conduit may run either concealed or exposed as conditions dictate and as practical unless noted otherwise on drawings. Installation shall maintain headroom in exposed vicinities of pedestrian or vehicular traffic.

B. Exposed conduit on exterior walls or above roof will not be allowed without prior written approval of Architect/Engineer. A drawing of the proposed routing and a photo of the location shall be submitted 14 days prior to start of conduit rough-in. Routing shall be shown on coordination drawings.

C. Conduit runs shall be routed as shown on large scale drawings. Conduit routing on drawings scaled 1/4"=1'-0" or less shall be considered diagrammatic, unless noted otherwise. The correct routing, when shown diagrammatically shall be chosen by the Contractor based on information in the contract documents, in accordance with manufacturer's written instructions, applicable codes, the NECA's "Standard of Installation", in accordance with recognized industry standards, and coordinated with other contractors.

D. Contractor shall adapt Contractor's work to the job conditions and make such changes as required and permitted by the Architect/Engineer, such as moving to clear beams and joists, adjusting at columns, avoiding interference with windows, etc., to permit the proper installation of other mechanical and/or electrical equipment.

E. Contractor shall cooperate with all contractors on the project. Contractor shall obtain details of other contractor's work to ensure fit and avoid conflict. Any expense due to the failure of This Contractor to do so shall be paid for in full by Contractor. The other trades involved as directed by the Architect/Engineer shall perform the repair of work damaged as a result of neglect or error by This Contractor. The resultant costs shall be borne by This Contractor.

3.3 CONDUIT SUPPORT

A. Conduit shall <u>not</u> be supported from ductwork, piping, or other non-structural members, unless approved by the Architect/Engineer. All supports shall be from structural slabs, walls, structural members, and bar joists, and coordinated with all other applicable contractors, unless noted otherwise.

B. Conduit shall be held in place by the correct size of galvanized one-hole conduit clamps, two-hole conduit straps, patented support devices, clamp back conduit hangers, or by other means if called for on the drawings.

C. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

D. Do not exceed 25 lbs. per hanger and a minimum spacing of 2'-0" on center when attaching to metal roof decking (excludes concrete on metal deck). This 25 lbs. load and 2'-0" spacing include adjacent electrical and mechanical items hanging from deck. If the hanger restrictions cannot be achieved, supplemental framing will need to be added.

E. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

F. Supports for metallic conduit shall be no greater than 10 feet. A smaller interval may be used if necessitated by building construction, but in no event shall support spans exceed the Electrical Code requirements. Conduit shall be securely fastened within 3 feet of each outlet box, junction box, device box, cabinet, or fitting.

G. Supports of flexible conduit shall be within 12 inches of each outlet box, junction box, device box, cabinet, or fitting and at intervals not to exceed 4.5 feet.

H. Finish:

1. Prime coat exposed steel hangers and supports. Hangers and supports in crawl spaces, pipe shafts, and above suspended ceiling spaces are not considered exposed.
2. Trim all ends of exposed field fabricated steel hangers, slotted channel and threaded rod to within 1" of support or fastener to eliminate potential injury to personnel unless shown otherwise on the drawings. Smooth ends and install elastomeric insulation with two coats of latex paint if exposed steel is within 6'-6" of finish floor and presents potential injury to personnel.

3.4 CONDUIT INSTALLATION

A. Conduit Connections:

1. Shorter than standard conduit lengths shall be cut square using industry standards. The ends of all conduits cut shall be reamed or otherwise finished to remove all rough edges.
2. Metallic conduit connections in slab on grade installation shall be sealed and one coat of rust inhibitor primer applied after the connection is made.
3. Where conduits with tapered threads cannot be coupled with standard couplings, then approved split or Erickson couplings shall be used. Running threads will <u>not</u> be permitted.

B. Conduit terminations for all low voltage wiring shall have nylon bushings installed on each end of every conduit run.

C. Conduit Bends:

1. Use a hydraulic one-shot conduit bender or factory elbows for bends in conduit 2" in size or larger. All steel conduit bending shall be done cold; no heating of steel conduit shall be permitted.
2. A run of conduit shall not contain more than the equivalent of four (4) quarter bends (360°), including those bends located immediately at the outlet or body.
3. Telecommunications conduits shall have no more than two (2) 90-degree bends between pull points and contain no continuous sections longer than 100 feet. Insert pull points or pull boxes for conduits exceeding 100 feet in length.

    a. A third bend is acceptable if:

        1) The total run is not longer than (33) feet.
        2) The conduit size is increased to the next trade size.

4. Telecommunications pull boxes shall not be used in lieu of a bend. Align conduits that enter the pull box from opposite ends with each other. Pull box size shall be twelve (12) times the diameter of the largest conduit. Slip sleeves or gutters can be used in place of a pull box.

5. Telecommunications Conduit(s): Maintain appropriate conduit bend radius at all times. For conduits with an internal diameter of less than 2", maintain a bend radius of at least 6 times the internal diameter. For conduits with an internal diameter 2" or greater, maintain a bend radius of at least 10 times the internal diameter.
6. Use conduit bodies to make sharp changes in direction (i.e. around beams).

D. Conduit Placement:

1. Conduit shall be mechanically continuous from source of current to all outlets. Conduit shall be electrically continuous from source of current to all outlets, unless a properly sized grounding conductor is routed within the conduit. All metallic conduits shall be bonded per the Electrical Code.
2. Route exposed conduit and conduit above suspended ceilings (accessible or not) parallel/perpendicular to the building structural lines, and as close to building structure as possible. Wherever possible, route horizontal conduit runs above water piping.
3. Avoid moisture traps where possible. Where unavoidable, provide a junction box with drain fitting at conduit low point.
4. All conduits through walls shall be grouted or sealed into openings. .
5. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OPENINGS REQUIRED IN MASONRY OR EXTERIOR WALLS UNDER THIS DIVISION. A QUALIFIED MASON AT THE EXPENSE OF THIS CONTRACTOR SHALL REPAIR ALL OPENINGS TO MATCH EXISTING CONDITIONS.
6. Seal interior of conduit at exterior entries, and where the temperature differential can potentially be greater than 20°F, to prevent moisture penetration. Seal shall be placed where conduit enters warm space. Conduit seal fitting shall be a drain/seal, with sealing compound, identified for use with cable and raceway system.
7. Contractor shall provide suitable mechanical protection around all conduits stubbed out from floors, walls or ceilings during construction to prevent bending or damaging of stubs due to carelessness with construction equipment.
8. Contractor shall provide a polypropylene pull cord with 2000 lbs. tensile strength in each empty conduit (indoor and outdoor), except in sleeves and nipples.

3.5 CONDUIT TERMINATIONS

A. Where conduit bonding is indicated or required in the contract documents, the bushings shall be a grounding type sized for the conduit and ground bonding conductor as manufactured by O-Z/Gedney, Appleton, Thomas & Betts, Burndy, Regal, Orbit Industries or approved equal.

B. Conduits with termination fittings shall be threaded for one (1) lock nut on the outside and one (1) lock nut and bushing on the inside of each box.

C. Where conduits terminate in boxes with knockouts, they shall be secured to the boxes with lock nuts and provided with approved screw type tinned iron bushings or fittings with plastic inserts.

D. Where conduits terminate in boxes, fittings, or bodies with threaded openings, they shall be tightly screwed against the shoulder portion of the threaded openings.

E. Conduit terminations to all motors shall be made with flexible metallic conduit (FMC), unless noted otherwise. Final connections to roof exhaust fans, or other exterior motors and motors in damp or wet locations shall be made with liquidtight flexible metallic conduit (LFMC). Motors in hazardous areas, as defined in the Electrical Code, shall be connected using flexible conduit rated for the environment. Flexible conduit shall not exceed 6' in length. Route equipment ground conductors from circuit ground to motor ground terminal through flexible conduit.

F. All conduit ends shall be sealed with plastic immediately after installation to prevent the entrance of any foreign matter during construction. The seals shall be removed and the conduits blown clear of all foreign matter prior to any wires or pull cords being installed.

3.6 BOX INSTALLATION SCHEDULE

A. Galvanized steel boxes may be used in:

1. Concealed interior locations above ceilings and in hollow studded partitions.
2. Exposed interior locations in mechanical rooms and in rooms without ceilings; higher than 8' above the highest platform level.
3. Direct contact with concrete except slab on grade.
4. Recessed in stud wall of kitchens and laundries.

B. Cast boxes shall be used in:

1. Exterior locations.
2. Direct contact with earth.
3. Wet locations.

3.7 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as shown on the drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.

B. Electrical box locations shown on the Contract Drawings are approximate, unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.

C. Locate and install boxes to allow access. Avoid interferences with ductwork, piping, structure, equipment, etc. Recessed luminaires shall not be used as access to outlet, pull, and junction boxes. Where installation is inaccessible, provide access doors. Coordinate locations and sizes of required access doors with the Architect/Engineer and General Contractor.

D. Locate and install to maintain headroom and to present a neat appearance.

E. Coordinate locations with Heating Contractor to avoid baseboard radiation cabinets.

3.8 OUTLET BOX INSTALLATION

A. Do not install boxes back-to-back in walls.

1. Provide a minimum horizontal separation of 6 inches between boxes installed on opposite sides of non-rated stud walls.

B. The Contractor shall anchor switch and outlet box to wall construction so that it is flush with the finished masonry, paneling, drywall, plaster, etc. The Contractor shall check the boxes as the finish wall surface is being installed to assure that the box is flush. (Provide plaster rings as necessary.)

C. Mount at heights shown or noted on the drawings or as generally accepted if not specifically noted.

D. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.

E. Provide knockout closures for unused openings.

F. Support boxes independently of conduit.

G. Use multiple-gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

H. Install boxes in walls without damaging wall insulation.

I. Coordinate mounting heights and locations of outlets mounted above counters, benches, backsplashes, and below baseboard radiation.

J. Position outlets to locate luminaires as shown on reflected ceiling drawings.

K. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioned to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.

L. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

M. Provide cast outlet boxes in exterior locations and wet locations, and where exposed rigid or intermediate conduit is used.

3.9 PULL AND JUNCTION BOX INSTALLATION

A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.

B. Support pull and junction boxes independent of conduit.

C. Do not install boxes back-to-back in walls.

1. Provide a minimum horizontal separation of 6 inches between boxes installed on opposite sides of non-rated stud walls.

3.10 EXPOSED BOX INSTALLATION

A. Boxes shall be secured to the building structure with proper size screws, bolts, hanger rods, or structural steel elements.

B. On brick, block and concrete walls or ceilings, exposed boxes shall be supported with no less than two (2) Ackerman-Johnson, Paine, Phillips, or approved equal screw anchors or expansion shields and round head machine screws. Cast boxes shall not be drilled.

C. Boxes shall be fastened to wood structures by means of a minimum of two (2) wood screws adequately large and long to properly support. (Quantity depends on size of box.)

D. Wood, plastic, or fiber plugs shall not be used for fastenings.

E. Explosive devices shall not be used unless specifically allowed.

END OF SECTION

SECTION 26 05 53 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Adhesive Markings and Field Labels

B. Product Colors

1.2 REFERENCES

A. NFPA 70E - National Electrical Safety Code

B. NFPA 70 - National Electrical Code (NEC)

1.3 QUALITY ASSURANCE

A. Electrical identification products shall be suitable for the environment installed. Identification labels damaged by the environment due to ultraviolet light fading, damp or wet conditions, physical damage, corrosion, or other conditions shall be replaced with labels suitable for the environment.

PART 2 - PRODUCTS

2.1 ADHESIVE MARKINGS AND FIELD LABELS

A. Adhesive Marking Labels for Raceway: Pre-printed, flexible, self-adhesive vinyl labels with legend indicating voltage and service (Emergency, Lighting, Power, HVAC, Communications, Control, Fire).

1. Label Size as follows:

a. Raceways: Kroy or Brother labels 1-inch high by 12-inches long (minimum).

2. Color: As specified for various systems.

B. Colored Adhesive Marking Tape for banding Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.

C. Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with preprinted numbers and letter.

D. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18-inch minimum width, 50-lb minimum tensile strength, and suitable for a temperature range from -40°F to 185°F (-40°C to 85°C), type 2/2S or type 21/21S based on application. Provide ties in specified colors when used for color coding. Cable ties shall be listed and identified for the application, securement, and support.

E. Text Sizes:

1. The following information shall be used for text heights, fonts, and size, unless otherwise noted.

a. Font: Normal 721 Swiss Bold
b. Adhesive Labels: 3/16 inch minimum text height
c. Vinyl / Plastic Laminate Labels: 3/4" inch minimum text height

2.2 PRODUCT COLORS

A. Adhesive Markings and Field Labels:

1. All Labels: Black letters on white face
2. Normal Power and General Labels: Black letters on white face
3. Control Labels: Black letters on white face
4. Fire Alarm: Red letters on white face

B. Box Covers:

1. Box covers shall be painted to correspond with system type as follows:

a. Normal Power and General: Silver
b. Fire Alarm System: Red

C. Conductor Color Identification: Refer to Part 3 for additional information.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as required by code.

B. Install identification devices in accordance with manufacturer's written instruction and requirements of Electrical Code.

C. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work. All mounting surfaces shall be cleaned and degreased prior to identification installation.

D. Circuit Identification: Tag or label conductors as follows:

1. Multiple Power or Lighting Circuits in Same Enclosure: Where multiple branch circuits are terminated or spliced in a box or enclosure, label each conductor with source and circuit number.
2. Multiple Control Wiring and Communication/Signal Circuits in Same Enclosure: For control and communications/signal wiring, use wire/cable marking tape at terminations in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tape.
3. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

E. Install labels parallel to equipment lines at locations as required and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

3.2 FEEDER AND BRANCH CIRCUIT DIRECTORIES

A. Product:

1. Adhesive labels and field markings
2. Nameplates and signs

B. Feeder Directories Branch: Provide each feeder, branch circuit, feeder modification, and branch circuit modification with a typed circuit directory label. Refer to technical equipment specification sections for additional requirements. Include the following with each label:

1. Load Description: Lighting, receptacles, specific equipment, spare, space, or similar description.
2. Location: Room name, number, location.

C. Provide a factory or custom clear plastic sleeve for each branch panel directory and secure to inside panel cover.

3.3 LIGHTING CONTROL AND RECEPTACLE COVER PLATES

A. Product:

1. Adhesive labels and field markings

B. Identification material to be a clear, 3/8-inch Kroy tape or Brother self-laminating vinyl label with black letters. Embossed Dymo-Tape labels are not acceptable. Permanently affix identification label to cover plates, centered above the receptacle openings.

C. Provide identification on all switch and receptacle cover plates. Identification shall indicate source and circuit number serving the device (e.g. "C1A #24"). Identification for switch cover plates shall be installed on the inside cover.

3.4 CONDUIT AND EXPOSED CABLE LABELING

A. Product:

1. Adhesive labels and field markings

B. Conduit Identification: Pre-printed, flexible, self-adhesive vinyl labels with legend at 25 footintervals to identify all conduits run exposed or located above accessible ceilings. Conduits located above non-accessible ceiling or in floors and walls shall be labeled within 3 feet of becoming accessible, or separated by enclosures, walls, partitions, ceilings, and floors. Labels for multiple conduits shall be aligned. Refer to color requirements in Part 2 when applicable in addition to the following:

1. Fire Alarm: Indicate "FIRE ALARM".
2. Grounding: Indicate "GROUND" and equipment and designation.

C. Blank conduit ends or outlet boxes for future extension of system shall have permanent identification marker indicating purpose of conduit or box and where the raceway originated.

3.5 BOX LABELING

A. Products:

1. Adhesive labels and field markings

B. All junction, pull, and connection boxes shall be identified as follows:

1. For power and lighting circuits, indicate system voltage and identity of contained circuits ("120V, 1LA1-3,5,7").
2. For other wiring, indicate system type and description of wiring ("FIRE ALARM NAC #1").

3.6 CONDUCTOR COLOR CODING

A. Products:

1. All wire and cables shall be color coded by the manufacturer.

B. Color coding shall be applied at all panels, switches, junction boxes, pull boxes, etc., where the wires and cables are visible and terminations are made. The same color coding shall be used throughout the entire electrical system, therefore maintaining proper phasing throughout the entire project.

C. Conductors shall be color coded as follows:

1. 120/240 Volt, 3-Wire:

a. A-Phase - Black

b. B-Phase - Red
c. Neutral - White
d. Ground Bond - Green

2. Grounding Conductors:

a. Equipment grounding conductors, main/system/supply-side bonding jumpers: Green.

3. Cabling for Remote Control, Signal, and Power Limited Circuits:

a. Fire Alarm: Red.

3.7 EQUIPMENT CONNECTION IDENTIFICATION

A. Products:

1. Nameplates and signs

B. Provide identification for hard wired electrical connections to equipment such as disconnects switches, starters, etc. Plug and cord type connections do not require this specific label.

C. Identification shall be provided for all connections to equipment furnished by this Contractor, other contractors, or the Owner.

D. Labeling shall include:

1. Equipment type and contract documents designation of equipment being served
2. Location of equipment being served if it is not located within sight.
3. Voltage and rating of the equipment.
4. Panel and circuit numbers(s) serving the equipment

END OF SECTION

SECTION 26 09 33 - LIGHTING CONTROL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Lighting Control Overview

B. Electrical Plan Symbols

C. Device Color and Coverplates

D. Standalone Line and Low Voltage Lighting Controls

1. Wall switches and wall dimmers

1.2 RELATED SECTIONS

A. The lighting system design includes a combination of luminaire sources, lighting control components, programming sequences, and supplementary components for building and energy code compliance. The design uses performance-based specifications for portions of the lighting system to account for the limitation of directly comparable product solutions available by competitive manufacturers. The Contractor shall reference related specification sections, plans, schedules, and details prior to submitting pricing, submittals, and installation. The Contractor shall coordinate system component compatibility among various manufacturers and suppliers for a turnkey lighting system. Referenced sections include, but are not limited to, the following:

1. Specification Section 26 51 19 LED Lighting
2. Electrical Drawings: Electrical Coversheet, plans, luminaire schedules, lighting control sequence of operations, diagrams, and details.

1.3 QUALITY ASSURANCE

A. Manufacturers shall be regularly engaged in the manufacture of lighting control equipment and ancillary equipment, of types and capacities required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. All components and assemblies are to be factory pre-tested prior to delivery and installation.

1.4 REFERENCES

A. FS W S 896 Switch, Toggle

B. NEMA WD 1 - General Color Requirements for Wiring Devices

C. NEMA WD 7 - Occupancy Motion Sensors

D. NFPA 70 - National Electrical Code (NEC)

E. UL 924 - Emergency Lighting and Power Equipment

F. UL 20 - Standards for General-Use Snap Switches

G. UL 1472 - Solid-State Dimming Controls

1.5 SUBMITTALS

A. Submit product data under provisions of Section 26 05 00.

1.6 SYSTEM DESCRIPTION

A. Performance Statement: The specification section and lighting design documents describe the minimum material quality, required features, and operational performance requirements of the lighting control system. The documents do not convey every component, relay, wire, and equipment connection required. The Contractor and lighting control manufacturer/vendor are solely responsible for determining all system components, wiring, and programming required for a complete and operational system based on the performance based requirements of the documents.

1.7 WARRANTY

A. Manufacturer shall warrant products under normal use and service to be free from defects in materials and workmanship for a period of two (2) years from date of commissioning.

B. Occupancy, vacancy, daylight sensors and controls shall have a five (5) year warranty from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LIGHTING CONTROL OVERVIEW

A. Lighting Control System: As defined in the System Description, the design documents describe the operational performance requirements of the lighting control system. The Lighting Control System has been categorized into the following groups. Refer to the Electrical Symbol Key, this specification section, and the drawings to determine the appropriate lighting control category when more than one is applicable to the project:

1. Standalone Lighting Control Devices: Independent (standalone) devices traditionally operating at line or low voltage, field configurable with other standalone devices to provide an overall lighting control system.

2.2 ELECTRICAL PLAN SYMBOLS

A. Refer to Electrical Coversheet for Electrical Symbols list and device specification tag.

1. Standalone Lighting Control Devices: Control station commonly defined by an alpha character with subscripts.

    a. Example symbol "S", tagged "SW-1P", description "switch- single pole switch".
    b. Example Control Designation: a, b, c (when required to clarify design intent).

2.3 DEVICE COLOR AND COVERPLATES

A. All switches and lighting controls shall be complete with coverplates that match material and color of the wiring device coverplates in the space. When the coverplate is proprietary to the device/manufacturer and do not match the wiring device coverplates, the architect shall select the coverplate color and materials from the standard coverplate options.

B. Where several devices are ganged together, the coverplate shall be of the ganged style for the number of devices used.

C. Install nameplate identification as indicated in Section 26 05 53.

D. Plate-securing screws shall be metal with head color matching the wall plate finish.

2.4 STANDALONE LINE AND LOW VOLTAGE LIGHTING CONTROLS

A. Overview:

1. Wall Switches and Wall Dimmers:

    a. UL listed with integral air-gap switch for on/off control, integral EMI/RFI suppression, non-viewable heat sink, dimmer to match device color.
    b. Dimmer compatibility and wiring with the load being controlled shall be verified by Contractor prior to purchase and installation.

B. **SW-1P**; Single Pole Switch:

1. Single throw, 120/277-volt, 20-amp maintained contact. Toggle handle, side and back wired.
2. Manufacturers:

    a. Hubbell HBL1221
    b. Leviton 1221-2
    c. Pass & Seymour PS20AC1
    d. Cooper AH1221

C. **SW-D;** Dimmer (Standalone):

1. Dimmer Single Pole, 120 volt, linear slider operator with positive off. Mounted in dedicated backbox.
2. Manufacturers:

a. Lutron AYCL-253P-WH

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings.

B. All wiring shall be installed in conduit.

C. All branch load circuits shall be live tested before connecting the loads to the lighting control panel.

D. Lighting Control Station Wiring: Provide the grounded (neutral) conductor portion of the branch circuit with the line voltage phase conductors at each lighting control station.

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Device plates and box covers

B. Receptacles (REC-#)

1.2 QUALITY ASSURANCE

A. Provide similar devices from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the Electrical Code, by a testing agency to Authorities Having Jurisdiction and marked for intended use.

C. Comply with the Electrical Code.

1.3 REFERENCES

A. DSCC W-C-896F - General Specification for Electrical Power Connector

B. FS W-C-596 - Electrical Power Connector, Plug, Receptacle, and Cable Outlet

C. NEMA WD 1 - General Color Requirements for Wiring Devices

D. NEMA WD 6 - Wiring Devices - Dimensional Requirements

E. NFPA 70 - National Electrical Code (NEC)

F. UL 498 - Standard for Attachment Plugs and Receptacles

G. UL 943 - Standard for Ground Fault Circuit Interrupters

1.4 SUBMITTALS

A. Submit product data under provisions of Section 26 05 00.

B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

PART 2 - PRODUCTS

2.1 DEVICE COLOR

A. All switch, receptacle, and outlet colors shall be verified with Architect, unless indicated otherwise.

2.2 COVERPLATES

A. All switches, receptacles, and outlets shall be complete with the following:

1. Unbreakable thermoplastic/thermoset plastic and match device color coverplates in finished spaces where walls are finished.
2. Galvanized steel coverplates in unfinished spaces for surface mounted boxes.

B. Where several devices are ganged together, the coverplate shall be of the ganged style for the number of devices used.

C. Install nameplate identification as indicated in Section 26 05 53.

D. Plate securing screws shall be metal with head color matching the wall plate finish.

2.3 RECEPTACLES

A. Refer to Electrical Symbols List for device type.

B. REC-DUP: NEMA 5-20R Duplex Receptacle:

1. Standard Grade: 125-volt, 20 amp, 3-wire grounding type with impact resistant thermoplastic face and steel back strap.

a. Manufacturers:

1) Hubbell 5352A
2) Leviton, 5362-S
3) Pass & Seymour 5362
4) Cooper 5352

C. REC-DUP-GFI: NEMA 5-20R Ground Fault Duplex Receptacle:

1. Standard Grade: 125-volt, 20 amp, 3-wire grounding type with test and reset buttons in impact resistant thermoplastic face, listed.

a. Device shall perform self-test of GFCI circuitry in accordance with UL 943.
b. Manufacturers:

1) Hubbell GF20L

2) Leviton GFNT2
3) Pass & Seymour 2097
4) Cooper SGF20

D. REC-DUP-WP: NEMA 5-20R Weatherproof Ground Fault Duplex Receptacle:

1. 125-volt, 20 amp, 3-wire grounding type with test and reset buttons in impact resistant thermoplastic face, weather resistant WR listed. Provide extra-duty NEMA 3R rated while-in-use clear outlet box hood.
2. Device shall perform self-test of GFCI circuitry in accordance with UL 943.

a. Manufacturers:

1) Hubbell:

a) GFTWRST20 with clear housing RW57300
b) GFCI type devices are not allowed. Contractor may substitute an alternative manufacturer when Hubbell is the basis of submittal for all other wiring devices.

2) Leviton GFWT2 with clear housing 5977-CL
3) Pass & Seymour 2097TRWR with clear housing WIUC10-C
4) Cooper WRSGF20 with clear housing WIU-1

E. REC-QUAD: NEMA 5-20R Double Duplex Receptacle:

1. Consists of two duplex receptacles, double gang box, plaster ring and faceplate.

a. Manufacturers:

1) Refer to Duplex Receptacle above.

F. Back wired devices shall be complete with eight holes that are screw activated with metal clamps for connection to #12 or #10 copper conductors.

G. Side wired devices shall have four binding screws that are undercut for positive wire retention.

H. Ground fault circuit interrupter (GFCI) receptacles shall be listed and comply with UL 943 requiring increased surge immunity, improved corrosion resistance, improved resistance to false tripping and diagnostic indication for miswiring if the line and load conductors are reversed during installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install convenience receptacles at elevations indicated in the General Installation Notes on the contract drawings.

B. Install specific-use receptacles at heights shown on the contract drawings. Install devices level, plumb, and square with building lines. Coordinate installation of adjacent devices of separate systems with common mounting heights, including lighting, power, systems, technology, and temperature control device rough-ins.

C. Ground Fault Protection: Provide ground fault protection for all branch circuit breakers serving 120/208 receptacles and electrical outlets rated 50 amps or less single-phase and 100 amps or less three-phase in the following locations, as shown on drawings, or required by adopted code:

1. Bathrooms
2. Kitchens' all 120-volt through 250-volt receptacles
3. Interior/Exterior locations subject to damp/wet conditions
4. When located within 6 feet of sinks, bathtubs, and shower stalls
5. Plug-and-cord receptacles when the utilization appliance is located within 6 feet of a sink edge.

D. Install receptacles vertically with ground slot up or where indicated on the drawings, horizontally with ground slot to the left.

E. Install decorative plates on switch, receptacle, and blank outlets in finished areas, using jumbo size plates for outlets installed in masonry walls.

F. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.

G. Install devices and wall plates flush and level.

H. Install nameplate identification to receptacle cover plates indicated. Identification shall identify panel name and circuit number. Refer to Specification Section 26 05 53 - Electrical Identification.

I. Test receptacles for proper polarity, ground continuity and compliance with requirements.

END OF SECTION

SECTION 26 41 00 - LIGHTNING PROTECTION SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Air terminals and interconnecting conductors

B. Grounding and bonding for lightning protection

1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Section 26 05 26 - Grounding and Bonding

1.3 REFERENCES

A. ANSI/NFPA 780 - Lightning Protection Code

B. ANSI/UL 96 - Lightning Protection Components

C. UL 96A - Installation Requirements for Lightning Protection Systems

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 26 05 00.

B. Shop drawings shall indicate layout of air terminals, grounding electrodes, and bonding connections to structure, ground grid, and other metal objects. Include terminal, electrode, and conductor sizes, and connection and termination details. Include indications for use of raceway and type, data on how concealment requirements will be met, and calculations required by NFPA 780 for bonding of grounded and isolated metal bodies.

C. Product data shall show dimensions and materials of each component, and include indication of listing in accordance with ANSI/UL 96 or a nationally recognized testing laboratory.

D. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include data on listing or certification by an NRTL or LPI.

E. Submit manufacturer's installation instructions under provisions of Section 26 05 00.

F. Field inspection reports indicating compliance with specified requirements.

1.5 SYSTEM DESCRIPTION

A. Lightning Protection System: System protecting entire building, consisting of air terminals on roofs, bonding of other metal objects; grounding electrodes; and interconnecting conductors. Class I materials shall be used for systems on structures not exceeding 75 feet in height. Class II materials shall be used for systems on structures exceeding 75 feet in height above grade.

B. Performance Statement: This specification and the accompanying roof plans describe the minimum material quality, required features, and operational requirements of the system. These documents do not convey every air terminal, conductor, and connection that must be made. Based on the equipment described and the performance required of the system, as presented in these documents, the Vendor and the Contractor are solely responsible for determining all equipment and wiring required for a complete and operational system.

1.6 PROJECT RECORD DOCUMENTS

A. Submit project record documents under provisions of Section 26 05 00.

B. Accurately record actual locations of air terminals, grounding electrodes, bonding connections, and routing of system conductors.

C. Listing and Labeling: As defined in NFPA 780, "Definitions" Article.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in lightning protection equipment with minimum three (3) years documented experience or who is listed by a nationally recognized testing laboratory.

B. Installer: Authorized installer of manufacturer with minimum three (3) years documented experience.

C. Listing and Labeling: As defined in NFPA 780, "Definitions" Article.

1.8 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference one week prior to commencing work of this Section.

1.9 SEQUENCING AND SCHEDULING

A. Coordinate work under provisions of Section 26 05 00.

B. Coordinate the work of this Section with exterior and interior finish installations. Coordinate painting of exposed conduits to match building finish with Architect.

C. Coordinate installation of lightning protection with installation of other building systems and components, including electrical wiring, supporting structures and building materials, metal bodies requiring bonding to lightning protection components, and building finishes.

D. Coordinate installation of air terminals attached to roof systems with roofing manufacturer and Installer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Heary Brothers Lightning Protection Co., Inc

B. Thompson Lightning Protection

C. Harger Lightning Protection

D. Robbins Lightning, Inc

E. Erico International Corporation

F. Burndy Thermoweld

G. VFC Lightning Protection

2.2 MATERIALS

A. All materials shall be copper and/or copper-bronze. In locations where the system components are mounted on aluminum surfaces, aluminum materials shall be used to avoid electrolytic corrosion of dissimilar metals.

B. Components: In accordance with ANSI/UL 96 or nationally recognized testing laboratory.

C. Air Terminals: Solid, unless otherwise indicated. Provide air terminals with safety 3/4" sphere tip. Provide swivel adapters to plumb air terminals when mounting on sloping surfaces.

D. Air Terminal for Chimney: Lead-coated copper.

E. Grounding Rods: Copper clad steel.

F. Ground Plate: 18"x18"x0.032" Copper ground plate.

G. Connectors and Splicers: Bronze, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Verify that field measurements are as shown on the shop drawings.

C. Beginning of installation means installer accepts existing conditions.

3.2 PROTECTION OF SURROUNDING ELEMENTS

A. Protect elements surrounding work of this Section from damage or disfiguration.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with ANSI/NFPA 780, UL 96A, and LPI-175.

C. Install conductors with direct paths from air terminals to ground connections. Avoid sharp bends and narrow loops.

D. Cable Connections: Use approved exothermic-welded connections for all conductor splices and connections between conductors and other components, except those above single-ply membrane roofing.

3.4 CORROSION PROTECTION

A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.

B. Use conductors with protective coatings where conditions would cause deterioration or corrosion of conductors.

C. Bi-metal transition fittings shall be used when changing between aluminum and copper conductors.

3.5 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 26 05 00.

B. Obtain the services of Underwriters' Laboratories, Inc. to provide inspection and certification of the lightning protection system under provisions of UL 96A to obtain a UL Master Label for system.

C. Install UL Master Label and attach to building at location directed by the Owner.

D. Provide an inspection by an inspector certified by LPI to obtain an LPI certification.

END OF SECTION

SECTION 26 51 19 - LED LIGHTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Interior luminaires and accessories

B. Light-emitting diode (LED) luminaire systems

C. LED emergency lighting units

1.2 RELATED SECTIONS

A. The lighting system design includes a combination of luminaire sources, lighting control components, programming sequences, and supplementary components for building and energy code compliance. The design uses performance-based specifications for portions of the lighting system to account for the limitation of comparable product solutions available by competitive manufacturers. The Contractor shall reference related specification sections, plans, schedules, and details prior to submitting pricing, submittals, and installation. The Contractor shall coordinate system component compatibility among various manufacturers and suppliers for a turnkey lighting system. Referenced sections include, but are not limited to, the following:

1. 26 09 33 Lighting Control Systems
2. Electrical drawings: Plans, luminaire schedules, lighting control sequence of operations, diagrams, and details.

1.3 REFERENCES

A. ANSI C82.16 - Light-Emitting Diode Drivers - Method of Measurement

B. ANSI C82.77 - Standard for Harmonic Emission Limits and Related Power Quality Requirements for Lighting Equipment

C. NFPA 70E - National Electrical Safety Code

D. NEMA SSL1 - Electronic Drivers for LED Devices, Arrays or System

E. UL 8750 - Light Emitting Diode (LED) Equipment for use in Lighting Products

F. LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

G. LM-80 - Measuring Luminous Flux and Color Maintenance of LED

H. FS W-L-305 - Light Set, General Illumination (Emergency or Auxiliary)

I. UL 924 - Standard for Emergency Lighting and Power Equipment

1.4 SUBMITTALS

A. Submit product data under provisions of Section 26 05 00.

B. Basic Requirements of Submittal:

1. Submit product data sheets for luminaires, LED light engines, drivers and poles. Include complete product model number with all options as specified. Submittal shall be arranged with luminaires listed in ascending order, and with each luminaire's, LED light engine, driver, or pole information following luminaire's product data. Failure to organize submittal in this manner will result in the submittal being rejected.
2. Submit lens product data, dimensions and weights if not included in product data sheet submittal.
3. Include outline drawings, support points, weights, and accessory information for each luminaire.
4. Submit manufacturer origin of LED chipset and driver.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site. Store and protect under provisions of Section 26 05 00.

B. Protect luminaire finishes, lenses, and trims from damage during storage and installation. Do not remove protective films until construction cleanup within each area is complete.

C. Handle site lighting poles carefully to prevent breakage and damage to finish.

PART 2 - PRODUCTS

2.1 INTERIOR LUMINAIRES AND ACCESSORIES - GENERAL

A. Recessed Luminaires: Confirm ceiling and wall type and furnish trim and accessories necessary to permit proper installation in each system.

B. Painted reflector surfaces shall have a minimum reflectance of 90%.

C. All painted components shall be painted after fabrication.

2.2 LIGHT EMITTING DIODE (LED) LUMINAIRE SYSTEMS

A. Refer to the luminaire schedule for color temperature and minimum color rendering index CRI requirements. Provide light source color consistency by utilizing a binning tolerance within a maximum 3-step McAdam ellipse unless noted otherwise.

B. Rated life shall be minimum of 50,000 hours at L70.

C. LED chips shall be wired so that failure of one chip does not prohibit operation of the remainder of the chip array.

D. Luminaire delivered lumens is defined as the absolute lumens per the manufacturers LM-79-08 test report.

E. LED Driver:

1. Solid state driver with integral heat sink. Driver shall have over-heat, short-circuit and overload protection, power factor 0.90 or above and maximum total harmonic distortion of 20%. Driver shall have a voltage fluctuation tolerance of +/- 10%.
2. Drivers shall have dimming capabilities as outlined in the luminaire schedule for each luminaire type. Dimming shall control light output in a continuous curve from 100% to 10% unless noted otherwise.
3. Driver shall have a minimum of 50,000 hours rated life.
4. Driver shall be tested to ANSI C82-16 for input current inrush, total harmonic distortion (THD), and power factor. Driver start time shall be less than 0.5 seconds to 98% of initial light output. Flicker should be less than 30% throughout the operating range.
5. Driver shall be field replaceable without removal of the luminaire.
6. Class A sound rating; inaudible in a 27 dBA ambient.
7. Demonstrate no visible change in light output with a variation of plus or minus 10 percent change in line-voltage input.

2.3 LED EMERGENCY LIGHTING UNITS

A. Self-Powered Emergency Lighting Units: One-piece, self-contained unit with sealed, maintenance-free nickel cadmium battery, automatic charger and electronic circuitry. Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

B. Charger: Dual-rate solid state current limiting charger, capable of maintaining the battery in a full-charge state during normal conditions, and capable of recharging discharged battery to full charged within 168 hours. Low voltage disconnect to prevent deep discharge of battery.

C. LED Lamp Wattage: As scheduled on luminaire schedule.

D. Remote Lamps: Match LED lamps on unit.

E. Provide test switch to transfer unit from normal supply to battery supply.

F. Electrical Connection: Knockout for conduit connection.

G. Unit Voltage: Refer to luminaire schedule volts, AC.

H. Self-Diagnostics and Testing:

1. Unit shall be self-diagnostic with continuous monitoring of charger performance and battery voltage. Any malfunction of battery, charger, transfer circuit, or emergency lamps shall be detected and visually indicated.
2. Unit shall be programmed to exercise the battery and test emergency operation by performing a five-minute discharge/diagnostic cycle every six months. A manual test switch shall allow a five-minute discharge/diagnostic test at any time.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Securely fasten luminaires to the listed and labeled ceiling framing member by mechanical means such as bolts, screws, rivets or listed clips identified for use with the type of ceiling framing members. The architectural ceiling framing system may be used in lieu of independent support with prior written approval by the ceiling system manufacturer and Authority Having Jurisdiction (AHJ). Luminaires and wiring installed in fire-rated ceiling assemblies shall be independently supported for all applications.

1. Install recessed flanged luminaires to permit removal from below. Use manufacturer-supplied plaster frames and swing gate supports.

B. Recessed luminaires and other optical accessories shall remain in protective wraps or films until construction in area is complete and area has been cleaned.

3.2 CONSTRUCTION USE OF PROJECT LUMINAIRES

A. The Contractor shall provide temporary construction lighting per the requirements of Division 1.

B. The project luminaires shown on the construction documents shall not be used for temporary construction purposes without providing a plan for Owner approval that addresses energy and luminaire operating hours.

3.3 EMERGENCY LIGHTING UNITS AND EXIT SIGNS

A. Install units plumb and level.

B. Aim directional lamp heads as directed.

C. Test emergency lighting equipment for 60 minutes to determine proper operation, prior to Substantial Completion. Provide electronic copy of periodic test log form to Owner's Representative. Explain and instruct Owner's Representative of requirements for testing and maintenance. Refer to latest adopted NFPA 101 for testing and logging requirements.

3.4 RELAMPING

A. Replace failed LED light engine modules or arrays at completion of work.

3.5 ADJUSTING AND CLEANING

A. Align luminaires and clean lenses and diffusers at completion of work. Clean paint splatters, dirt, and debris from installed luminaires.

B. Touch up luminaire and pole finish at completion of work.

3.6 OWNER TRAINING

A. Test emergency lighting equipment for 60 minutes to determine proper operation, prior to Substantial Completion, with the Owner's Representative.

B. Provide electronic copy of periodic test log form to Owner's Representative. Explain and instruct Owner's Representative of requirements for testing and maintenance. Refer to latest adopted NFPA 101 for testing and logging requirements.

3.7 LUMINAIRE SCHEDULE

A. As shown on the drawings.

END OF SECTION

SECTION 28 31 01 - FIRE ALARM AND DETECTION SYSTEMS ADDRESSABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fire alarm and detection systems.

1.2 RELATED WORK

A. Section 26 05 53 - Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

1.3 QUALITY ASSURANCE

A. Manufacturer: Company specializing in smoke detection and fire alarm systems with ten years' experience.

B. Installer: A factory-authorized Electrical or Security Contractor licensed with the State and local jurisdiction with five years' experience in the design, installation, and maintenance of fire alarm systems by that manufacturer.

C. Qualifications: The person managing/overseeing the preparation of shop drawings and the system installation/programming/testing shall be trained and certified by the system manufacturer and shall be Fire Alarm Certified by NICET, minimum Level 2. This person's name and certification number shall appear on the start-up and testing reports.

1.4 REFERENCES

A. NFPA 70 - National Electrical Code (NEC)

B. NFPA 72 - National Fire Alarm and Signaling Code

C. UL 2017 - General Purpose Signaling Devices and Systems

D. UL 268 - Standard for Smoke Detectors for Fire Alarm Systems

1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 26 05 00 and as noted below.

1. Failure to comply with all the following and all the provisions in 26 05 00 will result in the shop drawing submittal being rejected without review.
2. Failure to submit the fire alarm without all requirements fulfilled in a single comprehensive submittal will be grounds to require a complete resubmittal.

B. Provide product catalog data sheets as shop drawings.

1. Provide a product catalog data sheet for each item shown on the Electrical Symbols List and for each piece of equipment that is not shown on the drawings, but required for the operation of the system.
2. Where a particular Electrical Symbols List item has one or more variations (such as those denoted by subscripts, etc.) a separate additional product catalog data sheet shall be provided for each variation that requires a different part number to be ordered. The corresponding Electrical Symbols List symbol shall be shown on the top of each sheet.
3. Where multiple items and options are shown on one data sheet, the part number and options of the item to be used shall be clearly denoted.

C. Submit Floor Plans as Shop Drawings:

1. The complete layout of the entire system, device addresses, auxiliary equipment, and manufacturer's wiring requirements shall be shown.
2. A legend or key shall be provided to show which symbols shown on the submittal floor plans correspond with symbols shown on the Contract Documents.

D. About all fire alarm circuits, provide the following: manufacturer's wiring requirements (manufacturer, type, size, etc.) and voltage drop calculations.

E. Provide installation and maintenance manuals under provisions of Section 26 05 00.

F. Submit manufacturer's certificate that system meets or exceeds specified requirements.

G. Provide information on the system batteries as follows: total battery capacity, total capacity used by all devices on this project, total available future capacity.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 26 05 00.

B. Store and protect products under provisions of Section 26 05 00.

1.7 REGULATORY REQUIREMENTS

A. System: UL listed.

1.8 SYSTEM DESCRIPTION

A. Performance Statement: This specification section and the accompanying fire alarm specific design documents describe the minimum material quality, required features, and operational requirements of the system. These documents do not convey every wire that must be installed and every equipment connection that must be made. Based on the equipment described and the performance required of the system, as presented in these documents, the Vendor and the Contractor are solely responsible for determining all wiring, programming and miscellaneous equipment required for a complete and operational system.

B. This section of the specifications includes the furnishing, installation and connection of the microprocessor controlled, intelligent reporting, fire alarm equipment required to form a complete coordinated system that is ready for operation. It shall include, but is not limited to, alarm initiating devices,control panels, auxiliary control devices, annunciators, power supplies, and wiring as indicated on the drawings and specified herein.

C. Replacing the Existing Fire Alarm System: Provide all items, components, devices, hardware, software, programming, expansion components, conduit, wiring etc. needed toreplace the existing fire alarm system with the new fire alarm system. This includes, but is not limited to, additional power supplies, initiating devices and circuits, signaling devices and circuits, monitoring devices and circuits, auxiliary control and related devices such as, door holders and their control, smoke damper control, fan shutdown, etc. The existing fire alarm system shall bereplaced with the new fire alarm system such that the existing fire alarm system's functionality, integrity and annunciation shall be equivalent to pre-construction conditions, unless noted otherwise. The functionality and integrity shall be maintained during construction. The entire system shall be able to be completely reset from any single reset location point. The entire system shall be annunciated at any annunciation location.

D. Fire Alarm System: NFPA 72; Automatic and manual fire alarm system, non-coded, analog-addressable with automatic sensitivity control of certain detectors, multiplexed signal transmission.

E. System Supervision: Provide electrically supervised system, with supervised Signal Line Circuit (SLC) and Notification Appliance Circuit (NAC). Occurrence of single ground or open condition in initiating or signaling circuit places circuit in TROUBLE mode. Component or power supply failure places system in TROUBLE mode.

F. Alarm Reset: Key-accessible RESET function resets alarm system out of ALARM if alarm initiating circuits have cleared.

G. Drawings: Only device layouts and some equipment have been shown on the contract drawings. Wiring and additional equipment to make a complete and functioning system has not been shown, but shall be submitted on the shop drawings.

1.9 PROJECT RECORD DOCUMENTS

A. Submit documents under the provisions of Section 26 05 00.

B. Include location of end-of-line devices.

C. Provide a drawing of each area of the building (minimum scale of 1/16" = 1'-0") showing each device on the project and its address. The devices shall be shown in their installed location and shall be labeled with the same nomenclature as is used in the fire alarm panel programming. Use final room numbers as confirmed by Architect.

D. Submit test results of sound pressure level (dBA) and intelligibility (STI) with the rooms tested designated on the floor plan. Notification devices shall have the tap wattage designated.

1.10 OPERATION AND MAINTENANCE DATA

A. Submit data under provisions of Section 26 05 00.

B. Include operating instructions, and maintenance and repair procedures.

C. Include results of testing of all devices and functions.

D. Include manufacturer's representative's letter stating that system is operational.

E. Include the floor plan drawings.

F. Include shop drawings as reviewed by the Architect/Engineer and the local Authority Having Jurisdiction.

1.11 WARRANTY

A. Provide one (1) year warranty on all materials and labor from Date of Substantial Completion.

B. Warranty requirements shall include furnishing and installing all software upgrades issued by the manufacturer during the one (1) year warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Johnson Controls - Simplex

B. Notifier by Honeywell

C. Edwards - EST

D. Siemens Fire Safety

2.2 FIRE ALARM CONTROL PANEL (FAP)

A. Control Panel: Modular, power-limited electronic design. Provide surface wall-mounted enclosure as shown on plans. Enclosure shall be minimum 0.060 steel with provisions for electrical conduit connections into the sides and top. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.

B. Each Signaling Line Circuit (SLC loop) shall not be loaded over 80% of the maximum device capacity. For example, in the minimum system capacity column listed below, if the fire alarm manufacturer's system capacity of analog sensors per loop is 99 devices, then no more than 79 devices shall be wired on that loop. The minimum system capacity shall be as follows:

1. Minimum Total Addressable Points: 250
2. Minimum Total SLC Loops (including board, ready for field connections): 2
3. Panel Expansion Capability, Minimum Total SLC Loops: 10

C. Signal Line Circuit (SLC) and Notification Appliance Circuit (NAC) Boards:

1. Each board shall communicate directly with each addressable analog sensor and binary input to determine normal, alarm, or trouble conditions. Analog signals would be used for automatic test and determination of maintenance requirements.
2. Each board shall contain its own microprocessor and shall be provided to monitor addressable inputs and to control addressable outputs (addressable relays). The board shall communicate and provide power to all devices on its loop over a single pair of wires, except where 4-wire devices require a separate power circuit.

D. Central Processing Unit:

1. The central processing unit (CPU) shall communicate with the monitor and control all other modules in the panel. Removal, disconnection or failure of any control panel module shall be detected and reported to the CPU.
2. The CPU shall execute all control-by-event programs for specific action to be taken if a designated situation is detected in the system. A real-time system clock for time annotations on the display and printer shall be included.
3. All power for the unit shall be supervised and supplied by the FAP.

E. Display:

1. The board shall provide all controls and indicators used by the system operator and may also be used to program all control panel parameters.
2. The board shall provide an alphanumeric array for display of custom alphanumeric labels for all addressable points. It shall also provide indicators for AC Power, System Alarm, System Trouble, Display Trouble and Signal Silence.
3. Displayed descriptions of addressable points shall include actual room names/numbers selected by the Owner. This information shall be obtained prior to programming. Room names/numbers shown on floor plans shall not be used.

4. The board shall provide a touch key-pad with control capability to command all system functions and entry of any alphanumeric information. Twenty different passwords with four levels of security shall be supported to prevent unauthorized manual control or programming.

F. Memory: The CPU and display interface board shall be augmented by non-volatile field programmable memory. EPROM memory will also be allowed provided the memory is burned in with minimum expansion capability equal to the total system capacity of the panel. Memory shall not be lost upon primary and secondary power failure.

G. Power Supply:

1. Input power shall be 120 VAC, 60 Hertz. Output power shall be as noted on the device specifications and drawings. Each component of the fire alarm system requiring 120 VAC input power shall be served from a dedicated branch circuit. Provide two #12 conductors and one #12 ground in 3/4" conduit to a dedicated 20A/1P circuit breaker with a red handle and a manufacturer's standard handle lock-on device. Identify/label breaker and branch circuit in accordance with NFPA requirements and Specification Section 26 05 53.
2. Adequate to supply 125% of all control panel and peripheral power needs as well as 125% of power required for all external audio-visual devices. The power supply may be increased as needed by adding additional modular expansion power supplies. Over-current protections shall be provided on all power outputs.
3. All power supplies shall be designed and installed to meet UL and NFPA requirements for power-limited operation on all external initiating and indicating circuits.
4. The power supply shall provide integral charger for use with internal batteries. Battery capacity shall be sufficient for operation of the entire system for 24 hours in a non-alarm state followed by alarm mode for 15 minutes, plus 25% spare capacity for future devices.

H. Surge Protection:

1. All fire alarm control panels, NAC panels, etc. shall be provided with a surge protection device (SPD). The SPD shall be UL listed to Standard 1449 Rev 3. The unit should be clearly labeled in accordance with Identification Section 26 05 53. The SPD shall have thermal fuses to protect against fire in short circuit conditions. The unit shall provide visual indication that the unit is protecting and functioning.
2. Any communications or signaling circuits associated with the fire alarm system, which leave or enter a facility, shall be provided with a surge protection device. The devices shall be as recommended by the fire alarm system manufacturer.

I. Digital Communicator:

1. Provide connection to existing interface capable of fire alarm notification to monitoring service. Coordinate exact requirements with existing equipment and monitoring service provider.

2. Existing monitoring service contact:

Fire Alarm Maintenance Company (FAMCO)
Tammy Landosky
tlandosky@famcoalarms.com
(800)-996-8765

2.3 FIRE ALARM PATHWAY CLASS AND SURVIVABILITY LEVEL

A. Pathway Class:

1. Pathway Class B: Circuits NOT capable of transmitting an alarm beyond the location of the fault condition. Wiring of outgoing and return conductors is permitted to be run in the same conduit or cable.

B. Pathway Survivability Level:

1. Pathway Survivability Level 0: Circuits have no requirements for pathway survivability beyond the requirements of the code.

2.4 SIGNALING LINE CIRCUIT DEVICES

A. Combination Devices: Subscripts identify combination type devices when applicable. Contractor shall provide the combination device or provide multiple device(s) to meet the functionality when the manufacturer does not offer the required functionality with a single device.

B. Signal Line Device(s):

1. Subscripts: Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.

a. Device type as follows:

1) W = Weather Proof
2) WG = Wire guard is required
3) Candela Ratings:

a) ## = 15 Candela, 30 Candela; 75 Candela; 110 Candela; 177 Candela
b) CD = NICET designer shall select Candela rating as required to provide full coverage of the space.

C. FA-120; Smoke Detectors:

1. Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.

a. Device types as follows:

1) Blank = Photoelectric
2) AT = Attic (located in)
3) CO = Combination Smoke / Carbon Monoxide
4) H = Combination Smoke / Heat Detectors
5) ID = In-Duct Detector

2. (BLANK) Analog Photoelectric Type Sensor: Shall use the photoelectric principle to measure smoke density and send data to the control panel representing the analog level of smoke density measured.
3. (CO) Combination Smoke / Carbon Monoxide:

a. Multi-criteria sensor for photoelectrical smoke sensing and carbon monoxide (CO) detection. Carbon monoxide electrolytic sensing module shall provide toxic gas sensing to UL2034 and UL2075 standards.
b. The combined photoelectric smoke detection CO module shall have separate sensors that adjust the detection profile in response to the input from the sensors.
c. The combined photoelectric smoke detection / CO module shall have selectable modes of operation for OSHA compliant toxic gas sensing, enhanced fire sensing, and nuisance alarm reduction mode.
d. The detector shall use only one address on the SLC.
e. CO sensor cartridge element shall be field replaceable.

4. (H) Combination Smoke / Heat Detector:

a. Multi-criteria sensor for photoelectrical smoke sensing and rate of rise heat detection. Carbon monoxide electrolytic sensing module shall provide toxic gas sensing to UL2034 and UL2075 standards.
b. The detector shall use only one address on the SLC

5. (IN) In-Duct Smoke Detectors:

a. Analog Photoelectric Type Sensor: Shall use the photoelectric principle to measure smoke density and send data to the control panel representing the analog level of smoke density measured.
b. Low Flow Type: Listed for use in duct with 0-2000 feet per minute velocity.
c. Each smoke detector shall connect directly to an SLC loop.
d. Each detector shall be mounted, where shown on the drawings, on a twist-lock base with all mounting hardware provided to match the duct application. Provide a two-piece head/base design.
e. Each detector shall have a manual switching means to set the internal identifying code (address) of that detector, which the control panel shall use to identify its address with the type of sensor connected.
f. Provide a remote LED indicator device (FA-240/241), mounted in ceiling directly below detector with a single-gang faceplate labeled: Duct Smoke Detector.

6. Each smoke detector shall connect directly to an SLC loop, unless listed as stand alone.
7. Each detector shall be mounted, where shown on the drawings, on a twist-lock base with all mounting hardware provided. Provide a two-piece head/base design.
8. Each detector shall have a manual switching means to set the internal identifying code (address) of that detector, which the control panel shall use to identify its address with the type of sensor connected.
9. Dual alarm and power indicators shall be provided that flash under normal conditions and remain continuous under alarm or trouble conditions. Remote indicator terminals shall be provided. Provide a remote LED indicator device if detector is not visible from a floor standing position.
10. A test means shall be provided to simulate an alarm condition.

D. FA-130; Manual Pull Stations:

1. Manual pull station, addressable, double action, reset key lock, semi-flush mount, red high abuse plastic or cast metal construction with white lettering. Provided with all necessary mounting hardware.
2. Manual stations shall connect directly to an SLC loop. Stations shall provide address setting means using rotary decimal or DIP switches.

E. FA-140; Heat Detectors:

1. Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.

    a. Device types as follows:

        1) Blank = Combination Rate of Rise / Fixed Temp
        2) AT = Attic (located in)

2. (BLANK) Combination rate of rise and 135°F fixed temperature analog thermal type sensor. Factory programmed to alarm at 135°F and at 15°F per minute rate-of-rise. Sensor shall measure heat level and send data to the control panel representing the analog level of thermal measurement and rate-of-rise.
3. Provide a two-piece head/base design, with a manual switching means to set the internal identifying code (address) of that detector, which the control panel shall use to identify its address with the type of sensor connected.
4. Heat detectors shall connect directly to SLC loops.
5. Detectors shall be mounted, where shown on the drawings, on a twist-lock base with all mounting hardware provided.
6. Provide a remote LED indicator device if detector is not visible from a floor-standing position.
7. Dual alarm and power indicators shall be provided that flash under normal conditions and remain continuous under alarm or trouble conditions. A connection for attachment of a remote indicator shall be provided.
8. A test means shall be provided to simulate an alarm condition.

9. Where operation is noted as required below 32°F and/or above 120°F, a conventional device shall be installed with a unique monitor module located in the nearest available location with maintained temperatures between 32°F and 120°F.

F. FA-160; Monitor Modules:

1. Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.

   a. Device types as follows:

      1) Blank = Refer to Plans
      2) KB = Knox Box Monitor

2. Monitor Module shall connect directly to an SLC loop and receive power from a separate 24 VDC circuit. It shall interface initiating devices with the control panel using Style D or Style B circuits. Contractor Option: Use an interface module (2-wire operation) for Style B circuits connected to normally-open dry contacts, such as a flow switch.
3. The module shall be mounted in an enclosure located in an accessible service location as near as possible to the device(s) being monitored, or where shown on the drawings. All mounting hardware shall be provided.
4. The module shall supply the required power to operate the monitored device(s).
5. The module shall provide address setting means using rotary decimal or DIP switches.

G. FA-161; Addressable Control Module:

1. Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.

   a. Device types as follows:

      1) Blank = Refer to Plans
      2) DH = Door Hold Open
      3) PD = Hold Open Override

2. Relay that represents an addressable control point used primarily for the control of auxiliary devices as indicated on the drawings. Contractor to provide additional child relay(s), as required, rated for the electrical load being controlled (Contractor to match voltage, amps, etc.).
3. Relay shall connect directly to an SLC loop and receive power from a separate 24 VDC circuit.
4. The relay shall be mounted in an enclosure located in an accessible service location as near as possible to the device(s) being controlled, unless otherwise shown on the drawings. All mounting hardware shall be provided.
5. The relay shall supply 24 VDC power to the device(s) being controlled, unless otherwise indicated on the drawings.

2.5 NOTIFICATION APPLIANCE DEVICES

A. Combination Devices: Subscripts identify combination type devices when applicable. Contractor shall provide the combination device or provide multiple device(s) to meet the functionality when the manufacturer does not offer the required functionality with a single device.

B. Notification Appliance Device(s):

1. Subscripts: Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.

a. Device types as follows:

1) W = Weather Proof
2) WG = Wire guard is required
3) Candela Ratings:

a) ## = 15 Candela; 30 Candela; 75 Candela; 110 Candela; 177 Candela
b) CD = NICET designer shall select Candela rating as required to provide full coverage of the space.

C. Notification Device(s):

1. Wall Mounted: Red housing with white lettering or pictogram.
2. Ceiling Mounted: White housing with red lettering or pictogram.

D. FA-200; Visual Alarm Devices:

1. Wall or ceiling mounted, refer to plans.
2. High intensity (Candela rating as scheduled on the drawings) xenon strobe or equivalent under a lens. Candela rating shall be visible from exterior of the device.
3. The maximum pulse duration shall be 0.2 seconds with a maximum duty cycle of 40%. The flash rate shall be 1 Hz. Where more than two strobes are visible from any one location, the fire alarm visual devices shall be synchronized.
4. Device, housing, and backbox shall be UL listed for fire alarm/emergency applications.
5. (W) Weatherproof Visual Notification Device: High intensity strobe, square housing, 75 Candela rating, suitable for wet locations. Provide with weatherproof back box.

a. Mounting: Semi-flush wall.
b. Conduit shall not be exposed.

E. FA-210; Audio Horn Alarm Devices:

1. Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.
2. Device types as follows:

a. M = Mini-Horn

3. Wall or ceiling mounted, refer to plans.
4. Sound Rating: 85 dB at 10 feet. Sound levels for alarm signals shall not exceed 120 dBA in the occupied area.
5. Device shall be capable of a high and low dB level setting. Unless noted otherwise, the device shall be set to the high setting at building completion.
6. Device, housing, and backbox shall be UL listed for fire alarm/emergency applications.
7. (M) Mini-Horn Audio Notification Device: Electronic Horn.

   a. Mounting: Single-gang flush wall.

F. FA-211; Combination Audio Horn and Visual Alarm Device:

1. Wall or ceiling mounted, refer to plans.
2. Combine audio and visual components into a single device. Refer to the corresponding paragraphs above for requirements of each component.
3. (W) Weatherproof Audio/Visual Notification Device: Electronic horn with high intensity strobe, square housing, 75 Candela, suitable for wet locations. Provide with weatherproof back box.

   a. Mounting: Semi-flush wall.
   b. Conduit shall not be exposed.

2.6 ANNUNCIATION

A. FAA; Remote LCD Annunciators:

1. Auxiliary annunciators shall indicate alarm and trouble conditions visually and audibly as shown on the drawings. Provide local TROUBLE ACKNOWLEDGE, TEST, and ALARM SILENCE capability. Minimum 80-character display.
2. Communications and power to the annunciators shall be supervised. The annunciator shall receive power from the fire alarm control panel.
3. A single key switch shall enable all switches on the annunciator.
4. Mounting: Surface.

2.7 WIRING

A. Fire alarm wiring/cabling shall be furnished and installed by the Contractor in accordance with the manufacturer's recommendations and pursuant to National Fire Codes. Cabling shall be UL listed and labeled as complying with the Electrical Code for power-limited fire alarm signal service.

B. Fire Alarm Cable:

1. Manufacturers:

a. Comtran Corp.
b. Helix/HiTemp Cables, Inc.
c. Rockbestos-Suprenant Cable Corp.
d. West Penn Wire/CDT.
e. Radix.

PART 3 - EXECUTION

3.1 SEQUENCES OF FIRE ALARM OPERATION

A. General:

1. Refer to the Fire Alarm Operation Matrix on the drawings for basic requirements and system operation.
2. All system output programs assigned via control-by-event equations to be activated by the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

B. Panel/Annunciator Alarm, Trouble, Supervisory Indication:

1. Appropriate system Alarm, Trouble, or Supervisory LED shall flash at the control panel, transponder, and annunciator locations.
2. A local signal in the control panel shall sound.
3. The LCD display shall indicate all information associated with the condition, including the name of the item, type of device and its location within the protected premises.
4. Transmit the appropriate signal (supervisory, trouble, alarm) to the central station via the digital communicator.

C. Audible Alarms Sequence:

1. Audible alarms throughout the building shall sound.

D. Visual Alarms Sequence:

1. Visual alarms throughout the building shall flash.

3.2 INSTALLATION

A. Install system in accordance with manufacturer's instructions and referenced codes.

B. Fire Alarm Control Panel:

1. Install the control panel where shown on the drawings.
2. All expansion compartments, if required, shall be located at the control panel.

C. Devices:

1. General:

    a. All ceiling-mounted devices shall be located where shown on the reflected ceiling and floor plans. If not shown on the reflected ceiling or reflected floor drawings, the devices shall be installed in the relative locations shown on the floor drawings in a neat and uniform pattern.
    b. All devices shall be coordinated with luminaires, diffusers, sprinkler heads, piping and other obstructions to maintain a neat and operable installation. Mounting locations and spacing shall not exceed the requirements of NFPA 72.
    c. The location of all fire alarm devices shall be coordinated with other devices mounted in the proximity. Where a conflict arises with other items or with architectural elements that will not allow the device to be mounted at the location or height shown, the Contractor shall adjust location of device so that new location meets all requirements in NFPA 72 and all applicable building codes.

2. Per the requirements of NFPA, detector heads shall not be installed until after the final construction cleaning unless required by the local Authority Having Jurisdiction (AHJ). If detector heads must be installed prior to final cleaning (for partial occupancy, to monitor finished areas or as otherwise required by the AHJ), they shall not be installed until after the fire alarm panel is installed, with wires terminated, ready for operation. Any detector head installed prior to the final construction cleaning shall be removed and cleaned prior to closeout.
3. Protection of Fire Alarm System:

    a. A smoke detector shall be installed within the vicinity of the main fire alarm panel and every NAC extender panel per NFPA 72. A heat detector may be substituted when a smoke detector is not appropriate for the environment of installation.

4. Manual Pull Stations:

    a. Stations shall be located where shown and at the height noted on the drawings.

5. Addressable Relays and Monitor Modules:

    a. Modules shall be located as near to the respective monitor or control devices as possible, unless otherwise indicated on the drawings.
    b. All modules shall be mounted in or on a junction box in an accessible location.
    c. Where not visible from a floor standing position, a remote indicator shall be installed to allow inspection of the device status from a local floor standing location.

6. Notification Appliance Devices:

    a. Devices shall be located where shown on the drawings.
    b. Wall-mounted audio, visual and audio/visual alarm devices shall be mounted as denoted on the drawings.

D. Annunciators:

1. Remote Annunciators: The annunciators shall be located where shown on the drawings and approved by the fire marshal.

E. Wiring:

1. Fire alarm wiring/cabling shall be provided by the Contractor in accordance with the manufacturer's recommendations and pursuant to National Fire Codes.
2. Refer to Identification Section 26 05 13 for color and identification requirements.
3. All junction boxes with SLC and NAC circuits shall be identified on cover. Refer to Identification Section 26 05 13 for color and identification requirements.
4. Fire Alarm Power Branch Circuits: Building wiring as specified in Section 26 05 13.
5. Notification Appliance Circuits shall provide the features listed below. These requirements may require separate circuits for visual and audible devices.

    a. Fire alarm temporal audible notification for all audio appliances.
    b. Synchronization of all visual devices where two or more devices are visible from the same location.
    c. Ability to silence audible alarm while maintaining visual device operation.

6. Notification Appliance Circuits shall not span floors.
7. Signal line circuits connecting devices shall not span floors or.
8. No wiring other than that directly associated with fire alarm detection, alarm or auxiliary fire protection functions shall be in fire alarm conduits. Wiring splices shall be avoided to the extent possible, and if needed, they shall be made only in junction boxes, and enclosed by plastic wire nut type connectors. Transposing or changing color coding of wires shall not be permitted. All conductors in conduit containing more than one wire shall be labeled on each end, in all junction boxes, and at each device with "E-Z Markers" or equivalent. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal. Cabinet terminals shall be numbered and coded, and no unterminated conductors are permitted in cabinets or control panels. All controls, function switches, etc. shall be clearly labeled on all equipment panels.

F. Fire Alarm Cabling Color Code: Provide circuit conductors with insulation color coding as follows, or using colored tape at each conductor termination and in each junction box.

1. Power Branch Circuit Conductors: In accordance with Section 26 05 53.
2. Signaling Line Circuit: Overall red jacket with black and red conductors.
3. DC Power Supply Circuit: Overall red jacket with violet and brown conductors.
4. Notification Appliance Circuit: Overall red jacket with blue and white conductors.
5. Door Release Circuit: Gray conductors.
6. Central Station Trip Circuit: Orange conductors.
7. Central Station Fire Alarm Loop: Black and white conductors.

G. Devices surface mounted in finished areas shall be mounted on surface backboxes furnished by fire alarm equipment supplier. Backboxes shall be painted to match device and shall not have visible knockouts.

3.3 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 26 05 00.

B. Test in accordance with NFPA 72, Chapter 14 and local fire department requirements. Submit documentation with O & M manuals in accordance with Section 14.6 of the Code.

C. Contractor shall test and adjust the fire alarm system as follows:

1. Sound level measurement procedure shall meet the following requirements:

a. All measurements shall use the 'A' weighted, dBA, sound measurement scale.
b. All measurements shall be taken after furnishings, wall coverings and floor coverings are in place.
c. All measurements shall be taken after fixed equipment (HVAC units, etc.) producing ambient noise is installed and is in operation.
d. Final ambient sound measurements shall be taken during occupancy and the units shall be re-adjusted at that time, if necessary.
e. All sound level measurements shall be taken at a height of 5' above the finished floor level.
f. Measurements shall be taken in every unique room. If there are multiple rooms, which have the identical dimensions and function, 10%, or a minimum of two (2) rooms shall be tested. The results from the rooms tested shall be averaged and the remaining rooms may be adjusted per the average.
g. Measurements shall be taken on a 20' x 20' grid and the results for all points taken shall be averaged. If the room is smaller than 20' x 20' a minimum of two measurements are required.
h. Measurements shall be taken halfway between speakers or halfway between a speaker and the wall. No measurements shall be taken at the extreme edges of the room, nor directly under speakers.

3.4 MANUFACTURER'S FIELD SERVICES

A. Provide manufacturer's field services under provisions of Section 26 05 00.

B. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.

C. Note that room numbers depicted on the architectural/engineering drawings will not necessarily reflect the actual room (signage) numbers that the Owner selects. Contractor and fire alarm manufacturer shall coordinate the actual room numbers as the Owner directs to identify each device. This list shall be a part of the floor plan record drawing to be turned in at the project closeout.

3.5 SYSTEM TRAINING

A. System training shall be performed under provisions of Section 26 05 00.

END OF SECTION

SECTION 321400 - UNIT PAVING

PART 1 - GENERAL

1.1 SUMMARY

1. Brick pavers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data:

1. For materials other than water and aggregates.
2. For the following:

   a. Brick Pavers
   b. Non-adhesive asphalt waterproofing membrane
   c. Geotextile fabric

B. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C136.

C. Samples for Initial Selection & Verification:

1. Color, size, texture of brick.
2. Sand color, size for joint filler.

1.4 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store liquids in tightly closed containers protected from freezing.

1.6 FIELD CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 BRICK PAVERS

A. Brick Pavers, Light-Traffic Paving Brick: ASTM C902, Class SX, Type II, Application PS. Provide brick without frogs or cores in surfaces exposed to view in the completed Work.

1. Thickness: 2-1/4 inches
2. Face Size: 4 by 8 inches
3. Glen-Gery Paver Brick Color: 52-DD Paver or 53-DD Paver, or similar.

B. Efflorescence: Brick to be rated "not effloresced" when tested according to ASTM C67.

C. Temporary Protective Coating: Precoat exposed surfaces of brick pavers with a continuous film of a temporary protective coating that is compatible with brick, mortar, and grout products and can be removed without damaging grout or brick. Do not coat unexposed brick surfaces; handle brick to prevent coated surfaces from contacting backs or edges of other units. If, despite these precautions, coating does contact bonding surfaces of brick, remove coating from bonding surfaces before setting brick.

2.3 ACCESSORIES

A. Cork Joint Filler: Preformed strips complying with ASTM D1752, Type II.

B. Non-adhered asphalt water proofing membrane, contractors option.

2.4 AGGREGATE SETTING-BED MATERIALS

A. Graded Aggregate for Subbase: Sound, crushed stone or gravel complying with [ASTM D448 for Size No. 57, ASTM D2940/D2940M.

B. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C33/C33M for fine aggregate.

C. Stone Screenings for Leveling Course: Sound stone screenings complying with ASTM D448 for Size No. 10.

D. Sand for Joints: Fine, sharp, washed, natural sand or crushed stone with 100 percent passing No. 16 sieve and no more than 10 percent passing No. 200 sieve.

1. Provide sand of color needed to produce required joint color.

E. Drainage Geotextile: Nonwoven needle-punched geotextile fabric, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2, AASHTO M 288.
2. Apparent Opening Size: No. 40 sieve, maximum; ASTM D4751.
3. Permittivity: 0.5 per second, minimum; ASTM D4491.
4. UV Stability: 50 percent after 500 hours' exposure, ASTM D4355.

F. Herbicide: Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid, or wettable powder form.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces indicated to receive unit paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Where unit paving is to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving operations, including areas where waterproofing system is turned up or flashed against vertical surfaces.

C. Proceed with installation only after unsatisfactory conditions have been corrected[and waterproofing protection is in place].

3.2 PREPARATION

A. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base course for unit pavers.

3.3 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.

B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

D. Handle protective-coated brick pavers to prevent coated surfaces from contacting backs or edges of other units. If, despite these precautions, coating does contact bonding surfaces of brick, remove coating from bonding surfaces before setting brick.

E. Joint Pattern: Running bond.

F. Tolerances:

1. Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches and 1/4 inch in 10 feet from level, or indicated slope, for finished surface of paving.

G. Expansion and Control Joints:

1. Provide for sealant-filled joints at locations and of widths indicated. Provide compressible foam filler as backing for sealant-filled joints unless otherwise indicated; where unfilled joints are indicated, provide temporary filler until paver installation is complete.
2. Provide joint filler at locations and of widths indicated. Install joint filler before setting pavers. Make top of joint filler flush with top of pavers.

3.4 AGGREGATE SETTING-BED APPLICATIONS

A. Compact soil subgrade uniformly to at least 95 percent of [ASTM D698,ASTM D1557 laboratory density.

B. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

C. Place separation geotextile over prepared subgrade, overlapping ends and edges at least 12 inches.

D. Place aggregate subbase and base, compact by tamping with plate vibrator, and screed to depth indicated.

E. Place aggregate subbase and base, compact to 100 percent of ASTM D1557 maximum laboratory density, and screed to depth indicated.

F. Place leveling course and screed to a thickness of 1 to 1-1/2 inches, taking care that moisture content remains constant and density is loose and uniform until pavers are set and compacted.

G. Treat leveling course with herbicide to inhibit growth of grass and weeds.

H. Set pavers with a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to disturb leveling base. Use string lines to keep straight lines. Fill gaps between units that exceed 1/2 inch with pieces cut to fit from full-size unit pavers.

I. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.

1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches of uncompacted pavers adjacent to temporary edges.
2. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted pavers adjacent to temporary edges (laying faces).
3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches of laying face.
4. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and cover leveling course on which pavers have not been placed with nonstaining plastic sheets to protect them from rain.

J. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.

K. Do not allow traffic on installed pavers until sand has been vibrated into joints.

L. Repeat joint-filling process 30 days later.

3.5 REPAIRING, POINTING, AND CLEANING

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

B. Cleaning:

1. Remove temporary protective coating as recommended by coating manufacturer and as acceptable to paver and grout manufacturers.
2. Do not allow protective coating to enter floor drains. Trap, collect, and remove coating material.

END OF SECTION 321400

APPENDIX O

Delaware County
Political Contribution Disclosure Form

Background: Under Section 6-12.E of the Administrative Code of Delaware County, Contractors under certain Covered Contracts are required to provide this Disclosure Form in connection with consideration of approval of such Covered Contract by County Council. ***Definitions of Contractor, Covered Contract, and certain other terms used in this Disclosure Form, as well as additional instructions for its completion, are set forth in Exhibit A attached hereto.***

Political Contribution Disclosure: Within the past twenty-four (24) months, Contractor* has:

_____ **NOT** made any Reportable Contributions.

_____ made Reportable Contributions as set forth on Schedule A attached hereto.

Includes entities and persons related to a Contractor whose contributions are also required to be reported, as further described in the definition of "reportable contribution" on Exhibit A.

Type of Business Entity

Corporation ___	LLC ___	Sole Proprietorship ___	Other: ___ (describe)
Limited Partnership ___	Partnership ___	LLP ___	_____

Certification: In order for this Disclosure Form to be considered validly submitted, it must be properly signed by the Contractor or an officer or employee of the Contractor that is authorized to make this certification. Disclosure Forms that are not properly signed will not be considered as responsive to the requirements of the Delaware County Administrative Code.

By executing below, you:

(1) Declare and certify that you are the Contractor or an employee or officer of the Contractor and duly authorized to execute this Disclosure Form.

(2) Represent and warrant that, to the best of your knowledge after appropriate inquiry, all of the information and disclosures provided are true and contain no material misstatement or omissions.

(3) Acknowledge and agree to comply with the provisions described in Exhibit A.

Name of Contractor: _____

By: _____
Name:
Title:
Date:

Exhibit A
Delaware County
Political Contribution Disclosure Form

Definitions and Instructions

Timing.

Contracts subject to an RFP/Q, Invitation to Bid or other Solicitation – the Solicitation will have explicit instructions on when and how to submit this Disclosure Form. Please follow those instructions.

Other Contracts -- Disclosure Forms must be received by the County at least eight (8) days prior to the County Council meeting at which the approval of a contract will be considered. They should be submitted by e-mail to CentralPurchasing@co.delaware.pa.us.

In either case, failure to timely provide this Disclosure Form may delay consideration of your contract by County Council.

Public Posting; Right to Know Law.

The Disclosure Form for the selected Contractor is sought will be posted on the County website prior to the County Council meeting at which approval of the Covered Contract will be considered and included in the Agenda materials for such meeting.

The County will also provide copies of Disclosure Forms (whether or not the Contractor is awarded a Covered Contract) in response to requests under the Pennsylvania Right to Know Law.

Ongoing Reporting.

By January 30 of each year, commencing January 1, 2023, each Covered Contractor under a Covered Contract with a term exceeding one year is required to provide the County Clerk with an updated Disclosure Form showing any reportable contributions in the prior year or indicating that there are none. If a Contractor does not provide the required disclosure form within thirty (30) days of written notification from the County Solicitor of its failure to timely provide such form, the applicable Covered Contract is subject to being voided by County Council.

Penalties.

Any Contractor which fails to provide the Disclosure Form or which submits a Disclosure Form which is materially inaccurate may be banned as a contractor or subcontractor to the County for a period of up to three (3) years, and/or, to the extent legally permitted, the covered contract in question may be terminated, in each case, by a majority vote of County Council following such investigation and consideration of such evidence as County Council deems appropriate or by action of such other entity or body as may be designated by resolution of County Council.

Definitions.

"Contractor" means any non-governmental person, corporation, partnership, association or other entity, whether or not for profit, and includes any subcontractor which is reasonably anticipated to receive compensation of $50,000 or more under the applicable Covered Contract**.** ***See the definition of "Reportable Contribution" below for entities and persons related to a contractor whose contributions are also required to be reported.***

"Covered Candidate" means any individual who seeks nomination or election to the following offices by vote of the electorate (whether or not such individual is nominated or elected): (1) County Council, District Attorney, Sheriff, Controller or Register of Wills in Delaware County; (2) Judge of the Court of Common Pleas of Delaware County or the Magisterial District Courts of Delaware County; (3) any seat in the Pennsylvania General Assembly which represents residents of Delaware County; or (4) any state-wide office in Pennsylvania (non federal).

An individual shall be deemed to be seeking nomination or election to an office if such individual has:

(1) received a contribution or made an expenditure or given consent for any other person or committee to receive a contribution or make an expenditure for the purpose of influencing his nomination or election to such office, whether or not the individual has announced the specific office for which he or she will seek nomination or election at the time the contribution is received or the expenditure is made; or

(2) taken the action necessary under the laws of Pennsylvania to qualify for nomination or election to such office.

The term shall include individuals nominated or elected as write-in candidates unless they resign such nomination or elected office within 30 days of having been nominated or elected.

"Covered Contract" means any contract, agreement, memorandum of understanding or other arrangement which is (i) required to be approved by County Council and (ii) under which a Covered Contractor provides or leases goods, supplies, materials, equipment, consulting, professional or other services, and/or property to the County, whether or not payments under the Covered Contract are anticipated to be made from general revenues or another specified source of funds, but does not include grant agreements under which the County is the grantee.

"Political contribution" means any advance, conveyance, deposit, distribution, transfer of funds, loan, payment, pledge, purchase of a ticket to a testimonial or similar fund-raising affair, or subscription of money or anything of value, except volunteer services, in connection with a political campaign, and any contract, agreement, promise or other obligations, whether or not legally enforceable, to make a political contribution.

"Reportable Contribution" means a political contribution, to:

(A) A Covered Candidate.

(B) Any Pennsylvania state committee of a political party, any County committee of a political party or any committee of a political party established at the municipal level for a municipality in the County.

(C) A contribution to a political action committee with the intent or expectation that some or all of such contribution will be directed to a covered candidate. This intent shall be presumed if a political action committee only supports one or more covered candidates.

(D) A contribution to a political action committee controlled by a person or entity described in clauses (1) through (5) below.

Reportable contributions include contributions by: (1) a Contractor; (2) any corporate parent, subsidiary or other affiliate of a Contractor; (3) an officer or director of a Contractor; (4) a shareholder or partner of a Contractor with a 5% or greater ownership interest; and (5) the spouse of any person or entity listed in the preceding clauses; and shall also include any contribution reimbursed by a person or entity listed in clauses (1) through (5).

Questions.

Questions regarding the Disclosure Form may be directed to CentralPurchasing@co.delaware.pa.us.

APPENDIX Q

DIVERSITY BUSINESS ENTERPRISE PROGRAM
(DBE) PROGRAM

For DBE tracking purposes, the County requests that prime contractors who are bidding, proposing, or submitting statements of qualifications record whether or not they plan to employ DBE's as sub-contractors or consultants. With that in mind, please fill out, sign and submit (with your bid/proposal) the following subcontractor/ consultant statement.

COUNTY OF DELAWARE DIVERSITY BUSINESS DEFINITIONS

Diversity Business Enterprise (DBE's) are minority-owned (MOB), women-owned (WOB), service disabled veteran-owned (SDVO), and small businesses (SB), who are impeded from normal entry into the economic mainstream because of past practices of discrimination based on race or ethnic background. These persons must own at least 51% of the entity and operate or control the business on a daily basis.

Minority: A person who is a citizen or lawful admitted permanent resident of the United States and who is a member of one (1) of the following groups:

a. African American, persons having origins in any of the Black racial groups of Africa;
b. Hispanic American, persons of Mexican, Puerto Rican, Cuban, Central or South American of either Indian or Hispanic origin, regardless of race;
c. Native American or Alaskan native, persons who have origin in any of the original peoples of North America
d. Asian American, person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands.

Minority-owned business (MOB) is a continuing, independent, for profit business that performs a commercially useful function, and is at least fifty-one percent (51%) owned and controlled by one (1) or more minority individuals.
Woman-owned business (WOB) is a continuing, independent, for profit business that performs a commercially useful function, and is at least fifty-one percent (51%) owned and controlled by one (1) or more women.
Service-Disabled Veteran-owned business (SDOV) is a continuing, independent, for profit business that performs a commercially useful function, owned by any person who served honorably on active duty in the armed forces of the United States with at least a twenty percent (20%) disability that is service connected. Meaning such disability was incurred or aggravated in the line of duty in the active military, naval or air service, and is at least fifty-one percent (51%) owned and controlled by one (1) or more service-disabled veteran.
Small Business (SB) is a continuing, independent, for profit business which performs a commercially useful function and has total gross receipts of not more than ten million dollars ($10,000,000) average over a three-year period or employs no more than ninety-nine (99) persons on a full-time basis.

Subcontractor/Consultant Statement

(TO BE SUBMITTED IN THE BID/PROPOSAL ENVELOPE)

We_____ do certify that on the
(Bidder/Proposer Company Name)

_____
(Project Name)

$_____
(Amount of Bid)

Please select one:

☐ **Option A: Intent to subcontract using Diversity Businesses**

A Diversity Business will be employed as subcontractor(s), vendor(s), supplier(s), or professional service(s). The estimated dollar value of the amount that we plan to pay is: $_____.
Estimated Amount of Subcontracted Service

Diversity Business Enterprise Utilization

Description of Work/Project	Amount	Diverse Classification (MOB, WOB, SB, SDOV)	Name of Diverse Business

☐ **Option B: Intent to perform work without using Diverse Businesses**

No Diversity Business will be employed as subcontractor(s), vendor(s), supplier(s), or professional service(s).

DATE: _____COMPANY NAME: _____

SUBMITTED BY: _____ TITLE: _____
(Authorized Representative)

ADDRESS: _____

CITY/STATE/ZIP CODE: _____

TELEPHONE NO: _____