

Project Manual Specifications

FAMILY RESTROOM HOGBACK RIDGE PARK

FOR:

**Preservation Parks of Delaware County
District Office
2656 Hogback Road
Sunbury, Ohio 43074**



PREPARED BY:

**SCHORR ARCHITECTS, INC.
230 BRADENTON AVENUE
DUBLIN, OHIO 43017
614/798.2096**

AUGUST 21, 2024 BID DOCUMENTS

COMMISSION NUMBER: SAI 2415

SITE ELECTRICAL IMPROVEMENTS - HOGBACK PARK
PRESERVATION PARKS OF DELAWARE COUNTY

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PUBLIC NOTICE

Sealed Bids for the construction of the “Family Restroom – Hogback Ridge Park” will be received by Preservation Parks of Delaware County (PPDC), 2656 Hogback Road, Sunbury, Ohio 43074, until 2:00 p.m. local time on September 5, 2024 and immediately following the deadline the bids will be opened and publicly read.

Copies of the Instructions to Bidders and this notice are posted on the Preservation Parks website at: [Bidding & Contractor Information - Preservation Parks of Delaware County](#)

Bid Documents may be purchased at DC Reprographics, 1254 Courtland Ave., Columbus, Ohio 43201, 614/297-1200, www.dcreprographics.com, plus all applicable shipping charges. Bid Documents may be reviewed for no cost at the office of Schorr Architects, Inc., 230 Bradenton Avenue, Dublin, Ohio 43017 during regular business hours.

A Pre-Bid Conference will be held on August 27, 2024 at Hogback Ridge Park, 2656 Hogback Road, Sunbury, Ohio 43074 1:00 pm . All questions should be directed to Larry Rancour, Schorr Architects at lrancour@schorrarchitects.com .

All bids must be submitted in sealed envelopes and clearly marked with the project title. The cost of this project has been estimated to be approximately \$150,000.00.

No bidder may withdraw its bid within sixty (60) days after the actual date of the opening thereof. PPDC reserves the right to waive irregularities in proposals, to reject any or all bids, and to conduct such investigation as necessary to determine the responsibility of any bidder submitting a bid proposal for the Project.

A response to this Bid Notice should not be construed as a contract nor indicate a commitment of any kind by PPDC. The bid does not commit PPDC to pay for the costs incurred in the submission of a response to this Bid Notice or for any costs incurred prior to the execution of the final contract.

END OF NOTICE TO BIDDERS

Advertised Delaware Gazette;
8/21/24
8/28/24

INSTRUCTIONS TO BIDDERS

A. BIDDER'S PLEDGE AND AGREEMENT

1. Each Bidder acknowledges that this is a public project involving public funds and that the Owner expects and requires that each successful Bidder adheres to the highest ethical and performance standards. Each Bidder by submitting a bid pledges and agrees that (a) it will act at all times with absolute integrity and truthfulness in its dealings with the Owner and the Design Professional, (b) it will use its best efforts to cooperate with the Owner and the Design Professional and all other Contractors on the Project and at all times will act with professionalism and dignity in its dealings with the Owner, Design Professional, and other Contractors, (c) it will assign only competent supervisors and workers to the Project, each of whom is fully qualified to perform the tasks that are assigned to him/her, and (d) it has read, understands and will comply with the terms of the Contract Documents.

B. EXAMINATION OF CONTRACT DOCUMENTS AND SITE CONDITIONS AND RELIANCE UPON TECHNICAL DATA

1. Each Bidder shall have a competent person carefully and diligently review each part of the Contract Documents, including the Divisions of the Specifications and parts of the Drawings that are not directly applicable to the Work on which the Bidder is submitting its bid. By submitting its bid, each Bidder represents and agrees, based upon its careful and diligent review of the Contract Documents, that it is not aware of any conflicts, inconsistencies, errors, or omissions in the Contract Documents for which it has not notified the Design Professional in writing at least seven (7) days prior to the bid opening. If there are any such conflicts, inconsistencies, errors, or omissions in the Contract Documents, the Bidder (i) will provide the labor, equipment, or materials of the better quality or greater quantity of Work and/or (ii) will comply with the more stringent requirements. The Bidder will not be entitled to any additional compensation for any conflicts, inconsistencies, errors, or omissions that would have been discovered by such careful and diligent review, unless it has given prior written notice to the Design Professional.
2. Each Bidder shall have a competent person carefully and diligently inspect and examine the entire site and the surrounding area, including all parts of the site applicable to the Work for which it is submitting its bid, including location, condition, and layout of the site and the location of utilities, and carefully correlate the results of the inspection with the requirements of the Contract Documents. The Bidder's bid shall include all costs attributable to site and surrounding area conditions that would have been discovered by such careful and diligent inspection and examination of the site and the surrounding area, and the Bidder shall not be entitled to any Change Order, additional compensation, or additional time on account of such conditions.
3. The Bidder may rely upon the general accuracy of any technical data identified in the Owner-Contractor Agreement (e.g., any soils exploration reports, soil boring logs, site survey, or abatement reports) in preparing its bid, but such technical data are not part of the Contract Documents. Except for the limited reliance described in the preceding sentence, Bidder may not, if awarded a contract for the Work, rely upon or make any Claim against the Owner or Design Professional, or any of their agents or employees, with respect to any of the following:
 - (a) the completeness of such reports and drawings for Bidder's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by the successful Bidder and safety precautions and programs incident thereto; or

- (b) any interpretation by the successful Bidder of or conclusion drawn from any technical data or any such other data, interpretations, opinions, or information. For example, all interpolations and extrapolations of data performed by the Bidder to estimate locations or quantities of subsurface strata are independent factual assumptions, which the Owner does not warrant.
4. Each Bidder will be deemed to have actual knowledge of all information provided or discussed at the pre-bid meeting.

C. PROJECT

1. The Project and Work for the Project consists of all labor, materials, equipment, and services necessary for the construction of the project identified as Family Restroom – Hogback Ridge Park (“the Project”), all in accordance with the Drawings and Specifications prepared by the Design Professional.
2. The Design Professional for the Project is:

Schorr Architects, Inc.
230 Bradenton Avenue
Dublin, Ohio 43017
Telephone Number: 614/798-2096
Design Professional’s Representative:
Larry Rancour, VP
Senior Project Manager
lrancour@schorrarchitects.com

D. WORK

1. Only one contract will be issued by the Owner for constructing the Project, the General Contract, which will cover all scopes of work necessary to construct the Project.
2. The Contractor awarded the General Contract (General Contractor) will be responsible for the performance and coordination of all subcontractors and suppliers either directly or indirectly contracted with the General Contractor.
3. Subject to a prior, written request from the Bidder and prior authorization from the Owner, Owner may provide Bidders access to the Project site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates. Bidders may visit the Project site following the pre-bid conference.

E. ESTIMATE OF COST

1. The total estimated construction cost for the base bid Work for the Project is as follows:

\$150,000.00
2. The estimated construction cost of the Alternates for which Owner is seeking bids is as follows.
 - a. Not Applicable

F. CONTRACT DOCUMENTS AND PRE- BID MEETING

The Contract Documents consist of the Contract Documents listed in Section 1 of the Owner-Contractor Agreement.

Contract Documents may be examined without charge during business hours at Schorr Architects, Inc. 230 Bradenton Avenue, Dublin, Ohio 43017.

Copies of said drawings and specifications may be purchased from DC Reprographics, 1254 Courtland Avenue, Columbus, Ohio 43201; 614/297-1200, Fax: 614/297-1300, plus all shipping costs.

Bidders shall use complete sets of Contract Documents in preparing bids. Neither the Owner nor the Design Professional assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Contract Documents.

The Owner or the Design Professional, in making the Contract Documents available on the above terms, does so only for the purpose of obtaining bids on the Work and does not confer a license or grant for any other use.

A Pre-Bid Meeting has been scheduled as indicated in the Public Notice .The Pre-Bid meeting is not mandatory.

G. PREPARATION OF BIDS

1. All bids must be submitted on the "Bid Form" furnished with the Contract Documents.
2. All blank spaces shall be filled in, in ink or typewritten, in words and figures, and in figures only where no space is provided for words and signed by the Bidder. The wording on the Bid Form shall be used without change, alteration, or addition. Any change in the wording or omission of specified accompanying documents may cause the bid to be rejected. If there is an inconsistency or conflict in the bid amount, the lowest amount shall be controlled, whether expressed in numbers or words.
3. Bidders shall note receipt of Addenda on the Bid Form. If the Bidder fails to acknowledge receipt of each Addendum, the Bid shall be deemed non-responsive, unless the Bid amount clearly and unambiguously reflects receipt of the Addendum, or the Addendum involves only a matter of form and does not affect the price, quantity or quality of the Work to be performed.
4. Each Bidder shall submit **2** identical copies of its bid to the Owner. The Bid Form shall be signed with the name typed or printed below the signature. A Bid shall not be submitted by facsimile transmission. A Bidder that is a corporation shall sign its bid with the legal name of the corporation followed by the name of the state of incorporation and the legal signature of an officer authorized to bind the corporation to a contract.
5. Each Bid shall be enclosed in a sealed opaque envelope with the Bidder's name and the title of the Project printed in the upper left-hand corner and addressed as follows:

Family Restroom – Hogback Ridge Park
ATTN: Matt Simpson, Senior Park Planner
2656 Hogback Road
Sunbury, OH 43074
msimpson@preservationparks.com
6. **The completed Bid Form shall be accompanied by the following documents:**
 - a. **Pre-Bid Substitution Form (if any proposed substitutes have been pre-approved)**

- b. **Bid Guaranty and if applicable, Contract Bond**
- c. **Contractor's Review Certificate**

7. The Bidder shall take the following precautions in preparing its bid:

- a. Sign the bid and check to ensure all blank spaces have been filled in with requested information and that the specified accompanying documents have been included in a sealed opaque envelope.
- b. When the Bid Form provides for quoting either an addition or deduction for an Alternate item, indicate whether the sum named is an addition or deduction. If it is not indicated, it will be conclusively presumed that the amount is a deduction.
- c. When the Bid Form provides for quoting a unit price, the Bidder should quote the unit price as set forth in the Bid Documents.
- d. When applicable, make sure that the Bid Guaranty is properly executed and signed by:
 - 1) The Bidder
 - 2) The Surety or Sureties
- e. Make sure that the amount of the Bid Guaranty (if the Bid Guaranty is in the form of a certified check, letter of credit, or cashier's check) is for a specific sum in an amount as instructed in Paragraph G.8.a below. If the Bid Guaranty is in the form of the Bid Guaranty and Contract Bond, the amount may be left blank; if an amount is inserted, it must equal the total of the base bid, and all add alternates included. If inserted, then the failure to state an amount equal to the total of the base bid and all add alternates shall make the bid non-responsive if the Owner selects alternates not included in the amount.
- f. Make sure that the appropriate bid package and scope of work is inserted in the correct space on the Bid Guaranty and Contract Bond Form. Failure to include work covered by the bid submitted may make the bid non-responsive.

8. Bonds and Guarantees

- a. Bid Guaranty: Bidder shall furnish a Bid Guaranty, in the form prescribed in Sections 153.54, 153.57, and 153.571 of the Ohio Revised Code, in the form of either: (1) a bond for the full amount of the bid in the form of the Bid Guaranty and Contract Bond included in the Bid Documents; or (2) a certified check, cashier's check, or irrevocable letter of credit in a form satisfactory to the Owner in an amount equal to 10% of the bid. Bid amount shall be the total of all sums bid, including all add alternatives, but excluding all deduct alternatives. NOTE: AIA Bid Bond forms are not acceptable.
- b. Contract Bond: The successful Bidder, who, as a Bid Guaranty, submits a certified check, cashier's check, or irrevocable letter of credit in an amount equal to 10% of the bid, shall furnish a Contract Bond in the form Contract Bond included in the Bid Documents in an amount equal to 100% of the Contract Sum. NOTE: AIA Bond forms are not acceptable.
- c. The bond must be issued by a surety company authorized by the Ohio Department of Insurance to transact business in the State of Ohio and acceptable to the Owner. The bond must be issued by a surety capable of demonstrating a record of competent underwriting, efficient management, adequate reserves, and sound investments. These criteria will be deemed to be met if the surety currently has an A.M. Best Company Policyholders Rating of "A-" or better and has or exceeds the Best Financial Size

Category of Class VI. Other sureties may be acceptable to the Owner, in its sole discretion

- d. All bonds shall be signed by an authorized agent of acceptable surety and by the Bidder.
- e. Surety bonds shall be supported by credentials showing the Power of Attorney of the agent, a certificate showing the legal right of the Surety Company to do business in the State of Ohio, and a financial statement of the Surety.
- f. The Bid Guaranty, as applicable, shall be in the name of or payable to the order of the Owner.
- g. The name and address of the Surety and the name and address of the Surety's Agent should be typed or printed on each bond.

H. METHOD OF AWARD

1. All bids shall remain open for acceptance for sixty (60) days following the day of the bid opening, but the Owner may, in their sole discretion, release any bid and return the Bid Guaranty prior to that date. The Bid Guaranty shall be subject to forfeiture, as provided in the Ohio Revised Code, if a bid is withdrawn during the period when bids are being held.
2. The Owner reserves the right to reject any, part of any, or all bids and to waive any informalities and irregularities. The Bidder expressly acknowledges this right of the Owner to reject any or all bids or to reject any incomplete or irregular bid. Bidders must furnish all information requested on or accompanying the Bid Form. Failure to do so may result in disqualification of the bid.
3. Determination of the Lowest Responsible Bid. Subject to the right of the Owner to reject any or all bids, the Owner will award the Contract for the Work to the bidder submitting the lowest responsible bid, taking into consideration accepted alternates. In evaluating bids, the Owner may consider the qualifications of the Bidders, whether or not the bids comply with the prescribed requirements, and alternates and unit prices, if requested, on the Bid Form. The Owner may also consider the qualifications and experience of subcontractors and suppliers. The Owner may conduct such investigations as are deemed necessary to establish the qualifications and financial ability of the Bidder and its subcontractors and suppliers. The factors the Owner may consider in determining which bid is lowest responsible include the factors set forth below. The Owner, in its discretion, may consider and give such weight to these criteria as it deems appropriate.
 - a. The Bidder's work history. The Bidder should have a record of consistent customer satisfaction and of consistent completion of projects, including projects that are comparable to or larger and more complex than the Owner's Project, on time and in accordance with the applicable Contract Documents, and the Bidder's claims history. If the Bidder's management operates or has operated another construction company, the Owner may consider the work history of that company in determining whether the Bidder submitted the lowest responsible bid.

The Owner will consider the Bidder's prior experience on other projects of similar scope and/or complexity including prior projects with the Owner and/or Design Professional, including the Bidder's demonstrated ability to complete its work on these projects in accordance with the Contract Documents and on time, and will also consider its ability to work with the Owner and Design Professional as a willing, cooperative, and successful team member. Bringing overstated claims, an excessive number of claims, acting uncooperatively, and filing lawsuits against project owners and/or their design professionals on prior projects of similar scope and/or complexity will be deemed evidence of a Bidder's inability to work with the Owner and Design Professional as a willing, cooperative, and successful team member.

The Bidder authorizes the Owner and its representatives to contact the owners and design professionals (and construction managers, if applicable) on projects on which the Bidder has worked and authorizes and requests such owners and design professionals (and construction managers) to provide the Owner with a candid evaluation of the Bidder's performance. By submitting its bid, the Bidder agrees that if it or any person, directly or indirectly, on its behalf or for its benefit brings an action against any of such owners or design professionals (or construction managers) or the employees of any of them as a result of or related to such candid evaluation, the Bidder will indemnify and hold harmless such owners, design professionals (and construction managers) and the employees of any of them from any claims whether or not proven that are part of or are related to such action and from all legal fees and expenses incurred by any of them arising out of or related to such legal action. This obligation is expressly intended for the benefit of such owners, design professionals (and construction managers), and the employees of each of them.

- b. The Bidder's financial ability to complete the Contract successfully and on time without resort to its Surety.
 - c. The Bidder's prior experience with similar work on comparable or more complex projects.
 - d. The Bidder's prior history for the successful and timely completion of projects, including the Bidder's history of filing claims and having claims filed against it.
 - e. The Bidder's equipment and facilities.
 - f. The adequacy, in numbers and experience, of the Bidder's workforce to complete the Contract successfully and on time.
 - g. The Bidder's compliance with federal, state, and local laws, rules, and regulations, including but not limited to the Occupational Safety and Health Act and Ohio ethics laws.
 - h. The foregoing information with respect to each of the Subcontractors and Suppliers that the Bidder intends to use on the Project.
 - i. The Bidder's participation in a drug-free workplace program acceptable to the Owner, and the Bidder's record for both resolved and unresolved findings of the Auditor of State for recovery as defined in Section 9.24 of the Ohio Revised Code.
 - j. The Owner's prior experience with the Bidder's surety.
 - k. The Bidder's interest in the Project as evidenced by its attendance at any pre-bid meetings or conferences for bidders.
 - l. Depending upon the type of work, other essential factors, as the Owner may determine and as are included in the Specifications.
4. Qualifications Statement. Each Bidder will submit with its bid a completed Contractor Qualifications Statement, which is included with the Contract Documents, and thereafter provide the Design Professional promptly with such additional information as the Design Professional may request regarding the Bidder's qualifications. A Bidder shall submit any requested additional information within three (3) business days of the date on the request.
 5. The failure to submit the requested information on a timely basis may result in the determination that the Bidder has not submitted the lowest responsible bid.
 6. By submitting its bid, the Bidder agrees that the Owner's determination of which bidder is the lowest responsible bidder shall be final and conclusive, and that if the Bidder or any person on its behalf challenges such determination in any legal proceeding, the Bidder will indemnify and hold the Owner and its employees and agents harmless from any claims included or related to such legal proceeding, whether or not proven, and from legal fees and expenses incurred by the Owner, its employees, or agents that arise out of or are related to such challenge.

7. After bid opening, within three (3) business days of a request made by the Design Professional, the apparent low Bidder and any other Bidder so requested by the Design Professional must submit the following:
 - a. For all subcontracts with an estimated value of at least \$20,000, a list of all Subcontractors that the Bidder will use to construct the Project, as well as an indication of whether the Bidder has ever worked with a proposed Subcontractor before, including the following information for the three most recent projects on which the Bidder and each Subcontractor have worked together:
 - i. Project Owner
 - ii. Project Name
 - iii. Subcontract Scope
 - iv. Subcontract Value
 - v. Owner's contact name and phone number.

If Bidder and a proposed Subcontractor have not worked together on at least three projects in the five years, Bidder must submit the information set forth above for the three most recent similar projects to the Project that a proposed Subcontractor has worked on.

The above Subcontractor information, as well as the information pertaining to each proposed Subcontractor, shall be used in the Owner's determination of the lowest responsible bid.

Once a Bidder identifies its proposed Subcontractors as set forth herein, and Owner makes no objections, the list shall not be changed unless written approval of the change is authorized by the Owner and Design Professional.

8. Affidavit as to Personal Property Taxes. Each successful Bidder shall submit, prior to the time of the entry into the Contract, an affidavit in the form required by Section 5719.042, Ohio Revised Code, regarding the status of the Bidder's personal property taxes. A copy of the affidavit form is included with the Contract Documents.
9. No Bidder may withdraw its bid within sixty (60) days after the date bids are opened. The Owner reserves the right to waive any formalities or irregularities or to reject any or all bids.
10. The Owner reserves the right to disqualify bids, before or after opening, upon evidence of collusion with intent to defraud or other illegal practices on the part of the Bidder.
11. Award of Contract. The award of the Contract, when required, will only be made pursuant to a duly adopted resolution of the Owner.

I. EXECUTION OF CONTRACT

1. Within the time designated by the Design Professional after award of the Contract, the successful Bidder shall execute and deliver to the Design Professional the required number of copies of the Owner-Contractor Agreement, in the form included in the Contract Documents, and all accompanying documents requested, including, but not limited to, a Contract Bond (if applicable), insurance certificates, and a valid Workers' Compensation Certificate. The successful Bidder shall have no property interest or rights under the Owner-Contractor Agreement until the Agreement is executed by the Owner.

J. SUBSTITUTIONS/NON-SPECIFIED PRODUCTS

1. Certain brands of material or apparatus are specified. Each bid will be based on these brands, which may be referred to in the Contract Documents as Standards. The use of another brand (referred to as a substitution or proposed equal in the Contract Documents, when a bidder or the contractor seeks to have a different brand of material or apparatus than that specified approved by the Owner for use in the Project) may be requested as provided herein. Substitutions, however, will not be considered in determining the lowest responsible bid.
2. The products specified in the Contract Documents establish a standard of required function, dimension, appearance, and quality.
3. Bidders wishing to obtain approval to bid on non-specified products shall submit written requests to the Design Professional a minimum of seven (7) working days before the bid date and hour. To facilitate the submission of requests, a Pre-Bid Substitution Form is included in the Contract Documents. The Bidder shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution, including the name of the proposed manufacturer and/or product and a complete description of the proposed product including manufacturer's name and model number or system proposed, drawings, product literature, performance and test data, color selections or limitations, and any other information necessary for evaluation. Include a statement including any changes in other materials, equipment, or other work that would be required if the proposed product is incorporated in the materials, equipment, or other work that would be required if the proposed product is incorporated in the work. The burden of proof of the merit of the proposed product is on the proposer. The Design Professional's decision on approval of a proposed product will be final.

The following will be cause for rejection of a proposed substitution:

- a. Requests submitted by subcontractors, material suppliers, and individuals other than Bidders
 - b. Requests submitted without adequate documentation
 - c. Requests received after the specified cut-off date
4. When the Design Professional approves a product submission before receipt of bids, the approval will be included in an Addendum, and Bidders may include the pricing of this product in their bid. Bidders shall not rely on approvals made in any other manner.
 5. In proposing a non-specified product or a substitution, the Bidder represents and warrants that each proposed product will not result in any changes to the Project, including changes to the Work of other contractors, or any decrease in the performance of any equipment or systems to be installed in the Project and agrees to pay any additional costs incurred by the Owner and the Owner's consultants as a result of a non-specified or substitute product that is accepted.
 6. Following the award of the Contract, there shall be no substitutions for specified products, except pursuant to a Change Order. The Owner in its sole discretion may decline to consider a substitution for a Change Order.

K. ALTERNATES (IF ANY)

1. The Owner may request bids on alternates. If the Owner requests bids on alternates, the Bidder should include the cost of the alternates requested on its Bid Form.

2. At the time of awarding the contract, the Owner will select or reject alternates as it determines is in its best interest. A Bidder's failure to include on its Bid Form the cost of an alternate selected by the Owner and applicable to the Bidder's work shall render the bid non-responsive and be grounds for the rejection of the bid. Otherwise, the failure to include the cost of an alternate will not be deemed material.
3. The Bidder acknowledges that although there is an estimate for the cost of the Project, the market conditions may and frequently do result in the estimate being different from the sum of the bids received, either higher or lower. The Bidder understands that the Owner may include alternates, which may include deduct alternates as well as add alternates, to give it flexibility to build the Project with the funds available. The Bidder further understands and acknowledges that use of add and deduct alternates is a long held customary practice in the construction industry in the State of Ohio. The Bidder also acknowledges that the Owner will not decide about the alternates on which to base the award of contracts until the bids are received, and the Owner can compare its available funds with the base bids and the cost or savings from selecting different alternates. The Bidder understands that the award to the Bidder submitting the lowest responsible bid will be based on the lowest base bid plus selected alternates and may result in an award to a Bidder other than the Bidder that submitted the lowest base bid.
4. If, during the progress of the Work, the Owner desires to reinstate any alternate not included in the Contract, the Owner reserves the right to reinstate the alternate at the price bid by the Contractor provided that such action is taken in sufficient time so as not to delay the progress of the work or cause the Contractor additional expense.

L. UNIT PRICES

1. Where unit prices are requested in the Bid Form the Bidder should quote a unit price. Unless otherwise expressly provided in the Bid Documents, such unit prices shall include all labor, materials, and services necessary for the timely and proper installation of the item for which the unit prices are requested. The unit prices quoted in the bid shall be the basis for any Change Orders entered into under the Owner-Contractor Agreement, unless the Design Professional determines that the use of such unit prices will cause substantial inequity to either the Contractor or the Owner.

M. ADDENDA

1. The Owner reserves the right to issue Addenda changing, altering, or supplementing the Contract Documents prior to the time set for receiving bids. The Design Professional will issue the Addenda to clarify bidders' questions and/or to change, alter, or supplement the Contract Documents.
2. Any explanation, interpretation, correction, or modification of the Contract Documents will be issued in writing in the form of an Addendum, which shall be the only means considered binding; explanations, interpretations, etc., made by any other means shall NOT be legally binding. All Addenda shall become a part of the Contract Documents.
3. Bidders shall submit written questions to the Design Professional in sufficient time in advance of the bid opening to allow sufficient time for the Design Professional to respond. All Addenda will be issued, except as hereafter provided, and mailed or otherwise furnished to persons who have obtained Contract Documents for the Project, at least seventy-two (72) hours prior to the published time for the opening of bids, excluding Saturdays, Sundays, and legal holidays. If any Addendum is issued within such a seventy-two (72) hour period, then the time for opening of bids shall be extended one (1) week with no further advertising of bids required.
4. Copies of each Addendum will be sent only to the Bidders to whom Contract Documents have been issued and to Plan Rooms where copies of the Contract Documents are maintained. Receipt of Addenda shall be indicated by Bidders in the space provided on the

Bid Form. Bidders are responsible for acquiring issued Addenda in time to incorporate them into their bid. Bidders should contact the Design Professional prior to the bid opening to verify the number of Addenda issued.

5. Each Bidder shall carefully read and review the Contract Documents and immediately bring to the attention of the Design Professional any error, omission, inconsistency, or ambiguity therein.
6. If a Bidder fails to indicate receipt of all Addenda through the last Addendum issued by the Design Professional on its Bid Form, the bid of such Bidder will be deemed to be responsive only if:
 - a. The bid received clearly indicates that the Bidder received the Addendum, such as where the Addendum added another item to be bid upon and the Bidder submitted a bid on that item; or
 - b. The Addendum involves only a matter of form or is one which has either no effect or has merely a trivial or negligible effect on price, quantity, quality, or delivery of the item bid upon.

N. INTERPRETATION

1. If a Bidder contemplating submitting a bid for the proposed Project is in doubt as to the true meaning of any part of the Contract Documents, it may submit a written request for an interpretation thereof to the Design Professional. Requests received fewer than 5 days prior to bid opening may not be answered. Any interpretation of the proposed documents will be made by Addendum only, duly signed by the Design Professional, and a copy of such Addendum will be mailed or delivered to each Bidder receiving a set of Contract Documents and each plan room where the Contract Documents are maintained. The Owner will not be responsible for any other explanation or interpretation of the proposed documents.
2. In interpreting the Contract Documents, words describing materials that have a well-known technical or trade meaning, unless otherwise specifically defined in the Contract Documents, shall be construed in accordance with the well-known meaning recognized by the trade.
3. Bidders are responsible for notifying the Design Professional in a timely manner of any ambiguities, inconsistencies, errors, or omissions in the Contract Documents. The Bidder shall not, at any time after the execution of the Contract, be compensated for a claim alleging insufficient data, incomplete Contract Documents, or incorrectly assumed conditions regarding the nature or character of the Work, if no request was made by the Bidder prior to the bid opening.

O. STATE SALES AND USE TAXES

1. The Owner is a political subdivision of the State of Ohio and is exempt from taxation under the Ohio Sales Tax and Use Tax Laws. Building materials that the successful Bidder purchases for incorporation into the Project will be exempt from state sales and use taxes if the successful Bidder provides a properly completed Ohio Department of Taxation Construction Contract Exemption Certificate to the vendors or suppliers when the materials are acquired. The Owner will execute properly completed certificates on request.

P. DATE FOR SUBSTANTIAL COMPLETION/ DATE FOR FINAL COMPLETION /LIQUIDATED DAMAGES

1. The Date for Substantial Completion (aka Contract Time), Date for Final Completion, and Liquidated Damages shall be as defined and set forth in the Construction Agreement. By submitting its Bid, each Bidder agrees that the period for performing its Work is reasonable.

Q. OWNER'S RIGHT TO WAIVE DEFECTS AND IRREGULARITIES

1. The Owner reserves the right to waive all irregularities provided that the defects and irregularities do not affect the amount of the bid in any material respect or otherwise give the Bidder a competitive advantage.

R. MODIFICATION/WITHDRAWAL OF BIDS

1. Modification. A Bidder may modify its bid by written communication to the Owner addressed to the Owner's Representative at any time prior to the scheduled closing time for receipt of bids, provided such written communication is received by Owner's Representative prior to the bid deadline. The written communication shall not reveal the bid price but should provide the addition or subtraction or other modification so that the final prices or terms will not be known until the sealed bid is opened. If the Bidder's written instructions with the change in bid reveal the bid amount in any way prior to the bid opening, the bid may be rejected as non-responsive.
2. Withdrawal Prior to Bid Deadline. A Bidder may withdraw its bid at any time for any reason prior to the bid deadline for the opening of bids established in the Request for Bids. The request to withdraw shall be made in writing to and received by the Owner's Representative prior to the time of the bid opening.
3. Withdrawal after Bid Deadline.
 - a. All bids shall remain valid and open for acceptance for a period of at least 60 days after the bid opening; provided, however, that a Bidder may withdraw its bid from consideration after the bid deadline when all the following apply:
 - (1) the price bid was substantially lower than the other bids.
 - (2) the reason for the bid being substantially lower was a clerical mistake, rather than a mistake in judgment, and was due to an unintentional and substantial error in arithmetic or an unintentional omission of a substantial quantity of work, labor, or material
 - (3) the bid was submitted in good faith; and
 - (4) the Bidder provides written notice to the Owner, to the attention of the Owner's Representative, within two (2) business days after the bid opening for which the right to withdraw is claimed.
 - b. No bid may be withdrawn under this provision if the result would be the awarding of the contract on another bid for the bid package from which the Bidder is withdrawing its bid to the same Bidder.
 - c. If a bid is withdrawn under this provision, the Owner may award the Contract to another Bidder determined by the Owner to be the lowest responsible bidder or the Owner may reject all bids and advertise for other bids. In the event the Owner advertises for other bids, the withdrawing Bidder shall pay the costs incurred in connection with the rebidding by the Owner, including the cost of printing new Contract Documents, required advertising, and printing and mailing notices to prospective bidders, if the Owner finds that such costs would not have been incurred but for such withdrawal.

S. COMPLIANCE WITH APPLICABLE LAWS

1. By submitting a bid for Work on the Project, the Bidder acknowledges that following applicable federal, state, and local laws and regulations, including, but not limited to, the following:
 - a. Equal Employment Opportunity/Nondiscrimination. The Bidder agrees that if it is awarded a contract that in the hiring of employees for performance of work under the contract or any subcontract, neither it nor any subcontractor, or any person acting on its

behalf or its subcontractor's behalf, by reason of race, creed, sex, disability as defined in Section 4112.01 of the Ohio Revised Code, or color, shall discriminate against any citizen of the state in the employment of labor or workers who are qualified and available to perform work to which the employment relates. The Bidder further agrees that neither it nor any subcontractor or any person on its behalf or on behalf of any subcontractor, in any manner, shall discriminate against or intimidate any employees hired for the performance of the work under the contract on account of race, creed, sex, disability as defined in Section 4112.01 of the Ohio Revised Code, or color.

- b. Ethics Laws. The Bidder represents that it is familiar with all applicable ethics law requirements, including without limitation Sections 102.04 and 3517.13 of the Ohio Revised Code, and certifies that it is following such requirements.

T. FINDINGS FOR RECOVERY

1. By submitting its bid, each Bidder certifies for reliance of the Owner that it has no unresolved finding for recovery against it issued by the Auditor of the State of Ohio on or after January 1, 2001, except as permitted by Section 9.24 (F) of the Ohio Revised Code.

END OF INSTRUCTIONS TO BIDDERS

BID FORM

BID SUBMITTED BY:

(Contractor)

DATED: _____, 2024

DELIVER TO:

Preservation Parks of Delaware County
2656 Hogback Road
Sunbury, Ohio 43074

The Bidder is submitting its bid on the following Project.

Family Restroom- Hogback Ridge Park

The Project is for The Board of Park Commissioners, and the Bidder has received and reviewed the following Addenda, which are part of the Bidding Documents:

Addendum No. _____, dated _____;

Addendum No. _____, dated _____;

The Bidder certifies that it has examined the Contract Documents and the Site all as provided in the Instructions to Bidders and has no outstanding questions about the Contract Documents or the Site.

The Bidder certifies that it has carefully reviewed the Bidding Documents as listed in the Instructions to Bidders, including the Notice to Bidders, Instructions to Bidders, Bid Form, Form of Bid Guaranty and Contract Bond, Contractor's Affidavit (ORC 5719.042), Owner-Contractor Agreement, General Conditions of the Contract (as modified), Project Specifications, and the Drawings.

BONDS AND CONTRACT:

If the undersigned is notified of bid acceptance, it agrees to furnish required bonds as indicated in Instructions to Bidders.

COMPLETION OF WORK:

In submitting a bid, the undersigned agrees to execute and deliver the Owner-Contractor Agreement in the form included in the Contract Documents with no changes and to substantially complete its work by the Date for Substantial Completion as required by the Contract Documents.

NOTE A: The wording of the Bid Form shall be used throughout, without change, alteration, or addition. Any change may cause it to be rejected.

NOTE B: Bidder is cautioned to bid only on the "Brands" specified.

BID:

The Bidder's bid includes all the Work, as defined in the Contract Documents, for the contracts on which the Bidder is submitting its bid. Bidder is to fill in all blanks related to the Bid Package for which a bid is being submitted. If no bid is submitted for an item, leave the item blank or insert "NO BID" in the blank. For alternate items, indicate whether the amount stated is in addition to or a deletion from the base bid amount. If there is no indication of whether the amount is an add or a deduct, it shall be conclusively assumed that the amount is a deduct. If there is a difference between the words and the figures, the worded amount shall govern.

ITEM 1. BASE BID CONTRACT

ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

ITEM 2. ALLOWANCE (CONSTRUCTION TESTING) \$5,000.00 _____

TOTAL

ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

INSTRUCTIONS FOR SIGNING

The person signing for a sole proprietorship must be the sole proprietor or his authorized representative. The name of the sole proprietor must be shown below.

The person signing for a partnership must be a partner or his authorized representative.

The person signing for a corporation must be the president, vice president or other authorized representative; or he must show authority, by affidavit, to bind the corporation.

The person signing for some other legal entity must show his authority, by affidavit, to bind the legal entity.

BIDDER CERTIFICATIONS. The Bidder hereby acknowledges that the following representations in this bid are material and not mere recitals:

The Bidder represents that the bid contains the name of every person interested therein and is based upon the Standards specified by the Contract Documents.

The Bidder and each person signing on behalf of the Bidder certifies, and in the case of a bid by joint venture, each member thereof certifies as to such member's entity, under penalty of perjury, that to the best of the undersigned's knowledge and belief: (a) the Base Bid, any Unit Prices and any Alternate bid in the bid have been arrived at independently without collusion, consultation, communication or agreement, or for the purpose of restricting competition as to any matter relating to such Base Bid, Unit Prices or Alternate bid with any other Bidder; (b) unless otherwise required by law, the Base Bid, any Unit Prices and any Alternate bid in the bid have not been

knowingly disclosed by the Bidder and will not knowingly be disclosed by the Bidder prior to the bid opening, directly or indirectly, to any other Bidder who would have any interest in the Base Bid, Unit Prices or Alternate bid; (c) no attempt has been made or will be made by the Bidder to induce any other Person to submit or not to submit a bid for the purpose of restricting competition; and (d) the statements made in the Bidder's Affidavit are true and correct, to the best of the Bidder's knowledge and information.

The Bidder certifies that it has no unresolved findings for recovery issued by the Auditor of State.

The Bidder acknowledges that this is a public project involving public funds, and that the Owner expects and requires that each successful Bidder adheres to the highest ethical and performance standards. The Bidder by submitting its bid pledges and agrees that a) it will act at all times with absolute integrity and truthfulness in its dealings with the Owner and the Architect, b) it will use its best efforts to cooperate with the Owner and the Architect and all other Contractors on the Project and at all times will act with professionalism and dignity in its dealings with the Owner, Architect and other Contractors, c) it will assign only competent supervisors and workers to the Project, each of whom is fully qualified to perform the tasks that are assigned to him/her and d) it has read, understands and will comply with the terms of the Contract Documents.

LEGAL NAME OF BIDDER: _____

BIDDER IS: _____
(Sole proprietor, partnership, corporation or other legal entity)

NAME & TITLE OF PERSON LEGALLY AUTHORIZED TO BIND BIDDER TO A CONTRACT:

Name	Title
SIGNATURE:	_____
ADDRESS:	_____ _____
TELEPHONE:	_____
FAX:	_____
FEDERAL TAX I.D. #	_____
DATE SIGNED	_____

When the Bidder is a partnership or a joint venture, state name and address of each partner in the partnership or participant in the joint venture below:

Name

Address

Name

Address

Name

Address

Name

Address

Name

Address

END OF SECTION

**BID GUARANTY AND
CONTRACT PERFORMANCE AND PAYMENT BOND**
(O.R.C. § 153.571)

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned _____
_____ ("Contractor") as principal and
_____ as sureties are hereby held and
firmly bound unto the Preservation Parks of Delaware County, as obligee in the penal sum of the dollar
amount of the bid submitted by the principal to the obligee on _____, 2024, to undertake the
project known as Family Restroom – Hogback Ridge Park. The penal sum referred to herein shall be the
dollar amount of the principal's bid to the obligee, incorporating any additive or deductive Alternates made
by the principal on the date referred to above to the obligee, which are accepted by the obligee. In no
case shall the penal sum exceed the amount of _____
_____ Dollars (\$ _____). (If the foregoing blank is not filled in,
the penal sum will be the full amount of the principal's bid, including add Alternates. Alternatively, if the
blank is filled in the amount stated must not be less than the full amount of the bid including add
Alternates, in dollars and cents. A percentage is not acceptable.) For the payment of the penal sum well
and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators,
successors, and assigns.

Signed this _____ day of _____, 2024.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH that whereas the above-named principal has
submitted a bid for work on the Project.

Now, therefore, if the obligee accepts the bid of the principal and the principal fails to enter into a
proper contract in accordance with the bid, plans, details, specifications, and bills of material; and in the
event the principal pays to the obligee the difference not to exceed ten percent (10%) of the penalty
hereof between the amount specified in the bid and such larger amount for which the obligee may in good
faith contract with the next lowest bidder to perform the work covered by the bid; or in the event the
obligee does not award the contract to the next lowest bidder and resubmits the project for bidding, the
principal pays to the obligee the difference not to exceed ten percent (10%) of the penalty hereof between
the amount specified in the bid, or the costs, in connection with the resubmission, of printing new contract
documents, required advertising, and printing and mailing notices to prospective bidders, whichever is
less, then this obligation shall be null and void, otherwise to remain in full force and effect; if the obligee
accepts the bid of the principal and the principal within ten (10) days after the awarding of the contract
enters into a proper contract in accordance with the bid, plans, details, specifications, and bills of material,
which said contract is made a part of this bond the same as though set forth herein.

Now also, if the said principal shall well and faithfully do and perform the things agreed by said
principal to be done and performed according to the terms of said contract; and shall pay all lawful claims
of subcontractors, materialmen, and laborers, for labor performed and materials furnished in the carrying
forward, performing, or completing of said contract; we agreeing and assenting that this undertaking shall
be for the benefit of any materialman or laborer having a just claim, as well as for the obligee herein; then
this obligation shall be void; otherwise the same shall remain in full force and effect; and surety shall
indemnify the obligee against all damage suffered by failure of the principal to perform the contract
according to its provisions and in accordance with the plans, details, specifications, and bills of material
therefor and to pay all lawful claims of subcontractors, materialmen, and laborers for labor performed or
material furnished in carrying forward, performing, or completing the contract and surety further agrees
and assents that this undertaking is for the benefit of any subcontractor, materialman, or laborer having a
just claim, as well as for the obligee; it being expressly understood and agreed that the liability of the
surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as
herein stated.

The said surety hereby stipulates and agrees that no modifications, omissions, or additions in or to the terms of the said contract or in or to the plans or specifications therefore shall in any wise affect the obligations of said surety on its bond. The said surety further stipulates that it is authorized to execute bonds in the State of Ohio and that the liability incurred is within the limits of Section 3929.02 of the Ohio Revised Code.

Signed and sealed this _____ day of _____, 2024.

(PRINCIPAL) (Seal)

By: _____

Printed Name & Title: _____

(SURETY) (Seal)

By: _____

Printed Name & Title: _____

NAME OF SURETY'S AGENT

Surety's Agent's Address: _____

Surety's Agent's Telephone Number: _____

Surety's Agent's Fax Number: _____

CONTRACT BOND NOTE

NOTE: The Contract Bond Form that follows is to be used ONLY by a bidder that is determined to be the lowest responsible bidder AND that submits a form of bid guaranty other than the combined Bid Guaranty and Contract Bond with its bid. If a bidder submits a combined Bid Guaranty and Contract Bond, then the bid guaranty becomes the contract bond when the contract is awarded.

CONTRACT BOND
(O.R.C. § 153.57)

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned ("Contractor") as principal and _____ as sureties, are hereby held and firmly bound unto the Preservation Parks of Delaware County, (together referred to as the "Board") as obligee, in the penal sum of _____ Dollars (\$ _____), for the payment of which well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

Signed this ____ day of _____, 2024.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH that whereas, the above-named principal did on the ____ day of _____, 2024, enter into a contract with the Board for _____ in connection with the _____, which said contract is made a part of this bond the same as though set forth herein:

Now, if the said Contractor shall well and faithfully do and perform the things agreed by the Contractor to be done and performed according to the terms of said contract; and shall pay all lawful claims of subcontractors, materialmen, and laborers, for labor performed and materials furnished in the carrying forward, performing, or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any materialman or laborer having a just claim, as well as for the obligee herein; then this obligation shall be void; otherwise the same shall remain in full 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 as herein stated.

The said surety hereby stipulates and agrees that no modifications, omissions, or additions, in or to the terms of the said contract or in or to the plans or specifications therefore shall in any wise affect the obligations of said surety on its bond. The surety further stipulates that it is authorized to execute bonds in the State of Ohio and that the liability incurred is within the limits of Section 3929.02 of the Revised Code.

Signed and sealed this ____ day of _____, 2024.

(PRINCIPAL) (Seal)

By: _____

Printed Name & Title: _____

(SURETY) (Seal)

By: _____

Printed Name & Title: _____

NAME OF SURETY'S AGENT

Surety's Agent's Address: _____

Surety's Agent's Telephone Number: _____

Surety's Agent's Fax Number: _____

PRE-BID SUBSTITUTION FORM

Note. Certain brands of material or apparatus are specified. Each bid will be based on these brands, which may be referred to in the Contract Documents as Standards. The use of another brand (referred to as a substitution or proposed equal in the Contract Documents, when a bidder or the contractor seeks to have a different brand of material or apparatus than that specified approved by the Owner for use in the Project) may be requested as provided in the Instructions to Bidders. Substitutions, however, unless approved and issued in an Addendum, will not be considered in determining which bidder to award the contract to.

The detailed procedures for submitting substitutions are set forth in Paragraph J of the Instructions to Bidders.

Specification Section	Brand or Name Specified	Proposed Substitution

CONTRACTOR'S PERSONAL PROPERTY TAX AFFIDAVIT
(O.R.C. § 5719.042)

State of Ohio
County of _____, ss:

_____, being first duly sworn, deposes and says that he is the
(Name)

_____ of _____ with offices located at
(Title) (Contractor)

_____, and as its duly
(Address of Contractor)

authorized representative, states that effective this ____ day of _____, 2024,

(Name of Contractor)

() is charged with delinquent personal property taxes on the general list of personal property as set forth below:

<u>County</u>	<u>Amount</u> (include total amount penalties and interest thereon)
---------------	---

_____ County	\$ _____
--------------	----------

_____ County	\$ _____
--------------	----------

() is not charged with delinquent personal property taxes on the general list of personal property in any Ohio county.

(Affiant)

Sworn to and subscribed before me by the above-named affiant this ____ day of _____, 2014.

(Notary Public)

My commission expires

_____, _____.

CONTRACTOR'S QUALIFICATION STATEMENT

Introduction. As provided in the Instructions to Bidders, within three (3) business days after receipt of the bids, if requested, the apparent low Bidder, will complete and submit to the Design Professional AIA Document A305, Contractor's Qualification Statement, and the information required by the following supplement to AIA Document A305, and thereafter will provide the Design Professional promptly with such additional information as the Design Professional may request regarding the Bidder's qualifications. Upon request from the Design Professional, any other Bidder will promptly complete and submit to the Design Professional the AIA Document A305, Contractor's Qualification Statement and the following supplement to the AIA Document A305, and such additional information as the Design Professional may request regarding the Bidder's responsibility. A Bidder shall submit any requested information within three (3) business days of the date on the request.

The failure to submit requested information on a timely basis may result in the determination that the Bidder is not the lowest responsible bidder.

AIA Document A305, Contractor's Qualification Statement, is part of the Contract Documents. This document may be purchased at one of the following offices of the AIA:

AIA Cleveland	1001 Huron Road, #101 Cleveland, OH 44115 Phone: (216) 575-1242 Fax: (216) 575-1244	For Mail orders, print form from website: www.aiacleveland.com/documents.asp and click on Order Form. For Email orders, go to: aiadocs@aiacleveland.com to order. Shipped one day after payment is received; or For Online orders, download and print from website: www.aia.org/docs_purchase .
AIA Cincinnati	Longworth Hall Design Center 700 W. Pete Rose Way Cincinnati, OH 45203-1892 Phone: (513) 421-4661 Fax: (513) 421-4665	For Mail orders, call or send order by email to: aiacinc@fuse.net – order is shipped same day. Document can be ordered online and printed from website: www.aia.org/docs_purchase .
AIA Columbus	21 W. Broad St., Ste. 200 Columbus, OH 43215 Phone: (614) 469-1973 Fax: (614) 469-1976	For Mail orders, call or send order by email to: info@aiacolumbus.org to order – order is shipped same day. Document can be ordered online and printed from website: www.aia.org/docs_purchase .

SUPPLEMENT TO AIA DOCUMENT A305

AIA Document A305 is modified as follows:

Paragraph 3.2.3. Modify Paragraph 3.2.3 as follows:

3.2.3 Has your organization filed any claims or lawsuits or requested arbitration regarding construction contracts within the last five years? If so, please provide the following information. If there are more than ten (10) of these claims, lawsuits or arbitrations only provide information on the most recent ten (10). Attach a separate sheet if needed.

Project and Scope of Work	Description of the Claims and the Final Resolution of the Claim (by mediation, lawsuit, or arbitration)	Owner's Representative & Telephone Number	Design Professional's Representative & Telephone Number

Paragraph 3.5. Modify Paragraph 3.5 as follows:

3.5 Provide the following information for each contract your organization has had during the last five (5) years, including current contracts, where the Contract Sum is fifty percent (50%) or more of the bid amount for this Project, including add alternates. If there are more than ten (10) of these contracts only provide information on the most recent ten (10) contracts, including current contracts. If there was a construction manager on the project, please include the contact information for the construction manager in the same column as the Design Professional information. Use additional sheets if needed to provide the requested information.

Project and Scope of Work	Contract Sum	Owner's Representative & Telephone Number	Design Professional's Representative & Telephone Number

3.5.1 Provide the following information for each project your organization has had during the last five (5) years, which you believe is of comparable or greater size and complexity than the Owner's project. If there are more than five (5) of these projects, only provide information on the most recent five (5) projects, including current projects. If there was a construction manager on the project, please include the contact information for the construction manager in the same column as the Design Professional information. Use additional sheets if needed to provide the requested information.

Project and Scope of Work	Contract Sum	Owner's Representative & Telephone Number	Design Professional's Representative & Telephone Number

New Subparagraphs 3.5.2, 3.5.3 and 3.5.4. Add the following new subparagraphs:

3.5.2 If any of the following members of your organization's management--president, chairman of the board, or any director--operates or has operated another construction company during the last five (5) years, identify the company.

3.5.3 If your organization is operating under a trade name registration with the Secretary of State for the State of Ohio, identify the entity for which the trade name is registered. If none, state "none."

3.5.4 If your organization is a division or wholly-owned subsidiary of another entity or has another relationship with another entity, identify the entity of which it is a division or wholly-owned subsidiary or with which it has another relationship and also identify the nature of the relationship. If none, state "not applicable."

New Paragraph 3.7. Add the following new paragraph:

3.7 On a separate sheet, list the construction education, training and construction experience for each person who will fill a management role on the Project, including without limitation the Project Executive, Project Engineer, Project Manager, and Project Superintendent. For each person listed, include with the other information the last three projects on which the person worked and the name and telephone number of the design profession and the owner.

Signature _____

Dated at _____ on _____, 2024.

Name of Organization: _____

By: _____
Typed or printed name

Title: _____

County of _____,

State of _____, ss:

Sworn to me a notary public by _____ on behalf of
_____ on _____, 2024.

Notary Public

My Commission Expires: _____

CONTRACTOR'S REVIEW CERTIFICATE

The undersigned acknowledges that:

- Authorized agent has carefully read and understood all of the Bid Documents submitted for the Project, including, but not limited to, the Instructions to Bidders, Form of Proposal, Substitution Sheet, Form of Bid Guaranty and Performance Bond, Form of Performance Bond, Contractor's Affidavit (R.C. § 5719.042), this Contractor's Review Certificate, the Owner-Contractor Agreement, General Conditions of the Contract for the Project, Project Specifications and Drawings, and

- The Bid Documents are sufficient and adequate for the undersigned to perform the work; and

- Has carefully reviewed the site and conditions under which the Work will be performed, or has been given ample opportunity to do so, and fully assumes the risk for any condition at the site that could have been discovered by a careful and diligent review of the site;

- Has confirmed that his surety is authorized to do business in the State of Ohio.

- Has attended the pre bid meeting.

Date: _____

CONTRACTOR: _____

By: _____
SIGNATURE

TYPED OR PRINTED NAME

Its: _____

NOTE: The Bidder should review the Bid Documents and the site and conditions under which the Work will be performed so that he can give the acknowledgements contained in this Certificate.



Preservation Parks of Delaware County

2656 Hogback Road
Sunbury, Ohio 43074
Phone: 740.524.8600
Fax: 740.524.8200
Website: www.preservationparks.com

CONSTRUCTION AGREEMENT

Project Title:

Owner: Preservation Parks of Delaware County (PPDC)

Contractor:

Effective Date:

Project Description:

Time of Completion:

The work to be performed under this Agreement shall be commenced on _____, 20--__ and shall be substantially completed on or before _____. These start and completion dates are subject to weather conditions.

Correction of Work:

The Contractor shall promptly correct work rejected by PPDC or failing to conform to the requirements of the Project Description. In addition, the Contractor shall warranty all work within the Project Description for a period of one year from receiving final payment.

Insurance and Indemnity:

Preservation Parks of Delaware County requires that your company provide a Certificate of Insurance (“COI”) naming Preservation Parks of Delaware County as an additional insured under all liability insurance policies held by you. Contractor agrees that PPDC will not be liable under any agreements to which the Contractor is a party pertaining to the construction of the project. The contractor agrees to hold PPDC, its Board and employees harmless for all liabilities and claims arising out of, or related to, performance of work identified in this agreement.

Contracts \$25,000 and greater

The Contractor shall at all times throughout the term of the contract maintain insurance in full force and effect with an insurance company or companies with a AM Best Rating of “A” or better as set forth in the most current issue of Best’s Key Rating Insurance Guide relative to the contract in the following coverages and limits:

- Comprehensive General Liability Insurance with limits of not less than \$1,000,000 per occurrence and \$2,000,000 general aggregate for bodily injury, personal injury, and property damage, identifying Preservation Parks of Delaware County as an additional insured on the Certificate of Insurance.
- Comprehensive Automobile Liability Insurance including owned, non-owned and hired coverage in an amount not less than \$1,000,000 combined single limit for bodily injury and property damage, identifying Preservation Parks of Delaware County as an additional insured on the Certificate of Insurance.
- Builders’ Risk insurance to protect Contractor and Owner from loss incurred by fire, lightning, extended coverage hazards, vandalism, theft, explosion, and malicious mischief in the full amount of the contract and such insurance shall cover all labor and materials connected with work, including materials delivered to the site but not yet installed. Preservation Parks must be listed as an additional insured on the Certificate of Insurance. A copy of the Certificate of Insurance must be attached to the signed contract.
- Other insurance required by law, ordinance, rule or regulation, identifying Preservation Parks of Delaware County as an additional insured on the Certificate of Insurance, if applicable.

Compensation: Time of Payment

For services to be performed hereunder, PPDC shall pay the Contractor **\$XXXX.XX (XXXX dollars)**. The standard PPDC payment term is NET 30 days from the date of invoice.

General Provisions:

Any alterations or deviation from the above specifications, including but not limited to any such alterations of deviation involving additional material and/or labor costs, will be executed only upon written order for same, signed by PPDC and Contractor, and if there is any charge for such alteration or deviation, the additional charge will be added to the agreement price.

1. PPDC will provide periodic review during construction to ensure the work is satisfactory.
2. All work shall be completed in a workman-like manner.
3. To the extent required by law, all work shall be performed by individuals duly licensed and authorized by law to perform said work.
4. Contractor may at its discretion engage sub-contractors to perform work hereunder, provided Contractor shall fully pay said sub-contractor and in all instances remain responsible for the proper completion of this agreement.
5. All change orders shall be in writing and signed by both PPDC and Contractor, and shall be incorporated in, and become part of the agreement.
6. Contractor shall protect all existing features and facilities not specifically slated for removal within the work area. Any damage shall be repaired or replaced at the contractor's expense.
7. Contractor shall not be liable for any delay due to circumstances beyond its control including strikes, casualty, weather or general unavailability of materials.

LIQUIDATED DAMAGES:

If the Contractor does not have its Work on the Project Substantially Complete by the specified Date for Substantial Completion or Finally Complete by the Date of Final Completion, the Contractor shall pay the Owner (and the Owner may set off from sums coming due the Contractor) Liquidated Damages in the per diem amounts as set forth in the following tables, whichever may be applicable. "Contract Amount" of the Work will be determined by totaling the cost of all line items of Work, as set forth in the Schedule of Values.

LIQUIDATED DAMAGES – SUBSTANTIAL/FINAL COMPLETION

<u>Original Contract Amount</u>	<u>Dollars Per Day</u>
\$1.00 to \$500,000.00	\$ 200.00
\$500,000.01 to \$2,000,000.00	\$ 250.00
\$2,000,000.01 to \$10,000,000.00	\$ 325.00
\$10,000,000.01 to \$50,000,000.00	\$ 500.00
\$50,000,000.01 and greater	\$ 625.00

Governing Law:

This Agreement shall be governed by and interpreted in accordance with the laws of the State of Ohio. All legal disputes arising from this Agreement shall be filed in and heard before the courts of Delaware County, Ohio.

Signatures:

Any person executing this Agreement in a representative capacity hereby warrants that he/she has authority to sign this Agreement or has been duly authorized by his/her principal to execute this Agreement on such principal's behalf.

Signature of Preservation Parks representative: _____ Date: _____

Title of Preservation Parks representative: _____

Printed Name of Preservation Parks representative: _____

Signature of Contractor representative: _____ Date: _____

Title of Contractor representative: _____

Printed Name of Contractor representative _____

(If over \$25,000.00)

Auditor's Certification (RC 5705.41(D)):

The Delaware County Auditor hereby certifies that the funds required to meet the obligation set forth in this Agreement have been lawfully appropriated for such purpose and are in the county

treasury or in the process of collection, free from any other encumbrances. The Delaware County Auditor also certifies that it has confirmed with the State of Ohio Auditor that _____ has no outstanding findings for recovery issued against it by the State Ohio.

George Kaitsa, Delaware County Auditor

Contract # _____

Additional Documents to be provided/completed by Contractor:

1. Certificate of Insurance
2. Ohio Bureau of Worker's Compensation Certificates of Premium Payment

Additional Documents to be provided/completed by PPDC:

1. Certified search for unresolved findings for recovery.

 **AIA** Document A201™ – 2017**General Conditions of the Contract for Construction**

for the following PROJECT:
(Name and location or address)

THE OWNER:
(Name, legal status and address)

THE ARCHITECT:
(Name, legal status and address)

TABLE OF ARTICLES

- 1 GENERAL PROVISIONS
- 2 OWNER
- 3 CONTRACTOR
- 4 ARCHITECT
- 5 SUBCONTRACTORS
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
- 7 CHANGES IN THE WORK
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- 11 INSURANCE AND BONDS
- 12 UNCOVERING AND CORRECTION OF WORK
- 13 MISCELLANEOUS PROVISIONS
- 14 TERMINATION OR SUSPENSION OF THE CONTRACT

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.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

| 15 CLAIMS AND DISPUTES



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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

(Paragraphs deleted)

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as

binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

(Paragraphs deleted)

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

(Paragraphs deleted)

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

(Paragraphs deleted)

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

(Paragraphs deleted)

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

(Paragraphs deleted)

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

(Paragraphs deleted)

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

(Paragraphs deleted)

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

(Paragraphs deleted)

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

(Paragraphs deleted)

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

(Paragraphs deleted)

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

(Paragraphs deleted)

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for,

performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

(Paragraph deleted)

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

(Paragraphs deleted)

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

(Paragraphs deleted)

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

(Paragraphs deleted)

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to

completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

(Paragraphs deleted)

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

(Paragraph deleted)

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

(Paragraphs deleted)

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

(Paragraphs deleted)

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

(Paragraphs deleted)

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

(Paragraphs deleted)

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

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

(Paragraphs deleted)

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

(Paragraphs deleted)

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

(Paragraphs deleted)

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and

assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

(Paragraphs deleted)

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

(Paragraphs deleted)

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

(Paragraphs deleted)

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction

schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

(Paragraphs deleted)

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

(Paragraphs deleted)

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

(Paragraphs deleted)

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

(Paragraphs deleted)

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits

covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

(Paragraphs deleted)

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

(Paragraphs deleted)

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

(Paragraphs deleted)

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

(Paragraphs deleted)

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

(Paragraphs deleted)

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

(Paragraphs deleted)

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

(Paragraphs deleted)

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

(Paragraphs deleted)

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

(Paragraphs deleted)

§ 9.8.1 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 that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

(Paragraphs deleted)

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

(Paragraphs deleted)

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

(Paragraphs deleted)

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

(Paragraphs deleted)

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims,

damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

(Paragraphs deleted)

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

(Paragraphs deleted)

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract

Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

(Paragraph deleted)

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

(Paragraphs deleted)

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

(Paragraphs deleted)

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

(Paragraphs deleted)

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

(Paragraphs deleted)

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

(Paragraphs deleted)

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

(Paragraphs deleted)

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

(Paragraphs deleted)

Init.

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

(Paragraphs deleted)

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

(Paragraphs deleted)

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

(Paragraphs deleted)

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

(Paragraphs deleted)

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

(Paragraphs deleted)

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

(Paragraphs deleted)

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

(Paragraphs deleted)

Init.

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

(Paragraphs deleted)

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on

the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

(Paragraphs deleted)

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

(Paragraphs deleted)

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written

demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

(Paragraphs deleted)

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

SUPPLEMENTARY GENERAL CONDITIONS

1.0 GENERAL

A. The following supplements AIA Document A201-2017 General Conditions of the Contract for Construction.

2.0 MODIFICATIONS

A. Article 11, Insurance, add: The Contractor shall purchase the following insurances:

1. General Liability
 - a. Combination Single Limit for Bodily Injury, Personal Injury, and Property Damage - \$1,000,000 per occurrence with \$2,000,000 general aggregate.
 - b. Products/Completed Operation - for a period of (1) year after the substantial completion of the project - \$1,000,000 aggregate.
 - c. Personal and Advertising Injury - \$1,000,000 aggregate.
 - d. Fire Damage - \$50,000.
 - e. Medical Payment - \$5,000.
2. Automobile Liability
 - a. Combination Single Limit for Bodily Injury and Property Damage for Owned, Non-Owned, and Hired Vehicles - \$1,000,000.
3. Builders' Risk
 - a. Maintain insurance to protect himself and the Owner from loss incurred by fire, lightning, extended coverage hazards, vandalism, theft, explosion, and malicious mischief in the full amount of the Contract and such insurance shall cover all labor and materials connected with work, including materials delivered to the site but not yet installed in the building.

B. Exhibit A, Insurance, add: The Contractor is to have all of his subcontractors carry the same insurance and coverages. The Owner is to be additionally insured for each coverage and a statement regarding this is to be included on each insurance certificate. The Contractors insurances are primary over any other valid and collectable insurance. The Contractor shall file with the Owner a copy of the limits and coverages for each insurance stated above.

3.0 DEFINITIONS

A. "Provide" means provide in place, furnish and install.

4.0 RELATED DOCUMENTS

A. The requirements of the drawings, the General Provisions of the Contract, the General Conditions, the Bidding Requirements and Division 1 of the specifications apply to each of the specification sections.

B. The Contractor is to file with the Owner an affidavit regarding personal property tax in accordance with Section 5719.042 of the Ohio Revised Code.

C. Finding of Recovery:

1. The Bidder will need to provide certification that it has no unresolved findings of recovery issued by the Auditor of the State prior to award of their contract.

END OF SUPPLEMENTARY GENERAL CONDITIONS

**NOTICE OF COMMENCEMENT FOR
PUBLIC IMPROVEMENT UNDER
SECTION 1311.252 OF THE REVISED CODE**

The undersigned, _____, of _____, first being sworn gives the following information with respect to the indicated public improvement:

1. The name of the public improvement is Preservation Parks of Delaware County– Family Restroom – Hogback Ridge Park
2. The Public Improvement is located at _____
3. The project number for the public improvement is _____
4. The name and address of this public authority is as follows:

5. The name and address of all principal contractors working on the public improvement, the trade of each principal contractor, and the name and address of the surety for each principal contractor are as follows:

		Trade
A.	_____ _____ _____	_____
	Surety: _____ _____ _____	

B.	_____ _____ _____	_____
	Surety: _____ _____ _____	

C.	N/A _____ _____	_____
	Surety: _____ _____ _____	

D. N/A _____

Surety:

6. The name and address of the representative of the public authority for the purposes of serving the lien affidavit are as follows:

Preservation Parks of Delaware County
2656 Hogback Road
Sunbury, Ohio 43074

(Signature of Affiant)

County of _____
State of Ohio

Sworn to before me a notary public this ____ day of _____ 2024
by _____, _____, of
_____, on behalf of the public authority.

Notary Public



**STATE OF OHIO
DEPARTMENT OF TAXATION
CONSTRUCTION CONTRACT EXEMPTION CERTIFICATE**

Identification of Contract:

Contractee's (Owner's) name:

Exact location of job/project _____

Name of job/project as it
appears on contract documentation _____

The undersigned hereby certifies that the tangible personal property purchased under this exemption certificate was purchased for incorporation into:

- real property under a construction contract with the United States government, its agencies, the State of Ohio, or an Ohio political subdivision.
- real property which is owned, or will be accepted for ownership at the time of completion, by the United States government, its agencies, the State of Ohio, or an Ohio political subdivision.
- a house of public worship or religious education.
- a building used exclusively for charitable purposes by a nonprofit organization operated exclusively for charitable purposes as defined in section 5739.02(B)(12) of the Revised Code.
- the original construction of a sports facility under section 307.696 of the Revised Code.
- a hospital facility entitled to exemption under section 140.08 of the Revised Code.

The original of this certificate must be signed by the owner/contractee and/or government official and must be retained by the prime contractor. Copies must be maintained by the owner/contractee and all subcontractors. When copies are issued to suppliers when purchasing materials, each copy must be signed by the contractor or subcontractor making the purchase.

Prime Contractor

Name _____
Signed by _____
Title _____
Address _____
City, State, Zip _____
Date _____

Owner/Contractee

Name Preservation Parks of Delaware County
Signed by _____
Title _____
Address _____
City, State, Zip _____
Date _____

Subcontractor

Name _____
Signed by _____
Title _____
Address _____
City, State, Zip _____
Date _____

Political Subdivision

Name same as Owner
Signed by _____
Title _____
Address _____
City, State, Zip _____
Date _____

STATEMENT OF CLAIM FORM

Claim No. ____

1. Name of Contractor: _____.

2. Date written claim given: _____.

3. Contractor's representative to contact regarding the claim:

Name: _____ Title: _____

Telephone No. _____ (office) FAX No. _____

E-mail: _____

4. General description of claim:

5. Contract Documents. If the claim is based upon any part or provision in the Contract Documents, including but not limited to pages in the Drawings and/or paragraphs in the Specifications, Owner-Contractor Agreement, General Conditions or Supplementary General Conditions, state upon which parts or provisions the claim is based:

6. Delay claims:

6.1 Date delay commenced: _____

6.2 Duration or expected duration of the delay, if known: _____

6.3 Apparent cause of the delay and part of critical path affected:

6.4 Expected impact of the delay and recommendations for minimizing such impact:

7. Additional compensation. Set forth in detail all additional compensation to which the Contractor believes it is entitled with respect to this claim:

8. Truth of Claim. By submitting this claim, the Contractor and its representative certify that after conscientious and thorough review and to the best of his or her knowledge and belief a) the information in this State of Claim is accurate, b) the Contractor is entitled to recover the compensation in paragraph 7, and c) the Contractor has not knowingly presented a false or fraudulent claim. The Contractor by its authorized representative must acknowledge this Statement of Claim before a notary public.

CONTRACTOR: _____

By: _____

Name and Title: _____

Date: _____

CONTRACTOR'S ACKNOWLEDGMENT

State of Ohio

County of _____, ss:

_____ first being sworn, states that after conscientious and thorough review the statements made in attached Statement of Claim Form are true to the best of his or her knowledge and belief.

Sworn to before me a notary public by _____ on _____, 2024.

Notary Public

WHEN COMPLETED, FORWARD A COPY OF THIS NOTICE AND STATEMENT OF CLAIM FORM TO THE OWNER, ARCHITECT, AND CONSTRUCTION MANAGER (if applicable), AS DESCRIBED IN THE INSTRUCTIONS FOR COMPLETING THE NOTICE AND STATEMENT OF CLAIM FORM.

INSTRUCTIONS FOR COMPLETING THE STATEMENT OF CLAIM FORM

1. Completing the Statement of Claim Form ("Claim Form") is a material term of the Contract. The Claim Form tells the Owner, Architect, and, if applicable, the Construction Manager that the Contractor is making a Claim and that they need to act promptly to mitigate the effects of the occurrence giving rise to the Claim. The Claim Form also provides them with information so that they can mitigate such effects. The Contractor acknowledges that constructive knowledge of the conditions giving rise to the Claim through job meetings, correspondence, site observations, etc. is inadequate notice, because knowledge of these conditions does not tell the Owner, Architect, and, if applicable, Construction Manager that the Contractor will be making a Claim and most often is incomplete.

2. The Contractor must provide preliminary information in all blanks in the Claim Form, except for paragraph 7, within the ten (10) day period required by the Contract Documents. After providing the preliminary information, the Contractor must supplement the Claim Form with complete and detailed information within thirty (30) days of submitting the Claim Form. If the space provided in the Claim Form is insufficient, the Contractor, as necessary to provide complete and detailed information, must attach pages with the required information to the Claim Form.

3. Paragraph 4. The Contractor must state what it wants, *i.e.*, time and/or compensation, and the reason why it is entitled to time and/or compensation.

4. Paragraph 5. The Contractor must identify the exact provisions of the Contract Documents it is relying on in making its Claim. For example, if the Claim is for a change in the scope of the Contractor's Work, the Contractor must identify the specific provisions of the Specifications, and the Plan sheets and details which provide the basis for the scope change.

5. Paragraph 6. This paragraph applies to delay claims, including delays which the Contractor believes result in constructive acceleration. The Contractor must identify the cause of the delay, party or parties responsible, and what the party did or did not do that caused the delay, *i.e.*, specific work activities. The Contractor acknowledges that general statements are not sufficient, and do not provide the Owner with sufficient information to exercise the remedies available to the Owner or to mitigate the effects of the delay.

For example, if the Contractor claims a slow response time on submittals caused a delay, the Contractor must identify the specific submittals, all relevant dates, and then show on the applicable schedule, by circling or highlighting, the activities immediately affected by the delays. Also, for example, if the Contractor claims it was delayed by another Contractor, the Contractor must identify the delaying Contractor, specifically what the delaying Contractor did or did not do that caused the delay, and then show on the applicable schedule, by circling or highlighting, the activities immediately affected by the delays. Further by example, if the Contractor seeks an extension of time for unusually severe weather, the Contractor must submit comparative weather data along with a record of the actual weather at the job site and job site conditions.

6. Paragraph 6.4. Time is of the essence under the Contract Documents. If there is a delay, it is important to know what can be done to minimize the impact of the delay. It therefore is important that the Contractor provide specific recommendations on how to do so.

7. Paragraph 7. The Contractor must provide a specific and detailed breakdown of the additional compensation it seeks to recover. For future compensation, the Contractor shall provide its best estimate of such compensation.

8. Paragraph 8 and Acknowledgment. In completing the Claim Form, the Contractor and its representative certify that after conscientious and thorough review and to the best of its knowledge and belief (a) the information in this Claim Form is accurate, (b) the Contractor is entitled to recover the compensation in paragraph 7, and (c) the Contractor has not knowingly presented a false or fraudulent claim. The Contractor, by its authorized representative must acknowledge this Statement of Claim before a notary public at the time of the preliminary submission and also when making the supplemental submission.

End of Instructions

SECTION 011000 – SUMMARY

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. Work by Owner.
- 4. Access to site.
- 5. Work restrictions.
- 6. Specifications and drawings.

- B. The Work of this Project is defined by the Contract Documents and consists of the construction of a Family Restroom Facility at Hogback Ridge Park for Preservation Parks of Delaware County. All site related material removals, paving replacements, structures, and improvements are included.

- C. The drawings are indicative of the project in its final completed form.

- D. WORK COVERED BY THE CONTRACT DOCUMENTS

Project Manual and Specifications.

- 1. All Bidding Requirements and Technical Specification Divisions 1 – 33 are included.

Drawings.

- 1. Sheets; Cover Sheet, SP1, SD1, S1, S2, A1.0, A2.0, A3.0, A3.1, A4.0, A5.0, P1, E1

- E. Project Identification:

- 1. Project Location: 2656 Hogback Road, Sunbury, Ohio 43074

- F. Owner: Preservation Parks of Delaware County

- 1. Owner's Contact; Matt Simpson, Senior Park Planner, 2656 Hogback Road, Sunbury Road 43074. (740) 255-1169 msimpson@preservationparks.com

- G. Architect: Schorr Architects, Inc., Larry Rancour, 230 Bradenton Avenue, Dublin, Ohio 43017. (614) 519-4684. lrancour@schorrarchitects.com

H. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Electrical Consultant: Roger D. Fields & Associates, 4588 Kenny Road, Columbus, OH, 43220.

1.3 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner. PPDC will remove the existing landscape planting adjacent to the Lodge for the contractor to install the underground electrical.

1.4 ACCESS TO SITE

A. General: GC shall make full use of the Project site staging area for construction operations. Reference project site limits on the plans.

1.5 WORK RESTRICTIONS

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

1. This park is an active site. There are many visitors and ongoing activities that will be occurring while construction is in process. Comply with limitations on use of public spaces and with other requirements with PPDC activities.
2. PPDC (including all outdoor spaces) is a smoke /vaping and drug free area. Offenders will be removed from the project.
3. There will be a Sanitary System project that will be occurring at the same time as this project. Coordinate all will with other construction activities on site.

1.6 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 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 GC 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 scheduled on Drawings.
- D. Plan Approvals: The Architects Office will obtain and pay for all Plan Approvals from the agencies having jurisdiction over this project. The Contractor shall provide individual trade permits as required from local agencies to complete their own scope of work.
- E. Special Inspections: the Contractor shall arrange and pay for special inspections required for the project under the Contract Allowance Amount.
- F. Provide a minimum of (48) hours' advanced notice of all proposed utility shutdowns.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012100 – ALLOWANCES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Drawings and General Provisions of Contract, including General/Supplementary Conditions, other Division 1 Specification Sections, apply to Work of this Section.

1.2 SUMMARY

- A. Types of allowances include the following:
 - 1. Lump sum allowances
 - 2. Unit cost allowances
 - 3. Fixed contingency
- B. Designate in Construction Schedule delivery dates for product.

1.3 LUMP SUM ALLOWANCES

- A. Purchase product/material under allowance only as directed by Architect.
- B. Amount of allowance includes;
 - 1. Net cost of product.
 - 2. Delivery to the site.
 - 3. Applicable taxes.
- C. In addition to amount of allowance, include in base bid, for inclusion in Contract Sum, Contractor's costs for:
 - 1. Handling at site including unloading, uncrating, and storage.
 - 2. Protection from elements, from damage.
 - 3. Labor, installation and finishing.
 - 4. Other expenses (e.g., testing, adjusting, and balancing) required to complete installation.
 - 5. Overhead and profit.
 - 6. Allowances which will be adjusted by Unit Prices as listed on the Bid Proposal Form or subsequently renegotiated, should include Overhead and Profit and all associated costs. Monetary allowances which will not be adjusted by Unit Prices should not include Overhead and Profit. Overhead and Profit on monetary allowances should be carried elsewhere within the Contractor's bid.

1.4 UNIT COST ALLOWANCE

- A. Include the unit cost amounts in Base Bid for inclusion in the Contract Sum as indicated on the Bid Form.

1.5 FIXED CONTINGENCY (CASH ALLOWANCE)

- A. Provide Work under allowance only as directed by Architect and Owner and pursuant to Change Order executed in accordance with the Contract Documents.
- B. Include following amounts in bid for inclusion in Contract Sum:
 - 1. Allowance for those items and Work hidden, undetectable, or unforeseen and not visible from Prebid, onsite observation, or not shown, called for, or reasonably implied in the Contract Documents.
- C. Amount of Allowance includes:
 - 1. New cost of product.
 - 2. Delivery to the site.
 - 3. Applicable taxes.
 - 4. Handling at site including unloading, uncrating, and storage.
 - 5. Protection from elements, from damage.
 - 6. Labor, installation and finishing.
 - 7. Other expenses (e.g., testing, adjusting and balancing required to complete installation).

1.6 SELECTION OF PRODUCT/MATERIAL

- A. Architect Duties
 - 1. Consult with Contractor for consideration of product/material and suppliers.
 - 2. Make selection, designate product/material to be used.
 - 3. Notify Contractor in writing, designating:
 - a. Product, size, color and texture.
 - b. Supplier.
 - c. Cost, delivered at site.
- B. Contractor's Duties
 - 1. Assist in determining qualified suppliers.
 - 2. Obtain proposals from supplies when requested by Architect/Engineer.
 - 3. Make appropriate recommendations for consideration by Architect/Engineer.
 - 4. Notify in writing, of effect anticipated by selection of product or supplier under consideration on:
 - a. Construction Schedule
 - b. Contract Sum
 - 5. On notification of selection enter into purchase agreement with designated supplier.

1.7 DELIVERY

- A. Contractor Responsibility:
 - 1. Arrange for delivery and unloading.
 - 2. Promptly inspect product for damage or defects.
 - 3. Submit claims for transportation damage.

1.8 INSTALLATION

- A. Comply with reference Specification Section requirements.

1.9 ADJUSTMENT OF CASH ALLOWANCES

- A. Unused amounts of monies included under allowances shall be credited to the Owner by deduct Change Order prior to approval of Final Application for Payment.

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. Description: Fixed Contingency
 - 1. Allowance 1: Construction Testing = \$5,000.00
- B. A total of \$5,000.00 must be included in the Base Bid amount on the Bid Form.

END OF SECTION 012100

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

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 to meet other Project requirements but may offer an advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use Form under Bidding Requirements
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. 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.
- c. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - d. Samples, where applicable or requested.
 - e. Certificates and qualification data, where applicable or requested.
 - f. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - g. Research reports evidencing compliance with building code in effect for Project.
 - h. Supplier'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.
3. A/E Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Supplier 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.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution ten (10) days prior to bid submission date.
1. Conditions: Architect will consider Supplier's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect 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. The substitute 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: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. "Unit Prices" for adding to or deleting from the Contract after the Contract award.
 - 2. "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within the time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - d. Quotation Form: Use forms acceptable to A/E.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to A/E.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Comply with requirements "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
5. Proposal Request Form: Use form acceptable to Architect.

1.4 ADMINISTRATIVE CHANGE ORDERS

- A. Unit-Price Adjustment: See "Bid Form" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Supplier on Architect's form.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Work Change Directive: Architect may issue a Work Change Directive on A/E form.
 1. The Work Change Directive instructs Supplier to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 2. The Work Change Directive contains a complete description of changes in the Work. It also designates a method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General 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:
 - 1. "Unit Prices" for administrative requirements governing the use of unit prices.
 - 2. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.3 DEFINITIONS

- A. Schedule of Values: 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.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values.
 - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - 2. Submit the schedule of values to A/E at earliest possible date, but no later than fourteen days after the notice to proceed date.
 - 3. Sub schedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide sub schedules showing values coordinated with the scope of each design services contract as described in Section 011000 "Summary."

- B. Format and Content: 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.
1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of A/E
 - c. Project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 2. Arrange schedule of values.
 3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 1) Materials.
 - 2) Equipment.
 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts.
 - a. Include separate line items for EDGE subcontractors and material suppliers.
 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored.
 7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost.
 9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

- B. Payment Application Times: 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.
- C. Payment Application Times: Submit Application for Payment to Architect by the seventh day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
 - 1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- D. Application for Payment Forms: Submit forms for approval with initial submittal of schedule of values.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. A/E will return incomplete applications without action.
 - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- F. Submit each Application for Payment to A/E. One copy shall include waivers of lien and similar attachments if required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
 - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit conditional final or full waivers.
 - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. 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 who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's schedule (preliminary if not final).
 4. Combined Contractor's schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
 5. Products list (preliminary if not final).
 6. Schedule of unit prices.
 7. Submittal schedule (preliminary if not final).
 8. List of Contractor's staff assignments.
 9. List of Contractor's principal consultants.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Certificates of insurance and insurance policies.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013000- PROJECT MEETINGS

PART 1 -GENERAL

1.1 DESCRIPTION

- A. Responsibility for meetings is as follows:
 - 1. Trade coordination meetings shall be scheduled and conducted by the General Contractor.
 - 2. Progress meetings with the A/E shall be scheduled (1) per week during the process of construction.
- B. The Architect's responsibilities include:
 - 1. Prepare all meeting agenda.
 - 2. Make physical arrangements for meetings.
 - 3. Notify all parties of scheduled meetings.
 - 4. Preside at meetings.
 - 5. Prepare and distribute minutes of all meetings.

1.2 PRE-CONSTRUCTION MEETING

- A. A meeting will be scheduled after Award of Contract.
- B. Location: at the site of the Project.
- C. Attendance: Contractors, Owner's Representative and Architect.
- D. Agenda:
 - 1. Sign-in and introductions.
 - 2. Wage compliance.
 - 3. Safety and security:
 - a. Working hours.
 - b. Security and storage.
 - c. Emergency contact list.
 - d. Temporary facilities.
 - 4. Supervision:
 - a. Contractor's Superintendent.
 - b. Contractor's Daily Report.
 - 5. Payment Procedures:
 - a. Contract Cost Breakdown.
 - b. Payment procedures.
 - c. Final payment.
 - d. Tax exempt status.
 - 6. Change Orders:
 - a. Design generated changes.
 - b. Field conditions generated changes.
 - 7. Insurance:
 - a. Liability insurance.
 - b. Builder's Risk insurance.
 - c. State Worker's Compensation.
 - d. Bonding.

1.2 PRE-CONSTRUCTION MEETING

8. Shop Drawing Submittals
9. Schedule
 - a. Project schedule.
 - b. Submittals/material lead time/fabrication time.
10. Open Discussion

1.3 COORDINATION MEETINGS

- A. Contractor shall anticipate weekly coordination meetings with Contractors and material suppliers for each school that has additional work.
- B. Record and distribute minutes to all parties.

1.4 JOB PROGRESS MEETINGS

- A. Progress meetings will be scheduled weekly and generally be held on the same day and hour of the week for the duration of the construction period.
- B. Additional meetings as progress of work dictates may be required.
- C. Location of progress meetings; construction field office or other designated location such as Park District Office.
- D. Attendance:
 1. Contractors.
 2. Contractor's representative.
 3. Architect.
 4. Owner's representative.
- E. Minimum agenda:
 1. Review and approve minutes of previous meeting.
 2. Review work progress since last meeting.
 3. Note and discuss field observations, problems, and decisions.
 4. Identify problems which impede planned progress.
 5. Review off-site fabrication problems.
 6. Develop corrective measures and procedures to regain the planned schedule.
 7. Revise construction schedule as required.
 8. Plan progress during next work period.
 9. Review submittal schedules and expedite as required to facilitate ordering of equipment.
 10. Review quality and work standards.
 11. Discuss and complete other current business.
- F. Unexcused absence of a meeting will result in a \$1,000.00 reduction in the contract amount for each occurrence.

END OF SECTION 013000

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special 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.

1.3 DEFINITIONS

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

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Contractor shall coordinate its construction operations to ensure efficient and orderly installation of each part of the Work.
 - 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. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures 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.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

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 in the form specified.
1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of Subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's 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. RFI Forms:
1. Request for Interpretation form to be provided as requested.
- D. Architect's action: Architect will review each RFI, determine action required, and respond. Allow three working days for Architect's response for each RFI.

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 Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will start from time of receipt of additional information.
 3. An architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 7 days of receipt of the RFI response.
- E. A/E to keep an RFI Log
- F. On receipt of Architect's action, immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.6 PROJECT MEETINGS

- A. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect.
1. Conduct the conference to review responsibilities and personnel assignments.
 2. Attendees: Authorized representatives of Owner, Architect, 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.
 - b. Sequencing.
 - c. Designation of key personnel and their duties.
 - d. Lines of communications.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for RFIs.
 - g. Submittal procedures.

- h. Preparation of record documents.
- i. Use of the premises and existing building.
- j. Work restrictions.
- k. Working hours.
- l. Owner's occupancy requirements.
- m. Responsibility for temporary facilities and controls.
- n. Procedures for moisture and mold control.
- o. Procedures for disruptions and shutdowns.
- p. Construction waste management and recycling.
- q. Parking availability.
- r. Office, work, and storage areas.
- s. Equipment deliveries and priorities.
- t. First aid.
- u. Security.
- v. Progress cleaning.

B. Coordination Meetings: The Contractor shall conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

- 1. Attendees: Contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
- 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to 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.
 - b. Schedule Updating: Revise construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each Contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Access.
 - 4) Site utilization.
 - 5) Temporary facilities and controls.
 - 6) Work hours.
 - 7) Hazards and risks.
 - 8) Progress cleaning.
 - 9) Quality and work standards.
 - 10) Deliveries.

3. Minutes: Contractor to document discussions and provide upon request.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special 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 "Operation and Maintenance Data" 017823 for submitting operation and maintenance manuals.
 - 2. Section "Project Record Documents" 017839 for submitting record Drawings, record Specifications, and record Product Data.
 - 3. Section "Demonstration and Training" 017900 for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

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

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled date of fabrication.
 - h. Scheduled dates for purchasing.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 1. Architect will furnish Contractor digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. The contractor shall execute a data licensing agreement on the form attached to this Section.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

- a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 7 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 3 days for review of each resubmittal.
- D. Electronic Submittals: All submittals are to be submitted electronically. 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. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
 3. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner and Architect, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Names of subcontractors, manufacturer, and supplier.
 - g. Category and type of submittal.
 - h. Submittal purpose and description.
 - i. Specification Section number and title.
 - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Related physical samples submitted directly.
 - n. Indication of full or partial submittal.
 - o. Transmittal number numbered consecutively.
 - p. Submittal and transmittal distribution record.
 - q. Other necessary identification.
 - r. Remarks.
- E. Options: Identify options requiring selection by Architect.
- 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 Architect 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 Architect's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: 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.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 3. Certificates and Certifications Submittals: Provide a statement that includes the 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.
 4. Submit Product Data before or concurrent with Samples.
 5. Submit Product Data in the following format:
 - a. PDF electronic file.
- 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. Notation of dimensions established by field measurement.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
- 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. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

- a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
- E. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
- F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Architect and Owners, and other information specified.
- G. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- H. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- I. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- J. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- K. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- L. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

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 Architect.
- 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 ARCHITECT'S ACTION

- A. Informational Submittals: Architect will review each submittal and will not return it or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- B. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- C. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- D. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300

SECTION 013600 – CONSTRUCTION MILESTONES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide (3) copies of the final Project Time Schedule to the Architect indicating all areas of work and shop drawings submittal schedule. REVISE SCHEDULE AS CHANGES TO THE WORK OCCUR.
- B. By submitting the Bid, the bidder agrees that the periods for performing the Work are reasonable, and that the bidder's work can be substantially complete by its applicable date(s) for substantial Completion, as well as by any of the milestone dates identified that are applicable to its work.
- C. The milestone and completion dates below, and as agreed to at the time of contract execution, shall be adhered to unless modified by mutual agreement between the Contractor and the Architect. By submitting a bid, the contractor acknowledges that the number of days shown below, establish the contract milestones and that the dates shown below are the individual milestone dates based on the Anticipated Notice to Proceed. The Contractor is responsible to maintain progress so as to achieve the milestones including shift work, overtime work, weekend work, supplemental labor and equipment, etc. at no additional cost to the Owner:
- D. The phasing plan established by these milestone completion dates supersedes phasing identified in other contract documents. All alternates that are accepted must be completed within the dates listed below.

<u>MILESTONE ACTIVITY</u>	<u>MILESTONE DATES</u>
1. Contractor Notice to Proceed	September 19, 2024
2. Mobilize Construction Site	October 1, 2024
3. Footings / Foundations	October 15, 2024
4. Utilities Rough Ins	October 30, 2024
7. Under Rough	November 15, 2024
8. Finishes	January 5, 2025
9. Substantial Completion	February 15, 2025
10. Final Completion	March 1, 2025

NOTE: Anticipated Notice to Proceed date is indicated above. This schedule must be adhered to and will be enforced. Time of completion will be (151) calendar days and will be adjusted accordingly based upon the actual Notice to Proceed date and Weather days lost.

1.2 HISTORICAL WEATHER DATA

A. Contract Time may be extended by Change Order for the number of days lost due to inclement weather occurring in excess of the "Maximum Expected Days Lost" as shown on the following table. Actual weather experience will be recorded by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (USDC/NOAA). Inclement weather exists when one or more of the following occurs: the precipitation other than snow and ice exceeds 1/10" within a calendar day, when snow or ice accumulation exceeds 1.0 inch within a calendar day, when maximum temperature for the calendar day is 32 degrees F or below, or when any combination of these occurs simultaneously. The Contract Time shall not be extended unless actual inclement weather for a number of calendar days in excess of the "Maximum Expected Days Lost" for the Contract Time and that the completion of the work was, in fact, delayed because of such excess inclement weather.

1.3 SCHEDULE OF WORK

A. If at any time the Contractor's working force and equipment, in the opinion of the Architect shall be inadequate for securing the necessary progress or required quality of work as herein stipulated, the Contractor shall, if so directed, at his own expense, increase or supplement the working force and equipment and/or perform the work on an overtime or multiple shift basis to such an extent as to give reasonable assurance of compliance with the schedule of completion and the required quality of the work. When so directed, the Contractor shall submit for approval such supplementary construction schedules as may be necessary to demonstrate the way such compliance will be established. Failure to make such demands shall not relieve the Contractor of his obligation to secure the quality and the rate of progress required by the Contract; and the Contractor alone shall be and remain liable and responsible for the efficiency and adequacy of his methods, materials, working force, and equipment, irrespective of whether or not he makes any change as a result of any order, or orders received.

B. Should the Architect require, either for convenience or to move the completion date forward or to otherwise accelerate schedules, causing the Contractor to perform contract work outside of the normal working hours, the Contractor shall do so, in which case the Contractor shall be reimbursed for actual premium payments made for labor overtime worked, with no allowance for overhead or profit. If such overtime work is required the Contractor shall, at the end of each day on which the overtime is worked, furnish daily time slips showing the name or number of each workman employed thereon with the time worked, the character of work performed and the wages to be paid. Loss of efficiency or productivity associated with multiple shift or overtime work, work whether affecting work on which overtime is spent or on work under the contract, shall not be the basis for any claim for additional compensation by the Contractor.

END OF SECTION 013600

SECTION 013700 - CPM PROGRESS SCHEDULE

PART 1 GENERAL

1.1 DESCRIPTION

A. This Section includes specifications for the general requirements for the preparation, updating, revision and submittal of project progress schedules and the Monthly Progress Status Report. Progress schedules required include the Project CPM Schedule and Updated Project CPM Schedules.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, and other Division 1 specification sections, apply to this section.

1.3 GENERAL

A. The purpose of the project schedule is to allow the Contractor to prepare an orderly guide to aid in the timely completion of the project.

B. The approved construction schedule shall be used to measure the progress of the work, to aid in evaluation time extensions, and to provide the basis for all progress payments.

C. Progress schedules shall represent a practical plan to complete the Work within the Contract Time and shall convey the Contractor's intent in the manner of presentation and progress of the Work.

D. The scheduling and execution of construction in accordance with the Contract Documents are the responsibility of the Contractor. The Contractor shall involve and coordinate all subcontractors and material suppliers in the development and updating of progress schedules.

E. The submittal of progress schedules shall be understood to be the Contractor's representation that the progress schedule meets the requirements of the Contract Documents and that the Work will be executed in the sequence and duration indicated in the progress schedule.

1.4 PROJECT SCHEDULING SEQUENCE REQUIREMENTS

A. Upon receipt of a Notice to Proceed, the Contractor shall prepare a construction schedule for all work included under the scope of this contract, in accordance with general conditions of the contract for construction.

B. All Contractors shall provide all construction schedule requirements specified herein to the Contractor so that they can prepare a fully coordinated Construction Schedule.

1.5 SUBMITTALS

A. Progress schedules shall take the form of a time-scaled network diagram and shall be submitted on sheets no smaller than eleven inches wide by seventeen inches.

B. All progress schedule submittals shall include one reproducible and six full size copies with two of six full size copies being in color.

C. Re-submittals shall conform to the same requirements as original submittals.

D. The Project CPM Schedule shall be prepared so that a CPM activity, or group of activities, corresponds directly with the Schedule of Values breakdown. The Contractor's failure to submit the Project CPM Schedule and Schedule of Values breakdown as required may result in the withholding of progress payments until such submission requirements are met.

E. The Project CPM Schedule submittal, and all subsequent Project CPM schedule updates, and time extension requests shall consist of a computer-generated time-scaled network diagram, accompanying reports, and a monthly progress report.

1. The reports generated by the computer program shall include a tabulation of each activity. The following information shall be furnished as a minimum for each activity of work item:
 - a. Preceding and succeeding event numbers.
 - b. Activity description end number.
 - c. Responsible subcontractor, vendor, or other party for each activity.
 - d. Estimated duration of each activity.
 - e. Resource loading for each activity. Indicate the quantity of daily workforce necessary to accomplish the work in the times indicated.
 - f. Earliest start date (by calendar date).
 - g. Earliest finish date (by calendar date).
 - h. Latest start date (by calendar date).
 - i. Latest finish date (by calendar date).
 - j. Total float and free float.
 - k. Percentage of activity completed and number of days remaining (for updates only).
 - l. Actual start date (by calendar date) (for updates only).
 - m. Actual finish date (by calendar date) (for updates only).

2. PRODUCTS

2.1 SCHEDULE SOFTWARE

A. The Construction Schedule shall be prepared using one of the following project management software systems or an approved equal.

1. Primavera Project Planner (P3) Primavera Systems
2. Microsoft Project, Microsoft

3. EXECUTION

3.1 USE OF THE CRITICAL PATH METHOD

A. The Critical Path Method (CPM) of network calculations shall be used to generate the project schedule. The lead contractor shall provide the project schedule in either the Precedence Diagram Method (PDM) or the Arrow Diagram Method

B. A calendar time-scaled and resource loaded CPM network diagram schedule covering the complete project shall be submitted within thirty days following the date of the Notice to Proceed.

C. The schedule shall be in accordance with the Contract with the Contract requirements at the time of the Notice to Proceed.

D. A schedule found to be impractical for any reason shall be revised by the Contractor and resubmitted.

3.2 APPROVED CHANGES CERTIFICATION

A. Only construction schedule changes that have been previously approved shall be included in the schedule submission. The narrative report shall specifically reference, on an activity-by-activity basis, all changes made since the previous period and relate each change documented, approved schedule changes.

B. The Contractor shall prosecute the work in accordance with the approved Construction Schedule. Out of sequence construction, defined as a change from

the Construction Schedule in the Contractor's actual operations, requires prior approval.

C. Upon the approval of a change order the agreed upon change order activities, activity duration's, logic and impacts shall be reflected in the next schedule submittal by the Contractor.

D. No change to the approved activities, original activity duration's, logic, interdependencies, milestones, planned sequence of operations, or resource loading of the construction schedule shall be made without prior written approval. If the Contractor desires to make a change to the approved Construction Schedule, the Contractor shall request permission in writing, stating the reasons for the change as well as the specifics, such as the proposed changes in activities, original activity duration's, logic, interdependencies, milestones, planned sequence of operations, or resource loading of the baseline Construction Schedule.

E. A change will be considered of a major nature if the time estimated for an activity is varied from the original plan to the degree that there is reasonable doubt that the Contract completion date or milestones will be met, or if the change impacts the work of other contractors at the job site. Changes to activities having adequate float shall be considered as minor changes may be considered a major change when such changes affect the contract completion date or milestones.

END OF SECTION 013700

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect and Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual product incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

- D. Construction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction. Additional criteria may be required in particular Section to increase, not replace, criteria of this definition.
 - 1. Provide substantiation of experience as part of submittals when required in a Section.
 - 2. Provide substantiation upon architect's request regardless of specific section requirements.

1.4 CONFLICTING REQUIREMENTS

- A. General: Resolve discrepancies or conflicts during bidding by request for information and official addendum. For any unresolved conflicts comply with the following:
- B. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- C. If differing requirements, quantities or quality levels are indicated between drawings or between drawings and specifications, comply with the most stringent requirement and greater quantity.

- D. During construction Contractor will be instructed to provide the greater quantity or quality. No increase in the Contract Amount will be considered for Contractor bidding the lower quality and lesser quantity instead of seeking clarification during bidding.
- E. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Testing Agency Qualifications: For testing agencies specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.6 CONTRACTOR’S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor’s quality-assurance and quality-control responsibilities. Coordinate with Contractor’s construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.7 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.
- F. Testing Agency Qualifications: An NRTL, and NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
- G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
 1. Manufacturer's Representative: An experienced individual directly employed by the Manufacturer not be a subsidiary company, sales representative company, or installer.

- H. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
1. **Factory Representative:** An experienced individual or firm employed by the Manufacturer not by a subsidiary company. Not a manufacturer's sales representative company; not an installer of the manufacturer's products on this Project.
- I. **Construction Testing:** Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. **Contractor responsibilities include the following:**
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform the same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
 2. **Testing Agency Responsibilities:** Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- J. **Mockups:** Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - a. Construct mockups showing exterior elements in an open, unshaded area with the finish side of the mockup facing south.
 2. Notify the Architect seven days in advance of dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 6. Demolish and remove mockups when directed, unless otherwise indicated.

- K. **Manufacturer's Technical Services:** Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- L. **Retesting/Reinspecting:** Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- M. **Associated Services:** Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- N. **Coordination:** Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- O. **Schedule of Tests and Inspections:** Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for the Notice to Proceed.
 - 1. **Distribution:** Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.8 SPECIAL TESTS AND INSPECTIONS REQUIRED BY THE OHIO BUILDING CODE

- A. The contractor will engage and pay a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

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

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

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

3.2 REPAIR AND PROTECTION

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

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

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

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

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General 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. Division 01 Section "Summary" for work restrictions.

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 testing agencies and authorities having jurisdiction.
- B. Sewer Service: Not Applicable.
- C. Water Service: Not Applicable.
- D. Electric Power Service; Not Applicable.

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.
 - 1. Indicate sequencing of work that requires water and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

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.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: 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. Fencing: Reference Civil Engineering Drawings for requirements and location of temporary fencing required for construction.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Not required.
- B. Common-Use: General Trades Contractor to provide a facility of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep clean and orderly. Coordinate "Storage and Fabrication Sheds" Paragraph below with Owner for use of existing building for storage and protection of materials to be incorporated into Project.
- C. 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.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Not Applicable
- B. Sanitary Facilities: The contractor will be required to provide separate temporary toilet facilities for use during construction.
- C. Telephone Service: Company provide cellular phones that are acceptable for construction purposes.
 - 1. Post a list of important telephone numbers. Police and fire departments.
 - a. Ambulance service.
 - b. Contractor's home office.
 - c. Contractor's emergency after-hours telephone number.
 - d. Architect's office.
 - e. Engineers' offices.
 - f. Owner's office.
 - g. Principal subcontractors' field and home offices.
 - 2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- D. Each Contractor will be responsible to provide all utilities for their own scope of work as required. The existing lodge facility may be used for temporary water and electrical utilities as needed. Coordinate for the location and provide own connections required.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- C. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- D. Temporary 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 and vaping throughout the entire site .
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.4 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 the 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. The owner reserves the 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 Division 01 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 015639 – TREE PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Salvage of existing site elements to remain. Trees and shrubs, scheduled to remain, will be protected against injury or damage to branches, trunks or roots from construction and excavation.
 - 2. Salvage of existing site elements to be reinstalled.
 - 3. Restoration of pre-existing plantings after construction.
- B. Related Sections include the following:
 - 1. Section 011000 "Summary" for use of premises and Owner-occupancy requirements.
 - 2. Section 015000 "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
 - 3. Division 32 for "Seeding" for seeding requirements.

1.3 DEFINITIONS

- A. Remove and Reinstall: Detach items from existing landscaping, prepare them for protection and reuse, and reinstall them where indicated.
- B. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed, and salvaged, or removed and reinstalled.
- C. Caliper: Diameter of a trunk in inches measured by a diameter tape at 4'-6" above the ground or DBH (diameter at breast height). (Standard as defined by the ISA – International Society for Arboriculture).
- D. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and defined by calculating the critical root radius. The tree trunk caliper at 4'-6" above the ground multiplied by 1.5, the result expressed in feet. The root protection zone is the outside edge of a concentric circle with the radius extending from the trunk of the tree or as indicated on the drawings whichever is larger. Note that a particular tree/plant sensitivity or tolerance to construction disturbance may require a larger area than the area based on this calculation. This is to ensure that both the feeder and structural support roots are undamaged to maintain the integrity of the tree.

- E. Vegetation: Trees, shrubs, groundcovers, grass and other plants.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Include detailed photographs or videotape.
- C. Include notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- D. Indicate specimen trees and shrubs recommended for protection by the Owner.
- E. Tree Pruning Schedule: Written schedule from the Contractor detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
 - 1. Note: Tree removal is by the Contractor.
- F. Tree Protection Plan:
 - 1. Prepare a tree protection and removal plan for this project at each site requiring exterior access and Work.
 - a. Diagram the trees and plants to be removed or protected and their related tree protection zones.
 - b. Tree protection zones shall be indicated and are to be considered minimums; provide additional protection measures as necessary to protect the short and long-term health of each individual tree and as indicated by the arborist's review of site conditions and any additional recommendations.
 - c. Should correspond to the tree protection/site demolition plan which indicates the trees and plants to be removed or protected and their related tree protection zones.
 - d. Include species and size of tree or plant, location on plan, include unique identifier for each, indicate removal with an "x" through the plant symbol, indicate protection with the tree protection zone and fence location, indicate location of pruning of branches or roots outside of tree protection zones to avoid damage during construction or for the health of the tree, and include typical tree protection measures.
- G. Planting Schedule: Indicating anticipated planting dates for each type of planting.
- H. Maintenance Instructions: Recommended procedures to be established by the Owner for maintenance of lawns during a calendar year. Submit before expiration of required maintenance periods.

1.5 QUALITY ASSURANCE

- A. Existing trees:
 - 1. Maintain original grade.
 - 2. Do not grade under the drip line.
 - 3. Do not place top fill outside of the drip line that would elevate the new grade greater than 2 inches from the original grade.

- B. Existing shrubs within the construction area or staging area:
 - 1. Replace or correctively prune if damaged during construction.
 - 2. Prune to the height at the beginning of construction.
 - 3. Weed/Spray if weeds have grown up within the construction area and /or within the shrubbery.
- C. Existing lawns:
 - 1. Restore existing lawns when compacted during construction.
 - 2. Aerate and reseed if necessary.
- D. Installer Qualifications: A qualified landscape installer whose work has resulted in successful planting establishment.
- E. Tree Service Firm Qualifications: approved by or provided by Owner.
- F. Tree Pruning Standard: Comply with ANSI A300 Pruning Standards.
- G. Preinstallation Conference: Conduct conference at Project site. Before tree protection and trimming operations and construction activities begin, meet with Owner Construction Representative, Agency Representative, Architect/Engineer, Tree Service Firm and other concerned entities to review tree protection and trimming procedures and responsibilities. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
 - 1. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
 - 2. Enforcing requirements for protection zones.
 - 3. Field quality control.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.7 SCHEDULING - LAWNS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
 - 1. Spring Planting: March 15 through May 20
 - 2. Fall Planting: August 15 through October 15
- B. The early fall period is preferred. If seeding must take place after May or October and the lawn requires a perennial rye and bluegrass mix, the seeding will be split. The perennial rye seed will be sown at the time scheduled and the bluegrass seed will be split, seeded over the same area in September.
- C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.8 LAWN MAINTENANCE

- A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established and acceptance by the Owner.
- B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and mulch to produce a uniformly smooth lawn.
 - 1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.
- C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches.
 - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 - 2. Water lawn at a minimum rate of 1 inch per week.

1.9 PROJECT CONDITIONS

- A. The following practices are prohibited within tree protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water or excessive wetting.
 - 6. Spillage of noxious material while mixing, placing or storing construction materials.
 - 7. Excavation or other digging unless otherwise indicated.
 - 8. Compaction of soil over root systems.
 - 9. Fill in excess of one inch over tree roots.
 - 10. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward tree protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 6 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
 - a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

2.2 PLANTING ACCESSORIES

- A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.3 FERTILIZER

- A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 1. Composition: 18 percent nitrogen, 24 percent phosphorous, and 12 percent potassium, by weight.

2.4 TREE PROTECTION ZONE FENCING

- A. Parameters as indicated in the Civil Drawings.

2.5 LAWN MULCH

- A. Organic Mulch:
 1. Shredded hardwood, free of deleterious materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. LAWNS - Examine damaged areas of pre-existing lawns to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. TREES and SHRUBS- Examine damaged areas of pre-existing trees and shrubs for compliance with requirements and other conditions affecting performance. Proceed with tree and shrub protection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prior to construction activities commencing: trees, shrubs and other plantings to be protected are to be fenced.
 - 1. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag or Tie a 1-inch blue-vinyl tape around each tree trunk at 54 inches above the ground.
 - 2. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
 - 3. Tree Protection Zones: Mulch areas inside tree protection zones and other areas indicated.
 - 4. Apply 2-inch average thickness of organic mulch. Do not place mulch within 6 inches of tree trunks.

- B. Tree Protection Zone Fencing:
 - 1. Install protection zone fencing along edges of protection zones in a manner that will prevent people from easily entering protected area.
 - 2. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
 - 3. Tree Protection Zones include the canopy area above and beyond all tree protection areas as indicated in the construction documents. Canopy damage to protected vegetation is not acceptable. Contractor shall take measures to protect tree canopies and trunks from aerial construction equipment and shall maintain an aerial clear zone over the tree for the extent of the entire tree protection area and beyond to the edge of each individual tree canopy.
 - 4. Tree protection zone fencing shall be erected before any construction activities commence and remain until construction has concluded and shall be installed and removed without harm to trees or shrubs.
 - 5. Tree Protection Zone Signage: Install protection zone signage in visible prominent locations in a manner approved by Owner and Architect/Engineer.
 - 6. If trees scheduled to remain are injured notify Owner's Construction Representative immediately.

3.3 PREPARATION - LAWN RESTORATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

- C. Limit lawn subgrade preparation to areas disturbed during construction and require restoration.

- D. Unchanged Subgrades: Lawn restoration in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations during construction, prepare surface soil as follows:
 - 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.

2. Loosen surface soil with a rototiller to a depth of at least of 6 inches to break up the pan. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.
 3. Remove rocks, gravel, dirt, turf clods stick, roots, trash, and other extraneous matter prior to seeding.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off The Owner's property.
- E. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade area 1 to 1-1/2" above grade of existing lawn; blend edges to existing turf and sidewalks. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.
- F. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- G. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.4 PREPARATION - TREES

- A. Heavy equipment will not be allowed to compact the soil over the critical root zone of existing trees. Restricted equipment access routes will be established before work is begun. Temporary paving materials such as plywood or rubber matting spread over the root zone may be required to prevent compaction.
- B. Installation of utilities under the dripline of existing trees must be directionally bored or drilled below the root zone. Top of the bore or tunnel should be no higher than 3 feet deep. Open trenches within the root zone must be avoided. When roots must be severed, clean cuts must be made with proper pruning tools.
- C. Where grade change is required within the root zone of trees, a sufficient residual root zone to provide for the good health of the trees should remain undisturbed and protected by either a dry well or retaining wall if the grade is to be raised or lowered.
- D. Construction materials, excavation debris, chemicals, fuel, equipment or vehicles are not to be stockpiled, stored, dumped or parked within the dripline of public trees.
- E. Fires are not permitted within the dripline of any trees.
- F. All existing trees designated for preservation will be protected with a good, substantial fence, frame or box not less than four feet high and as far from the tree as possible. Dripline is preferable; however, actual location will be determined by site limitations.
- G. Fencing will be installed before commencing site preparation work. Fence must be maintained during the full construction period.
- H. Interfering branches of trees may be removed when acceptable to the Owner and shall be pruned in accordance with ANSI A300 and Z133.1 standards.

- I. Any trees damaged or destroyed due to contractor negligence will be treated or removed at the contractor's expense. If damaged beyond repair, the Owner will require reimbursement for the value of the tree as determined by the current edition of the 'Guide for Plant Appraisal' published by the International Society of Arboriculture.

3.5 LAWN RENOVATION

- A. Renovate existing lawn.
- B. Renovate existing lawn damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
 1. Reestablish lawn where settlement or washouts occur or where minor regrading is required.
- C. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil.
- D. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.
- E. Mow, dethatch, core aerate, and rake existing lawn.
- F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off The Owner's property.
- H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.
- I. Apply initial fertilizers required for establishing new lawns and mix thoroughly into top 4 inches of existing soil.
- J. Apply seed and protect with straw mulch as required for new lawns.
- K. Water newly planted areas and keep moist until new lawn is established.

3.6 MAINTENANCE

- A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches.
- B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.
- C. Maintain tree protection zones free of weeds and trash.
- D. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations. Repair should occur within 24 hours of the damage. Treat

damaged trunks, limbs, and roots according to certified arborist's written instructions and A/E approval.

- E. Maintain tree protection zone fencing and signage in good condition as acceptable to Architect/Engineer and remove when construction operations are complete and equipment has been removed from the site.
- F. Do not remove tree protection fencing to allow for deliveries or equipment access through the protection zone.
- G. Temporary access may be permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.
- H. Roots torn or damaged by construction operations shall be repaired according to the standards outlined in this section and by a certified arborist.
- I. Silt fence may not be trenched within the Tree Protection Zone of any tree or shrub. In areas where silt fence is shown within Tree Protection Areas, silt fence shall be folded toward the flow direction and secured at grade-level by pinning or backfilling with a 6" layer of clear stone.
- J. Contractors shall be responsible for setting up tree maintenance programs to maintain trees and surfaces within construction boundaries for the duration of construction and until tree protection measures are completely removed from the site. This includes watering, preconstruction pruning, clearance pruning during construction, mowing, and re-mulching. Coordinate tree maintenance programs with Owner's Construction Representative.

3.7 SATISFACTORY RESTORED AREAS

- A. Release of the restored areas will be approved by the Owner and the Architect.

3.8 EXCAVATION

- A. General: Excavate at edge or beyond tree protection zones. Install shoring or other protective support systems to minimize sloping or benching of excavations.
- B. Trenching near trees: Where utility trenches are required within tree protection zones, tunnel under the roots a minimum of 24" below the soil surface by drilling, auger boring, pipe jacking or digging by hand. Do not cut main lateral tree roots or tap roots; cut only smaller roots in the within the proposed utility line area. Cut roots as required for root pruning.
- C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction as required for root pruning.
- D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition.

Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.9 ROOT PRUNING

- A. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:
- B. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
- C. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
- D. Cover exposed roots with burlap and water regularly.
- E. Backfill as soon as possible with topsoil or planting mixture as outlined in Section 32 91 13 Soil Preparation. Tamp to settle soil and eliminate voids and air pockets. When the area is approximately one-half filled with topsoil, water thoroughly then place the remaining topsoil required to fill around the exposed roots.
- F. Root pruning at edge of tree protection zone: Prune roots 12 inches outside of the protection zone, by cleanly cutting all roots to the depth of required excavation.
- G. Preventing Oak wilt: Do not prune, cut or injure Oaks between April 1 and October 1st. If an Oak is wounded during this period, cover the wound immediately with tree wound paint (water-based paint) in a 1” wide band around the circumference of the cut surface. November through March is the preferred period for pruning and tree removal. Refer to Wisconsin Department of Natural Resources Forestry Division Publication PUB-FR-127 2009 for further Oak tree protection requirements.

3.10 BRANCH PRUNING

- A. Coordinate all pruning of trees and shrubs and/or repairs to damaged limbs with Owner’s Construction Representative. Pruning shall be performed Owner’s Park Staff.
- B. Pruning standards: Prune trees according to ANSI A300 Pruning Standards.
- C. Remove tree branches and dispose of off-site.

3.11 REGRADING

- A. Grade Lowering: Where new finish grade is indicated below existing grade around trees slope grade away beyond tree protection zones. Maintain existing grades within tree protection zones.
- B. Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.

- C. Minor Fill: Where existing grade is 1 inch or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations. Note raising grade within a tree protection zone should be minimal in area and depth and can be fatal to trees. No grade change is acceptable over Oak tree roots.

3.12 FIELD QUALITY CONTROL

- A. Inspections: Engage a certified arborist to direct plant protection measures in the vicinity of trees, shrubs and other vegetation indicated to remain and to prepare inspection reports.

3.13 REPAIR AND REPLACEMENT

- A. Repair trees, shrubs and other vegetation indicated to remain or be relocated that are damaged by construction operations, in accordance with a certified arborist's written instructions and approved by the project Architect/Engineer and Owner's Construction Representative.
- B. Remove and replace trees, shrubs and other vegetation indicated to remain that die or are damaged during construction operations that a certified arborist determines are incapable of restoring to normal growth pattern and approved by the project Architect/Engineer.
- C. Soil Aeration: Aerate surface soil compacted during construction in lawn areas. Aerate compacted lawn areas beyond the tree protection zones. Drill 2-inch- diameter holes a minimum of 12 inches deep at 24 inches on center. Backfill holes with an equal mix of augured soil and sand.

3.14 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove excess excavated material, displaced trees, trash and debris and legally dispose of them off Owner's property.
- B. Burning of surplus and waste materials is not permitted.

3.15 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.
- C. Remove erosion-control measures after grass establishment period.

END OF SECTION 015639

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special 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.

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. Designating one product or manufacturer as the "Basis-of-Design" does not either directly or unintentionally establish a proprietary specification. It is fully expected that the other named manufacturers have standard or modified products, with or without accessory and supplementary items or methods of installation, which provide equivalent utility, function, properties and design intent to the basis-of-design.
 - 2. Any Contractor needing clarification about the acceptability of a product or method of installation of one of the other named manufacturers shall seek clarification from the

Architect during bidding by submitting complete documentation for the intended product and a written statement of intent. Submit full substantiating documents in time for Architect's review and analysis before the cutoff date for issuing an addendum.

3. If clarification is not requested as required during bidding, comply with the Architect's instructions during Submittals Process that establish other named manufacturer product equivalency to the basis-of-design product; or provide the basis-of-design product.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 1. Each Contractor is responsible for providing products and construction methods compatible with products and construction methods of other Contractors. Date of Architect's favorable review shall be the date used in determining precedence.
 2. If a dispute arises between Contractors over concurrently selectable but incompatible products Architect will determine which products shall be used. Provide products determined by Architect with no additional cost to Owner.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 1. 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.
 2. 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 cementitious products and materials on elevated platforms.
 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 5. Comply with storage requirements indicated in specific specification Sections.
 6. Store products that are subject to damage by the elements, in a weathertight enclosure, with ventilation adequate to prevent condensation.
 7. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 8. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Pre-printed written warranty form furnished by individual manufacturer for a particular product and then specifically dated and endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
 3. Warranty initiation date shall be the date indicated in the applicable specification section. Contractor shall obtain any additional, supplemental, or extended insurance necessary to cover insurances for the time period indicated if manufacturer-provided insurance does not cover the full timeframe required.
 4. There shall be no delay in the initial start and continuation in effect of any warranty required by the Specifications for any cause, including but not limited to any obligations of performance or payment of fee(s), or other requirement between the Contractor and the product manufacturer/warranty provider.
 - a. Where fee is required to initiate and bring into effect or to maintain a Warranty, the Contractor shall pay such fee(s) as part of the Work.
 5. Warranties shall not be suspended, terminated, or revoked due to any failure of the Contractor or their sub-contractor to pay premiums or initiation-of-warranty fees.
 6. For the full duration of the warranty period, an executed warranty as delivered to the Owner shall not be suspended, terminated or revoked by the manufacturer or Contractor without written documentation signed by an officer of the manufacturer and delivered to the Owner by registered mail.
 7. Manufacturer Direct Inspections for Warranty Continuance: All fees for the product manufacturer's inspections required to maintain a warranty in full force and effect throughout the warranty period shall be waived or be pre-paid and included as part of the construction Work; this applies whether the manufacturer uses their own forces or contracts with an inspection agency. This does not apply to regular maintenance inspections and service obligations of the Owner.
 8. Contractor is responsible to pay all fees and to obtain any and all additional warranties or warranty extensions necessary to fulfill the requirements of this section and of specific Product Section warranties including but not limited warranty initiation date, warranty initiation fee payments, periodic inspection costs if required by the warranty, warranty termination date, and warranty work coverage, as part of the Work without additional cost to the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Progress cleaning.
 - 6. Starting and adjusting.
 - 7. Protection of installed construction.
 - 8. Correction of the work.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original condition after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor.
- B. Qualification Data: For professional delegated design engineer for any cutting and patching that involves structural elements or potential structural failure.
- C. Product Literature: Provide product literature for all products to be used for patching.
 - 1. Use products identical to those being used (or intended to be used) by the contractors of Division 02 through 33.
- D. Qualifications of Workers: Patching, particularly of finishes, must be performed by experienced workers of the applicable skilled trade. Provide names of workers or subcontractors who will perform the repairs; provide experience qualifications upon request.

- E. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed; for any work affecting structure submit at least 5 workdays in advance of operations and do not proceed without favorable review by the Architect/Structural Engineer. Include the following information:
1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - a. For proposed structural cutting or change submit detailed structural engineering drawings and calculations signed and sealed by the Contractor's delegated Design Engineer for review.
 - b. For operational changes proposed, submit for Engineering review.
 - c. For appearance changes proposed, submit to Architect for review.
 3. Dates: Indicate when cutting and patching will be performed.
 4. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
 5. Comply with any changes indicated by the Architect / Engineer's reviews of the cutting and patching proposal.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in the jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.

- d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Fire-detection and -alarm systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
- a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Except as otherwise indicated or as directed by the Architect, use materials for cutting and patching that are identical to existing materials and accepted in the Part 1 submittals process.
- 1. If identical materials are not available submit for review materials that fully match existing adjacent surfaces possible with regard to visual effect.
 - 2. Use materials for cutting and patching that will result in equal or better performance characteristics.

- B. For replacement of new Work removed comply with Technical Specification Sections for type of Work to be performed.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing site survey, topography, and subsurface conditions: Existing conditions presented in drawing, report or specification form are believed accurate within normal industry tolerances but are not guaranteed. Investigate, survey, confirm and verify all conditions bearing on the Work by any means necessary before starting any Work that changes existing conditions. Report any unacceptable discrepancies to the Architect in writing before beginning operations.
 - 1. Written claims of difference shall be accompanied by all substantiating evidence necessary to document such claim.
 - 2. Claims of difference shall be resolved, including determination of quantities and costs and methods of Contract Modification, before work that alters such existing conditions is started.
 - 3. Initiation of site-clearing, soil-moving operations, demolition or other activity that alters existing conditions shall be evidence that Contractor has made all investigations and evaluations it deems necessary and has accepted all existing conditions asent whether or not they conform exactly to the Contract Documents.
 - 4. Without advance written notification of unacceptable discrepancy, no claim for extra will be considered for a claim of difference between documents and actual conditions after the Contractor has altered existing conditions.
- B. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of storm sewer, underground electrical services, and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

- D. **Written Report:** Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work.
 2. List of detrimental conditions, including substrate.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.
- E. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.
- F. **Concealed Conditions:** Concealed conditions that the contractor believes to differ substantially from Contract requirements, that change the products or performance requirements indicated, or that otherwise have a time / cost impact on the contractor's work shall be brought to the attention of the Architect immediately upon discovery.
1. Verbal or written claims of difference shall be accompanied by all substantiating evidence necessary to document such claim. Verbal claims shall be documented in writing by the contractor following discussions including full description of claim and points of understanding.
 2. Claims of difference shall be resolved in writing, including determination of quantities and costs and methods of Contract Modification, before work that alters such existing conditions is started.
 - a. When actual quantities remain concealed at time of discovery, the unknown quantities shall be estimated and a unit price agreed upon; as work progresses contractor shall track and document actual quantities to the Architect daily and shall not exceed estimated quantities without specific notification and further discussion.
 3. Without such written agreement no claim for extra will be considered for a claim of difference between documents and actual conditions after the contractor has altered existing conditions.

3.2 PREPARATION

- A. **Existing Utility Information:** Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. **Field Measurements:** Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. **Space Requirements:** Verify space requirements and dimensions of items shown diagrammatically on Drawings.

- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.

2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities have jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Contract Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.

5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- H. Acceptability of the Work: Architect's opinion is final for all issues of aesthetics and suitability of patching work. Unaccepted repairs shall be replaced or the repair re-performed until Architect is satisfied with the work at no additional cost to the Owner.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

5. Contractors failing to clean their work areas as indicated and directed will be back-charged costs .
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Contract Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Contract Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Contract Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in "Cutting and Patching" paragraphs.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Judgment of repair and replacement work acceptability is solely the Architect's decision and shall not be challenged or over-ridden by time constraints or difficulty of performance.
- F. Any removal and reinstallation of other work in place and all consequential repairs to other work in place shall be the responsibility of the contractor of the unaccepted work

END OF SECTION 017300

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special 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. Prerequisites to final inspection and acceptance.
 - 2. Inspection procedures.
 - 3. Warranties.
 - 4. Final cleaning.

1.3 DEFINITIONS

- A. Closeout: General requirements near end of Contract Time in preparation for final acceptance, final payment, normal termination of contract, occupancy by Owner, and similar actions evidencing completion of the Work.

1.4 PREREQUISITES TO FINAL INSPECTION AND ACCEPTANCE

- A. Comply with requirements of Article 6 of the General Conditions.
- B. Comply with final requirements of the Construction Waste Management and Recycling Plan.
 - 1. Confirm all waste management records and quantities and submit substantiation.
- C. General: Before requesting Architect inspection complete the following:
 - 1. Submit a copy of itemized work as identified by the Contractor (Contractor's Punch List) to be completed or corrected, starting at the value of items on the list, and reasons why the Work is not complete.
 - a. Contractor's List shall include all closeout documents not yet delivered to Architect or Owner.
 - 2. Submit all recorded document submittals per General Conditions, and similar final record information.
 - 3. Submit specific warranties, maintenance agreements, final certifications, and similar documents. Including but not limited to the following:

- a. Certificate occupancy operating certificates and similar releases.
 - b. Inspection Certificates.
 - c. Certification stating that no materials containing more than 1 percent asbestos was incorporated into the Work.
 - d. Warranties as indicated in “Warranties” Article below.
4. Deliver tools, spare parts, extra stocks of materials, and similar physical items to Owner and obtain a receipt. Label with manufacturer’s name and model number where applicable.
 5. Make final changeover of locks and transmit keys to Owner and advise Owner’s personnel of changeover in security positions.
 6. Complete start-up testing of systems and instructions of Owner’s operating/maintenance along with construction tools, mock-ups, and similar elements.
 7. Submit test/adjust/balance records.
 8. Terminate and remove temporary facilities from Project site along with mockups, construction tools, and similar elements.
 9. Complete final cleaning-up requirements. See technical sections, other Division 01 Sections and “Final Cleaning” article in Part 3 of this Section.
 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

1.5 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Contract Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8 ½-by-11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the production of installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of the installer.
 3. Identify each binder on the front and spine with the typed or printed title “WARRANTIES,” Project name, and name of Contractor.
 4. Warranties are to be included in the Maintenance Manual for each material.
- C. Provide additional copies of each warranty to include in the operation and maintenance manuals.
- D. The Owner will not accept the start of the warranty period on systems or equipment until the Certificate of Contract Completion is issued.
 1. Each Contractor shall make such provisions as required to extend the manufacturer’s warranty from time of initial operation of systems or equipment until Contract Completions is given in writing.

1.6 FINAL INSPECTION

- A. Final Inspection: Contractor shall submit the “Contractor’s Punch List” to the Architect, with a request for Final Inspection of the Work. On receipt of request, the Architect will either proceed with inspection or notify Contractor of unfilled requirements.
 - 1. The Architect shall notify the Contractor and the School District Board of the scheduled time of Final Inspection.
 - 2. Architect’s Punch List will be combined with Contractor’s Punch List and issued to the Contractor.

1.7 PREREQUISITES TO CONTRACT COMPLETION

- A. Contractor shall request a reinspection by Architect when all “Punch List Items” have been completed. Final inspection shall occur within 7 days of issuance of Architect’s Punch List.
 - 1. Contractor shall indicate any items to be deferred in request.
- B. Reinspection: Architect will reinspect work and when all items have been completed and record documents have been received, Architect will process a Certificate of Contract Completion.
- C. If punch list work is not complete at time of reinspection Architect will not process the Certificate of Contract Completion but will reissue the punch list with uncompleted work noted as not complete.
- D. Contractor shall notify Architect when uncompleted items are in fact complete and shall reimburse the Architect at Architect’s standard hourly rates for all time spent in additional reinspection(s) until Contractor’s work is accepted as complete.
 - 1. Architect will process Certificate of Contract Completion when work is complete, record documents have been received and when compensation for Architect’s second (and beyond) reinspection time has been received.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use no high VOC containing agents.

PART 3 - EXECUTION

3.1 GENERAL

3.2 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 the 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 Contract 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. Clean exposed exterior and interior hard-surface 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.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Damp mop concrete and resilient floor surfaces.
 - h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - j. Remove labels that are not permanent.
 - k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Replace parts subject to unusual operating conditions.
 - n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

- p. Clean ducts, blowers, and coils if units were operated without filters during construction.
- q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Clean light fixtures, lamps, globes, and reflectors to function will full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- r. Leave Project clean and ready for occupancy.

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 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. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.
- 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 SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. A/E will comment on whether content of operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

- a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
- C. Final Manual Submittal: Submit each manual in final form approved by Architect. Architect will return copy with comments and corrections if necessary.
 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 7 days of receipt of Architect's comments.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
 1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 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 Construction Manager.
 7. Name and contact information for Architect.
 8. Name and contact information for Commissioning Authority.
 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 10. Cross-reference to related systems in other operation and maintenance 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 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include

instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.

8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.

2.5 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.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment 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. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. 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. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. 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.
 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. 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.
- F. 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.
 2. Comply with requirements of newly prepared record Drawings in Section 01 78 39 "Project Record Documents."
- G. Comply with General Conditions Article 6-Construction and Closeout for schedule for

submitting operation and maintenance and all closeout 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 Special 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.
- B. Related Requirements:
 - 1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 2. Divisions 02 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up record prints.
- B. Record Specifications: Submit one paper copy of Project's Specifications.

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.

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. Locations and depths of underground utilities.
 - d. Changes made by Change Order or Construction Change Directive.
 - e. Changes made following Architect's written orders.
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.

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 017900 – DEMONSTRATION AND TRAINING

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 instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment and training in operation and maintenance of systems, subsystems, and equipment.

1.3 CLOSEOUT SUBMITTALS

- A. Demonstration and Training: Submit one copy within seven days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name and address of videographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date of video recording.
 - 2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with the same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
 - 3. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
 - 4. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file.

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.

- b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
2. Operations: Include the following, as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
3. Adjustments: Include the following:
- a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
4. Maintenance: Include the following:
- a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
5. Repairs: Include the following:
- a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operations and Maintenance Data."
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, through Architect, with at least seven days' advance notice.
- B. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

END OF SECTION 017900

SECTION 031000 – CONCRETE FORMS AND ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Temporary wood and metal forms, and corrugated paper forms, shoring, bracing, and anchorage for placing concrete.

1.2 QUALITY ASSURANCE

- A. Codes and Standards: Unless otherwise specified, design, construct, erect, maintain, and remove forms and related structures for cast-in-place concrete work in compliance with the American Concrete Institute Standards ACI 347R-01, “Recommended Practice for Concrete Formwork” and ACI 301-99, “Specifications for Structural Concrete”.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms shall be constructed using Douglas Fir plywood, solid on one side, construction grade with sound undamaged surface or No. 2 grade yellow pine lumber.
- B. Form Coatings; provide V.O.C. compliant commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

PART 3 - EXECUTION

3.1 CONSTRUCTION

- A. General; construct forms complying with ACI 347R-01 and ACI 301-99 to the exact sizes, shapes, lines, and dimensions as required to obtain accurate alignment, location, grades, level, and plumb work in finish structures. Provide openings, offsets, sinkage, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, and inserts, and other features required.
- B. Allowable Tolerances: construct formwork to provide completed cast-in-place concrete surfaces complying with the tolerances specified in ACI 301-99 and ACI 347-01. Top of form units, not more than 1/8” in 10’.

END OF SECTION 031000

SECTION 032000 – CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes reinforcing steel bars, welded wire fabric and accessories for cast-in-place concrete.
- B. Related sections: Section 03 30 00 Cast-In-Place Concrete

1.2 REFERENCES

- A. ACI 301 (American Concrete Institute) – Structural Concrete

1.3 SUBMITTALS

- A. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, and supporting and spacing devices.
- B. Submit certified copies of mill test report of reinforcement material analysis.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with CRSI – Manual of Standard Practice, ACI 301, and ACI 318.
- B. Arrange with access to fabrication plant to facilitate Architect/Engineer’s inspection of reinforcement. Notify Architect/Engineer of commencement and duration of shop fabrication in sufficient time to allow inspection.

1.5 QUALIFICATIONS

- A. Detail reinforcement and prepare shop drawings in accordance with ACI 315.
- B. Welders’ Certificates: Submit under provisions of manufacturer’s certificates, certifying welders employed on the work, verifying AWS qualification within previous 12 months.

1.6 COORDINATION

- A. Coordinate with placement of formwork, formed openings and other work.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars, in accordance with ASTM A767, Class I A934 finish.
- B. Stirrups Steel: ASTM A82 galvanized in accordance with ASTM A641, epoxy coated in accordance with ASTM A884 finish.
- C. Welded Steel Wire Fabric: ASTM A497 Deformed Type in flat sheets, coiled rolls, unfinished galvanized epoxy coated in accordance with ASTM D884 Class A finish.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16-gauge annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic-coated steel type; size and shape as required for project conditions.

2.3 FABRICATION

- A. Fabricate concrete reinforcement in accordance with CRSI Manual of Practice.
- B. Weld reinforcement in accordance with AWS D1.4
- C. Locate reinforcement splices not indicated drawings, at point of minimum stress.

PART 3 - EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor retarder.
- C. Accommodate placement of formed openings.
- D. Maintain concrete cover around reinforcement as follows:

<u>Item</u>	<u>Coverage</u>
Beams	1 inch

Supported Slabs and Joists	1 inch
Column Ties	2 inch
Walls (exposed to weather or backfill)	2 inch
Footings and Concrete Formed Against Earth	3 inch
Slabs on fill	2 inch

3.2 SCHEDULE

- A. Reinforcement for Superstructure Framing Members: Deformed bars, unfinished.
- B. Reinforcement for Foundation Wall Framing Members and Slab-On Grade: Deformed bars and wire fabric, galvanized finish.

END OF SECTION 032000

SECTION 033000- CAST-IN-PLACE CONCRETE

PART 1-GENERAL

1.1 SECTION INCLUDES

- A. Restroom floor slab on grade, footings, and walkways.
- B. Isolation, contraction and construction joints and devices associated with concrete work.
- C. Coordinate and cooperate in the casting-in-place of all sleeves, pipes, inserts, conduits, hangers, ties and other miscellaneous items required and installed by others Contractors.
- D. Provide all engineering surveying work to layout all concrete work.

1.2 RELATED SECTIONS

- A. Section 09 90 00 – Painting

1.3 REFERENCES

- A. ACI 301 – Specifications for Structural Concrete.
- B. ACI 302 - Concrete Floor and Slab Construction.
- C.

1.4 SUBMITTALS FOR REVIEW

- A. Submit concrete mix design for each different type of mix to be used. Give owner copies of Delivery Tickets.
- B. Product Data: Provide data on curing compounds, joint devices, attachment accessories, admixtures and epoxy adhesives.
- C. Location where concrete will be pumped.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and ACI 302 as applicable.
- B. Acquire concrete from the same supplier for all concrete surfaces visible to the public.
- C. Conform to ACI 305R when concreting during hot weather.
- D. Conform to ACI 306R when concreting during cold weather.

PART 2-PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement:
 - 1. Type I – Normal (ASTM C150, Standard Spec. for Portland Cement)
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Pozzolan: Fly ash (ACI 302, Section 5.6.5)
- D. Admixtures: Use admixture types as needed and as weather conditions warrant.
- E. Water: Clean and not detrimental to concrete.

2.2 ADMIXTURES

- A. Air Entrainment: (ACI 302 Sect.5.6.1) Air-entraining admixture should be included in concrete for interior slab floors of unheated structures, all exterior concrete slabs and walks. (Not required for footings)
- B. Chemical admixtures (ACI 302, Section 5.6.2):
 - 1. Type A: Water reducing.

2. Type C: Use noncorrosive, non-chloride accelerating admixtures in cold weather only when approved by Owner's Representative. Use of admixtures will not relax cold weather placement requirements.
 3. Type B: Use set retarding admixtures during hot weather only when approved by Owner's Representative.
 4. Type F: High-range water reducing (Superplasticizer) for use in filling concrete block cores.
- C. Pozzolans (ACI 302, Section 5.6.5): Fly ash (Do not use with air entrainment.)

2.3 REINFORCING MATERIALS

- A. Reinforcing Bars: Provide deformed bars complying with the following, except where otherwise indicated.
1. ASTM A 615, Grade 60
- B. Welded Wire Fabric: ASTM A 185, cold drawn steel, plain.
- C. Reinforcing Accessories:
1. Tie wire: Black annealed type, 16-1/2 gage or heavier.
 2. Supports: Bar supports conforming to specifications of Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
 - a. Precast concrete blocks of strength equal to or greater than specified strength of concrete. Concrete masonry units not accepted.

2.4 ACCESSORIES

- A. Vapor Retarder: 10 mil (Min.) thick clear polyethylene film. Vapor retarder should have a minimum of 2 inches of granular base over the top of the vapor retarder.
- B. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.
- C. Curing Compound & Bonebreaker: Use only bio-based materials that are non-toxic, environmentally safe, wildlife friendly with low VOC. Submit product data for approval by owner.
- D. Concrete sealer: Use a high solid, low VOC, solvent based penetrating concrete sealer. Submit product data for approval by owner.

2.5 JOINT DEVICES AND FILLER MATERIALS

- A. Isolation Joint Filler: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/2 inch thick; tongue and groove profile.
- B. Isolation Joint Devices: Integral extruded plastic; 1/2 inch thick, formed to tongue and groove profile, with removable top strip exposing sealant trough, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge.
- C. Elastomeric Joint Sealant: Use quality product with minimum 10-year warranty.

2.6 CONCRETE MIX

- A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM [C94.
- B. Concrete mix per cubic yard shall be as specified according to the following:
1. Footing: 3,000 psi, min. 380 lbs. of cement, without air entrainment.
 2. Interior building floor slab: 4,000 psi, min. 564 lbs. of cement, with 5% to 7% air entrainment, no fly ash
 3. Exterior walkway: 4,000 psi, min. 564 lbs. of cement, with 5% to &7% air entrainment, no fly ash.

- C. Use non-corrosive, non-chloride accelerating admixtures in cold weather only when approved by Owner's Representative. Use of admixtures will not relax cold weather placement requirements.
- D. Do not use calcium chloride.
- E. Use set retarding admixtures during hot weather only when approved by Owner's Representative.
- F. Air-entraining admixture should be included in concrete for interior slab floors of unheated structures, exterior slabs and walks. (ACI 302 Sect.5.6.1)

PART 3-EXECUTION

3.1 EXAMINATION

- A. Verify that excavations are free of water and ice, and of the required dimensions.
- B. Welded wire reinforcement should be placed 2 inches below the slab surface or upper third of slab thickness, whichever is closer to the surface. Reinforcement should extend to within 2 inches of the slab edge. (ACI 302, Section 3.2.4)
- C. Verify that sleeves, pipes, anchors, inserts, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely.

3.2 PREPARATION

- A. Coordinate the placement of isolation joints, contraction joints, and construction joints. If the joint layout is not provided, the contractor should submit a layout plan to the owner for approval prior to proceeding.
- B. If concrete is ever interrupted long enough for the placed concrete to harden, a construction joint should be used. Tool the top edge where the temporary bulkhead will be placed.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301, Chapter 8 and ACI 304, Chapter 5.
- B. Notify Owners representative minimum 24 hours prior to commencement of concrete placement.
- C. Ensure reinforcement, sleeves, pipes, conduits, inserts, embedded parts, formed expansion and contraction joints are secured in position and not disturbed during concrete placement.
- D. Install vapor retarder under all slabs on grade for structures. Vapor Retarder: 10 mil (Min.) thick clear polyethylene film. Vapor retarder should have a minimum of 2 inches of granular base over the top of the vapor retarder.
- E. Install 1/2-inch-thick preformed joint filler at junctions with walls, and other points of restraint.
- F. Install joint devices in accordance with manufacturer's instructions.
- G. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor finish.
- H. Apply elastomeric joint sealants where required.
- I. Place floor slabs in pattern indicated on floor plan.
- J. Saw cut joints within 4 to 12 hours after placing. Hot weather within 4 hours, cold weather within 12 hours. The depth of saw cut should be at least 1/4 of the slab depth or a minimum of 1 inch whichever is greater. (ACI 302, Section 8.3.12)
- K. Screed floors and slabs level or sloped according to plans. If no slope is shown on plans around floor drains provide 1/8" per foot of slope to allow positive drainage.

3.4 CONCRETE FINISHING

- A. Finish concrete floor surfaces in accordance with ACI 302.
- B. Restroom Facility: Steel trowel surfaces smooth which will receive painted flooring.
- C. Walks: Light broom finish surfaces.
- D. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.5 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Curing Restroom Slab: Water cure floor surfaces using burlap, cotton mats or rugs. Place materials over concrete surfaces and wet materials with water spray. Maintain continuous wetness for 3 days, after the initial 3 days seal concrete with one layer of (0.10mm) plastic film to allow continued strength gain. Burlap should be double layered. Do not use curing compound, see paint specification.
- C. Sealing Exterior Walks: Apply a high solid, low VOC, solvent based penetrating concrete sealer. Comply with ASTM C 309. Apply two applications after 28 days of curing.
- D. Protecting Restroom Slab: Protect cured concrete slab immediately after three-day cure period and before overhead work resumes, with plywood installed flat with tight joints, over one layer of (0.10mm) plastic film. Maintain protection throughout construction period until permanent finish floor finish is in place and protected.

3.6 FIELD QUALITY CONTROL

- A. For Quality Assurance follow Specifications for Structural Concrete, ACI 301-99.
- B. Concrete Testing Samples:
 - 1. For all separate concrete pours take one set of four test cylinders.
 - a. (1) cylinder for 7-day break
 - b. (2) cylinders for 28-day break
 - c. (1) cylinder as backup to hold
 - 2. Conduct tests in accordance with ASTM Standards, C 31/C 31M-98.
 - 3. Costs of concrete testing will be paid by the Contractor.
 - 4. Provide Owner with copy of test results. The owner must review and approve test results before making final payment.

3.7 CONCRETE SURFACE REPAIRS

- A. Repair any slabs which do not meet the finish requirements. The Design Professional will determine whether grinding, filling cracks, patching and leveling, or removal and replacement procedures are required.
- B. Patching Mortar: Mix dry pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white Portland cement and

standard Portland cement, so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by the Design Professional.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, grazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has been cured for at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing them with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plain and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting them out and replacing them with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove the top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to the Design Professional's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to the Design Professional's approval.

3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Owner's Representative.

- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Owner's Representative for each individual area.

3.9 SCHEDULE - CONCRETE TYPES AND FINISHES

- A. See drawings for schedule as indicated.
- B. If a schedule is not provided meet with Owner's Representative to discuss the type of surface finish to use.

END OF SECTION 033000

SECTION 040513 – MORTAR

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide mortar for all building masonry.

1.2 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver cement and lime materials in original, unopened containers.
- B. Store cement and lime materials off ground, under cover, and protected from weather damage.
- C. Do not change source or brands of colored mortar material during the course of the work.

1.3 SUBMITTALS

- A. Submit product literature and installation instructions prior to the start of construction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C150, Type I or III, non-staining, without air entrapment and of natural color or white, to produce the required color of mortar or grout.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C150, Type I or III, and or hydrated lime complying with ASTM C207.
 - 1. For pigmented mortars, use colored Portland cement lime mix of formulation required to produce color indicated, or if not indicated, as selected from manufacturer's standard formulations. Pigment shall not exceed 10 percent of Portland cement by weight for mineral oxides nor 2 percent for carbon black.
- D. Masonry Cement: ASTM C91. For non-structured brick and CMU only. Not to be used for "Engineered Masonry".

- E. Mortar Cement: ASTM C1329. For structural or “Engineered Masonry “as an option to Portland Cement-Lime Mix.
- F. Aggregates: ASTM C144, except for joints less than ¼ inch, use aggregate graded with 100 percent passing the No. 16 sieve.
- G. Water: Potable, clean, free of deleterious materials which would impair strength or bond.
- H. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
- I. Epoxy Pointing Mortar: ASTM C395.
- J. Integral Water Repellent Admixture (Exterior): An integral liquid polymeric admixture.

2.01 MORTAR MIXES

- A. Do not use calcium chloride in mortar or grout

TABLE
Guide for the Selection of Masonry Mortars

Location	Building Segment	Mortar Type
Exterior, above grade	Loadbearing wall	S
	Non-loadbearing wall	N
	Parapet wall, chimney and veneer wall	N
Exterior, at or below grade	Foundation wall, retaining wall, manholes, sewers, pavements, walks and patios	S
Interior	Loadbearing wall	N
	Non-loadbearing partitions	O

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use accurate measuring devices. Shovel count not acceptable.
- B. Mix all cementitious materials and sand in a mechanical batch mixer for a minimum of 5 minutes. Use all mortar within 2-1/2 hours of the initial mixing. Discard mortar off-site after single re-tempering.

END OF SECTION 040513

SECTION 040523 – MASONRY ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section includes unit masonry assemblies consisting of the following:
 - 1. Masonry joint reinforcement.
 - 2. Ties and anchors.
 - 3. Miscellaneous masonry accessories.

1.2 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory, and other manufactured product specified.
- B. Shop Drawings: Show fabrication and installation details for the following:
 - 1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, “Details and Detailing of Concrete Reinforcement.” Show elevations of reinforced walls.
- C. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

PART 2 - PRODUCTS

2.1 CONTINUOUS WIRE REINFORCING AND TIES FOR MASONRY

- A. Masonry Joint Reinforcement, General ASTM A951.
- B. Provide welded wire units prefabricated in straight lengths of not less than 10 foot, with matching corner (“L”) and intersection (“T”) units.
- C. Fabricate from cold drawn steel wire complying with ASTM A82, with deformed or embossed continuous side rods and plain cross-rods, with unit width of 1-1/2 to 2 inches less than thickness of wall or partition.
- D. Wire shall be mill galvanized and in accord with the following:
 - 1. Joint reinforcement, interior walls exposed to relative humidity less than or equal to 75 percent. ASTM A641
mill galvanized
(010 oz. per sq.ft.)
 - 2. Wire ties or anchors in interior walls or exposed to relative humidity less than or equal to 75 percent. ASTM A641, Class 1
(0.35 oz. per sq.ft.)

- | | | |
|----|--|--|
| 3. | Joint reinforcement, wire ties, or anchors in exterior walls or a mean relative humidity exceeding 75 percent. | ASTM A153, Class B2
(1.50 oz. per sq.ft.) |
| 4. | Sheet metal ties or anchors, interior walls or exposed to relative humidity less than 75 percent. | ASTM A653, G60
(0.60 oz. per sq.ft.) |
| 5. | Sheet metal ties or anchors in exterior walls or a mean relative humidity exceeding 75 percent. | ASTM A153, Class B2
(1.50 oz. per sq.ft.) |
| 6. | Steel plates and bars | ASTM A153, Class B
(1.50 oz. per sq.ft.) |
- E. For single wythe and composite masonry, provide ladder type joint reinforcing fabricated with a minimum two W1.7- or 0.148-inch steel side rods and W1.7 or 0.148 inch cross rods.
- F. For multi-wythe masonry, provide as follows:
1. When both wythes are to be constructed simultaneously:
 - a. Provide ladder type joint reinforcing fabricated with three W1.7 or 0.148 inch steel side rods and W1.7 or 0.148 inch cross rods.
 2. When each wythe is to be considered separately:
 - a. Provide adjustable ladder type joint reinforcing fabricated with two W1.7 or 0.148 inch steel rods, W1.7 or 0.148 inch cross rods, 3/16 inch eyes and 3/16 inch double legged pintles. Longitudinal rods shall be spaced for each face shell of CMU; eye sections shall extend into walls cavity, and pintles shall rest upon bed joints of face brick.

2.2 ANCHORING DEVICES FOR MASONRY

- A. Rigid Anchors: Where masonry is to be rigidly anchored to structural steel beams, provide galvanized steel straps, bars or rods welded to the steel beam and extending into the mortar joint. Straps shall be not less than 14 gauge in thickness. Bars and rods shall be not less than 1/4 inch in diameter.
- B. Flexible Anchors: Where masonry is to be laterally supported from structural steel, while permitting only vertical movement or both vertical and horizontal movement, provide flexible anchors consisting of 2 different components as follows:
1. Weld-On Anchors: Shall be 3/16-inch galvanized steel or formed rods of 1/4 inch plain steel with 3/8 inch offsets and 4 inch adjustment for ties specified below. Anchors shall be continuous wherever possible.
 2. Flexible anchor ties shall be one of the following:
 - a. Web Ties or Beam Ties: Shall be 3/16-inch galvanized steel wire, ASTM A82, 12 inches long with width being approximately 2 inches

less than nominal wall thickness. Provide ties with blunt rod end when used with strap anchors and provide ties with tapered end when used with rod anchors. This type of tie shall permit only vertical movement and shall be installed parallel to masonry walls that abut steel columns.

- b. Triangular Ties: Shall be 3/16-inch galvanized steel wire, ASTM A82, lengths as required to extend to within 5/8 inch of opposite face of masonry. Closed end shall be 1 inch wide, and split-end opening shall be 1/2 inch. This type shall permit both vertical and horizontal movement and shall be installed where masonry bypasses steel columns, and where masonry is parallel and adjacent to steel beams and joists.
- c. Flexible Anchors: Where masonry is to be laterally supported from cast-in-place or precast concrete, provide 22-gauge galvanized dovetail slots with 3/16 inch diameter galvanized triangular ties.

2.3 FLASHING

A. Embedded Flashing Materials

- 1. Provide concealed flashing built into masonry. Provide sheet metal drip edge.
- 2. Provide one of the following types of flashing materials:
 - a. Copper-Fabric Laminate: Copper sheet of 3 ounce bonded with asphalt between 2 layers of glass fiber cloth.
 - b. Rubber Asphalt Sheet Flashing: Manufacturer's standard composite flashing product consisting of 32 mil thick pliable and highly adhesive rubberized asphalt compounds bonded completely and integrally to 8 mil thick, high density, cross laminated polyethylene film to produce an overall thickness of 40 mils. Provide termination mastic and accessories as recommended by membrane manufacturer.
 - c. Elastomeric Thermoplastic Flashing: Manufacturer's standard composite flashing product consisting of a polyester reinforced ethylene interpolymer alloy 0.040 inch thick.
- 3. Sheet Metal Drip Edge: Fabricated from 26-gauge stainless steel or 16 gauge lead coated copper with hemmed edge.
 - a. Application: Where drip edge is required per recommendations of NCMA-TEK 19-4.

2.4 MISCELLANEOUS

- ### A. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142 inch steel wire, hot-dip galvanized after fabrication.
- 1. Provide units with either two loops or four loops as needed for number of bars indicated.

2. Available Products: Subject to compliance with requirements, cavity drainage materials that may be incorporated into the Work include, but are not limited to, the following:
 - a. Reinforcing Bar Positioners:
 - 1) D/A 811; Dur-O-Wal, Inc.
 - 2) D/A 816; Dur-O-Wal, Inc.
 - 3) No. 376 Rebar Positioner; Heckman Building Products, Inc.
- B. PVC Control Joints
 1. Provide PVC control joints designed for standard sash block in CMU walls where control joints (CJ) are indicated and as specified in Unit Masonry. The following products are acceptable.
 - a. Blok-Tite AA2000; AA Wire Products Company, Chicago, Illinois
Vulco 8101; Vulcan Metal Products, Inc., Birmingham, Alabama.
 - b. Vinylex Type CJ-A; Vinylex Corporation, Knoxville, Tennessee.
 - c. 2901; Masonry Reinforcing Corp. of America, Charlotte, North Carolina.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 1. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance.
 2. Verify that foundations are within tolerances specified.
 3. Verify that reinforcing dowels are properly placed.
 4. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections

3.2 MORTAR BEDDING AND JOINTING

- A. Lay hollow masonry units as follows:
 1. With full mortar coverage on horizontal and vertical face shells.
 2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.

3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.
 - C. Built-in Work: As the work progresses, build in items specified under this and other Sections of these Specifications. Fill in solidly with masonry around built-in items.
 1. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of grout stop mesh in the joint below and rod mortar or grout into core.
 2. Fill cores in hollow concrete masonry units with grout 3 courses (24 inches) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
 3. Take particular care to embed all conduits and pipes with concrete masonry without fracturing exposed shells and to fit units around switch, receptacle and other boxes set in walls. Where electric conduits, outlets, switch boxes, and similar items occur, grind and cut units before building in services.
 4. Install anchors and related work built into masonry work, where indicated.

3.3 MASONRY JOINT REINFORCEMENT

- A. General: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2- inch elsewhere. Lap reinforcement a minimum of 6 inches.
 1. Space reinforcement not more than 16 inches o.c., unless otherwise indicated.
 2. In addition to continuous reinforcement, provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
- B. Cut or interrupt joint reinforcement at control joints, unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

END OF SECTION 040523

SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 1. Concrete unit masonry.
 2. Precast concrete lintels.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops installed compressive strengths at 28 days, based on net area, of 1,350 psi.

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the General Conditions of the Contract and Division 1 Specification Sections.
- B. Product data and certifications for each different masonry unit, accessory, and other manufactured product specified.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color through one source from a single manufacturer for each product required.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not install until they are in an air-dried condition.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

- A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.
 2. Protect sills, ledges, and projections from mortar droppings.

3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.
- C. Cold-Weather Requirements: 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 masonry damaged by frost or freezing conditions. Comply with the following requirements:
1. Cold-Weather Construction: When the ambient temperature is within the limits indicated, use the following procedures:
 - a. 40 to 32 deg F: Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F.
 - b. 32 to 25 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry.
 - c. 25 to 20 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F if grouting. Use heat on both sides of walls under construction.
 - d. 20 deg F and Below: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F. Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F within the enclosures.
 2. Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection:
 - a. 40 to 25 deg F: Cover masonry with a weather-resistant membrane for 48 hours after construction.
 - b. 25 to 20 deg F: Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Install wind breaks when wind velocity exceeds 15 mi./h.
 - c. 20 deg F and Below: Provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 48 hours after construction.
 3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.
- D. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and above.

2. PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. General: Provide shapes indicated and as follows for each form of concrete masonry unit required.
1. Provide special shapes for lintels, corners, jambs, control joints, headers, bonding, and other special conditions.

2. Provide bullnose units at all corners .
- B. Concrete Masonry Units: ASTM C 90 Type II and as follows:
 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
 2. Weight Classification: Normal Weight.
 3. Aggregates: Do not use aggregates made from pumice, scoria, or tuff.
 4. Size: Manufactured to the actual dimensions (within tolerances specified in the applicable referenced ASTM specification) for the corresponding nominal sizes as indicated on Drawings for :
 - a. Smooth faced unit masonry.
 5. Manufacturer's standard color and texture, unless otherwise indicated.
- C. Standard and Split faced CMU:
 1. Oberfields , 740.965.4141.

2.2 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Masonry Cement: ASTM C 91.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
 - a. Lafarge North America Inc.; Magnolia Masonry Cement or Lafarge Masonry Cement.
 - b. Lehigh Cement Company; Lehigh Masonry Cement.
 - c. Holcim (US) Inc.; Holcim Masonry Cement
- D. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch, use aggregate graded with 100 percent passing the No. 16 sieve.
- E. Aggregate for Grout: ASTM C 404.
- F. Water: Potable.

2.3 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate and 1/2-cup dry measure laundry detergent dissolved in 1 gal. of water.

2.4 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 1. Do not use calcium chloride in mortar or grout.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:
 1. For all masonry, use type S or N, per drawings.
- C. Grout for Unit Masonry: Comply with ASTM C 476. Minimum compressive strength shall be 3,000 psi. Use grout of consistency (fine or coarse) at time of placement that will completely fill spaces intended to receive grout.
 1. Use fine grout in grout spaces less than 2 inches in horizontal dimension, unless otherwise indicated.
 2. Use coarse grout in grout spaces 2 inches or more in least horizontal dimension, unless otherwise indicated.

2.5 INTEGRAL WATER REPELLENT

- A. General: For CMU and mortar, provide integral water repellent as admixture in batches as follows:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include the following:
 - a. Acme Shield, as manufactured by Acme-Hardesty Company, Inc.
 - b. Rheopel, as manufactured by Master Builders
 - c. Dry-Block, as manufactured by Grace Construction Products, W.R. Grace & Co.
- B. For Concrete Masonry Units: Add water repellent to units as recommended by water repellent manufacturer, but not less than the following dosages:
 - 1. For Lightweight CMU: Not less than 28 fl. oz. / cwt
 - 2. For Normal weight CMU: Not less than 16 fl. oz. / cwt
- C. For mortar: Add water repellent admixture to mortar mix as recommended by water repellent manufacturer for specific mortar mix used to achieve minimum water retention percentage of 80 for Type N and S mortar when tested as per ASTM C270.

3. EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit masonry. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Build single-wythe walls to the actual thickness of the masonry units, using units of thickness indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections of the Specifications.
- C. Leave openings for equipment to be installed before completion of masonry. After installing equipment, complete masonry to match construction immediately adjacent to the opening.
- D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting, where possible. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

3.3 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces of walls, do not exceed 1/4 inch in 10 feet, nor 3/8 inch in 20 feet, nor 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For vertical alignment of head joints, do not exceed plus or minus 1/4 inch in 10 feet, nor 1/2 inch maximum.
- B. Variation from Level: For bed joints and lines of exposed lintels, sills, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more.
- C. Variation in Cross-Sectional Dimensions: From dimensions shown, do not exceed minus 1/4 inch nor plus 1/2 inch.

- D. Variation in Mortar-Joint Thickness: Do not vary from joint thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary joint thickness from joint thickness of adjacent course by more than 1/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.
- B. Lay walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
- C. Bond Pattern: Lay masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
 - 1. One-half running bond with vertical joint in each course centered on units in courses above and below.
- D. Stopping and Resuming Work: In each course, rack back 1/2-unit length; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar prior to laying fresh masonry.
- E. Built-in Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
- G. Fill cores in hollow concrete masonry units with grout full height under lintels and similar items, unless otherwise indicated. Jambs at all door and window openings shall be grouted full height.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
 - 1. With full mortar coverage on horizontal and vertical face shells.
 - 2. Bed webs in mortar in starting course on footings and slabs and where adjacent to cells or cavities to be filled with grout.
 - 3. Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 3/8-inch joints.
- B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not furrow bed joints or slush head joints.
- C. Tool joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
 - 1. For glazed masonry units, use a nonmetallic jointer 3/4 inch or more in width.

3.6 HORIZONTAL-JOINT REINFORCEMENT

- A. General: Provide continuous horizontal-joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch. Lap reinforcing a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
- B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 PLACING REINFORCEMENT

- A. General: Comply with ACI 530.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with grout.
- C. Accurately position, support, and secure reinforcement against displacement.

3.8 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as the masonry progresses. Do not form a continuous span through movement joints.

3.9 LINTELS

- A. Provide precast concrete lintels where shown and where openings of more than 12 inches for brick size units and 24 inches for block size units are shown without other supporting lintels. Provide precast concrete lintels made with concrete that complies with requirements in Section 03 30 00, Cast-in-Place Concrete.
- B. Where indicated on the Drawings, provide precast refractory concrete lintels per the following requirements.
 - 1. Provide precast refractory concrete lintels made with refractory concrete, consisting of calcium aluminate cement and fired aggregates, with a minimum ultimate compressive strength of 4,000 psi and reinforcing bars placed as indicated on the drawings. Cure precast lintels before handling and installing. Lintels shall be warranty items that must not be damaged during the warranty period by repetitive live fire training, including exposures to temperatures up to 1,800 degrees F and thermal shock due to water application.
- C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.10 GROUTING

- A. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
 - 1. Do not exceed the following pour heights for fine grout:
 - a. For minimum widths of grout spaces of 3/4 inch or for minimum grout space of hollow unit cells of 1-1/2 by 2 inches, pour height of 12 inches.
 - b. For minimum widths of grout spaces of 2 inches or for minimum grout space of hollow unit cells of 2 by 3 inches, pour height of 60 inches.
 - c. For minimum widths of grout spaces of 2-1/2 inches or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches, pour height of 12 feet.
 - d. For minimum widths of grout spaces of 3 inches or for minimum grout space of hollow unit cells of 3 by 3 inches, pour height of 24 feet.
 - 2. Do not exceed the following pour heights for coarse grout:
 - a. For minimum widths of grout spaces of 1-1/2 inches or for minimum grout space of hollow unit cells of 1-1/2 by 3 inches, pour height of 12 inches.
 - b. For minimum widths of grout spaces of 2 inches or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches, pour height of 60 inches.
 - c. For minimum widths of grout spaces of 2-1/2 inches or for minimum grout space of hollow unit cells of 3 by 3 inches, pour height of 12 feet.
 - d. For minimum widths of grout spaces of 3 inches or for minimum grout space of hollow unit cells of 3 by 4 inches, pour height of 24 feet.
 - 3. Provide cleanout holes at least 3 inches in least dimension for grout pours over 60 inches in height.

3.11 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units; install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point-up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of sealants.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels. If necessary, use cleaner to remove stains.
- E. Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

3.12 QUALITY CONTROL DURING CONSTRUCTION

- A. General: The Owner will employ a testing agency to perform tests and inspections and to submit testing and inspection reports.
- B. Perform visual inspections of at least 25% of masonry placement, checking for reinforcement placement, mortar placement, joint placement, anchorage placement, and grouting.
- C. Testing Frequency: Tests listed in this Article will be performed during construction for each 2,000 sq. ft. of wall area or portion thereof, but no less than three of each test for the Project if there is less than 6,000 square feet of wall surface for the Project.
- D. Compressive-Strength Tests for Grout: Test grout cylinders or cubes for compressive strength per ASTM C 1019 as follows:
 - 1. Prepare 1 set of laboratory-cured specimens, cylinders or cubes, for testing as follows: one specimen tested at 7 days, two specimens tested at 28 days, and one spare specimen to be held in reserve for later testing if required.
- E. Field Sampling and Testing of Mortar: Test mortar for consistency of materials and procedures per ASTM C 780.
- F. Prism-Test Method: For each type of wall construction indicated, test one set of three masonry prisms for compressive strength per ASTM C 1314 and as follows:
 - 1. Prepare 1 set of prisms for testing at 7 days and 1 set for testing at 28 days.
- G. Test results shall be reported in writing to Engineer and Contractor within 24 hours after tests. Reports of strength tests shall contain the Project identification name and number, date of masonry placement, name of testing service, masonry type and class, location of masonry in structure, and compressive breaking strength for both 7-day tests and 28-day tests.

END OF SECTION 04 20 00

SECTION 042300 - GLASS UNIT MASONRY

PART 1-GENERAL

1.1 DESCRIPTION

- A. Glass block masonry units, hollow or solid.
- B. Integral joint reinforcement.

1.2 REFERENCES

- A. ASTM A153 - Class B2, Spec. zinc coating (hot dip) on iron and steel hardware.
- B. ASTM C144, Spec. for aggregate for masonry.
- C. ASTM C150, Spec. for Portland Cement.
- D. ASTM E163, Fire test of window assemblies (equivalent to UL 9).
- E. ASTM C270, Spec. for hydrated lime for masonry purposes.
- F. ASTM C270, Spec. for mortar for unit masonry.

1.3 PRODUCT DATA

- A. Fire tests; submit documents verifying glass block units are classified for a 1-1/2-hour fire exposure according to ASTM E163 or UL 9 "Fire Tests of Window Assemblies".
- B. Insulating value; submit copies of manufacturer's literature and installation instructions.
- C. Edge coating; glass block shall have a polyvinyl butyl edge coating to provide for better bonding and to provide for an expansion/contraction mechanism for each block.

1.4 SAMPLES

- A. Submit glass block units of each type specified showing size, color, design and pattern of faces.
- B. Submit representative samples of panel reinforcing, panel anchors, expansion strips and sealant.

1.5 PROJECT CONDITIONS

- A. Store unopened cartons of glass block in a clean, cool, dry area.
- B. Protect unopened cartons of glass block against windblown rain or water run-off with tarpaulins or plastic covering.
- C. Do not install glass block units when temperature is 40 degrees F and falling.

PART 2-PRODUCTS

2.1 GLASS BLOCK UNITS

- A. Solid glass units; Pittsburgh Corning Glass "Essex" 8" x 8" x 4" thick made opaque colorless glass as manufactured by one of the following:
 - 1. Privacy by IPB Glass Block.
 - 2. Cross Ribbed by Solaris.

2.2 ACCESSORIES

- A. Panel reinforcing; ladder type, 9-gauge wires 2" on center with welded cross-wires spaced at regular intervals, galvanized after welding.
- B. Expansion strips; made of fibrous glass or polyethylene foam with a thickness of 3/8".
- C. Panel anchors; 20-gauge perforated steel strips 24" long by 1-3/4" wide, galvanized after perforation.

- D. Asphalt emulsion; a water-based asphalt emulsion, by Karnak Chemical Corp.
- E. Sealant; non-staining, waterproof mastic urethane type.
- F. Backer rods; polyethylene foam, neoprene, fibrous glass or equal as approved by sealant manufacturer.

2.3 MORTAR MATERIALS

- A. Mortar; Type S in accordance with ASTM C270. Mortar shall be 1-part Portland Cement, ½ part lime, and sand equal to 2-1/4 to 3 times the amount of cementitious material (cement plus lime), all measures by volume with an integral type waterproofed should be added to the mortar mix.
 - 1. Portland cement; Type 1 in accordance with ASTM C150. If a waterproof Portland Cement is used, the integral type waterproofed shall be omitted. (Masonry cement is not recommended on exterior applications.)
 - 2. Lime; Type S, in accordance with ASTM C207. Shall be a high-calcium lime, or a pressure-hydrated dolomitic lime, provided that not less than 92% of all the active ingredients are completely hydrated.
 - 3. Sand; a clean, white quartzite or silica type, essentially free of iron compounds, for thin joints, in accordance with ASTM C144, not less than 100% passing a No. 8 sieve.
 - 4. Integral type water repellent; stearate type by Sonneborn Building Products. Note: add hydroxides powder to dry mortar mix. Do not add powder to wet mortar mix.

PART 3-EXECUTION

3.1 PREPARATION

- A. Verify that channels have been provided at head and jambs for the purpose of providing panel support within the opening.
- B. Mix all mortar components to a consistency that is drier than mortar for ordinary masonry. Retempering the mortar after it has taken its initial set shall not be permitted. DO NOT USE ANTIFREEZE COMPOUNDS OR ACCELERATORS.

3.2 INSTALLATION

- A. Cover sill area with a heavy coat of asphalt emulsion. Allow emulsion to dry at least two hours before placing mortar.
- B. Adhere expansion strips to jambs and head. Make certain expansion strip extends to sill.
- C. Set a full mortar bed joint, applied to sill.
- D. Set lower course of block. Maintain a uniform joint width of ¼” to 3/8” plus or minus 1/8”. All mortar joints must be full and not furrowed. Steel tools must not be used to tap glass block into position. (Place a rubber crutch tip on end of trowel to tap block into position.) Do not realign, tap, or otherwise move block after initial placement.
- E. Install panel reinforcing every 16” o.c. maximum in the horizontal mortar joint, and in joints immediately above and below all openings with panels.
- F. Place full mortar bed for joints not requiring panel reinforcing - do not furrow. Maintain uniform joint width.
- G. Set succeeding courses of block. Space at head of panel and jambs must remain free of mortar for caulking with sealant.
- H. Strike joints smooth while mortar is still plastic and before final set. Remove surplus mortar from faces of glass blocks and wipe dry.

- I. After final mortar set (approx. 24 hours), install packing tightly between glass block panel and jamb and head construction. Leave space for sealing.
- J. Apply sealant evenly to the full depth of recesses as indicated on the drawings and in accordance with the manufacturer's application manual and instructions.

3.3 CLEANING

- A. Remove surplus mortar from the faces of the glass block at the time joints are struck or tooled. **MORTAR SHOULD BE REMOVED WHILE IT IS STILL PLASTIC** using a clean, wet sponge or an ordinary household scrub brush having stiff bristles.
- B. Do not use harsh cleaners, acids, abrasives or alkaline materials while cleaning glass block.

- C. Final mortar removal is accomplished with a clean, wet sponge or cloth.
- D. After all organic sealants, caulking, etc., have been applied, remove excess caulking materials.
- E. Final cleaning of glass block panels is accomplished after they are completely installed. Start at the top of the panel and wash with generous amounts of clean water. Use a clean, dry, soft cloth to remove all water from the glass block surface. Change cloth frequently to eliminate dried mortar particles or aggregate that could scratch the glass surface or reflective finish.

END OF SECTION 042300

SECTION 044000 – ADHERED STONE VENEER

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide high density concrete masonry stone veneer units, sills, etc.

1.2 SUBMITTALS

- A. Submit product data for each different unit, accessory, and other manufactured product indicated.
- B. Submit shop drawings for detailing and fabrication.
- C. Submit samples, for verification purposes, of the following:
 - 1. Accessories.
 - 2. Actual pieces for initial color selection.

1.3 QUALITY ASSURANCE

- A. General: Appoint at least one supervisory journeyman mason who shall be present at all times and direct work performed under this Section. Supervisor shall be thoroughly familiar with design requirements, type of materials being installed, referenced standards, and other requirements.
 - 1. Use skilled journeyman masons for cutting and placing. In acceptance or rejection of installed masonry, no allowance will be made for lack of workmen's skill.
 - 2. Comply with applicable codes, regulations, and standards. Where provisions of applicable codes, regulations, and standards conflict with requirements of this Section, the more demanding shall govern.
- B. Consult other trades and make provisions to permit installation of their work in a manner to avoid cutting and patching. Build in work specified under other Sections, as necessary, and as work progresses.
- C. Single Source Responsibility for Units: Obtain exposed units from one manufacturer for each different product required for each continuous surface or visually related surface.
- D. Single Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.
- E. Sample panel: Before start of veneer work, construct sample walls for approval.

1. Construct sample wall where directed, minimum 4' long x 3' high x full thickness.
2. Construct sample walls sufficiently in advance of starting work.
3. Retaining and maintain sample panel during construction is undisturbed condition as standard for completed.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to project in undamaged condition.
- B. Store and handle off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place them until units are in an air-dried condition.
- C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.
- D. Store accessories including metal items to prevent corrosion and accumulation of dirt and oil.

1.5 PROJECT CONDITIONS

- A. Protection: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of day's work. Cover partially completed masonry when construction is not in progress.
 1. Extend cover a minimum of 24" down both sides and hold cover securely in place.
 2. Stain prevention; prevent mortar, and soil from staining the face of masonry to be left exposed. Remove immediately any grout, mortar, and soil that comes in contact with such masonry.
 - a. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
 - b. Protect sills, ledges, and projection from mortar droppings.
 - c. Protect surfaces of door frames; as well as similar products with painted and integral finishes from mortar droppings.

1.6 WARRANTY

- A. Submit manufacturer's standard limited warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Adhered Stone Veneer as manufactured by StoneCraft Industries.

1. Type ; Old Ohio

B. Accessories: Provide all stone caps, sills, water tables, trim, etc. as required by StoneCraft Industries products and/or detailed on the drawings.

2.2 MANUFACTURED MASONRY MATERIAL

A. General Description: Cast masonry using a mixture of cement, lightweight aggregates, concrete additives, and color pigments.

B. Physical Properties:

- | | | |
|----|--|--|
| 1. | Density: ASTM C 567: | 15 psf. (73 kg/m ²) maximum. |
| 2. | Efflorescence: ASTM C67: | None visible. |
| 3. | Compressive Strength: ASTM C 39: | 2100 psi (17 MPa) (5 sample average). |
| 4. | Bond Strength: ASTM C 482: | 50 psi (345 kPa). |
| 5. | Freeze/Thaw: ASTM C 67: | Less than 3 percent weight loss. |
| 6. | Absorption: ASTM C 140: | Less than 29 percent. |
| 7. | Surface Burning Characteristics: UBC Standard 7-1: | |
| | a. | Flame Spread: 0. |
| | b. | Smoke Developed: 0. |

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lay out all work in such a manner as to avoid using pieces less than 1/2 inch length. Make exposed cuts with a masonry saw. Cut accurately around pipe, duct openings, and similar penetrations. Neatly “build-in” items provided by other trades.
- B. Store, handle and install to avoid chips in exposed units. Remove and replace damaged as directed by the Architect.
- C. Provide special units and set as required to form corners, returns, offsets, and closures. Maintain proper bond throughout the wall.
- D. Units shall be delivered to the site DRY and within the specified limitations for moisture content and shall be maintained in this condition, before laying in the structure, by storing them above ground and covering them for protection against weather. Unprotected units which have been wetted by rain within the preceding 7 days shall be considered too wet for use.

3.2 GENERAL PRACTICE

- A. Stack materials on wood dunnage and protect with tarpaulin or shed.
- B. Consult other trades in advance of the work and make provision for the installation of their work to avoid later cutting and patching. Cut and patch as required to accommodate the work of other trades.
- C. Lay masonry level and true to required lines, elevations and dimension properly anchored with joints of uniform thickness.
- D. Install all products as required by the manufacturer.

3.3 PROTECTION OF WORK IN PROGRESS

- A. Cover all walls with non-staining waterproof covers at the end of each workday, during inclement weather and when work is not in progress to prevent entrance of water or moisture into wall.
- B. Turn waterproof cover down over wall at least 24" each side and hold down edges to prevent loss of protection due to being blown by the wind.

3.4 COLD WEATHER PRACTICE

- A. No masonry shall be installed at temperatures below 32 degrees F on a rising thermometer or below 40 degrees F on a falling thermometer unless adequate precaution against freezing is provided. No masonry shall be installed using frozen materials.
- B. In cold weather, masonry shall be protected against freezing for a minimum of 12 hours after installation with the temperature on both sides of the wall maintained above 40 degrees F. The use of anti-freeze or quickset compounds will not be permitted.
- C. Cold weather masonry construction shall conform to the following:

<u>Temperature</u>	<u>Construction Requirements</u>	<u>Protection Requirements</u>
Above 40°	Normal masonry procedures	Cover walls with plastic or canvas at end of day to prevent water from entering masonry.
40° to 32°F	Heating mixing water to produce mortar temperature between 40° and 120°F.	Cover walls and materials to prevent wetting and freezing. Covers should be plastic or canvas.
32° to 25°F	Heat mixing water and sand to produce mortar temperatures between 40° and 120°F.	With wind velocities over 15 mph, provide windbreaks during the work day and cover walls and materials at the end of the work day to prevent wetting and freezing.
25° to 20°F.	Mortar on boards should be above 40°F.	Maintain masonry above freezing for 16 hours using auxiliary heat or insulated

20° to 0°F.

Heat mixing water and sand to mortar temperatures between 40° and 120°F.

blankets.
Provide enclosures and sufficient heat to maintain masonry.

END OF SECTION 044000

SECTION 061053 – MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Wood blocking and nailers.
 - 3. Wood furring and grounds.
 - 4. Plywood backing panels.
- B. Related Requirements:
 - 1. Section 061600 "Sheathing."

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NHLA: National Hardwood Lumber Association.
 - 3. NLGA: National Lumber Grades Authority.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include

physical properties of treated materials based on testing by a qualified independent testing agency.

3. Include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Power-driven fasteners.
3. Powder-actuated fasteners.
4. Expansion anchors.
5. Metal framing anchors.

1.6 QUALITY ASSURANCE

- ### A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- ### A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering it with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- #### A. Certified Wood: shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- #### B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory marks each piece of lumber with grade stamp of grading agency.

2. For exposed lumber indicated to receive a stained or natural finish.
 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 4. Provide dressed lumber, S4S, unless otherwise indicated.
- C. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
1. For exposed lumber indicated to receive a stained or natural finish.
- D. Application: Treat miscellaneous carpentry as indicated.
1. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.

2.3 DIMENSION LUMBER FRAMING

- A. Framing: No. 2 grade and the following species:
1. Hem-fir (north); NLGA.
 2. Southern pine; SPIB.
 3. Douglas fir-larch; WCLIB or WWPA.
 4. Mixed southern pine; SPIB.
 5. Spruce-pine-fir; NLGA.
 6. Douglas fir-south; WWPA.
 7. Hem-fir; WCLIB or WWPA.
 8. Douglas fir-larch (north); NLGA.
 9. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Rooftop equipment .
 4. Furring.
 5. Grounds.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber.
1. Hem-fir (north); NLGA.
 2. Mixed southern pine; SPIB.
 3. Spruce-pine-fir; NLGA.
 4. Hem-fir; WCLIB or WWPA.
 5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
 6. Western woods; WCLIB or WWPA.
 7. Northern species; NLGA.
 8. Eastern softwoods; NeLMA.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:
1. Mixed southern pine, No. 2 grade; SPIB.
 2. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
 3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
 4. Eastern softwoods, No. 2 Common grade; NELMA.
 5. Northern species, No. 2 Common grade; NLGA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used if it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1.
1. Plywood shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1.
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - 1. Adhesives shall have a VOC content of or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other constructions; scribe and cope as needed for accurate fit. Locate nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- D. Install plywood backing panels; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities.
- I. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- J. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 061600 – SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing.
 - 2. Roof sheathing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
 - 3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
 - 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For following products, from ICC-ES:
 - 1. Preservative-treated plywood.
 - 2. Fire-retardant-treated plywood.
 - 3. Foam-plastic sheathing.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory."

2.2 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Certified Wood: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
 - 1. Plywood.
- C. Plywood: DOC PS 1.
- D. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- E. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat all plywood unless otherwise indicated.

2.4 WALL AND ROOF SHEATHING

- A. Sheathing: Exposure 1, Structural sheathing.
 - 1. Span Rating: Not less than 16/0.
 - 2. Nominal Thickness: Not less than nominal 1/2 inch.
- B. Wall Sheathing: ASTM C 1177/1177M.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corporation.
 - b. G-P Gypsum Corporation.
 - c. National Gypsum Company.
 - 2. Type and Thickness: 1 inch thick, R-6 zip panels

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
- F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.
 2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

2.6 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Division 07 Section "Joint Sealants."
- B. Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.
- C. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.
1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to wood framing with screws.
 - 2. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 3. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 - 4. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent

boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

E. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 061600

SECTION 062200 – INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Plastic laminate millwork and finishing items, including accessories as specified and indicated on drawings and casework schedule.
 - 2. Interior wood trim.
 - 3. Interior wainscoting.
 - 4. Shelving and rods.
- B. Related Requirements:
 - 1. Section 061053 “Miscellaneous Rough Carpentry”.

1.3 SUBMITTALS

- A. Submit product data for each type of product and process of millwork during fabrication, finishing, and installation.
 - 1. Submit MSDS sheets for all adhesives and glues identifying VOC content in conformance with specification.
- B. Submit shop drawings showing the relationship and location of each millwork item, dimensioned plans and elevations, large scale details, attachment devices and other components.
- C. Submit samples, for initial selection purposes, showing full range of colors, textures and patterns available.
- D. Submit product data on core materials identifying materials containing no added urea formaldehyde.

1.4 QUALITY ASSURANCE

- A. Manufactured qualifications: firm experienced in successfully producing millwork similar to that indicated for this project, with the sufficient production capacity to produce required take out units without causing delay in work.
- B. Installer qualifications: arrange for installation of millwork by a firm demonstrating successful experience in installing millwork items similar type and quality to those required for this project.
- C. AWI Quality Standard: Architectural Woodwork Institute (AWI) “Architectural Woodwork Quality Standards, latest edition except as otherwise indicated.
 - 1. Unless otherwise indicated, AWI Custom Grade shall be the minimum quality millwork grade. When a higher quality grade standard is specified or indicated on the drawings, those requirements shall govern.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Protect millwork during transit, delivery, storage and handling to prevent damage, soilage and deterioration.
- B. Do not deliver millwork until painting, wet work, grinding, and similar operations that could damage or deteriorate millwork have been completed in installation areas.
- C. Comply with millwork manufacturer and installer recommendations for optimum temperature and humidity conditions for millwork during storage and installation. Do not install millwork until these conditions are reached.
- D. Where millwork is indicated to be fitted to other construction, verify dimensions of other construction by accurate field measurements before manufacturing millwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of work.

PART 2 - PRODUCTS

2.1 INTERIOR TRIM

- A. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish):
 - 1. Species and Grade: Pine, Clear; NHLA.
 - 2. Maximum Moisture Content: 13 percent.
 - 3. Finger Jointing: Not allowed.
 - 4. Gluing for Width: Use for lumber trim wider than 6 inches.
 - 5. Veneered Material: Not allowed.
 - 6. Face Surface: Surfaced (smooth).
 - 7. Matching: Selected for compatible grain and color.

2.2 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- B. Low-Emitting Materials: Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
 - 1. Wood glue shall have a VOC content of 30g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Paneling Adhesive: Comply with paneling manufacturer's written recommendations for adhesives.
 - 1. Adhesive shall have a VOC content of 50g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.
 - 1. Adhesive shall have a VOC content of 70g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 FABRICATION

- A. First quality workmanship is required with finished millwork free of defects.
- B. Fabricate millwork items to dimensions, profiles, materials, and details indicated.
- C. Complete fabrication, including assembly, finishing and accessing doors, before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where fitting at site is necessary, provide ample allowance for scribing, trimming, and fitting.
- D. Cut openings to receive hardware, plumbing fixtures, electrical work, and similar items. Field cut only where necessary. Coordinate locations with Mechanical and Electrical Contractors. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and when located in countertops and similar exposures.
- E. Ease and cleanup edging to minimize exposure of core.
- F. Back out of kerf backs of the following members except those with ends exposed in finished work.
- G. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The field verifies measurements and examines adjoining work upon which this work is dependent. The contractor is responsible for the proper fitting of all items furnished and installed as part of the work of this section.

3.2 PREPARATION

- A. Condition millwork to average prevailing humidity conditions in installation areas before installing.
- B. Before installing millwork, examine shop fabricated work for completion and complete work as required, including back priming and removal of packing.

3.3 INSTALLATION

- A. Scribe and fit millwork items to other finished surfaces in a careful manner. Other work damaged or distributed shall be repaired or replaced.
- B. Millwork item shall be installed plumb or level, straight and true with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8" in 8' for plumb level and with no variation in flushness of adjoining surfaces.
- C. Secure millwork items to grounds, stripping, concealed blocking or ledgers with countersunk concealed fasteners.

3.4 ADJUSTMENT AND CLEANING

- A. Repair damaged and defective millwork where possible to eliminate defects functionally and visually. Where not possible to satisfactorily repair damage and defects, provide new millwork items as specified. Adjust joinery for uniform appearance.
- B. Clean millwork on exposed and semi-exposed surfaces. Touch up factory applied finishes to restore damaged or soiled areas.

3.05 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, to ensure millwork is protected from damage or deterioration at time of Substantial Completion.

END OF SECTION 062200

SECTION 072100 – THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Below-grade perimeter and under slab:
 - a. Foam-plastic board insulation.
 - 2. Cavity Wall and Attic insulation:
 - a. Glass-fiber blanket insulation.
 - b. Sound attenuation batt insulation.
 - 3. Miscellaneous weather barrier items:
 - a. Insulating foam sealants.
 - b. Transition wrap at openings.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.
- C. Evaluation Reports: For spray polyurethane foam insulation and thermal barriers, tested as an assembly, and approved for use as an exposed interior finish from ICC-ES, in accordance with testing requirements of UL 1715, UL 1040, FM 4880, or NFPA 286.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having

jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Surface Burning Characteristics: ASTM E 84.
 2. Fire-Resistance Ratings: ASTM E 119.
 3. Combustion Characteristics: ASTM E 136.
- C. Recycled Content: Provide glass and slag-wool-fiber/rock-wool-fiber insulation with recycled content so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic board insulation as follows:
1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
 3. Quickly complete installation and concealment of plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 FOAM BOARD INSULATION AT BELOW-GRADE PERIMETER AND UNDER SLAB

- A. Extruded-Polystyrene Board Insulation for below grade: 2" thick minimum LTTR value of 10.6. ASTM C 578, Type IV, minimum compressive strength of 25 psi, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. DiversiFoam Products.
 2. Dow Chemical Company (The).
 3. Owens Corning.
 4. Pactiv Building Products.
- C. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

2.2 CAVITY WALL INSULATION

- A. Extruded-Polystyrene High-R Board Insulation for wall cavity: minimum LTTR value of 5 per inch, thickness as indicated on drawings. ASTM C 578, Type IV, minimum compressive strength of 25 psi, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively per ASTM E 84, as manufactured by Owens Corning or Dow Chemical Company (The).
- B. To complete system tape joint or install insulating polyurethane-based foam sealant between boards to create a water-resistive barrier.

2.3 CAVITY WALL INSULATION AND OTHER LOCATIONS

- A. Insulating Foam Sealants: Polyurethane based.
 - 1. Basis-of Design Product: Subject to compliance with requirements, provide “Great Stuff” as manufactured by The Dow Corning Company or comparable products by one of the following:
 - a. GE.
 - b. DAP.
 - c. Convience.
 - d. TigerFoam.

2.4 TRANSITION WRAP AT EXTERIOR OPENINGS

- A. Transition Wrap at Exterior Openings: Blue creped high-density polyethylene (HDPE) film facer with a butyl rubber adhesive.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide ”Weathermate Flexible Flashing” as manufactured by the Dow Chemical Company or comparable products by one of the following:
 - a. Carlisle Coatings & Waterproofing.
 - b. Heckmann Building Products, Inc.
 - c. Hohmann & Barnard, Inc.

2.5 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CertainTeed Corporation.
 - 2. Johns Manville.
 - 3. Knauf Insulation.
 - 4. Owens Corning.
- B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

- C. Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II, Class A, Category 2, polyencapsulated batts with a non-vapor-retarder facing consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; per ASTM E 84; passing ASTM E 136 for combustion characteristics. ASTM E96 permeability of 10 perms.
 - 1. Provide at locations where insulation is exposed to the ceiling plenum and not encapsulated by gypsum board or gypsum sheathing.
- D. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 - 1. Provide at locations where insulation is encapsulated by gypsum board or gypsum sheathing on the interior surface of the building.
- E. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:
 - 1. 3-1/2 inches thick with a thermal resistance of 13 deg F x h x sq. ft./Btu at 75 deg F.
 - 2. 6-1/2 inches thick with a thermal resistance of 21 deg F x h x sq. ft./Btu at 75 deg F.
- F. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
 - 1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
 - 2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.6 MINERAL-WOOL BLANKET INSULATION (SAFING INSULATION)

- A. Manufacturers:
 - 1. Fibrex Insulations Inc.
 - 2. Owens Corning.
 - 3. Roxul Inic.
 - 4. Thermafiber.
- B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84 passing ASTM E 136 for combustion characteristics.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.
- E. Close all gaps and voids between the interior and the exterior and between the interior and the cavity of exterior wall construction. Ensure that the thermal envelope of the building is completely closed and sealed against thermal leaks.
 - 1. Provide supplemental support system if necessary, to assure insulation remains in place for the life of the building.

3.3 INSTALLATION OF BELOW-GRADE PERIMETER AND UNDER-SLAB

- A. On vertical surfaces, set insulation units according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.4 INSTALLATION OF CAVITY-WALL

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions at cavity walls, with edges butted tightly in both directions. Press units firmly against inside substrates. Tape joints or install insulating foam sealant between boards to create a water-resistive barrier.
 - 1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 04 Section "Unit Masonry."

3.5 INSTALLATION OF CAVITY WALL AND OTHER SPRAY-APPLIED INSULATION

- A. Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked.

- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

- 1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.6 INSTALLATION OF GLASS-FIBER OR MINERAL WOOL BLANKET INSULATION

- A. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

- 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

3.7 INSTALLATION OF INSULATING FOAM SEALANTS AND TRANSITION WRAP

- A. Install insulating foam sealants and transition wrap where indicated on the drawings to create a weather barrier as recommended by the manufacturer.

3.8 TOP OF EXTERIOR-WALL THERMAL ENVELOPE

- A. Close between top of exterior wall construction and underside of roof deck to prevent gaps and to maintain continuity of the thermal envelope.

- 1. Spray Polyurethane Foam Insulation: Apply to completely fill and seal the opening according to manufacturer's written instructions. Trim Flush with adjacent surface after foam has set when necessary to avoid conflict with other materials
 - 2. Apply foam in thickness that provides the same R-value as the wall construction below.
 - 3. Provide any supplemental support system consistent with testing recommended by the foam insulation manufacturer for the opening sizes and construction conditions.
 - 4. Thermal Barrier: Apply over all over-exposed spray polyurethane insulation and according to manufacturer's written instructions.

3.9 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100.1

SECTION 072500 – VAPOR BARRIER

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section includes vapor barrier under interior slab-on-grade concrete.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Vapor barrier; Use only materials that are resistant to deterioration when tested in accordance with ASTM E 154, as follows:
 - 1. At concrete slab; polyethylene sheet not less than 10 mils thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and installation conditions. Do not proceed with vapor barrier installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install vapor barrier over gravel subbase before placing concrete slab-on-grade. Gravel surface shall be leveled before laying vapor barrier. Take care not to puncture or damage the membrane.
 - 1. Repair punctures and tears by taping a 6-mil polyethylene patch over the penetration. Patch shall extend one (1) foot larger than penetration in all directions.
 - 2. Place no concrete until vapor barrier is observed and approved by the Architect.
- B. Apply vapor barrier sheets in the widest practical width parallel to direction of pour with joints overlapped 6 inches minimum and sealed. Turn up and seal sheets at walls, columns, and other vertical surfaces.
 - 1. Seal with appropriate tape at seams.

END OF SECTION 072500

SECTION 074113 – METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Standing-seam metal roof panels.
 - 2. Rail-type seam-mounted snow guards.
 - 3. Ridge vent.

1.3 DEFINITIONS

- A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight roofing system.

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Delegated Design: Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- D. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at the following test-pressure difference:
 - 1. Test-Pressure Difference: Negative 1.57 lbf/sq. ft.
 - 2. Test-Pressure Difference: Positive and negative 1.57 lbf/sq. ft.
 - 3. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
 - 4. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

- E. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.
- F. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
 - 1. Uplift Rating: UL 90.
- G. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:
 - 1. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - a. Uniform pressure as indicated on Drawings.
 - 2. Snow Loads: 25 lbf/sq. ft.
 - 3. Deflection Limits: Metal roof panel assemblies shall withstand wind and snow loads with vertical deflections no greater than 1/180 of the span.
- H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- I. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of roof panel and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; insulation fastening patterns, details of edge conditions, side-seam and end lap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.
 - 1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
 - a. Flashing and trim.
 - b. Gutters.
 - c. Downspouts.
 - d. Snow guards.
 - e. Ridge vents.
- C. Samples for Initial Selection: For each type of metal roof panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
1. Metal Roof and Soffit Panels: 12 inches long by actual panel width. Include fasteners, clips, battens, closures, and other metal roof panel accessories.
 2. Accessories: 12-inch- long Samples for each type of accessory.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
1. Metal Roof Panels: Include reports for air infiltration, water penetration, thermal performance, and structural performance.
 2. Insulation: Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.
- C. Field quality-control reports.
- D. Warranties: Samples of special warranties.
- E. Snow Retention System Calculations: Include calculation of number and location of snow guards based on snow load, roof slope, panel length and finish, and seam type and spacing. Drawings shall indicate number of rows and spacing of rows for snow guards required at locations indicated in accordance with snow guard manufacturer's design. Submit design formulation with shop drawings. Indicate locations of diverters to protect penetrations. Manufacturer's design shall at a minimum meet the design indicated on the project drawings.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal roof panels to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Preinstallation Conference: Conduct conference at Project site.
1. Meet with Owner, Architect, metal roof panel Installer and metal roof panel manufacturer's representative.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 3. Review methods and procedures related to metal roof panel installation, including manufacturer's written instructions.

4. Examine conditions for compliance with requirements, including flatness and attachment to structural members.
 5. Review structural loading limitations of during and after roofing.
 6. Review flashings, special roof details, roof drainage, roof penetrations, and condition of other construction that will affect metal roof panels.
 7. Review governing regulations and requirements for testing and inspecting.
 8. Review temporary protection requirements for metal roof panel assembly during and after installation.
 9. Review roof observation and repair procedures after metal roof panel installation.
 10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.
- C. Manufacturer will provide on-site inspections as required to warrant to the Architect and Owner that the systems are installed in accordance with the plans, specifications, and manufacturer's standards for the roof systems specified and that the systems can be warranted in accordance with the requirements of this specification.
- D. The standing-seam metal roof panels and the thermoplastic membrane roofing shall be installed by a single roofing contractor authorized by each respective manufacturer to install the complete roof system. The roofing contractor shall obtain written certification from the manufacturers of the roofing systems certifying that the installer and their specific on-site foreman is approved by the manufacturer to install the specified roofing systems. Provide copy of certification to Architect prior to awarding roofing work.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.
- B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.
- E. Protect foam-plastic insulation as follows:
 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

- F. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

1.10 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements.
- B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.11 COORDINATION

- A. Coordinate sizes and locations of roof penetrations.
- B. Coordinate metal roof panels with rain drainage work, flashing, trim, and construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

- A. GENERAL: Warranties shall be in effect upon installation of materials and shall not be terminated, revoked or abridged by manufacturer or installer for any reason including but not limited to failure of installer to pay for warranty initiation fees or other cause without specific notification on manufacturer's letterhead, dated and signed by an officer of the manufacturer, delineating specific reasons for the action, delivered to the Owner by registered mail.
 - 1. For purposes of establishing end date of warranty requirements, the Warranty time period 'clock' shall start on date of project completion
 - 2. Any fees for periodic manufacturer or installer inspections over the entire warranty period, and stated as necessary to maintain the Warranty, shall be either prepaid by the Contractor or waived by the manufacturer and a statement of this condition shall be attached to and referenced by the manufacturer's special warranty.
- B. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of standing-seam metal roof panel system that fail in materials, workmanship, weather tightness, including leaks, within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Special warranty comprehensively includes all materials specified in this specification section including but not necessarily limited to metal roofing, base flashings, roof insulation, fasteners, roofing accessories, and other components of metal roofing system.

All such materials and systems shall be individually mentioned and listed in the warranty form or on a separate dated attachment specifically referenced on the warranty form.

3. Warranty to be inclusive of wind speeds up to 90 mph.
 4. Warranty Period: 20 years from date of Substantial Completion.
- C. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

- A. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A 729/A 792M, Class AZ50 coating designation.
1. Profile: Smooth, flat embossed finish. Vertical rib, seamed joint.
 2. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
- B. Panel Sealants:
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.2 MISCELLANEOUS MATERIALS

- A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.
- B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to support using concealed clips inside laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
 - 1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
- B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and snapping panels together. Provide ridge vent system.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Dimensional Metals, Inc., with 17 inch seams, panel to have two high bead stiffeners per sheet, or comparable product by one of the following:
 - a. Firestone Building Products.
 - b. Pac-Clad Roofing.
 - c. Englert Series 1300.
 - 2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Nominal Thickness: 0.034 inch.
 - b. Exterior Finish: Two-coat fluoropolymer.
 - c. Color: to be selected from manufacturer's standard color range.

2.4 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.

2.5 METAL ROOF ACCESSORIES

- A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fascia, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
 2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
 3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- B. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.018 inch thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fascia, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

2.6 RAIL-TYPE SNOW GUARDS

- A. Seam-Mounted, Rail-Type Snowguards:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Alpine Snow Guards; SnowMax Fence-Style.
 - b. LMCurbs; S-5! ColorGard System.
 - c. Metal Roof Innovations, Ltd.; S-5! ColorGard System.
 - d. Sno Gem; Sno Barricade Clamp-on Systems.
 2. Description: Snow guard rails fabricated from metal extrusions, anchored to brackets and equipped with one rail with color-matching inserts of material and finish used for metal roofing or rail in color matching metal roofing if rail style does not accommodate inserts.
 3. Ice Flag: Provide two ice flag clips attached to snow guard rail between each metal roof panel rib.
 4. Material and Finish: Aluminum with Kynar finish to match color of metal roof panels.

2.7 FABRICATION

- A. Fabricate and finish metal roof panels and accessories at the factory to the greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.
- D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. End Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 3. Sealed Joints: Form no expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

2.8 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.
- B. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.

- C. Examine roof decking to verify that decking joints are supported, and that installation is within flatness tolerances required by metal roof panel manufacturer.
- D. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- E. For the record, prepare a written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.
- B. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.

3.3 METAL ROOF PANEL INSTALLATION, GENERAL

- A. Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
- B. Thermal Movement. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels for fasteners.
- C. Install metal roof panels as follows:
 - 1. Commence metal roof panel installation and install minimum of 300 sq. ft. in presence of factory-authorized representative.
 - 2. Field cutting of metal panels by torch is not permitted.
 - 3. Install panels perpendicular to purlins.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Provide metal closures at each side of ridge caps.
 - 6. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.
 - 7. Installing ridge caps as metal roof panel work proceeds.
 - 8. End Splices: Locate panel end splices over, but not attached to, structural supports. Stagger panel end splices to avoid a four-panel splice condition.
 - 9. Install metal flashing to allow moisture to run over and off metal roof panels.
- D. Fasteners:

1. Aluminum Roof Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- E. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- F. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
 1. Coat the back side of roof panels with bituminous coating where roof panels will contact wood, ferrous metal, or cementitious construction.
- G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.
 1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturers.
 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

3.4 METAL ROOF PANEL INSTALLATION

- A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
 1. Install clips to support self-tapping fasteners.
 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

3.5 INSULATION INSTALLATION

- A. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Mechanically fasten. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation. Comply with anchorage quantity and spacing required by wind uplift performance specifications.

- C. Install insulation under area of roofing to achieve the required thickness. Install two layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding ¼ inch with insulation. Seal all joints in top layer of insulation with tape.
 - 1. Cut and fit insulation within 1/4-inch of nailers, projections, and penetrations, and fill gap with compatible expanded foam insulation trimmed flush with top of layer.

3.6 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - 1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with mastic sealant (concealed within joints).
- C. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.7 SNOW GUARD INSTALLATION

- A. Attachment for Standing-Seam Metal Roofing:
 - 1. Do not use fasteners that will penetrate metal roofing, or fastening methods that void metal roofing finish warranty.
 - 2. Provide two rows of snow guards, at locations indicated on Drawings. Provide clamps at every roof panel standing seam (16-inches on center). Provide ice flag clips two per panel, evenly spaced and installed on the upside of the snow guards. Provide additional rows of snow guards on the upslope side of roof penetrations including vent pipes.

3.8 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.9 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.
- C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain a clean condition during construction.
- B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113

SECTION 074600 FIBER CEMENT SIDING AND TRIM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section includes the following:
 - 1. Soffits, fascia and eave trim.
 - 2. Fiber cement siding, corner boards siding and battens.

1.2 RELATED WORK

- A. Documents affecting this work shall include, but are not limited to Bidding, Requirements, General and Supplemental Conditions, and Division 1.

1.3 SUBMITTALS

- A. Product data for each type of product specified, including details of construction relative to materials, dimensions of individual components, profiles, textures, and colors.
- B. Samples for initial selection purposes in form of manufacturer's sample finishes showing full range of colors, profiles, and textures available.

1.4 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
 - 1. Furnish quantity of soffit materials equal to 2% of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Provide "Hardi Plank" fiber cement siding and corner boards as manufactured by James Hardie Siding Products. No other manufacturers will be accepted.
- B. Provide all accessory items such as trim, soffits, etc. from Hardiplank Siding project.

2.2 FIBER CEMENT SIDING AND TRIM

- A. Siding made from fiber cement board that does not contain asbestos fibers; complies with ASTM C1186, Type A, Grade II; is classified as noncombustible when tested according to ASTM E136; and has a flame spread index of 25 or less when tested according to ASTM E84.

1. Siding: Vertical Cedarmill.
2. Batten: 1x2 Batten Covers.
3. Trim: 5/4, sizes as indicated.
4. Soffits: Cedarmill, vented.

2.3 ACCESSORIES

- A. Siding Accessories: Provide starter strips, edge trim, corner cap, and other items as recommended by siding manufacturer for building configuration.
 1. Provide accessories made from same material as adjacent siding, unless otherwise indicated.
 2. Provide accessories matching color and texture of adjacent siding, unless otherwise indicated.
- B. Flashing: Provide aluminum flashing at window and door heads and where indicated.
 1. Finish for Aluminum Flashing: Siliconized polyester coating, same color as siding.
- C. Elastomeric Joint Sealant: Single component neutral curing silicone joint sealant complying with requirements Joint Sealers.
- D. Fasteners:
 1. For fastening to wood, use siding nails of sufficient length to penetrate a minimum of 1" into substrate.
 2. For fastening to metal, use ribbed bugle head screws of sufficient length to penetrate a minimum of ¼" or 3 screw threads into substrate.
 3. For fastening aluminum, use aluminum fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.
 4. For fastening fiber cement siding, use hot dip galvanized fasteners.
- E. Fasteners: Non-corrosive aluminum siding nails, in sufficient length to penetrate minimum of 1" into substrate. Provide prefinished fasteners in color to match soffit where face nailing is unavoidable.
- F. Building paper "Tyvek Permeable Perimeter Wrap".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for substrates, installation tolerances, and other conditions affecting performance of soffit. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's installation instructions and recommendations. Center nails in elongated nailing slots without binding soffit materials to allow for thermal movement. Install trim and accessories in accordance with manufacturer's recommendations. Overlap butt joints to shed water away from direction of prevailing wind.
- B. Fiber Cement Siding:
 - 1. Block framing between studs where siding horizontal joints occur.
 - 2. Place fasteners no closer than 3/8" from panel edges and 2" from panel corners.
 - 3. Allow minimum 1" vertical clearance between roofing and bottom edge of siding.
 - 4. Maintain clearance between siding and adjacent finished grade.
 - 5. Field paint with one (1) coat paint prior to installation. Paint siding with second coat after erection.

3.3 CLEANING

- A. Clean finished surfaces as recommended by the manufacturer and maintain in a clean condition during construction.

END OF SECTION 0746000

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Latex joint sealants.

1.3 CONTRACTOR'S PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Submit pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 - 5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each kind of sealant and joint substrate indicated.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.

- a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. LEED Submittal:
 1. Product Data for Credit EQ 4.1: For sealants and sealant primers used inside the weatherproofing system, including printed statement of VOC content.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- D. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- E. Joint-Sealant Schedule: Include the following information:
 1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified installer.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

- E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- G. Field-Adhesion Test Reports: For each sealant application tested.
- H. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
 - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.
- E. Pre-Installation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Mildew-Resistant, Single-Component, Nonsag, Neutral- or Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
1. Applications: Interior joints of:
 - a. Non-porous surfaces in area of moisture and high humidity including toilet rooms, showers and kitchens;
 - b. Countertops that have sinks.
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems: Omniplus.
 - b. Dow Corning Corporation; 786 Mildew Resistant.
 - c. GE Advance Materials – Silicones; Sanitary SCS1700.
 - d. May National Associates, Inc.; Bondaflex Sil 100 WF.
 - e. Pecora Corporation; 898.
 - f. Tremco Incorporated; Tremsil 200 sanitary.

2.3 URETHANE JOINT SEALANTS

- A. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50 for Use NT.
1. Applications:
 - a. Interior joints in vertical and overhead surfaces including;
 - 1) Control joints on exposed interior surfaces of exterior walls;
 - 2) Perimeter joints of exterior openings;
 - 3) Control joints on exposed unit masonry walls.
 - b. Exterior joints in vertical and overhead surfaces including:
 - 1) Control joints in unit masonry;
 - 2) Window, door frame, storefront, curtainwall, and louver perimeter joints (both interior and exterior side of opening).
 - 3) All other exterior non-traffic joints not include otherwise.
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Pecora Corporation; Dynatrol II.
 - b. Polymeric Systems, Inc.; PSI-270.
 - c. Tremco Incorporated; Dymeric 240 FC.
 3. Color Selection Range: Standard or custom colors providing minimum wide-range selection from at least 50 choices.

2.4 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 - 1. Applications:
 - a. Interior vertical and overhead surfaces at perimeter of wall surfaces and frames of interior doors and borrowed lights.
 - b. Perimeter of gypsum board surfaces where they abut another material.
 - c. All other interior nontraffic joints not included otherwise.
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Sonolac.
 - b. Bostik, Inc.; Chem-Calk 600.
 - c. Pecora Corporation; AC-20+.
 - d. Tremco Incorporated; Tremflex 834.

2.5 SOLVENT-RELEASE-CURING JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealant: ASTM C 1311.
 - 1. Applications:
 - a. Bedding thresholds to concrete at exterior door locations.
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bostik, Inc.; Chem-Calk 300.
 - b. Pecora Corporation; BC-158.
 - c. Tremco Incorporation; Tremco Butyl Sealant.

2.6 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- B. Applications:
 - 1. Perimeter joints of gypsum board partitions indicated to have sound-reduction properties or containing sound attenuation blankets.
 - 2. Electric boxes and other penetrations of gypsum board in partitions indicated to have sound-reduction properties or containing sound attenuations blankets.
- C. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Auralex Acoustics; Auralex StopGap Acoustical Sealant.

2. Pecora Corporation; AIS-919.
3. USG Corporation; SHEETROCK Acoustical Sealant.

2.7 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, as approved in writing by joint-sealant manufacturer for joint application indicated], and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 3. Remove laitance and form-release agents from concrete.
 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
1. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 2. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 3. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints

were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

4. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Contract Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 081000- METAL DOORS AND FRAMES

PART 1-GENERAL

0.1 DESCRIPTION

- A. This Section includes standard pressed steel door frames, glass stops, bucks, braces, and other work shown on Drawings, Door Frame Elevations, Door Schedule, and as specified.
 - 1. Frames: Welded unit type pressed steel frames for doors.
 - 2. Factory primed frames ready for field painting.
 - 3. Glazed openings.
 - 4. Anchors, spreaders, floor clips, and similar items as required for a complete installation.
 - 5. Hardware preparation and reinforcement to accommodate specified hardware.

0.2 SUBMITTALS

- A. Submit product data for each type of frame specified, including details of construction, materials, dimensions, hardware preparation, core label compliance, sound ratings, profiles, and finishes.
- B. Submit shop drawings showing fabrication and installation of steel frames. Include details of each frame type, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.
 - 1. Provide schedule of frames using same reference numbers for details and openings as those on Contract Drawings.
 - 2. Indicate coordination of glazing frames and stops with glass and glazing requirements.

0.3 QUALITY ASSURANCE

- A. Provide frames complying with Steel Door Institute "Recommended Specifications Standard Steel Doors and Frames" ANSI/SDI-100, latest edition, and as specified.
 - 1. Materials and methods shall equal or exceed NAAM Standard HMMA-861 of the Hollow Metal Manufacturers Association entitled "Guide Specifications for Commercial Hollow Metal Doors and Frames" except as modified.
- B. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to frame assemblies whose fire resistance characteristics have been determined per ASTM E 152 and which are labeled and listed by UL, Factory Mutual, Warnock Hersey, or other testing and inspecting organization acceptable to authorities having jurisdiction.

0.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver frames cardboard-wrapped or crated to provide protection during transit and job storage.
- B. Inspect frames upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect, otherwise, remove and replace damaged items as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inches high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately.

PART 2-PRODUCTS

0.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide standard steel doors and frames by one of the following:
 - 1. Amweld Building Products, Inc.
 - 2. Pioneer Industries.
 - 3. Republic Builders Products.
 - 4. Steelcraft Manufacturing Company.
 - 5. Ceco Door Products.

0.2 MATERIALS

- A. Insulated hollow metal doors and frames; ASTM A 366, commercial quality level, cold rolled steel.
- B. Supports and anchors; 16-gauge sheet steel; galvanized were used with galvanized frames.
- C. Inserts, bolts, and fasteners; manufacturer's standard units.
- D. Shop applied primer paint; white or similar light color rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints complying with ANSI A224.1, "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames." Apply after fabrication.

0.3 DOORS AND FRAMES

- A. Provide insulated metal frames for doors and framed openings. Conceal fastenings, unless otherwise indicated. Fabricate frames with mitered, coped, and continuously welded full-face weld and full web weld.
 - 1. Frames; minimum 16 gauge cold-rolled steel, galvanized.
 - 2. Frames for openings over 4 feet wide; provide a channel stiffener of 12-gauge steel welded into head, except were indicated otherwise.
 - 3. Doors; minimum 18 gauge cold rolled steel.
- B. Door silencers; provide 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.
- C. Plaster guards; minimum 26-gauge steel plaster guards or mortar boxes at back of hardware cutouts.

0.4 FRAME ANCHORS

- A. Provide T-strap anchors, minimum 14 gauge.
- B. Anchors for hollow metal frames shall be at least 4 inches long.
- C. Provide 14-gauge floor anchors which are full width of frame and securely welded.
- D. Modify frame anchors to fit special frame and wall construction and provide special anchor were shown or required. On shop drawings analyze each jamb condition and provide proper anchor for each condition.
- E. Provide anchor for frame for fire rated doors which are required by labeling agency.

0.5 FABRICATION

- A. Fabricate steel frame units rigid neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at project site.
- B. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and

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- Frames.”
- C. Hardware preparation; prepare frames to receive mortised and concealed hardware, (including all function holes for locksets and exit devices), in accordance with final Door Hardware Schedule and templates provide by hardware supplier. Comply with applicable requirements of ANSI A115 Series specifications for door and frame preparation for hardware. Hardware preparation, except for surface mounted items, shall be done in the factory.
 - D. Reinforce frames to receive surface applied hardware. Drilling and tapping for surface applied hardware may be done at project site except as indicated otherwise.
 - E. Locate hardware as indicated on final shop drawings or, if not indicated, in accordance with “Recommended Locations for Builder’s Hardware on Standard Steel Doors and Frames,” published by Door and Hardware Institute.
 - F. Shop painting; clean, treat, and prime paint exposed surfaces of steel frame units, including galvanized surfaces.
 - 1. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.
 - 2. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint in field.
 - 3. Prime all concealed surfaces, including throat with rust inhibitive primer.

PART3-EXECUTION

0.1 INSTALLATION

- A. General: Install standard steel frames and accessories in accordance with final shop drawings, manufacturer’s data, and as specified.
- B. Placing Frames: Comply with provisions of SDI-105 “Recommended Erection Instructions For Steel Frames,” unless otherwise indicated.
 - 1. Place frames before construction of enclosing walls and ceilings as required. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set and frames retain proper position during construction. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
 - 2. Frames for opening over 4 feet wide shall have a vertical brace placed at the center to support frame head during installation until grouting has cured.
 - 3. In masonry construction, locate 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry Tee anchors.
 - a. Embed frame anchors in masonry walls in mortar and frames grout filled as walls are built.
 - 4. Install fire-rated frames in accordance with NFPA Standard No. 80.
- C. All hardware except hinges shall be installed after field painting.

0.2 ADJUST AND CLEAN

- A. Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- B. Final Adjustments: Check and readjust operating hardware items, leaving steel frames undamaged and in complete and proper operating condition. Upon completion of installation, each door shall operate smoothly and easily. Doors with closers shall latch under power of closer.

END OF SECTION 081000

SECTION 087100- FINISH HARDWARE

PART 1 -GENERAL

0.1 SUMMARY

- A. Furnish labor, materials, equipment, transportation, and services necessary to complete the following work:
 - 1. Finish door hardware installation including necessary screws, bolts, special fasteners, expansion shields, and other devices necessary and required for proper hardware application and use.
 - 2. Temporary locks at exterior doors for security during construction. After construction is completed, remove temporary locks.
 - 3. If hardware items are not specified but are required for completion of the work, furnish items of type and quality suitable to the service and function required and comparable to adjacent hardware.
- B. Types of finish hardware required include the following:
 - 1. Hinges.
 - 2. Lock cylinders and keys.
 - 3. Exit devices.
 - 4. Closers.
 - 5. Locksets.
 - 6. Hold opens.
 - 7. Stops.
 - 8. Kick plates.

0.2 DEFINITIONS

- A. Finish Hardware: Includes items known commercially as finish hardware which are required for swing, sliding and folding doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame.

0.3 SUBMITTALS

- A. Submit product data for each item of hardware. Include whatever information may be necessary to show compliance with requirements, and instructions for installation and maintenance of operating parts and finishes.
 - 1. Hardware Schedule will not be considered for review without complete product data sheets.
- B. Submit Hardware Schedule in manner indicated below. Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware.
 - 1. Hardware Schedule shall be prepared by a member in good standing of the American Society of Architectural Hardware Consultants.
 - 2. Final Hardware Schedule Content: Based on finished hardware indicated, submit hardware schedule indicating complete designations of every item required for each door or opening. Include the following information:
 - a. Type, style, function, size and finish of each hardware item.
 - b. Name and manufacturer of each item.
 - c. Fastenings other pertinent information,
 - d. Location of hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, codes, etc. contained in schedule.
 - f. Mounting locations for hardware.

- g. Door and frame material.
- h. Keying information.
- 3. Submittal Sequence: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work (e.g. hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.
- 4. Keying Schedule: Submit separate detailed schedule indicating clearly how the final instructions on keying of locks has been fulfilled.
- C. Samples: Before submittal of the final hardware schedule and before final ordering of finish hardware, submit one sample of each type of exposed hardware unit, finished as required, and tagged with full description for coordination with schedule.
 - 1. Samples will be returned to the supplier. Units which are acceptable and remain undamaged through submittal, review and field comparison procedures may, after final check of operation, be used in the work, within limitations of keying coordination requirements.
- D. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check shop drawings of other work, to confirm adequate provisions are made for proper location and installation of hardware.
- E. Record of instruction: Submit written record signed by personnel that instructions were received.
- F. Special Instructions: Before Substantial Completion submit to Sponsor Agency the following:
 - 1. Instruction sheets for all locks, door closers, and any other special hardware items.
 - 2. Special closers and lock wrenches.
 - 3. Signed record of receipt of transmittal.

0.4 QUALITY ASSURANCE

- A. Supplier: A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware in the project's vicinity for not less than 5 years, and who is, or who employs an experienced Architectural Hardware Consultant who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements, to Sponsor Agency, Associate Architect, and Contractor.
- B. Manufacturer: Obtain each type of hardware (latch and lock sets, hinges, closers, etc) from a single manufacturer, even though several may be indicated as offering products complying with requirements.
- C. Fire-Rated Openings: Provide hardware for fire-rated openings in accordance with NFPA 80 and local building code requirements. Provide only hardware which has been tested and listed by UL or FM for types and sizes of doors required and complies with requirements of door and door frame labels.
 - 1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL or FM labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL or FM label on exit devices indicating "Fire Exit Hardware".

0.5 DELIVERY, STORAGE, AND HANDLING

- A. Tag each item or package separately, with identification related to final hardware

- schedule, and include basic installation instructions with each item or package.
- B. Packing of hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packaged in same container.
 - C. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.
 - D. Provide secure lock-up for hardware delivered to the project, but not yet installed. Control handling and installation of hardware items which are not immediately replaceable, so that completion of the work will not be delayed by hardware losses, both before and after installation.

PART 2-PRODUCTS

0.1 SCHEDULED HARDWARE

- A. Requirements for design, grade, function, finish, size and other distinctive qualities of each type of finish hardware is indicated on Hardware Schedule:

0.2 MATERIALS AND FABRICATION

- A. General:
 - 1. Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
 - 2. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI A156 series standard for each type hardware item and with ANSI A156.18 for finish designations indicated. Do not furnish optional materials or forming methods for those indicated, except as otherwise specified.
 - 3. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.
 - 4. Furnish screws for installation, with each hardware item. Provide pin head torx screws. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.
 - 5. Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners. Do not use through-bolts for installation where bolt head or nut opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each through-bolt or use sex screw fasteners.
 - 6. Tools and Maintenance Instructions for Maintenance: Furnish a complete set of specialized tools and maintenance instructions as needed for continued adjustment, maintenance, and removal and replacement of finish hardware.

2.3 MANUFACTURERS

- A. Hinges:
 1. Stanley or Hager, heavy-duty stainless steel with non-removable pins.
 2. Provide three (3) per door.
- B. Closers:
 1. LCN, Model #P-4041-H for chase room door.
 2. LCN, Model #4041-MC for restroom doors.
 3. Finish; brushed aluminum.
- C. Latch sets; Schlage Heavy Duty "D" series with Rhodes lever handle.
 1. Classroom lock; Schlage D70LD-RHO-626, with 2-3/4" backset. (See Keying)
 2. Vandlgard lock; Schlage D96LD-RHO-626, with 2-3/4" backset. (See 2.3 Keying, E)
- D. Cylinders;
 1. Classroom lock; supply and install Schlage, C Keyway cylinder.
 2. Vandlgard lock; supply and install Schlage, C Keyway cylinder.

2.4 KEYING

- A. Lockset with Yale cylinder for use at:
 1. Outside doors for chase. (Turn/push-button locking inside.)
- B. Lockset with Yale cylinders for use at:
 1. Interior doors for mechanical equipment rooms, electrical rooms. Door locks when closed, outside lever fixed, always unlocked on inside.
 2. Interior storage, minimal level of security. (Locked by a key, inside lever always unlocked.)

2.5 FINISHES

- A. Latch set finishes; latch set series numbers shown with Satin chromium plated finish (626) unless otherwise noted.

2.6 HARDWARE SCHEDULE

A. Set A:		
- Hinges	Continuous	Hager
1 Lockset	\$2,000.00	Allowance
1 Cylinder/Core	By Owner	
1 Closer	D-4990 x 623	Precision
2 Push Plates	CL2216-6	Precision
1 Threshold	513-AL	National
1 Sweep	600A	National
1 Weather seal	120NA	National
2 Kickplate	204S-8"H	Hager
1 Electric Strike		Precision
1 Power Supply		Precision

Operation Description, doors are to be closed and latched, key switch shunts exterior actuator , when not shunted actuators will signal electric strike power supply and activate door operators .From secure side egress by manually pushing exit device using inside actuator to activate auto operator .

Set B:		
- Hinges	Continuous	Hager
1 Lockset	ND70LD x RHO	Schlage

1 Cylinder/Core	By Owner	
1 Closer	4040 XP	LCN
1 Threshold	513-AL	National
1 Sweep	600A	National
1 Weather seal	120NA	National
2 Kickplate	204S-8"H	Hager

PART 3-EXECUTION

3.1 EXAMINATION

- A. Coordination and meetings; verification of existing conditions before starting.
- B. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

3.2 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions.
- B. Use templates provided by hardware item manufacturer.
- C. Mounting heights for hardware from finished floor to centerline of hardware item, refer to manufacturer's printed information for accessible operation.
- D. Contractor to install Yale lock cylinders into latch sets as specified.

3.3 FIELD QUALITY CONTROL

- A. Field inspection, testing, and adjusting.
- B. Owner will inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.4 ADJUSTING

- A. Contract Closeout; adjusting installed work.
- B. Adjust hardware for smooth operation. Contractor to return on six-month anniversary from project closeout, to check and re-adjust all door hardware if necessary.

3.5 PROTECTION OF FINISHED WORK

- A. Contract Closeout; protecting installed work.
- B. Do not permit adjacent work to damage hardware or finish.

END OF SECTION 087100

SECTION 099000- PAINTING

PART 1-GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces. Work includes:
 - 1. Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.
 - 2. Labor, materials, scaffolding, tools, and equipment necessary to complete painting, filling, and sealing requirements of the project as indicated on the Drawings and as specified.
- B. Exterior items include, but are not limited to:
 - 1. Exposed lintels and ferrous metals.
 - 2. Miscellaneous sheet metal flashing not prefinished in finish color.
 - 3. Exterior vents, louvers, handrails, and stairs.
- C. Interior items include, but are not limited to:
 - 1. Refer to Room Finish Schedule, remarks and notes on Architectural Drawings for general areas requiring painting. Areas indicated as exposed shall be fully painted.
 - 2. Concrete unit masonry.
 - 3. Soffits and ceilings.
 - 4. Hollow metal doors and frames.
 - 5. Access doors and panels.
 - 6. Exposed lintels above windows and doors.
 - 7. Prime painted mechanical grilles, registers, diffusers, and electrical panels shall be finish painted to match adjacent surfaces.
 - 8. Finishes behind grilles, registers, and diffusers which might present a reflective type appearance.
 - 9. Miscellaneous pipes, ducts, valves, fitting, conduits, and insulation in areas without ceilings, except for mechanical rooms and chases. Also includes piping exposed under ceilings.
 - 10. Exposed pre-cast concrete deck.
- D. Paint exposed surfaces whether or not colors are designated in Room Finish Schedule, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.
 - 1. Provide accent colors were indicated by the Associate Architect.
- E. Painting is not required to prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.
 - 1. Prefinished items not to be painted include the following factory-finished components:
 - a. Prefaced concrete unit masonry.
 - b. Finished mechanical and electrical equipment.
 - c. Light fixtures, switchgear, and distribution cabinets.
 - 2. Concealed surfaces not to be painted include wall or ceiling surfaces in generally inaccessible areas such as foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts, and above ceiling spaces, unless otherwise noted.
 - 3. Finished metal surfaces not to be painted include anodized or mill finished aluminum, stainless steel, or chromium plate.
 - 4. Operating parts not to be painted include moving parts of operating equipment such as valve and damper operators, linkages, sensing devices, and motor and fan shafts.

5. Other items:
 - a. Concrete floors, except as specifically indicated otherwise.
 - b. Pipes, ducts, valves, fittings, conduits, fans, and insulation in areas above suspended ceilings.
6. Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.2 SUBMITTALS

- A. Submit product data, manufacturer's technical information, label analysis, and application instructions for each material proposed for use.
 1. List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.
- B. Submit samples, for verification purposes, of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate. Define each separate coat, including block fillers and primers. Use representative colors when preparing samples for review.
- C. Resubmit until required sheen, color, and texture are achieved.
 1. Provide a list of material and application for each coat of each sample. Label each sample as to location and application.

1.3 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coat.
- B. Material Quality: Provide manufacturer's best quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.
 1. Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude equal products of other manufacturers.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 1. Product name or title of material.
 2. Product description (generic classification or binder type).
 3. Federal Specification number, if applicable.
 4. Manufacturer's stock number and date of manufacturer.
 5. Contents by volume, for pigment and vehicle constituents.
 6. Thinning instructions.
 7. Application instructions.
 8. Color name and number.
- B. Store materials not in use in tightly covered containers in a well-ventilate area at a minimum ambient temperature of 45°F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.5 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50°F and 90°F.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45°F and 95°F.
- C. Do not apply paint in snow, rain, fog, or mist, when the relative humidity exceeds 85 percent, at temperatures less than 5°F above dew point, or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

PART 2-PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Sherwin-Williams. Equal products by the following manufacturers are also acceptable provided that, in the opinion of the Architect, appearance and manufacturing quality, meet specified standards.
 - 1. Benjamin Moore and Co.
 - 2. Duron.

2.2 EXTERIOR PAINT SCHEDULE

- A. Exterior Wood
 - 1. Two coats of exterior semi-transparent acrylic latex stain.

2.3 INTERIOR PAINT SCHEDULE

- A. Wood – Transparent:
 - 1. Two coats of exterior semi-transparent 100% acrylic latex stain
- B. Concrete, Concrete Block:
 - 1. One coat of alkyd primer.
 - 2. Two coats of alkyd enamel, semi-gloss.
- C. Steel – Unprimed:
 - 1. One coat of alkyd primer.
 - 2. Two coats of “Armor Tile Polyester Epoxy,” 2.5-4.0 mils per coat.
- D. Steel – Primed:
 - 1. Touch-up with alkyd primer.
 - 2. Two coats of alkyd enamel, semi-gloss.
- E. Steel – Galvanized:
 - 1. One coat galvanize primer.
 - 2. Two coats of alkyd enamel, semi-gloss.
- F. Concrete Floors:
 - 1. One coat of primer; “Ceramic Carpet Resinous Flooring”, 8-10 Mils thickness.
 - 2. Second coat of “Ceramic Carpet Resinous Flooring”, 8-10 Mils thickness. Broadcast with Silica Sand.
 - 3. Third coat of “Ceramic Carpet Resinous Flooring, 20-30 Mils thickness.

PART 3-EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint. Do not begin paint application until unsatisfactory conditions have been corrected.
 - 1. Start of painting constitutes Applicator's acceptance of surfaces and conditions within a particular area.

3.2 PREPARATION

- A. General Procedures: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary, for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.
 - 1. Clean surfaces before applying paint. Remove oil and grease before cleaning. Schedule cleaning and painting so dust and other containments from the cleaning

process will not fall on wet, newly painted surfaces.

- B. Surface Preparation: Clean and prepare surfaces to be painted in accordance with the manufacturer's instructions for each particular substrate condition and as specified.
 - 1. Cementitious Materials: Prepare precast concrete and concrete unit masonry surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - 2. Ferrous Metals: Clean non-galvanized ferrous metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC recommendations.
 - a. Touch up bare areas and damaged shop-applied prime coats. Wire-brush, clean with paint manufacturer recommended solvents, and touch up with the same primer as the shop coat.
 - 3. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- C. Materials Preparation: Carefully mix and prepare paint materials in accordance with manufacturer's directions.
 - 1. Maintain containers used in mixing and applications of paint in a clean condition, free of foreign materials and residue.
 - 2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
 - 3. Use only paint manufacturer approved thinners. Comply with manufacturer's recommended limits.
- D. Measure moisture content of surfaces using approved methods. Do not apply finishes unless moisture content of surfaces is below the following maximums:
 - 1. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 - 2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
4. Concrete Floors to be coated with epoxy coating: Up to 4 percent.

3.3 APPLICATION

- A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
- B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 1. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even smooth surface in accordance with the manufacturer's directions.
 2. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
 3. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convactor covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.
 4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
 5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, no specular black paint.
 6. Finish doors on tops, bottoms, and side edges same as exterior faces.
 7. Sand lightly between each succeeding enamel coat.
 8. Omit primer on metal surfaces that have been shop-primed and touch up painted.
- C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
 1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
 2. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate.
- D. Electrical items to be painted include, but is not limited to, conduit and fittings.
- E. Block Fillers: Apply block fillers to concrete masonry units at a rate to ensure complete coverage with pores filled.
- F. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material that is required to be painted or finished and has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing.
- G. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish or repaint work not in compliance with specified requirements.
- H. Concrete Floors:

1. New concrete floors: Remove all curing compounds, and other foreign matter by sandblasting, shotblasting or mechanical scarification. Maintain heat in rooms to allow for proper drying.
2. Old concrete floors: Clean surface with strong detergent. Fill all cracks with Armor Seal Crack Filler. Remove all curing compounds, and other foreign matter by sandblasting, shotblasting or mechanical scarification. Maintain heat in rooms to allow for proper drying.

3.4 CLEANING

- A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
- B. Upon completion of painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping, using care not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

- A. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Associate Architect.
- B. Provide “wet paint” signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.
 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 09900

SECTION 099300 – STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and application of wood finishes on the following substrates:
 - 1. Interior Substrates:
 - a. Dressed lumber (finish carpentry).
 - b. Exposed wood products not prefinished.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- D. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- E. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Samples for Verification: For each type of finish system and in each color and gloss of finish indicated.
 - 1. Submit samples on representative samples of actual wood substrates, 8 inches square or 8 inches long.
 - 2. Label each sample for location and application area.

- D. Product List: For each product indicated, include the following:
1. Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 2. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Stains and Transparent Finishes: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of stain color selections will be based on mockups.
 - a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.

1.7 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 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

- A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply finishes when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. ICI Paints.
 - 3. Scofield Systems
 - 4. Pratt & Lambert.
 - 5. Sherwin-Williams Company (The).
- B. Products: Subject to compliance with requirements, listed in other Part 2 articles for the category indicated.

2.2 MATERIALS, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.
- B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior stains and finishes applied at project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 1. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 - 2. Stains: VOC not more than 250 g/L.
 - 3. Primers, Sealers, and Undercoaters: 200 g/L.
- C. Low-Emitting Materials: Interior stains and finishes shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Stain Colors: As selected by Architect from manufacturer's full range.

2.3 WOOD FILLERS

- A. Wood Filler Paste.

2.4 PRIMERS AND SEALERS

- A. Alkyd, Sanding Sealer, Clear.

2.5 STAINS

- A. Stain, Semi-Transparent, for Interior Wood.

2.6 SOLVENT-BASED VARNISHES

- A. Varnish, Interior, Semi-Gloss (Gloss Level 5).

2.7 POLYURETHANE VARNISHES

- A. Varnish, Interior, Polyurethane, Oil-Modified, Satin (Gloss Level 4):

2.8 SOURCE QUALITY CONTROL

- A. Testing of Materials: Owner reserves the right to invoke the following procedure:
 1. Owner will engage the services of a qualified testing agency to sample wood finishing materials. Contractor will be notified in advance and may be present when samples are taken. If materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying wood finishes if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and refinish surfaces finished with rejected materials. Contractor will be required to remove rejected materials from previously finished surfaces before refinishing with complying materials if the two finishes are incompatible or produce results that, in the opinion of the Architect, are aesthetically unacceptable.

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 Interior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

- D. Proceed with finish application only after unsatisfactory conditions have been corrected.
 - 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
 - 1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 - 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- D. Interior Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Apply wood filler paste to open-grain woods to produce smooth, glasslike finish.
 - 3. Sand surfaces that will be exposed to view and dust off.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations.
 - 1. Use applicators and techniques suited for finish and substrate indicated.
 - 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
 - 3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

- A. Wood substrates;
 - 1. Polyurethane Varnish over Stain System:
 - a. Stain Coat: Stain, semi-transparent, for interior wood.
 - b. Two finish coats: Interior oil-modified, clear urethane stain.
- B. Concrete Floor Surfaces (Semi-Transparent): (Decorative Stain System)
 - 1. Manufacturer: Scofield Systems, ground, stained and polished concrete.
 - 2. Style: Lithochrome Tintura Waterborne Concrete Stain.
 - 3. Color: 2626 Light Grey.
 - 4. Note: Mock up on slab must be approved prior to work.

END OF SECTION 099300

SECTION 102800 - TOILET ACCESSORIES

PART 1 GENERAL

0.1 DESCRIPTION

- A. Provide toilet accessories, including mounting and anchorage devices and templates necessary for their installation. Work includes:
 - 1. Commercial quality recessed and surface mounted toilet accessories.
 - 2. Framed mirrors.
 - 3. Janitor accessories.

0.2 SUBMITTALS

- A. Submit product data for each toilet accessory item specified, including details of construction relative to materials, dimensions, gauges, profiles, method of mounting, specified options, and finishes.
- B. Submit full-size samples of each toilet accessory item for verification of design, operation, and finish requirements. Acceptable samples will be returned and may be used in the work.
- C. Submit setting drawings where cutouts are required in other work, include templates, substrate preparation instructions, and directions for preparing cutouts and installation of anchorage devices.

0.3 PROJECT CONDITIONS

- A. Coordinate accessory locations, installation, and sequencing with other work to avoid interference and to assure proper installation, operation, adjustment, cleaning, and servicing of toilet accessory items.

0.4 WARRANTY

- A. Submit manufacturer's written 10-year warranty against silver spoilage of mirrors, agreeing to replace mirrors that develop visible defects within warranty period.

PART 1 PRODUCTS

1.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide toilet accessories by one of the following:
 - 1. Bobrick Washroom Equipment, Inc.
 - 2. Bradley Corporation
 - 3. Gamco Co.

1.2 MATERIALS, GENERAL

- A. Stainless steel; AISI Type 302/304, with polished No. 4 finish, 0.034-inch (22 gauge) minimum thickness.
- B. Brass; Leaded and unleaded, flat products, ASTM B19; rods, shapes, forgings, and flat products with finished edges, ASTM B16; Castings, ASTM B30.
- C. Sheet Steel; Cold-rolled, commercial quality ASTM A 366, 0.04-inch (20 gauge) minimum. Surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet; ASTM A527, G60.
- E. Chromium Plating; Nickel and chromium electro-deposited on base metal, ASTM B456, Type SC2.

- F. Baked Enamel Finish; Factory-applied, gloss white, baked acrylic enamel coating.
- G. Mirror Glass; Nominal 6.0-mm (0.23-inch) thick, conforming to ASTM C1036, Type I, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.
- H. Galvanized Steel Mounting Devices; ASTM A153, hot-dip galvanized after fabrication.
- I. Fasteners; Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.

1.3 GRAB BARS

- A. Stainless Steel Type: Provide grab bars with wall thickness not less than 0.05 inch (18 gauge) and as follows:
- B. Mounting: Exposed fasteners, manufacturer's standard flanges and anchorages.
- C. Clearance: 1-1/2-inch clearance between wall surface and inside face of bar.
- D. Gripping Surfaces: Smooth, satin finish.
- E. Gripping Surfaces: Manufacturer's standard non-slip texture.
Heavy-Duty Size: Outside diameter of 1-1/2 inches.

1.4 MISCELLANEOUS ACCESSORIES

- A. Mop and Broom Holder/Utility Shelf: Combination unit with 0.05-inch (18 gauge), Type 304, stainless steel shelf with 1/2-inch returns, 0.062-inch (16 gauge) support brackets for wall mounting. Provide 0.062-inch (16 gauge) stainless steel hooks for wiping rags on front of shelf, together with spring-loaded, rubber hat, cam-type mop/broom holders; 1/4-inch-diameter stainless steel drying rod suspended beneath shelf. Provide unit 36 inches long and complete with four mop/broom holders and three hooks.

2.5 MIRROR UNITS

- A. Standard Stainless-Steel Framed Mirror Units: Fabricate frame with channel shapes not less than 0.04 inch (20 gauge), with square corners carefully mitered to hairline joints and mechanically interlocked. Provide in Type 430 bright polished finish.
- B. Shelves: Fabricate steel in same gauge and finish as mirror frame, approximately 5 inches deep by width of mirror. Turn down and return edges for additional rigidity. Weld shelves securely to bottom of mirror frame; provide concealed, rigid bracket supports for widths exceeding 36 inches.

2.6 TOILET ACCESSORY TYPES

- A. Furnish accessories with mounting and anchorage devices as recommended by the manufacturer for the type of surface on which to be mounted.
- B. Toilet accessory types:
 - 1. T-1; Toilet Paper Holder
 - a. Bobrick #B-2892
 - 2. T-2; Soap Dispenser
 - a. Bobrick #B-2111
 - 3. T-3; Sensor Hand Dryer
 - a. Bobrick # B700
 - 4. T-4; Grab Bar - 42
 - a. Bobrick #B-6806 Series
 - 5. T-5; Mirror 18x36
 - a. Bobrick #B-2900 Series
 - 6. T-6; Sanitary Napkin
 - a. Bobrick #B-6806 Series

7. T-7; Grab Bar-36
 - a. Bobrick #B6806 Series
8. T-8; Changing Station
 - a. Foundations #100SSE-SM
9. T-9; Mop/Broom Holder
 - a. Bobrick #B239
10. T-10; Grab Bar – 18”
 - a. Bobrick #B6806 Series
11. T-11; Child Seat
 - a. Bobrick: #KB102

C. Similar products as manufactured by Gamco and Bradley as considered equivalent.

2.7 FABRICATION

- A. 1-1/2-inch diameter, unobtrusive logo of manufacturer, as approved by Architect, is permitted on exposed face of toilet accessory units. On either interior surface not exposed view or back surface, provide additional identification by means of either a printed, waterproof label or a stamped nameplate, indicating manufacturer’s name and product model number.
- B. Surface-mounted toilet accessories; except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless-steel piano hinge. Provide concealed anchorage wherever possible.
- C. Recessed toilet accessories; except where otherwise indicated, fabricate units of all welded construction, without mitered corners.
- D. Framed mirror units; fabricate frames for glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamper-proof glass installation and prevent accumulation of moisture, as follows:
 1. Provide galvanized steel backing sheet, not less than 22 gauge (0.034 inch) and full mirror size, with non-absorptive filler material. Corrugated cardboard is not acceptable filler material.
 2. Mirror unit hangers; one-piece galvanized steel wall hanger device with spring action locking mechanism to hold mirror unit in position with no exposed screws or bolts to provide rigid, tamper proof and theft proof installation.

PART 3 EXECUTION

1.1 INSTALLATION

- A. Install toilet accessory units in accordance with manufacturer’s instructions, using fasteners appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamper proof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, in accordance with manufacturer’s instructions for type of substrate involved.
- C. Installation of toilet accessories must use torx-head (star design with center pin) security fasteners in all exposed locations unless otherwise approved by Architect.

1.2 ADJUSTING AND CLEANING

- A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

- B. Clean and polish all exposed surfaces in strict accordance with manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION 102800

SECTION 105220 – FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

0.1 DESCRIPTION

- A. Provide fire extinguisher cabinets and fire extinguishers.

0.2 SUBMITTALS

- A. Submit product data for each type of product specified. For fire extinguisher cabinets include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction, and materials.

0.3 QUALITY ASSURANCE

- A. UL Listed Products: Fire extinguishers UL listed and bear UL “Listing Mark” for type, rating, and classification of extinguisher.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Manufacturer; Potter-Roemer, Inc., Similar materials that meet or exceed the standard specified by the following manufactures will be considered equivalent;
 - 1. J.L. Industries, Cosmic Series
 - 2. Larsen’s Manufacturing Co., MP Series

0.2 FIRE EXTINGUISHERS

- A. Fire extinguisher, dry chemical: Model No. 3006, ABC Multi-purpose Dry Chemical Fire Extinguisher, UL rated 3A-40B; C,6lb, nominal capacity, in red glossy polyester-coated steel.

0.3 FIRE EXTINGUISHER CABINETS

- A. Fire extinguisher cabinets; Model No. 7022-FRC, semi-recessed fire extinguisher cabinet with trim, frame, door, and hardware as required for a complete installation. Provide full glass doors. Weld joints and grind smooth. Miter and weld perimeter door frames.
 - 1. Box, door and frame: 20-gauge tubular steel construction.

- B. Finish; all components to be powder-coated with an electronically applied thermal-fused, recoatable polyester finish. Door and frame to be red.
- C. Door hardware; manufacturer's standard door-operating hardware, including self-adjusting roller catch and heavy gauge continuous piano hinge permitting door to open 180 degrees.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fire extinguisher and fire extinguisher cabinets in accordance with manufacturer's installation instructions at locations and mounting heights indicated. If not indicated, mount key lock at 54 inches AFF.
 - 1. Prepare fire extinguisher cabinet wall recesses in accordance with manufacturer's instructions.
 - 2. Securely fasten fire extinguisher cabinets to structure, square and plumb.

END OF SECTION 105220

SECTION 220000- BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Each bidder shall inspect the project site and the premises of the existing building. Conditions shall be compared with information shown on the drawings. Report any significant discrepancies which may be discovered. After the contract is signed, no allowance will be made for failure to have made a thorough inspection.

1.2 DRAWINGS AND SPECIFICATIONS

- A. Equipment, ductwork or piping shall not be installed or run above electrical switchgear or panelboards, nor in or above the access space in the immediate vicinity of the electrical switchgear/panelboards, in accordance with NEC Article 384.
- B. Where any system runs and components are so placed as to cause or contribute to a conflict, it shall be readjusted at the expense of the contractor causing such conflict.
- C. Provide offsets in system runs, additional fittings, necessary drains and minor valves, traps, dampers and devices required to complete the installation, or for the proper operation of the system. Each Contractor shall exercise due and particular caution to determine that all parts of the work are made quickly and easily accessible.
- D. Should overlap of work among the trades become evident, this shall be called to the attention of the Architect.

PART 2-PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment furnished under this contract shall be in strict accordance with the specifications and drawings and shall be new and of best grade and quality. When two or more articles of the same material or equipment are required, they shall be of the same manufacturer.

2.2 REFERENCE STANDARDS

- A. Where standards (NFPA, NEC, ASTM, UL, etc.) are referenced in the specifications or on the drawings, the latest edition is to be used except, however, where the authority having jurisdiction has not yet adopted the latest edition, the edition so recognized shall be used.

2.3 EQUIPMENT SELECTION

- A. Substitute equipment of equal quality and capacity will be considered when the listing of such is included as a separate item of the bid. State the deduction or addition in cost to that of the specified product.
- B. Before bidding equipment, and again in the preparation of the shop drawings, the Contractor and his supplier shall verify that adequate space is available for entry and installation of the item of equipment, including associated piping and accessories. Also verify that adequate space is available for servicing of the equipment.
- C. If extensive changes in pipe, duct or equipment layout or electrical wiring and equipment are brought about by the use of equipment which is not compatible with the layout shown on the drawings, necessary changes shall be deemed to be included in the contract.

PART 3-EXECUTION

3.1 PIPE TESTING

- A. All piping provided in this work shall be pressure tested, as specified below.
- B. Pipe testing for plumbing piping shall be:
 - 1. Domestic water service - hydrostatic at 125 psig for 6 hours, and in conformance with AWWA procedures.
 - 2. Domestic cold and hot water piping - hydrostatic at 125 psig for 6 hours at the low point of the system.
 - 3. Soil, waste and vent piping - rough test and final test, in conformance to plumbing code requirements.
- C. Tests shall be witnessed by field representatives or shall be monitored by a recorder. Furnish a written record of each piping system test indicating date, system, pressure, duration and results of tests. Copies of test reports shall be included in the O & M manuals.
- D. Leaks discovered during testing shall not be patched. Threaded connections shall be either tightened or replaced. Small leaks in welded pipe may be chipped and rewelded.
- E. Where a new pipe connects to an existing pipe, provide the following to facilitate testing, cleaning, draining and eventual shutoff service:
 - 1. A shutoff valve in the new pipe near the point of connection.
 - 2. A ¾" valved stub beyond the valve for testing of the new pipe extension.

3.2 DISINFECTION OF PIPING

- A. All new and existing domestic water piping shall be disinfected by company or personnel regularly engaged in the performance of this service.
- B. Disinfection shall be performed in accordance with AWWA C351-86 Standards. Disinfection shall be by means of a chlorine solution injected into the water system near the source. Outlets throughout the system shall be tested to prove presence of minimum chlorine concentration. Flush out the system with clean water until the residual chlorine content is not greater than 0.2 parts per million or until approved by the Health Department.

3.3 OPERATING DEMONSTRATION AND INSTRUCTIONS

- A. The Contractor shall set the various systems into operation and demonstrate that the systems function properly and that the requirements of the Contract are fulfilled.
- B. The Contractor shall provide the Owner's representatives with detailed explanations of operation and maintenance of equipment and systems. A thorough review of the operating and maintenance manuals shall be included in these instructional meetings.
- C. O & M manuals shall be submitted, reviewed and approved prior to scheduling of demonstrations.

END OF SECTION 220000

SECTION 220500- PIPING MATERIALS AND METHODS

PART 1-GENERAL

1.1 DESCRIPTION

- A. Included in this section are:
 - 1. Pipe, fittings and joining methods.
 - 2. Unions and flanges.
 - 3. Dielectric connectors.
 - 4. Pipe sleeves, openings, curbing and escutcheons.
 - 5. Firestopping of pipe penetrations at fire rated construction.
 - 6. Installation methods of piping.
- B. Pipe sleeves, floor and wall openings, water protective curbing and escutcheon plates shall be provided as described below. Pipe sleeves shall be placed in all floor slabs, poured concrete roof decks, wall and partitions, except as noted below, to allow new piping to pass thru and to allow for expansion, contraction and normal movement of the pipe. Sleeves are also required for all existing piping related to the various trades in new walls, partitions, floors and roof slabs, same as for new piping.
- C. Sleeves are not required:
 - 1. In stud and gypsum board or plaster walls and partitions which are not fire rated.
 - 2. For uninsulated pipe passing thru masonry walls and partitions and stud and gypsum board or plaster walls and partitions.
 - 3. In core drilled openings in solid concrete not requiring water protection.
 - 4. In large floor openings for multiple pipe and duct risers which are within a fire rated shaft, unless the opening is to be closed off with concrete or other material after pipes are set.
- D. Firestopping at penetrations of piping thru fire rated assemblies, shall be provided by means of a firestopping system to maintain the required fire resistive rating of the floor or wall. Firestopping systems shall conform to ASTM E814 and E119 (UL 1479, UL263). Shop drawings shall be submitted for approval defining UL System numbers, as published in the UL Fire Resistance Directory for the various conditions, details of the installation and description of the materials and components.
- E. Where pipes penetrate walls and floors other than those required to be fire rated, the annular space between the sleeve, core drilling or opening and the pipe or pipe insulation shall be closed to retard the passage of smoke.

PART 2 -PRODUCTS

2.1 MATERIALS

- A. Steel pipe and fittings and joints shall be:
 - 1. Type S1 Pipe - Schedule 40 black steel, ASTM A-53, Types E and F. Fittings and joints - 150 lb., seamless steel welding type and malleable iron or cast-iron screwed fittings and joints.
 - 2. Reinforced forged welding outlets equal to Bonney Weldolet and Thredolet may be used where branch is two sizes smaller than the main. Unreinforced nipples and fishmouthed connections are not acceptable.
- B. Copper tubing, conforming to ASTM B88, and fittings and joints shall be:

1. Type "L" seamless hard drawn copper tubing. Fittings - wrought copper or cast bronze, solder ends. Joints - soldered with lead-free tin alloy, 95-5 tin-antimony or silver-bearing tin equal to Harris "Stay-Brite", "Stay-Brite 8" or "Bridgit".
 2. Type "L" seamless hard drawn copper tubing. Fittings - wrought copper or cast bronze, solder ends. Joints - brazed with 15% silver brazing alloy equal to Harris "Stay-Silv 15" or Harris "Dynaflow".
 3. Type "K" soft copper tubing. Fittings - wrought copper, solder ends. Joints - brazed with 15% silver brazing alloy equal to Harris "Stay-Silv 15" or Harris "Dynaflow".
- C. Unions and flanges shall be:
1. Unions on copper tubing, all bronze construction 150 lb., solder ends.
 2. Unions on steel pipe 2" and smaller, malleable iron with ground seat, bronze to steel, 300 lbs., screwed ends.
 3. Flanges on steel pipe with welded or screwed joints, 2-1/2" and larger. Gaskets shall be 1/16" thickness full faced compressed sheet suitable for temperature and pressure ranges of the application. Bolts for flanges in all steam piping shall be No. 7 hardened bolts.
- D. A dielectric connector shall be incorporated at each connection between ferrous and copper piping. Connectors shall be:
1. Dielectric flange with non-metallic bolt hole grommets and gasket.
 2. Dielectric union. Gasket material shall be rated for service application.
 3. Brass adaptor.
- E. Pipe sleeves shall be:
1. Schedule 40 black steel pipe or 18-gauge galvanized steel in poured concrete.
 2. 26-gauge galvanized sheet steel or Schedule 40 black steel pipe in other than poured concrete.
 3. Cast iron pipe or Schedule 40 galvanized steel pipe in exterior walls below grade, with intermediate wall stop and anchor collar set in place before concrete pouring. Sleeve shall be a part of the sealing assembly. When the wall opening is core drilled the wall sleeve may be omitted. A mechanically compressed rubber sealing assembly equal to Thunderline Corp. "Link-Seal" shall be placed in the annular space between pipe and sleeve or core drilling.
 4. Galvanized sheet metal for existing pipes passing thru new poured concrete floors (18 gauge) and thru new walls and partitions (26 gauge).

PART 3 -EXECUTION

3.1 INSTALLATION

- A. Piping shall be pitched for drainage. The low points shall be fitted with a 3/4" drain valve (with hose thread adapter if not piped to a floor drain) except that on piping 1-1/4" and smaller where a drain valve is not shown, a drain plug is acceptable. Hose thread adapters on drain valves of potable water piping shall be fitted with a non-removable vacuum breaker.
- B. Piping shall be installed consistent with good piping practice and run concealed wherever possible.
- C. Installation of plastic piping shall be in full compliance with manufacturer's recommendations and code requirements, with specific consideration given to expansion

compensation and pipe hanger spacing. Plastic pipe is not permitted in air plenum spaces.

- D. Piping shall NOT be run above electrical switchgear or panelboards, nor above the access space in the immediate vicinity of the equipment, in accordance with N.E.C. Article 384.
- E. Where uninsulated pipes requiring no pipe, sleeves pass thru non-fire rated floor, wall or partition, the annular space shall be closed with materials and methods compatible with the wall or partition material (Type M masonry grout, drywall joint compound, plaster, etc.).

END OF SECTION 220500

SECTION 220523- VALVES

PART 1- GENERAL

1.1 DESCRIPTION

- A. Valves and materials shall comply with applicable standards and specification of ANSI, ASTM and ASME. Working pressure and temperature ratings of each valve shall exceed those imposed by the service in which it is applied.

PART 2 -PRODUCTS

2.1 MATERIALS

- A. Ball Valves - Nibco, Powell, Grinnell, Crane, Apollo, Stockham, Watts, Milwaukee, Kitz.
 - 1. 2" and smaller: Nibco T-580-70, 125 w.s.p., two-piece bronze body, screwed ends, chrome plated bronze ball and stem, TFE seat and seal, handle.
 - 2. 2-1/2" and larger: Nibco F-510, 150 w.s.p., two-piece carbon steel or cast iron body, flanged ends, stainless steel ball and stem, standard port, Teflon seat and seal, handle.
- B. Check Valves - Nibco, Powell, Milwaukee, Grinnell, Crane, Stockham, Watts, Mueller, Kitz.
 - 1. 2" and smaller: Nibco T-413-Y, 125 w.s.p., bronze body, screwed ends, renewable bronze swing disc with TFE seat ring.
- C. Plug Valves - Rockwell Nordstrom, Newman-Milliken, Homestead, Durco or DeZurik.
 - 1. 2" and smaller: Lubricated cock. Rockwell Nordstrom 142, 175 w.o.g., semi-steel lubricated plug cock with wrench, screwed ends.
 - 2. 2-1/2" and larger: Lubricated cock. Rockwell Nordstrom 143, 175 w.o.g., semi-steel lubricated plug cock with wrench, flanged ends.

PART 3 -EXECUTION

3.1 INSTALLATION

- A. Gate valves 3" and larger in steam piping shall be fitted with a 1" by-pass line and globe valve for slow warm-up.
- B. Drain valves shall be the same as for shutoff service. Provide a 3/4" hose thread adapter on the outlet of each drain valve that is not piped to a drainage point. Hose thread adapters on drain valves of potable water piping shall be fitted with a non-removable vacuum breaker.
- C. Internals shall be removed and the remaining elements of sweat end valves shall be protected against heat damage during soldering or brazing.
- D. Valves shall be installed with the stem at or above the centerline of the pipe. Valves shall be located to be accessible for operation, servicing and/or removal.
- E. Packing glands shall be tightened before placing the valves in service.

END OF SECTION 220523

SECTION 220529- PIPE HANGERS AND SUPPORTS

PART 1-GENERAL

1.1 DESCRIPTION

- A. All interior piping shall be supported from the building structure.

PART 2-PRODUCTS

2.1 MATERIALS

- A. Hangers and supports for horizontal piping shall be equal to:
1. General service - clevis type - Grinnell Fig. 260.
 2. Uninsulated copper tubing - copper plated clevis type - Grinnell Fig. CT-65 (or plastic-coated clevis).
- B. Hanger rods shall be solid steel, threaded-end or all-thread rod, of diameter listed below, with double nut attachment to the hanger and at the hanger attachment.
- | <u>Pipe Sizes</u> | <u>Min. Rod Dia.</u> |
|-------------------|----------------------|
| 1" and smaller | 1/4" |
| 1-1/4" to 3" | 3/8" |
| 4" to 6" | 1/2" |
- C. Where the length of the hanger rod between the top of the hanger and the attachment device is 3" or less, clevis type hangers with rollers, Fig. 181, shall be used to allow for expansion travel.
- D. Hangers on insulated horizontal piping shall be oversized to surround the pipe insulation. To protect the insulation from damage or inordinate compression due to concentrated weight, the following shall be provided at each hanger:
1. Pipe 2" and smaller - Fig. 168 18 ga. sheet metal rib-lock shield with belled ends, 12" long.
 2. Pipe 2-1/2" and larger - factory or shop fabricated assembly Pipe Shields, Inc. A1000 or Grinnell No. 168 sheet metal shield with half-round high density hard insulation. Sheet metal shield 12" long.
- E. Trapeze hangers for numerous pipes run in parallel may be utilized. Horizontal support members shall be unistrut type section with pipe rollers (to allow for expansion travel) and spring and nut connectors, suspended with hanger rods and attachments similar to individual pipe hanger suspension.

PART 3-EXECUTION

3.1 PREPARATION

- A. Spacing of hangers shall be as follows:
1. Steel pipe (vertical) - at the base and 15 ft. maximum spacing unless otherwise shown.
 2. Steel pipe (horizontal) - 8 ft. intervals for piping 2" size and smaller, 10 ft. intervals for piping 2-1/2" thru 6", 12 ft. intervals for larger pipe.
 3. Copper tubing (vertical) - at the base and 10 ft. maximum spacing unless otherwise shown.
 4. Copper tubing (horizontal) - 6 ft. intervals for tubing 1-1/4" size and smaller, 8 ft. intervals for 1-1/2" and 2" sizes, 10 ft. intervals for tubing 2-1/2" size and larger.

5. Cast iron pipe (vertical) - at the base and at each floor (15 ft. maximum between).
 6. Cast iron pipe (horizontal) - at each fitting and at each joint on straight lengths, 10 ft. maximum spacing.
- B. Attachment of pipe hangers to the structure shall be with:
1. After set concrete inserts, in 4" minimum depth concrete, shall be steel expansion type set in drilled holes. Powder actuated driven fasteners are not permitted.
 2. Beam clamps in steel construction shall be equal to Fig. 95 ("C" clamp with locknut), or Fig. 14 (adjustable beam clamp). Provide anchoring where clamps are attached to sloping surfaces of beam flanges and where otherwise required to insure permanent attachment.
 3. Side beam bracket in wood construction shall be equal to Fig. 206, secured to the wood joist with lag screws set in drilled pilot holes.
 4. Unistrut channels with spring and nut rod connection may be utilized where a number of pipes are run parallel. Channel shall be pre-set or attached to the structure with inserts or clamps.
 5. Attachment to deck is prohibited. Span from steel structural members with supplementary steel shapes where direct attachment to structural members is not practical.

3.2 INSTALLATION

- A. Pipe hangers shall be adjusted to proper elevation and all hanger rods set in a vertical position before pipe insulation is installed.
- B. Extended legs of pipe riser clamps shall be shortened as needed to maintain concealment of the clamp within the pipe chase. Ensure that adequate support is still maintained.
- C. Hanger and support assemblies which will remain exposed on completion of the project shall be painted before installation.

END OF SECTION 220529

SECTION 220548- PIPING EXPANSION, NOISE & VIBRATION ISOLATION

PART 1 -GENERAL

1.1 DESCRIPTION

- A. Provide thermal expansion control for all piping.
- B. Isolate all piping for both noise and vibration transmission.
- C. Provide expansion loops, guides, anchors and offsets in piping systems as necessary to accurately control pipe movement due to equipment operation or thermal gradients, to prevent damage to building, equipment, joists, hangers and piping.
- D. Provide expansion joints and accompanying anchors and guides where expansion cannot be provided for with loops and offsets.
- E. Contractor shall install anchor points as needed to properly control piping movement.
- F. Typically piping shall be anchored at tees, elbows, and bends, and piping shall be anchored in each direction, as needed.

1.2 ACCEPTABLE MANUFACTURERS

- A. Metraflex Company, Hyspan Precision Products, Inc., Flexicraft, Flexonics Products, Uniroyal or General Rubber.

PART 2-PRODUCTS

2.1 MATERIALS

- A. Metraflex "MC" with all wetting parts stainless steel, including bellows and elements. Vanstone flanges, cast iron equalizing rings, steel cover over bellows. Pipe connections as required, 250 psi working pressure. Size each bellows end for 3 in. expansion. Use Metraflex "HPMF" stainless steel with copper sweat ends, packless, internally guided expansion compensator type for lines 2 in. and smaller.

2.2 PIPE ALIGNMENT GUIDES

- A. Painted, steel, cylinder guide assembly with welded mounting brackets, two-piece pipe clamp "Spider" assembly.

PART 3-EXECUTION

3.1 INSTALLATION

- A. Line expansion:
 - 1. U-Bends: In all piping subject to expansion and contraction, install U-Bends or loops in piping, in accordance with ASHRAE Equipment Handbook, Chapter 33. Option: Provide Metraflex "Metraloop", sized per Manufacturer's recommendations.
 - 2. Expansion Joints: Where unable to provide U-bends, or where specifically shown or specified, provide expansion joints. Install according to the Manufacturer's instructions.
- B. Branch connections:
 - 1. Branch connections to mains shall be made with a minimum of two 90-degree elbows, and must incorporate at least one change of direction in the horizontal

plane, and one change of direction in the vertical plane, before connecting to equipment or fixtures, or before dropping in or rising in a wall.

2. Bullhead connections in any piping service are expressly prohibited.
- C. Guides: All loops and expansion joints shall be supplemented with adequate guides as close to loops and joints as possible and additionally at recommended intervals from joints, to preserve alignment and pitch. Guides shall be rigidly secured to the structure and shall permit axial movement only. Follow Manufacturer's instructions on locations where applicable.
- D. Anchors: Pipe anchors shall be installed where required to secure the pipe and totally eliminate movement. They shall be attached securely to the structure.

END OF SECTION 220548

SECTION 220553- EQUIPMENT & PIPING IDENTIFICATION

PART 1-GENERAL

1.1 DESCRIPTION

- A. Identify by labels and tags the following new items:
 - 1. Piping exposed in equipment rooms, accessible service areas, or accessible chases.
 - 2. Piping running above accessible ceiling construction.
 - 3. All shock absorbers, where accessible or not.
- B. Install laminated plastic nameplates for equipment, color banding for piping, flow arrows and contents identification.
- C. Unless otherwise noted, conform with ANSI A13.1.

1.2 ACCEPTABLE MANUFACTURER'S

- A. Brady, Seton, MSI or Calpico.

PART 2-PRODUCTS

2.1 EQUIPMENT IDENTIFICATION

- A. Engraved laminated plastic nameplates, white over black, sized for 3/4 in. high letters or numbers, Gothic style.

2.2 PIPING IDENTIFICATION

- A. Stencils or vinyl tape with embossed letters. Color same as 2 in. band.
- B. Size to be as follows:

Overall Pipe/Insulation Size	Minimum Letter Height
Up to 1-1/4 in. diameter	1 in. high
1-1/2 in. to 2 in. diameter	1 in. high
2-1/2 in. to 6 in. diameter	1-1/4 in. high

2.3 COLOR BAND

- A. 2 in. wide painted gloss enamel or vinyl tape. Second color to be 1 in. wide and centered over first color.

2.4 IDENTIFICATION SCHEDULE

- A. Identify as follows:

2 in. Band	1 in. Band		
Type of Service	Color		Designation
Plumbing Piping:			
Domestic Cold Water	Green	--	DCW
Domestic Hot Water	Orange	--	DHW

PART 3-EXECUTION

3.1 PREPARATION

- A. Coordinate with the Owner to match existing piping identification. Where existing piping or ductwork is not identified by name or banding, refer to Identification Schedule.

3.2 INSTALLATION

- A. Equipment tags and nameplates shall be attached with stainless steel screws, except where screws might damage equipment, use compatible adhesive.
- B. Apply piping identification only after finish painting is completed.
- C. Provide service designation, flow arrow and color banding at 15-foot maximum intervals.
- D. Also identify piping at connections to equipment, at valves, at branches from main, at each riser and at both sides of wall or barrier through which pipe passes.
- E. Stencil over white or black background as appropriate for color and varnish over when dry.
- F. Stencils must be readable from a standing position.
- G. Where pipes pass through a wall, apply a service label on the pipe where it enters and exits the wall.

END OF SECTION 220553

SECTION 220700- PIPE INSULATION

PART 1 -GENERAL

1.1 DESCRIPTION

- A. Piping systems shall be insulated as described below. Pipe, fittings, unions, flanges, mechanical joint couplings, valves, devices, specialties and related items in the piping systems shall be insulated unless otherwise excepted.
- B. Composite insulation assemblies shall not exceed maximum flame spread of 25 and smoke development of 50 except as specifically allowed below, as established by NFPA 255 test methods.
- C. The following plumbing piping shall be insulated:
 - 1. Domestic cold water, hot water (at and below 130 degrees).
2-1/2" and larger - 1" thickness; 2" and smaller - 1/2" thickness.
 - 2. Domestic hot and cold-water supply/stops and traps on fixtures designated to be ADA compliant.
- D. Insulation on plumbing systems is to be omitted on the following:
 - 1. Exposed plumbing fixture supplies, supply stops and traps except where required for ADA compliance.
 - 2. Exposed chrome plated piping and pipe line devices.

PART 2-PRODUCTS

2.1 MATERIALS

- A. Insulation shall be manufactured by Schuller-Manville, Owens-Corning, Knauf, Certainteed, Armstrong or Mason.
- B. Pipe insulation shall be fiberglass or, at the Contractor's option within the limitations stated below, tubular foamed elastomeric insulation.
- C. Fiberglass pipe insulation shall be factory molded tubular fiberglass with "all service" jacket having an integral vapor barrier. Longitudinal joints of the jacket shall be overlapping with factory applied adhesive. In lieu of the factory adhesive, staples on 6" centers may be used with vapor barrier mastic applied to seal both the joint and stable holes. Butt joints shall be sealed with 3" wide ASJ pressure sensitive tape.
- D. Foamed elastomeric insulation shall be 1/2" thickness tubular closed cell flexible pipe insulation, Armstrong Self-Seal Armaflex 2000 with factory applied longitudinal joint sealant or Armstrong AP Armaflex. Joints which do not have factory applied sealant shall be sealed with 2" wide vinyl tape (as appropriate) or vapor sealing adhesive, complying with specifications of the insulation manufacturer. Installation shall be in accordance with the manufacturer's published installation instructions to the Contractor. Use is restricted to 2" and smaller pipe, 140 degree maximum service temperature.
- E. Fittings, valves, flanges and other devices, both exposed and concealed, requiring insulation shall be covered same thickness as pipe insulation with:
 - 1. For fiberglass insulation systems:
 - a. Factory molded fitting insulation cover with PVC one-piece fitting cover;
 - b. Miter-cut segments of pipe insulation, held in place with adhesive and/or wire, filled with insulating cement smoothed to shape and covered with PVC one-piece fitting cover;

- c. Fiberglass blanket insulation, compressed, held in place and covered with PVC one-piece fitting cover; or
 - d. Oversized pipe insulation, where applicable, finished same as straight run pipe insulation.
2. For foamed elastomeric insulation systems:
- a. Fiberglass blanket insulation with PVC one-piece fitting cover, for Armaflex 2000 only;
 - b. Miter cutting of tubular insulation using special tools and mitering devices.
 - c. Oversized pipe insulation overlapped and shaped to conform to the fitting, valve or device.

PART 3-EXECUTION

3.1 GENERAL

- A. Installation shall be done by tradesmen specializing in insulation work in strict accordance with manufacturer's recommendations.
- B. Overlap and seal all longitudinal joints of fiberglass insulation jacket. Staples and adhesive may be used as stated above. Tape and seal cross joints. Vapor barrier shall be continuous on insulation of all cold services. Vapor barrier type mastic shall be used where needed to maintain a vapor seal.
- C. Foamed elastomeric insulation outside the building exposed to direct or indirect sunlight shall be painted with an appropriate paint to provide protection against solar ultra-violet deterioration.

3.2 INSTALLATION

- A. Where fiberglass insulation is terminated, insulation shall be beveled at 45 degrees and the beveled surface sealed with vapor barrier mastic. PVC caps over straight cut ends which have been vapor sealed may be used in lieu of beveling.
- B. Insulation on cold service piping shall be run thru floor and wall sleeves to maintain vapor barrier continuity. Insulation on other services may likewise be run continuous when sleeve size permits. Refer to the Pipe Sleeves paragraph for special considerations which must be given at fire rated wall and floor penetrations. Refer to the Pipe Hangers and the Firestopping at Pipe Penetrations paragraphs for non-compressible insulation or blocking material and sheet metal saddles required at pipe hangers. Coordinate with the piping contractor on the furnishing, installation and detailed requirements of these. Provide insulation and vapor barrier on and around supports for pipe risers of services which require vapor seal so as to prevent sweating.
- C. Reinsulate piping to match where existing insulation has been damaged or removed in the performance of work in this project.

END OF SECTION 220700

SECTION 220719 - DUCT INSULATION

PART 1-GENERAL

1.1 DESCRIPTION

- A. All supply air and intake outside air ductwork and plenums shall be insulated as described below.
- B. Flexible ductwork with factory applied insulation need not be further insulated.
- C. Composite insulation assemblies shall meet NFPA 255, requirements and not exceed maximum flame spread of 25 and smoke development of 50.

PART 2-PRODUCTS

2.1 GENERAL

- A. Insulation shall be manufactured by Schuller-Manville, Owens-Corning, Certainteed or Knauf. Installation shall be done by tradesmen specializing in this work in strict accordance with manufacturer's recommendations.
- B. Insulation on concealed ductwork shall be fiberglass blanket insulation with factory applied reinforced foil and kraft paper jacket, 1-1/2" thickness, 3/4" p.c.f. density.
- C. Insulation on exposed ductwork shall be fiberglass board insulation with factory applied "all service" jacket with vapor barrier, 1-1/2" thickness, 3 p.c.f. density.

PART 3-EXECUTION

3.1 GENERAL

- A. Blanket insulation shall be wrapped tight to the duct. Insulation shall be secured to ducts 20" wide and greater with weld pins and fasteners, 18" on center maximum. Adhesive shall be applied to the duct as an aid to installation and adhesion. Vapor barrier jacket shall be lapped, stapled and sealed with adhesive and 3" wide FSK pressure sensitive tape.
- B. Board insulation with factory applied jacket shall be secured to the duct with weld pins and fasteners, 12" on center maximum. Vapor barrier jacket shall be lapped, stapled and sealed with adhesive and 3" wide ASJ pressure sensitive tape.
- C. Reinsulate ductwork where existing insulation has been damaged or removed in the performance of work in this project.

END OF SECTION 220719

SECTION 221100- INTERIOR DRAINAGE AND VENT SYSTEMS

PART 1-GENERAL

1.1 DESCRIPTION

- A. Interior drainage and vent systems including soil, waste and vent system shall be provided as shown on the drawings and as specified.

PART 2-PRODUCTS

2.1 MATERIALS

- A. Interior soil, waste and vent drainage system.
 - 1. Pipe and fittings located in grade below the floor slab.
 - a. Centrifugally cast SV hub and spigot ASTM A-74 coated cast iron. Joints shall be either lead caulked or push tight with elastomeric gaskets, ASTM C-564.
 - 2. Pipe and fittings above grade may be any one of the following at the Contractor's option.
 - a. Cast iron as described for pipe in grade below floor.
 - b. Standard weight galvanized steel conforming to ASTM A-53, Schedule 40, using cast iron screwed recess pattern drainage.
 - 3. Traps serving floor drains shall be same material as the connecting piping.

PART 3-EXECUTION

3.1 INSTALLATION

- A. Ream pipe to remove all burrs. Align horizontal pipe carefully to assure even pitch. Over-excavate and lay in sand bed where underground. Pitch a minimum of 1/8" per ft. Extend 5 ft. beyond exterior wall of building before changing to exterior pipe. All adaptors from one material to another shall be a standard manufactured product designed for that specific use. Do not run piping above electrical switchgear.
- B. Push tight gaskets on cast iron hub and spigot pipe located in grade shall be installed using gasket lubricant.
- C. All flashing shall be furnished and placed by the Plumbing Contractor. Flashing shall be secured watertight to the vent pipe by one of the following methods:
 - 1. Vent sleeve with flashing clamp - Zurn Z-195, Z195-1, Z195-5 or equal by Wade, Josam or J.R. Smith.
- D. Install cleanouts at base of all soil and waste stacks and downspouts, at not greater than 50 ft. intervals in horizontal lines, at exterior wall of the building and elsewhere as necessary to rod, with not more than one 90-degree bend between cleanouts.

END OF SECTION 221100

SECTION 221116- INTERIOR DOMESTIC WATER PIPING

PART 1-GENERAL

1.1 DESCRIPTION

- A. Piping, valves and associated devices and materials for interior domestic cold water, hot water systems shall be provided as shown on the drawings and as specified.

PART 2-PRODUCTS

2.1 MATERIALS

- A. Water piping and associated devices, materials and accessories shall be as described in Piping Materials and Methods. Piping shall be:
 - 1. 3" and smaller - Type "L" copper tubing with soldered joints or mechanically formed tees with brazed joints equal to T-Drill.
 - 2. Underfloor and other buried pipe - Type "K", soft copper tubing with silver brazed joints.
 - 3. Pipe nipples extending out to the wall to connect fixtures - brass with screwed ends. Exposed piping shall be chrome plated.
- B. Valves for the various services shall be as listed.
 - 1. Shutoff - Ball
 - 2. Check - Swing

PART 3-EXECUTION

3.1 INSTALLATION

- A. Installation shall conform to provisions in Section 220500 Piping Materials and Methods and Section 220529 Pipe Hangers and Supports.
- B. Installers shall be factory trained and authorized in the use of mechanically formed tee installation.

END OF SECTION 221116

SECTION 221316- INTERIOR WASTE AND VENT SYSTEMS

PART 1-GENERAL

1.1 DESCRIPTION

- A. Sanitary branches longer than 2'-0" will not be permitted.
- B. All piping materials shall comply with the State and Local Building Code.
- C. Connect to existing sanitary drains with "No-Hub" fittings and "No-Hub" stainless steel bands.
- D. Test complete system.

1.2 QUALITY ASSURANCE

- A. Standards: American Society for Testing and Materials (ASTM) and the Cast Iron Soil Pipe Institute (CISPI).
- B. All pipe and fittings shall conform to the requirements of Commercial Standard CS188.
- C. Installation shall meet State and Local Building Code and State Health Department Certificate.

1.3 RELATED WORK DESCRIBED ELSEWHERE

- A. Plumbing Valves.
- B. Plumbing Piping Insulation.
- C. Plumbing Fixtures.
- D. Refer to Drawings for Fixture Connection Schedule.

1.4 ACCEPTABLE MANUFACTURERS

- A. Piping and Fittings:
 - 1. Cast Iron: Charlotte, Clow, American Cast Iron, Tyler Pipe, U.S. Pipe & Foundry or Griffin.
 - 2. Copper: American Brass Co., Revere, Chase Brass Co. or Nibco.
 - 3. Steel: Armco, Republic or Wheeling.

PART 2-PRODUCTS

2.1 PIPING

- A. Interior Above Grade Piping and Fittings:
 - 1. Service weight, single hub cast iron (ASTM A74), factory coated with coal tar enamel.
 - 2. Hubless cast iron (ASTM A74), factory coated with coal tar enamel.
 - 3. Copper/DMV (ASTM B306).
 - 4. Schedule 40 ASTM A120, Type F, for 2-1/2" and smaller sizes.
- B. Vent Piping:
 - 1. Service weight, single hub cast iron (ASTM A74), factory coated with coal tar enamel.
 - 2. Hubless cast iron (ASTM A74), factory coated with coal tar enamel.
 - 3. Standard weight, galvanized steel (ASTM A53CW).
 - 4. Copper/DWV (ASTM B306).
- C. All pipe and fittings shall conform to the requirements of Commercial Standard CS188.

2.2 JOINTS

- A. Cast Iron:

1. Tarred jute or oakum with lead pour flush with hub.
 2. (ASTM C-564) Compression type plastic seal.
 3. Joints in hubless cast iron pipe sizes 1-½" to 10" shall be made with coupling approved to F.M. Standard 1680 Class 1 and marked with the logo. Couplings shall be manufactured by Clamp-All Corporation model #80 pipe sizes 1-½" to 4" model #125 pipe sizes 5" to 10" or approved equal.
 4. Joints in hubless cast iron pipe sizes 1-½" to 2" where exposures to head pressure cannot exceed 10 feet shall be approved to CISPI Standard 310-85. Couplings shall be manufactured by Anaco, Tyler, Charlotte or Jones.
- B. Copper: Cast (ASTM B16.23) or wrought (ASTM B16.29) copper drainage fittings with solder joints.
 - C. Galvanized Steel: Screwed, galvanized cast iron drainage fittings.
 - D. All fittings shall be compatible with piping for size, material and joint type.
 - E. Cast iron pipe and fittings shall be factory coated with coal tar enamel.
 - F. Rubber Gaskets: "Dual-Tight" and "Ty-Seal" with "Lubrifast" lubricant.

PART 3-EXECUTION

3.1 PREPARATION

- A. Coordinate location, size and depth of existing building drains.

3.2 BUILDING INSPECTION

- A. Contractor must examine the areas and the conditions under which interior sanitary piping system work is to be installed.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected and existing interior sanitary piping location and depth has been established.
- C. The location of existing interior sanitary piping shown on the Drawings should be considered approximate.
- D. The Contractor is responsible for determining the exact location of any existing pipe to which it must make connections, or which may be affected by its work in any way.

3.3 GENERAL REQUIREMENTS

- A. Pitch soil and waste piping in direction of flow at no less than 1/8" in. per ft. and not more than ¼" per ft. Pitch pipes 2 in. and smaller at ¼" per ft. Pitch all vents for proper drainage. All piping to be concealed, unless indicated on Drawings.

3.4 TESTS

- A. Test entire new sanitary piping system as required by the State and Local Building Code and as specified below.
- B. For a minimum test, plug piping at the lowest point and fill with water to highest point on roof to provide a minimum of 10 ft. of head of water on all parts of the system. Maintain for one hour with no leakage. Repair any deficiencies. Final test to be conducted with smoke or peppermint at 1 in. W.G. for 15 min. Install gaskets or reset fixtures as required.
- C. All tests to be performed before any piping is covered or concealed.
- D. Should leaks occur, the defective section of pipe and defective fitting shall be removed and replaced.
- E. Tests shall be repeated until no leaks occur.
- F. Isolate existing system as much as possible during test.

END OF SECTION 221316

SECTION 221319 PLUMBING SPECIALTIES

PART 1 GENERAL

1.1 DESCRIPTION

- A. Plumbing specialties related to the plumbing work shall be provided as shown on the drawings and as specified.
- B. Refer to interior domestic water piping, domestic water heating, drainage and vent systems, and other sections for work related to this section.

PART 2-PRODUCTS

2.1 MATERIALS

- A. Drainage specialties:
 - 1. Specialties shall be as manufactured by Smith, Wade, Josam, or Zurn. When a specific manufacturer is listed and his catalog numbers are given, it is for the purpose of establishing the type, quality and features of the item to be provided. Items that are identical in size, that incorporate similar features and that are substantially equal in quality, as manufactured by any one of the manufacturers listed above, will be acceptable.
 - 2. Drains are scheduled or indicated on the drawings by manufacturer (see paragraph A. above), catalog number, type, size and features required.
 - 3. Cleanouts located in interior floors shall be equal to Smith Series 4000 consisting of two-piece adjustable housing, cast iron gasketed plug and round non-slip secured nickel-bronze cover. Additional features such as clamping device for waterproof membrane, synthetic covering top, heavy duty top, carpet flange or carpet marker shall be provided where necessary.
 - 4. Cleanouts located in interior walls shall be equal to Smith Series 4472 consisting of brass plug and round stainless-steel access cover secured by vandal-proof center screw. Wall cleanouts that cannot be made accessible in this manner shall be provided with an access panel.
- B. Miscellaneous plumbing specialties:
 - 1. Cushion chambers to be furnished where shown on the drawings. These shall be sealed gas bellows or diaphragm design by Wade, Zurn, Smith, Josam, Sioux Chief, Amtrol or Precision Plumbing Products, Inc. Unit shall conform to PDI Institute Standard WH-201, and ASSE Standard 1010. Size shall be recommended by PDI.
 - 2. Tempering valves shall be provided where shown to limit the hot water discharge temperature to 110 degrees. Valves shall be by Leonard, Powers or Symmons.
 - 3. Backflow preventors:
 - a. Units shall be reduced pressure type consisting of two check valves and an automatic pressure differential relief valve located between the two check valves. A low outlet relief shall be below the pipe inlet and a test cock shall be provided. All units shall be constructed of corrosion resisting material and include strainer, ball valves (2" and smaller), OS&Y valves (3" and larger) and unit mounted (factory supplied) air gap fitting.

- b. Units shall be on the list of acceptable equipment published by the U.S. Public Health Service and shall be Watts, Hersey-Beeco, Clow “Cal-Val”, Wilkins or Conbraco.
 - c. Follow strictly manufacturer’s instructions for installation. Install a check valve in the service line ahead of the backflow preventer to prevent unwarranted discharge due to fluctuation in service line pressure.
 - d. Relief discharge from backflow preventer shall have an open-air gap.
4. Trap primer shall be Precision Plumbing Products Prime-Rites, E&S Valve, Watts or equal.

PART 3-EXECUTION

3.1 INSTALLATION

- A. Cleanouts shall be same size as pipe thru 4” size. Maximum size of cleanouts shall be 4” diameter unless larger units are required for testing or special access purposes. Provide cleanouts where indicated on the drawings and at other locations where deemed advisable. Location of cleanouts as stipulated by applicable code shall be considered as the minimum requirement.

END OF SECTION 221319

SECTION 223000 - WATER HEATERS

PART 1-GENERAL

1.1 DESCRIPTION

- A. Provide electric point-of-use water heater with 4-gallon built-in storage tank, and controls, complete, tested, and ready for domestic service.
- B. Provide thermostatic mixing valve as required by Code.

1.2 QUALITY ASSURANCE

- A. Standards; Underwriters Laboratories (U.L.), National Electric Code (NEC), American National Standards Institute (ANSI), National Sanitation Foundation (NSF), and American Society of Mechanical Engineers (ASME).

1.3 ENERGY CODE APPROVALS

- A. Heater shall comply with the latest edition of the State Energy Code, ASHRAE 90.1b-1992, and 1990 NAECA.

1.4 GUARANTEE

- A. Heater shall have a 5-year parts-only limited warranty for commercial use. Written warranty must be furnished.

PART 2- PRODUCTS

2.1 WATER HEATERS

- A. Provide temperature/pressure relief valve included.
- B. Similar products as manufactured by the following are considered equivalent provided, they meet or exceed the above:
 - a. Bosch
 - b. Ruud

PART 3-EXECUTION

3.1 COORDINATION

- A. Coordinate location of water heaters with equipment.
- B. Coordinate water heater ingress.
- C. Coordinate electrical requirements.

3.3 GENERAL INSTALLATION

- A. Install water heater where shown on drawings.
- B. Set water heater supply temperature at 120 deg. F.
- C. Provide shutoff valves and dielectric unions on inlet and outlet of water heaters.
- D. Install ASME temperature and pressure relief valve, and extend a metallic material relief valve discharge line to 6 in. above floor and elbow down.
- E. Provide brass drain valve if drain not provided with heater.

3.3 WIRING

- A. Power wiring and conduit shall be provided by the Electrical Contractor.

END OF SECTION 223000

SECTION 224000- PLUMBING FIXTURES

PART 1-GENERAL

1.1 DESCRIPTION

- A. Provide new plumbing fixtures installed in place, complete with supports and supply and waste trim as specified herein and indicated on the Drawings.
- B. Provide trim, fittings, carriers, angle stops, chrome water supply piping and all accessories required for a complete installation.
- C. Caulk around fixtures at wall and floor.
- D. Fixture connection sizes are shown on Drawings.

1.2 QUALITY ASSURANCE

- A. Standards: Americans with Disabilities Act (ADA) guidelines, American Society of Sanitary Engineering (ASSE), City and State Plumbing and Energy Codes, National Sanitation Foundation (NSF), Plumbing and Drainage Institute (PDI), and American National Standards Institute (ANSI).
- B. Unless otherwise noted, all fixtures and fittings of the same type shall be by the same Manufacturer.
- C. Exposed metal parts shall be nonferrous construction and be chrome-plated, unless otherwise noted. Vitreous china or enamel fixtures and trim shall be free of defects. Plumbing fixtures to be white in color, unless otherwise noted.
- D. All plumbing fixtures shall be of commercial quality and free of defects.

1.3 SUBMITTALS

- A. Submit Manufacturer's product data for all products specified in this Section and shown on Drawings.
- B. Each Shop Drawing submittal shall be clearly marked with model number, fixture designation number and indicate all required fittings, dimensions, construction, color and rough-in requirements. Submit color charts when required.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Protection: Fixtures and trim shall remain crated and stored until installation to prevent moisture and dirt contamination and physical damage. Plumbing Contractor shall adequately protect installed fixtures from damage.

PART 2-PRODUCTS

2.1 PLUMBING FIXTURES AND ACCESSORIES

- A. Acceptable Fixture Manufacturers:
 - 1. Vitreous China and Enameled Cast Iron Fixtures: American Standard, Kohler, Eljer or Crane.
- B. Acceptable Fittings Manufacturers:
 - 1. Faucets: Chicago Faucet, American Standard, Elkay, Kohler, Eljer, Crane, T&S Brass Company, Grohe, Speakman, Moen or Delta.
 - 2. Automatic Flush Valves: Zurn "AquaSense" or Sloan "Optima".
 - 3. Water closet Seats: Beneke, Church, Kohler, Bemis, Olsonite, Centoco or Sperzel.

- 4. Supplies, Escutcheons and Traps: Brasscraft, Bridgeport, Consolidated, Frost, Waterway, McGuire Mfg. Co., Dearborn, Sanitary-Dash, Speedway or Anso-Flex.
- C. All trim and exposed piping to be chrome-plated unless otherwise noted.
- D. Faucets to have renewable seats.
- E. All plumbing fixtures and accessories of the same generic type shall be the products of the same Manufacturer.

2.2 CARRIERS

- A. Provide heavy duty, rectangular vertical support, floor supported, commercial type fixture carrier for all new wall mounted plumbing fixtures, unless noted otherwise.
- B. Lavatories: Zurn Model Z-1231.
- C. Water Closets: Zurn Model Z-1204, floor supported, with buttress foot and foot anchor, rear foot support, flush valve supply support, cast iron, commercial type. Coordinate location of carrier closely with Associate Architect.
- D. All carriers shall be specifically chosen to accommodate the particular brand and style of fixture actually installed, the particular type of floor and wall actually present at each fixture location and the piping arrangement at each fixture. Furnish plastic or metal positioning frames to isolate carrier bolts from wall construction.
- E. Zurn or equal by J.R. Smith, Wade or Josam.

PART 3-EXECUTION

3.1 COORDINATION

- A. Coordinate exact location and installed height of plumbing fixtures.
- B. Coordinate mounting height of all fixtures and controls to be used by the physically handicapped. Refer to ADA Guidelines.

3.2 INSTALLATION

- A. Install fixtures according to Manufacturer's recommendations.
- B. Install fixtures carriers and drainage fittings on wall hung fixtures, such as water coolers, urinals and lavatories. Carriers to be anchored securely to floor.
- C. Chrome plated brass escutcheons shall be installed on waste and supply piping at walls, including piping in cabinets.
- D. Install stops on all cold and hot water supplies to fixtures.
- E. All fixtures shall be thoroughly cleaned of paper and dirt before final acceptance.
- F. Provide all required seals, gaskets, nuts, bolts and washers.
- G. Fixtures shall be carefully assembled and connected to the required plumbing inlets and outlets, and tested so the fixtures will be functioning correctly when the Work is completed.
- H. After the installation of the plumbing fixture is completed, all connecting pipes shall be flushed out through the fixtures to eliminate scale. Clean faucet strainers. "Domestic Water Piping System", Sterilization of Water Lines.
- I. Self-sustaining water closet seats shall be field adjusted to self-sustain in any position.
- J. Provide anchors and supports behind walls and chases for flush valve supply piping.
- K. Insulate all hot water and drain piping that could come in contact with wheelchair occupants.

END OF SECTION 224000

SECTION 233000 - EXHAUST FANS

PART 1-GENERAL

1.1 DESCRIPTION

- A. Provide packaged, factory-wired exhaust fans of the following types:
 - 1. In-Line Fan.
 - 2. Attic Fans.

1.2 QUALITY ASSURANCE

- A. Standards:
 - 1. AMCA 210; fan performance rating.
 - 2. AMCA 300; sound rating.
 - 3. U.L. Listed; fan assembly.

1.3 RATINGS AND CAPACITY

- A. Refer to drawings for model number, CFM, static pressure, RPM, HP and other electrical requirements.

1.4 MOTORS

- A. Unless otherwise noted, motors shall be NEMA Design B, continuous rated with 1.15 service factor, with Class F insulation and Class B temperature rise, copper windings and leads, RPM, with the horsepower indicated on the drawings. All motors shall be equipped with ball bearings.

PART 2-PRODUCTS

2.1 EXHAUST FANS

- A. General construction; galvanized steel housing, complete with acoustical lining, field adjustable horizontal/vertical discharge duct connection with backdraft damper, control/junction box. Architectural inlet grille on ceiling mounted fans. Inlet duct connection on inline fans.
- B. Fans; forward curved centrifugal blower wheel(s) shaft mounted to permanently lubricated motor. Blower and/or motor resiliently mounted to fan housing.
- C. Controls; motor power cord with receptacle plug, and fan control as scheduled. Furnish wall-mounted variable speed controller, unit-mounted variable speed controller, or other devices as shown on the Exhaust Fan Schedule.
- D. Accessories; provide aluminum wall cap with ½ in. mesh aluminum birdscreen, and flashing skirt, as required; size to match fan. Wall caps to be etched and primed for painting. Color selected by Architect.
- E. Acceptable manufacturers; Broan, Air Vent or approved equal by ACME Engineering, Penn, Greenheck, Coolair, or Jenn-Fan.

PART 3 -EXECUTION

3.1 INSTALLATION

- A. Provide flexible connections for ductwork attachment to each fan.

- B. Extend discharge duct from fan full size to wall outlet as shown on drawings. On direct drive ceiling fans, provide balancing damper in duct in accessible location. (Not shown.)
- C. Electrical Contractor shall install and wire.
- D. Contractor to provide mesh birdscreen at all exterior penetrations, including wall caps.

3.2 WIRING

- A. Provide power wiring, control wiring, and switching.
- B. Motor starters and disconnect switches for wall fans are provided by the Electrical Contractor.
- C. Means of control is provided by supplier. Refer to Exhaust Fan Schedule.

END OF SECTION 233000

SECTION 233113- LOW VELOCITY DUCTWORK

PART 1- GENERAL

1.1 DESCRIPTION

- A. Include turning vanes, extractors, splitter-dampers, volume dampers, access doors, flex connections.
- B. Duct layout is schematic; provide duct risers, drops, offsets around obstructions, flattened sections, etc. and all fittings necessary to install ductwork.

1.2 QUALITY ASSURANCE

- A. Standards:
 - 1. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), Sheet Metal and Air Conditioning Contractors National Association (SMACNA), National Fire Protection Association (NFPA), and Underwriters' Laboratories (UL).
 - 2. SMACNA "Duct Construction Standards": These are absolute MINIMUM Standards; duct construction shall meet or exceed these standards.

1.3 RELATED WORK DESCRIBED ELSEWHERE

- A. Refer to "Hangers, Supports and Inserts".

1.4 SUBMITTALS

- A. If any changes are made from plans, submit ductwork layout shop drawings for review.
- B. Layout drawings shall be at 1/8" = 1'-0" scale, with enlarged sections and elevation plans as necessary.
- C. These drawings will be used as a basic coordination tool by all Contractors.
- D. Sheet Metal Contractor shall notify the Architect during the bidding period, of any obvious conflicts between the ductwork and the work of all other trades.

1.5 DUCT DIMENSIONS

- A. The dimensions indicated on the drawings are the net inside clear dimensions available for air flow.
- B. Contractor shall allow for shop-lined or exterior insulation thickness as required.

PART 2- PRODUCTS

2.1 STEEL DUCTWORK

- A. Construction: Galvanized steel, 24 gauge thru 16-gauge, intermediate reinforcing bracing, slip joints, mechanical formed seams, beaded and cross-broken.
 - 1. SMACNA Section I.
- B. Elbows, Branches, Transitions, Offsets: Round duct fittings to be conical with scoops at branch takeoffs. Round elbows to be 3-piece type.
- C. Turning Vanes: Double thickness airfoil construction. Tuttle & Bailey "Duct-Turns" or equal by Titus or Anemostat.
- D. Hangers, Attachments and Supports: SMACNA Section IV.

2.2 DUCT SEALER

- A. United McGill Corporation "United Duct Sealer" or approved equal.

2.3 FLEXIBLE DUCTWORK

- A. Preinsulated metal flexible round ductwork for branch runouts and connections to diffusers. Min. 3" pressure rating with .25" C Factor.
 - 1. Flexmaster Type M or approved equal.
- B. Option: Insulated round rigid sheet metal ductwork for branch runouts and insulated flexible duct connections to diffusers (maximum 5 ft. long flexible duct).
 - 1. Hart & Cooley, Atco or approved equal.
- C. U.L. 181, Class I, must not exceed 25 Flame Spread or 50 Smoke Developed.

2.4 FLEXIBLE CONNECTIONS

- A. 30 oz. neoprene coated glass fabric ventfabrics "Ventglas" or approved equal.

2.5 DUCT ACCESS DOORS

- A. Constructed of corresponding metal, minimum twice the gauge thickness of the duct in which it is installed, felt stripping or foam rubber gasketing, completely airtight. Quick opening latches or wing nuts.
 - 1. Square door equal to width of duct minimum 2" for access.

PART3 - EXECUTION

3.1 INSTALLATION

- A. Ductwork installation shall comply with all recommendations of SMACNA reference publication.
- B. Install turning vanes at all changes of direction. Option: Use standard radius turns, with centerline radius a minimum 1-1/2 times duct dimensions.
- C. Install extractors at all rectangular supply branches. Install combination scoop extractors/butterfly dampers at all round supply branches. Ensure damper quadrant operator is exposed after insulating ductwork. Tape around.
- D. Apply sealer to all joints per manufacturer's instructions.
- E. Make final connections to diffuser in suspended ceilings with insulated flexible duct (10 ft. long maximum).
- F. Install a minimum 4 in. flexible connection where ductwork connects to motor-driven equipment. Do not bulge or install on a bind.
- G. Duct access doors: Install in accessible usable locations.
- H. Keep ductwork tight as possible to underside of structure.
- I. Install all dampers and provide blank-off plates to seal frames airtight.
- J. Contractor shall coordinate size and location of ductwork with structure, piping, lighting, equipment, conduit, cable trays, ceiling construction and clear height above and other items which may present a potential conflict.

3.2 TESTING

- A. Pressurize ductwork to 110% of design pressure. Air leakage shall not exceed 0.5% of the design CFM in any main or branch.

END OF SECTION 233113

SECTION 233700 GRILLES, REGISTERS AND DIFFUSERS

PART 1- GENERAL

1.1 DESCRIPTION

- A. Provide grilles, registers and diffusers as indicated on the drawings.
- B. Service shall be for supply and exhaust as noted on the drawings.

1.2 QUALITY ASSURANCE

- A. Standard: Air Diffusion Council (ADC).

1.3 RATINGS AND CAPACITIES

- A. Refer to drawings for air device construction, CFM, finish and accessories.

1.4 APPROVED MANUFACTURERS

- A. Design Base: Anemostat. Model Numbers are on the drawings.
- B. Acceptable Options: Titus, Tuttle & Bailey, Carnes or Krueger.

PART 2- PRODUCTS

2.1 GRILLES, REGISTERS AND DIFFUSERS

- A. General Construction:
 - 1. Steel and aluminum, factory-fabricated to evenly distribute design CFM throughout the space without causing noticeable drafts.
 - 2. Ceiling diffusers shall be square or round, with equalizing grid and fixed or adjustable air discharge pattern.

PART 3- EXECUTION

3.1 INSTALLATION

- A. Diffusers on rectangular ducts shall be installed with equalizing deflectors at the diffuser neck and combination damper and equalizing grid at top into rectangular duct. Install dampers in neck with blades 90 degrees from blades in grid unit. Diffusers supplied by flexible ducts shall be installed with louver damper equalizing grid installed in the diffuser neck.
- B. Do not install combination damper/equalizer on bottom connection to a continuing supply air main duct.
- C. Registers shall be provided with sponge-rubber gasket between flanges and wall or ceiling.
- D. Wall supply registers shall be installed at least 6 inches below the ceiling, unless otherwise indicated.
- E. Insure air-tight seal at all connections.

END OF SECTION 233700

SECTION 260000- ELECTRICAL SPECIFICATIONS

PART 1-GENERAL

1.1 DESCRIPTION

- A. Provide all labor, material, equipment, services and inspection necessary for the proper completion of all electric work.
- B. Coordinate location of electrical item with equipment installation requiring electric service.
- C. Contractor is responsible for relocating all existing items that interfere with the installation of new work. The drawings do not show every item that must be removed and disconnected by the Contractor. Unless otherwise noted, Contractor shall deliver all removed items to the Owner. Service to existing equipment that remains shall be maintained or reconnected.

1.2 WORK NOT INCLUDED

- A. The following work shall be provided by the Owner directly or through a separately negotiated contract:
 - 1. Primary Service Transformers

1.3 PERMITS AND FEES

- A. Unless otherwise excluded in the Contract Documents, Contractor shall secure and pay for all other permits and governmental fees, bonds, licenses and inspections necessary for the proper execution and completion of its work.
- B. The Contractor must give notice and comply with all laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the performance of the work.
- C. If the Contractor observes that any of the Contract Documents are at variance therewith in any respect, shall promptly notify in writing, and any necessary changes will be arranged.
- D. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules and regulations and fails to give prior notice, Contractor shall assume full responsibility for, and shall bear all costs associated with correcting the work.

1.4 EXAMINATION OF SITE

- A. Certain existing conditions may affect the manner or sequence of the performance of the work. Existing services, structures and operating schedules may need to be reviewed to facilitate the installation of the work.
- B. Contractor should visit the site of the proposed project. After the Contract is signed, no allowance will be made for lack of knowledge of project conditions.
- C. The Contractor shall verify and reconcile work required by the Contract Documents with conditions at the site.

- D. Should the Contractor note any discrepancies during the bidding period, shall notify immediately, in writing, to permit issuance of an addendum to prevent misunderstandings at a later date.

1.5 STANDARDS OF QUALITY

- A. The Contractor shall provide work of the highest quality, conforming to the accepted practices and standards of the trades involved. Further definition of quality is given by reference to various laws, codes, standards and regulations.
- B. Any law, code standard or regulation referred to in other Sections of Division 16, is included in its entirety as a part of these Specifications.
- C. Listed below are titles and abbreviations that may be used in the Specification:
 - 1. National Electrical Code (NEC).
 - 2. National Electrical Manufacturers Association (NEMA).
 - 3. Underwriters' Laboratories (UL).
 - 4. National Fire Protection Association (NFPA).
 - 5. Institute of Electrical and Electronic Engineers (IEEE).
- D. The following codes apply to this work:
 - 1. National Electrical Code.
 - 2. State Building Code.
 - 3. Americans With Disabilities Act Accessibility Guidelines (ADAAG).
- E. Work must be performed by licensed Contractors as required by local and state codes.
- F. All equipment, fixtures, devices, and wiring shall be listed by Underwriters' Laboratories.

1.6 CONTRACT DRAWINGS

- A. Drawings are schematic and show approximate locations and extent of work. Exact locations must be coordinated with other trade Contractors and verified in the field.
- B. Significant deviations from drawings must be approved in writing.
- C. Make minor changes in location which do not require additional labor or material, up to the time of roughing-in, without additional cost.
- D. If a conflict occurs between the drawings and specifications, the Contractor shall immediately call it to the attention of the Architect.

1.7 GUARANTEE AND WARRANTIES

- A. Provide one full year guarantee from date of substantial completion on all equipment and work performed.
- B. Repair and/or replace any defective work, material or equipment within (1) year period.

END OF SECTION 260000

SECTION 260126- ELECTRICAL TESTS, ADJUSTMENTS AND INSPECTIONS

PART 1-GENERAL

1.01 DESCRIPTION

- A. Contractor shall conduct such tests and adjustments of equipment as required by Associate or necessary to verify performance requirements. Contractor shall pay all professional engineering fees involved in required testing of equipment.
- B. Contractor to perform a megger test at 1,000 volts on all power conductors.
- C. All special systems shall be checked out and tested by Certified Representative of Equipment Supplier. A report shall be submitted indicating results of such final check out and test.
- D. Upon completion of electrical work, test the full load phase balance of the entire electrical system.
- E. Any panelboard requiring circuit changes for balance, shall have properly revised changes made in the panel directory.
- F. Verify proper rotation of motors during load balance and final adjustments.
- G. Test lines before covering with new construction.
- H. Tests shall include:
 - 1. Proper operation of lights and equipment.
 - 2. Continuity of conduit system.
 - 3. Insulation leakage and impedances.
 - 4. Ground system resistance.
 - 5. Any special system tests described in other Sections of these Specifications.
- I. Contractor shall demonstrate that all electrical systems are operating properly. It also shall make available upon request, the following information: feeder and branch wiring megger tests, grounding resistance measurements, load balance and special system tests.

1.02 ARRANGEMENTS FOR INSPECTION

- A. On-going inspections shall be performed by the local code authority having jurisdiction.

1.03 CERTIFICATE

- A. Furnish approved Certificate of Final Inspection.

PART 2-PRODUCTS

Not Applicable

PART 3-EXECUTION

Not Applicable

END OF SECTION 260126

SECTION 260519- CONDUCTORS

PART 1-GENERAL

1.1 DESCRIPTION

- A. Provide conductors for secondary feeder and branch circuit wiring, special system wiring, and control wiring.
- B. Unless otherwise noted, all conductors shall be enclosed in a continuous, grounded raceway system.

1.2 QUALITY ASSURANCE

- A. Underwriters' Laboratories (UL).

1.3 ACCEPTABLE MANUFACTURERS

- A. Pirelli, Southwire, Clifford, American, Triangle, Rome Anaconda, Liqui-Tite, or Canadian Wire.

PART 2-PRODUCTS

2.1 MATERIALS

- A. All conductors shall be copper: conductors shall be insulated for 600 volts.
- B. Insulation types referenced are those of NEC. All conductors shall be UL labeled and shall be marked for size and type at regular intervals on its length. Conductors #8 and larger shall be stranded; #10 and smaller may be stranded provided approved terminations are used.
- C. Types of conductor insulation for general use may be any of the following, subject to limitations listed in addition to those in the NEC:
 - 1. Type THW - no restrictions.
 - 2. Type THHN - restrictions - do not use for conductors in slab. Do not use in wet locations.
 - 3. Type THWN - no restrictions.
 - 4. Type XHHW - no restrictions.
- D. Use Type THHN or XHHW, (90 degrees C. rated) types for connecting fluorescent fixtures for running thru fixture housings).
- E. Use conductors such as type FEP with high temperature insulation as identified in the NEC for connections to resistance heating elements or in other areas subject to temperature exceeding the rating of THW or XHHW.
- F. Color Coding:
 - 1. On 240/120-volt, single phase grounded systems, wires colored black, red and blue shall be used for phase conductors. Neutral wires on these systems shall be white. If conductors No. 8 AWG or larger are not available in white, the neutral may be a black wire identified with white tape, minimum size ½" wrapped twice around at the following points:
 - a. At each terminal.
 - b. At each conduit entrance.
 - c. At intervals not more than 12" apart in all accessible enclosures.
 - 2. Equipment grounding conductors shall be green, or completely taped green, at all accessible points.
 - 3. All control circuits shall be red with individual wire identification on each conductor.

- G. Wire size ampacity shall equal or exceed its overload protective device. Where wire sizes shown on the drawings are greater than the apparent ampacity requirements, the size shown shall prevail to compensate for voltage drop. In no instance shall conductors be installed that are less than required by NEC. Minimum conductor size shall be No. 12 AWG except No. 14 AWG may be used only for control wiring or where otherwise specifically shown.
- H. When necessary to use a lubricant for pulling wires, lubricant must be listed by Underwriters' Laboratories, Inc. Only cable lubricants approved for the type of jacket material or insulation shall be used, and must be of such consistency that it will dry completely when exposed to air. Lubricant must leave no obstruction of tackiness that will prevent pulling out old wires or pulling in new wires or additional wires, and, after drying, must leave a film of lubrication which will promote easy movement of the wires. The lubricant shall contain no waxes, greases, silicones, or polyalkylene glycol oils or waxes. Lubricant shall be ideal "Yellow 190" or approved equal.
- I. Splices No. 10 AWG and smaller shall be made using the following:
 - 1. Preinsulated spring pressure connectors as follows: ITT Holub "Freespring", with metal grip threads - 3M "Scotch-Lok", Ideal "Wingnut", Thomas and Betts Type "PT", or Buchanan "B-Cap". Other hard insulated wire connectors which have bakelite or ceramic insulation are prohibited. (Non-metallic thread connectors shall not be used.)
- J. Splices No. 8 AWG and larger shall be made using the following:
 - 1. Approved crimp type connectors with special crimping tool; T&B, Burndy or approved equal. Joints and free ends shall be covered with tape or approved moistureproof insulating kits. Applied insulation shall exceed 150% of conductor insulation voltage rating.
 - 2. For two or more taps use Power Distribution Blocks by Square D, Goild, Taylor, IlSCO or Connectron.
- K. Wiring in vertical raceways shall be supported with strain relief devices; Kellem's grips or approved equal.
- L. Connections to equipment shall be made with pressure type terminals. On stranded wire, use spade type terminals or terminals approved for use with stranded wire. Connections shall contain only single conductors unless approved for multiples.
 - 1. For conductors No. 10 AWG and smaller, applied crimp type terminals shall be T&B "Sta-Kon" or approved equal.
 - 2. For No. 8 AWG and larger conductors, applied crimp type terminals shall be Burndy, T&B or approved equal.
- M. Where tape is applied over wires and connectors on 600 volt or lower voltage applications, it shall consist of a minimum of two (2) half-lapped layers of Scotch "88" or Plymouth No. 4240 for both indoor and outdoor applications, except Scotch 33 Plus or Plymouth No. 4453 is acceptable for use indoors.
- N. Where fireproofing of cables is noted on the drawings or required by Code, each cable shall be arc and fireproofed with one (1) half-lapped layer of Scotch Brand 77 Electric Arc and Fireproofing Tape. Tape shall be secured with a 2-layer band of Scotch Brand 69 Glass Electrical Tape over the last wrap. Installation shall comply with manufacturer's recommendation.

PART 3-EXECUTION

3.1 INSTALLATION

- A. Unless noted otherwise, all conductors shall be installed in conduit, including special systems.
- B. Contractor shall increase branch circuit wiring shown on the Drawing by (1) size for homeruns over 100 ft. long and increase wire by an additional (1) size every 100 ft. thereafter.
- C. A maximum of (3) homeruns shall be permitted in any (1) conduit run, however, a full size neutral must be provided for each homerun. All multiple wiring installations shall be de-rated in accordance with NEC Table 310-16. Provide a neutral conductor for each circuit; no neutral sharing will be permitted where multiple circuits are installed in the same circuit.
- D. Free ends and loops at boxes and enclosures are to be pushed back in box and protected by blank covers or other means until the interior painting and decorating work is completed. Swab all conduits clean and dry before pulling wire. Wires #8 AWG and smaller to be hand pulled. Use only UL-listed pulling lubricants such as Ideal Co. "WireLube" or "Yellow 77". Refer to Section 16052 for testing of conductors.
- E. Leave at least six (6) inches of free conductor at all outlets, except where conductors are intended to loop without joints through outlets for fixtures or wiring devices.
- F. The following wire color code shall be used as applicable to this Project:

<u>WIRE</u>	<u>240/120</u>
Phase A	Black
Phase B	Red
Neutral	White
Ground	Green
- G. Branch circuits to be connected as numbered on Drawings.
- H. Test and permanently tag by circuit number each conductor wire, except neutrals, in panelboard gutter before connecting to panelboard. Use Thomas and Betts "WM" adhesive tapes wrapped around the wire and formed into a flag.
- I. Use deoxidant cleaner on all wiring connections.
- J. Tag and identify all conductors entering or leaving terminal wiring strips.
- K. Motor control, low voltage and line voltage conductors shall be installed in separate conduits.
- L. Low voltage wiring shall be run in minimum 1/2" conduit. All wiring run in air handling plenums shall be UL 910 listed. Wiring shall be run neatly, perpendicular to walls, away from piping, ductwork or other construction likely to damage the insulation, and securely clipped or fastened directly to the building structure or supported with bridle rings.
- M. Wiring installation shall be acceptable to the Code Authority having jurisdiction.

END OF SECTION 260519

SECTION 260526- SYSTEM GROUNDING REQUIREMENTS

PART 1-GENERAL

1.1 DESCRIPTION

- A. Contractor shall ground the electrical service and distribution system, including all equipment, raceways, receptacles, and motors.
- B. Ground metering equipment and base in accordance with the requirements of the local utility company.

1.2 QUALITY ASSURANCE

- A. National Electrical Code Article 250.

1.3 EQUIPMENT GROUNDING CONDUCTOR

- A. An equipment grounding conductor (green ground wire) shall be included with all circuit conductors over 100 volts. Size in accordance with NEC Table 250-95, except not smaller than #12 AWG for power and lighting circuits and #14 AWG for control circuits.

1.4 NEUTRAL CONNECTION

- A. The grounding conductor shall be connected to the neutral in only two locations – on the supply side of the service disconnect means and on separately derived systems. Because the ground is lost through the transformer, it must be re-established by use of a grounding conductor which connects the transformer secondary neutral point to the preferred ground connection.
- B. The neutral of the service entrance shall be bonded to the enclosure by a main bonding jumper. The neutral of the transformer of a separately derived system shall also be bonded by a main bonding jumper to the transformer enclosure.

1.5 WIRED GROUND CONNECTIONS

- A. Because the conduit system can provide a lower impedance path than the wired equipment grounding system, the wired equipment grounding system shall connect to the metallic conduit ground system in EVERY accessible panel, junction box, pull box, fixture housing, motor terminal box, and other metallic enclosures as follows:
 - 1. Lighting and power panels shall have a ground assembly, that has the same number, size and type of anti-turn solderless lugs that the neutral assembly has. This grounding assembly shall be factory bonded to the panel tub and shall have the screwdriver slots facing the front of the panel.
 - 2. Junction and pull boxes shall be bonded by the use of UL listed grounding screws or lugs. If there are more than four ground wires entering a box, a ground assembly of the same type used for panelboards shall be bonded securely to the enclosure. Note that NEC requires that an equipment grounding conductor passing through any accessible location be bonded to that enclosure. Self-tapping sheet metal screws may not be used.
 - 3. In enclosures not requiring a ground assembly, all ground conductors entering an enclosure shall be connected together and a pigtail the size of the largest conductor bonded to the enclosure with an attachment used for no other purpose.
 - 4. General use outlet boxes shall be bonded by the use of a ground screw in the threaded ground tap.

5. Motor terminal boxes shall be bonded by the use of a ground lug or by drilling and tapping a hole for a ground screw. Remove paint prior to making the connection.
6. Lighting fixtures shall be grounded by the use of a pigtail fastened on bare metal that is free of paint.
7. Use equipment grounding conductors on all convenience outlets. Outlet box attachment screws shall not be used as a ground.
8. In any enclosure that has a grounding assembly, all ground wires shall be connected to the assembly. Provide connection lugs or terminals for the ultimate number of wires to be connected to the assembly. Use a separate connection for each wire.
9. Paint and any other material shall be removed from ground connections so the connection is metal to metal.

PART 2-PRODUCTS

Not Applicable.

PART 3-EXECUTION

Not Applicable.

END OF SECTION 260526

SECTION 260553- ELECTRICAL IDENTIFICATION

PART 1-GENERAL

1.1 DESCRIPTION

- A. Nameplate on controller and disconnect switches shall indicate source, voltage and load served.
- B. Branch circuit panelboards:
 - 1. Identify panel designation on directory card within the panel.
 - 2. Fill out branch circuit directory indicating circuit number and area served, rooms, group of rooms, lighting, convenience outlets, motors, etc. Card index shall be neatly typed.
 - 3. Update or replace branch circuit directory in existing panelboards in areas of alteration to reflect any modifications made within the scope of this project.
 - 4. Branch circuit phase conductor color format shall be permanently identified inside each panelboard.
- C. Identify communications and signaling system wiring and branch circuit wiring by circuit number in panels wiring gutters by means of permanent durable wire markers wrapped around or fastened to conductors. This shall be done concurrently with pulling of conductors.

PART 2-PRODUCTS

2.1 MATERIALS

- A. Nameplates shall be laminated phenolic with black surface (red surface for emergency) and white core. Use 1/16" thick material for plates up to 2"x4" and 1/8" thick for larger sizes. The lettering shall be condensed Gothic with space between the lines equal to the width of the letters. Use 1/4" minimum height letters on the small plates increasing the size proportionately to plate size.
- B. The lettering on the plate shall indicate the name of equipment, the specific unit number, voltage, phases, which panel or switchboard the equipment is served from, and any other reference data pertinent to the operation. Names and numbers shall coincide with those listed on the drawings. Sample: Panel 3A; 277/480 V, 3 phase, 4 wire, served from unit substation USI.

PART 3-EXECUTION

3.1 INSTALLATION

- A. Nameplates shall be secured with screws, one on each end.

END OF SECTION 260553

SECTION 260900 -CONDUIT AND FITTINGS

PART 1-GENERAL

1.1 DESCRIPTION

- A. This specification section covers common conduit systems, boxes, firestopping and sleeves. Where other methods are specified under separate sections for specific applications, the specific application requirements shall govern.
- B. Unless otherwise noted, all conductors shall be enclosed in a continuous, grounded raceway system.

1.2 QUALITY ASSURANCE

- A. Underwriters' Laboratories (UL) Label.
- B. ANSI C80 Specification.
- C. Use galvanized steel conduit. No aluminum conduit is permitted.

1.3 MINIMUM SIZE

- A. ¾" wiring size, typical everywhere.

1.4 ACCEPTABLE MANUFACTURERS

- A. Steel conduit: Allied, Steel Duct, Omega, LTV, or approved equal.
- B. Non-metallic conduit: Carlton, Certainteed, Condux, or National Pipe.

PART 2-PRODUCTS

2.1 MATERIALS

- A. (Use only conduit types listed) Conduit - Rigid or Intermediate Grade Galvanized Threaded. Application - restrictions (not to be used in):
 - 1. Corrosive atmospheres.
- B. Conduit - Rigid Aluminum threaded. Application - restrictions (not to be used in):
 - 1. Corrosive atmospheres.
 - 2. In concrete.
- C. Conduit - Thinwall EMT. Application - restrictions (not to be used in):
 - 1. Poured concrete.
 - 2. Exposed in mechanical equipment or other equipment/process rooms below 48".
 - 3. Hazardous or corrosive atmosphere.
 - 4. Not to be used for medium voltage (2001 volts or higher) cable.
- D. Conduit - Flexible Metal (Greenfield type), galvanized steel.
Application - use limited to:
 - 1. Connection to lighting fixtures; not over 6 ft. in length.
 - 2. Connections to controls on dynamic equipment (except motors) and transformers.
 - 3. In existing walls for remodel projects, vertical drops to outlets and switches; no more than 2 ft. out the top of the wall.
- E. Conduit - Liquidtight Flexible Metal. Application - use and limitations:
 - 1. Connections to all motors.
 - 2. Connections to controls on dynamic equipment, transformers, etc. indoors in wet locations.
 - 3. Use not permitted where subject to physical damage.

2.2 CONDUIT SIZES

- A. Interior conduit and fittings; minimum conduit size for power circuits shall be ¾". Minimum conduit sized for control wiring shall be ¾".

2.3 CONDUIT FITTINGS

- A. Fittings and workmanship shall assure electrical continuity. All conduit systems in poured concrete shall be concrete tight.
- B. Application of bushings, locknuts and insulated fittings shall comply with NEC requirements.
- C. Use conduit fittings as manufactured by Efcor, Steel City, Raco, Midwest, Appleton, ETP or T&B, equal to the following catalog numbers:
 - 1. Rigid conduit;
 - a. All fittings, couplings and connectors shall be threaded type.
 - b. Grounding bushings, malleable iron; insulated; Steel City BG-801; Midwest Series GLL.
 - 2. EMT;
 - a. Fittings shall be all steel, compression type, concrete tight.
 - b. Compression type couplings; Midwest series 660S; Steel City TK111; Appleton TWC50CS.
 - c. Compression type connectors; Midwest Series 650; Steel City TC111; Appleton TW50CS.
 - 3. Flexible Conduit;
 - a. Malleable iron, "squeeze" type, non-insulated; Midwest series 1708; Steel City XC-901; Appleton 7481V. (For lighting fixture whips only - all steel or die-cast screw-in connector; Midwest 771; Steel City XC-241; Appleton SGC-50DC).
 - 4. Liquid-tight conduit;
 - a. Steel or malleable iron; Midwest Series LT; Steel City LT-100; Appleton ST.

2.4 BOXES

- A. Junction boxes and pull boxes shall be code gauge galvanized steel with multiple screw fasteners and covers.
- B. Boxes not otherwise accessible in ceilings and walls shall be made accessible by installation of hinged door access panels.
- C. Outlet boxes all steel construction with galvanized or plated finish or otherwise all metal, by Steel City, Appleton, Crouse Hinds, R&S or Raco.
 - 1. Fixture outlet boxes 4" square or octagonal, 2-1/8" deep, with 3/8" fixture studs. Equal to Steel City Series 54171; Series 52171 with FE-421 stud. Fixtures weighing more than 50 lbs. shall be supported independently of the outlet box.
 - 2. Flush mounted device outlet boxes shall be minimum 4" square. Provide extension rings as required.
 - 3. Device rings in finished masonry or tile walls shall be square corner masonry type with no extended ears, to allow flush mounting of plates.
 - 4. Surface mounted device boxes shall be cast "FS" type or special surface mounted boxes for use with surface raceway systems.
- D. Provide water tight boxes, slip expansions and bonding jumpers where dictated by construction conditions.
- E. Terminations at boxes shall be secured by locknuts or approved bushings.

2.5 SURFACE METAL RACEWAYS

- A. Snap-on cover types by Wiremold or Walkermold with prime gray finish (enamel finish coat to match room finishes in remodel areas). Application - permitted only when specifically shown on the drawings or when approved in writing by the Architect.

2.6 SLEEVES AND OPENINGS

- A. Sleeves and formed openings shall be placed in walls, partitions, floor slabs and poured concrete roof decks for the passage of conduit, cable, and wireway. Sleeves and formed openings are not required:
 1. In floor slabs on grade.
 2. Where conduit is installed before the wall, partition or slab is constructed.
 3. Openings are cut for conduit passage and patched with equal or comparable material to close the space around the conduit.
 4. In stud and gypsum board or plaster walls and partitions which are not fire rated.
 5. For conduit passing thru masonry walls and partitions and stud and gypsum board or plaster walls and partitions. Sleeves are required however, for which expansion, contraction and other movement can be expected.
 6. In core drilled openings in solid concrete not requiring water protection. Sleeves are required, however, at core drilling thru hollow pre-cast slabs and concrete block walls, to facilitate containment of required firestopping material.
 7. In large floor openings for multiple pipe and duct risers which are within a fire rated shaft, unless the opening is to be closed off with concrete or other material after conduits are set.
- B. Sleeves for passage of conduit and cables shall be schedule 40 black steel pipe or galvanized rigid conduit. Rectangular sleeves for cables and wireway shall be 18 gauge galvanized steel in poured concrete floors, walls and roof decks; 26 gauge galvanized sheet steel in other than poured concrete.
- C. Sleeves shall be sized to afford 1/4" to 3/4" clearance space.

2.7 FIRESTOPPING

- A. Firestopping at penetrations of conduit and raceway thru fire rated walls, ceilings, floors and partitions shall be provided by means of a firestopping system to maintain the required fire resistive rating of the floor or wall. Firestopping systems shall conform to ASTM E814 and E119 (UL 1479, UL 263). Shop drawings shall be submitted for approval defining UL System numbers, as published in the UL Fire Resistance Directory for the various conditions, details of the installation and description of the materials and components.
- B. Firestop fittings shall be provided with wireway for installation in fire rated floors, walls and partition.
- C. Where conduit, cable and raceway penetrate walls and floors other than those required to be fire rated, the annular space between the sleeve, core drilling or opening and the conduit, cable and raceway shall be closed to retard the passage of smoke.
- D. Firestopping systems and materials shall be manufactured by 3M, Dow Corning, Hilti, Specified Technologies, Flame Stop, Tremco or other approved manufacturer. Materials shall be in the form of caulk, putty, sealant, intumescent wrap strip and foam, applied in conjunction with sleeves, damming and fill materials and associated products.

2.8 ESCUTCHEON PLATES

- A. Escutcheon plates shall be split-ring chromium plated pressed steel. Plates shall be sized to cover the surface penetration and sleeve. Plates shall be installed on exposed piping in finished rooms and areas where conduits penetrate walls, floors, ceilings or overhead structure.

PART 3- EXECUTION

3.1 INSTALLATION

- A. Conduit shall be run overhead, concealed in all finished areas and elsewhere unless specifically indicated. All conduit shall run parallel building lines.
- B. Conduit shall be run overhead and shall not be run in concrete slabs unless specifically indicated on the drawings. The 90 degree elbow and stub-up shall be galvanized rigid steel.
- C. Conduit crossing building expansion joints shall have expansion provisions with grounding continuity; use special expansion fittings or other NEC approved method.
- D. Do not install wall-mounted boxes back-to-back in opposite sides of wall; in stud walls, boxes shall be on opposite sides of studs.
- E. Work shall be so planned as to:
 - 1. Minimize the number of offsets and junction boxes. For feeder conduits, use all long radius conduit bends or accessibility located large junction boxes with screw covers.
 - 2. Generally run conduit and conductors as high as practicable.
 - 3. Coordinate activity in advance to avoid interference with other trades.
 - 4. Provide access to all junction and pull boxes.
 - 5. Maintain 6" from conduit to paralleled hot water piping and 4" from cross piping.
- F. Secure feeder conduit to basic structural elements with galvanized strap hangers and clamps; use of trapeze type hangers is encouraged for multiple conduits where space will permit. Galvanized metal clamps and screws may be used for attaching and supporting branch circuit conduit. Non-metallic fasteners shall not be used except plastic inserts may be used in concrete for small conduits. Vertical conduits shall be supported at each floor by clamps.
- G. During construction temporarily cap open ends of conduit. Caution trades to take special care of runs in concrete slabs during pouring.
- H. Empty conduit installed for communications use or for future systems shall have an insulated pull wire or heavy nylon cord inserted for use in pulling wires.
- I. Firestopping systems and materials shall be applied at penetrations to form rated systems to restore the fire resistive rating of the floor, floor-ceiling, roof-ceiling or wall assembly. Components and installation shall be conformance with the manufacturers instructions and the appropriate UL systems listed in the Fire resistance Directory.
- J. Where firestopping is not required, the annular space between the sleeve, core drilling or opening and the conduit, cable and raceway shall be closed with caulking to retard the passage of smoke.
- K. Where conduits requiring no pipe sleeves pass thru floor, wall or partition, the annular space shall be closed with materials and methods compatible with the wall or partition material (Type M masonry grout, drywall joint compound, plaster, etc.).
- L. Conduits, wire and cables entering from outside the building shall be sealed water and moisture tight. Seal between conduit and sleeves, conduits and core drilled holes and around conductors inside conduits. Provide cast iron pipe or schedule 40 galvanized steel conduit sleeves in exterior walls below grade, with intermediate wall stop and anchor

collar set in place before concrete pouring. Sleeve shall be a part of the sealing assembly. When the wall opening is core drilled the wall sleeve may be omitted. A mechanically compressed rubber sealing assembly equal to Thunderline Corp. "Link-Seal" shall be placed in the annular space between conduit and sleeve or core drilling.

- M. Unless noted otherwise on the drawings, a maximum of 8 conductors shall be installed in a branch circuit conduit. This maximum is a count of all phase and neutral conductors only - ground conductors are not counted when determining maximum fill for this purpose.

3.2 LIQUID-TIGHT FLEXIBLE METAL CONDUIT (LTFMC) INSTALLATION

- A. Provide liquid-tight flexible metal conduit (LTFMC) for the following:
 - 1. Motors and the motor branch circuit conduit (or motor disconnect switch where present)
 - 2. Damper operators and associated conduit or J-box.
- B. Install a wired equipment grounding conductor with appropriate terminations in all LTFMC. Grounding wire shall be sized in accordance with NEC Article 250, except #12 AWG Cu shall be the smallest size ground wire permitted. Drill and tap a hole in motor pigtail box and other enclosures if a suitable ground lug attachment means is not provided. Spring steel box grounding clips are not acceptable attachments.

END OF SECTION 260900

SECTION 262400 -PANELBOARD

PART 1-GENERAL

1.1 DESCRIPTION

- A. Each panelboard shall comply with all applicable codes, recommended practices and standards of IEEE, NEMA and UL.
- B. The panelboard manufacturer shall supply equipment which is rated, listed, and labeled for the available short circuit current and the fuse/circuit breaker combinations indicated on the drawings.

PART 2-PRODUCTS

2.1 MATERIALS

- A. Panelboard types – 120/240-volt AC panelboards:
 - 1. Breakers in sizes thru 100 amp shall be 10,000 amp, I.C. rated, equal to Siemens “BL”, Square D “QOB”, Westinghouse “BAB” or “Quicklag”, G.E. “THQB” or Cutter Hammer.
 - 2. GFCI breaker - UL Class A (5 milliamperere sensitivity). Ground fault circuit protection shall be an integral part of the branch circuit breaker which also provides overload and short circuit protection. Space required in panelboard shall be same as standard single pole circuit breaker.
 - 3. Panelboard by Siemens, Square D, Cutler Hammer, Westinghouse, G.E., Kinney or Park-Ohio.
- B. Circuit breaker distribution panelboard;
 - 1. Removable front with hinged door. Bussing braced for 40,000-amp short circuit current; 1200 amp bussing and less.
 - 2. Power and distribution panelboards by Square D “I-Line”, Siemens “Sentron” or equivalent by Cutler Hammer, Westinghouse, G.E., Kinney or Park Ohio.
- C. Refer to “Electrical Identification” Section for nameplate requirements.
- D. General Construction
 - 1. Code gauge, galvanized steel tubs with minimum 4” clear gutters all sides. Minimum tub width 20”, depth 5”.
 - 2. Locking type reinforced doors with concealed hinges; equipped with directory card holder on inside of door; enameled finish. Doors over 48” high shall have 3 point latch and vault locks. All locks shall be master keyed cylinder, keyed alike.
 - 3. Permanent individual breaker pole numbers affixed adjacent to each breaker in a uniform position consisting of a stamped metallic or painted numeral.
 - 4. Bussing shall be copper.
 - 5. Branch circuit panelboard tubs and fronts shall be sized to have required amp bussing and accommodate 42 poles unless indicated otherwise on the drawings. Furnish number of breakers shown.
 - 6. A neutral bar assembly (when required) and separate ground bar assembly shall be provided and shall be mounted at opposite end of cabinet from the mains. Each assembly shall be copper and have the adequate number of terminals, of sufficient size and type of anti-turn solderless lugs. Each assembly shall have conductor terminal screwdriver slots facing the front of the panel. Bond ground bar assembly to panel cabinet.

7. Terminals for feeder conductors to the panelboard mains, neutral, ground and branch circuit breaker wiring shall be suitable for the type of conductor specified.
8. Circuit breakers shall be thermo-magnetic, bolted type and where more than one pole is used, they shall employ a common trip.
9. Breakers in panelboards used for switching of circuits shall be rated for switching duty; UL "SWD" type.
10. Breakers used for protection of heating, air conditioning and refrigeration equipment shall be UL "HACR" type.

PART 3-EXECUTION

3.1 INSTALLATION

- A. Mount top of wall mounted cabinets 6'-0" above floor. Coordinate location of panels so they are accessible and to avoid interference with other equipment and trades.
- B. The position of breakers in each panel shall be arranged in the field for sequence phasing by this Contractor to best suit wiring conditions and balancing of phases. Fill in, typewritten, the directory of each branch circuit panelboard.
- C. Provide a directory for each panelboard. Fill in, typewritten where applicable.

END OF SECTION 262400

SECTION 262700 -OUTLET, JUNCTION AND PULL BOXES

PART 1-GENERAL

1.1 DESCRIPTION

- A. Provide boxes for devices, lighting fixtures, motors and equipment connections, system equipment connections, and special outlets. Provide pull boxes where more than (3) 90-degree bends are required or if conductors are pulled farther than 100 ft.

1.2 QUALITY ASSURANCE

- A. Underwriters' Laboratories (UL) label.

1.3 ACCEPTABLE MANUFACTURERS

- A. Appleton, Raco, Steel City, Thomas & Betts, National Electric or Crouse-Hinds.

PART 2-PRODUCTS

2.1 BOXES

- A. All outlet boxes to be galvanized pressed steel of standard knockout type. Covers to be secured with screws.
- B. Lighting outlet boxes to be standard 4" octagonal, 1-1/2" minimum deep boxes with 3/8" fixture mounting stud. Outlet boxes having more than two conduits, or when 3/4" conduit is used, to be standard 4" square boxes 1-1/2" deep or deeper as might be required to accommodate the wiring contained therein.
- C. Flush device boxes in masonry walls to be masonry boxes designed for the purpose, or 4" square boxes with raised covers designed for masonry.
- D. Wiring device boxes for surface conduit work and those located in potentially damp areas to be FS series cast boxes. Exterior exposed boxes to be weatherproof or airtight with gaskets.
- E. Flush device boxes in plaster or drywall construction to be 4" square, 2-1/8" deep boxes with plaster covers or gangable 2-1/2" deep boxes. Shallow 1-1/2" deep gangable boxes may be used only in demountable partitions and in other walls too thin for standard depth boxes.
- F. All fittings, covers and hardware shall be galvanized steel.
- G. Boxes must be NEMA type approved for the environmental conditions prevailing.

PART 3-EXECUTION

3.1 INSTALLATION

- A. Install plaster rings where boxes are concealed in drywall.
- B. All boxes to be rigidly supported from building structure independent of the conduit system. Boxes to be screwed to studs; no "caddy clips" will be permitted. Boxes cast into masonry or concrete are considered to be rigidly supported.
- C. Flush boxes must finish within 1/4" of surface of non-combustible materials. Boxes shall not project beyond finished surfaces.
- D. Flush-mounted fixtures in ceilings to have branch circuit conduit terminated in a junction box above ceiling, but accessible through ceiling opening and located at least one foot away from the fixture. Use 3/8" flexible steel conduit connection between junction box and fixture housing. Pre-wired lighting fixtures may have the branch circuit conduit

terminate in the fixture junction box provided the box is sized sufficient for the wire and UL labeled for 75 Deg. C wire.

- E. Boxes installed in masonry walls shall be placed with top or bottom of box at the nearest block joint.
- F. Flush device and outlet boxes in walls are not to be installed back-to-back. Offset for sound isolation.

END OF SECTION 262700

SECTION 262726- WIRING DEVICES AND COVERPLATES

PART 1-GENERAL

1.1 DESCRIPTION

- A. Provide wiring devices as indicated, including cover plates.
- B. Wiring devices must be NEMA type approved for the environmental conditions prevailing.

1.2 QUALITY ASSURANCE

- A. Underwriter's Laboratories (UL) label.
- B. NEMA Standards as applicable.

1.3 ACCEPTABLE MANUFACTURERS

- A. Hubbell, Pass & Seymour, Arrow-Hart, G.E., Bryant or Leviton.

1.4 EQUIPMENT TERMINATION

- A. Prior to rough-in, Contractor shall verify termination requirements, including, but not limited to, plug, receptacle configuration.

PART 2-PRODUCTS

2.1 MATERIALS

- A. Commercial specification grade receptacles shall be listed by Underwriters Laboratories, Inc. and shall be minimum 20 ampere, 125 volt, NEMA configuration.

Acceptable
Manufacturer
Arrow Hart
Bryant
G.E.
Hubbell
Leviton
P&S

- B. Toggle-type AC switches shall be listed by Underwriters Laboratories, Inc. and shall be 20 ampere, 120/277 volt AC.

Acceptable
Manufacturer
Arrow Hart
Bryant
G.E.
Hubbell
Leviton
P & S

Provide a device plate to suit each particular application. Cover all empty outlet boxes with a blank plate. Cover plate shall be manufactured by Pass and Seymour, Hubbell, Arrow Hart,

Bryant, G.E., Leviton or Mulberry; Taymac is an acceptable manufacturer for weatherproof non-metallic cover plates.

2.2 PLATES

- A. Plates for flush devices in interior partitions shall be Specification Grade stainless steel Type 302/304.
- B. Plates for flush devices in concrete block walls shall be Specification Grade stainless steel Type 302/304 "Jumbo" plates.
- C. Plates for devices in surface fittings shall be cadmium plated steel surface covers. Covers to fit without overlap and have round corners.
- D. Plates for heavy duty outlets and for specialty switches and outlets required for auxiliary systems shall be stainless steel.
- E. All metal plates shall be grounded.
- F. Plates for future system outlets shall be blank covers matching device plates in quality and finish.
- G. Weatherproof plates shall be Hubbell Cat. No. WP8M one-gang, cast aluminum, gasketed with single latched lift cover suitable for duplex receptacle, NEMA 3R rating raintite while in use.

PART 3-EXECUTION

3.1 INSTALLATION

- A. Switches shall be installed adjacent to strike side of door openings. Prior to roughing in, Contractor shall verify which side of the door opening is the strike side. Devices and cover plates to be absolutely plumb and horizontal with no visible gaps around edge of plates. Install top and bottom of box at nearest block joint.
- B. Install cover plates on all devices.
- C. Install galvanized, blank, screw or hinge covers on all junction boxes.
- D. Install gang plates on gang devices.
- E. Install engraved flush switch plates at all locations indicated on the Drawings.
- F. Connect green insulated ground wire to each device grounding terminals. Wire to panel ground bar.

3.2 COORDINATION

- A. Contractor shall verify conductor ampacity/voltage and NEMA type plug configuration of equipment being connected with Equipment Supplier to insure proper final connection.

END OF SECTION 262726

SECTION 262800- DISCONNECT SWITCH

PART 1 -GENERAL

1.1 DESCRIPTION

- A. Provide disconnect switches, fused and non-fused, where indicated on the drawings and in the specifications, and where required by the NEC for all devices and equipment.

PART 2-PRODUCTS

2.1 MATERIALS

- A. Disconnect switches shall be listed by Underwriter's Laboratories and shall be manufactured by Square D, Siemens, Westinghouse, G.E. or Cutler Hammer. All starters and disconnect switches shall be of the same manufacturer unless otherwise approved.
- B. Switches shall be Heavy-Duty Type, NEMA 1 enclosures, non-fused except where fuses are specified or required to protect wiring from overload; provide raintight NEMA 3R type enclosures for outdoor applications unless otherwise noted.
- C. Disconnect switches shall be quick-make, quick-break, externally operated with door interlocked with operating handle. Provide solid neutral and ground bars indicated or where required by the application.
- D. The fuse holders shall be designated for Class "R" rejection type fuses.
- E. Refer to "Electrical Identification" Section for nameplates requirements.

PART 3-EXECUTION

3.1 INSTALLATION

- A. Mount top of wall mounted disconnect switch 6'-0" above floor where space permits.
- B. Coordinate location of disconnect switches to avoid interference with other equipment and trades.

END OF SECTION 262800

SECTION 265100- LIGHTING FIXTURES AND LAMPS

PART 1-GENERAL

1.1 DESCRIPTION

- A. Refer to schedule on the drawings for information on fixtures, lamps and manufacturers. Fixtures of manufacturers other than those listed, if offered, shall be on a substitute basis and so listed as a substitute with the bid.
- B. The catalog numbers listed on the schedule do not necessarily have complete prefix and suffix designations for placing the fixture order. The Contractor shall verify these numbers and include in his base bid the necessary plaster frames, trim, mounting hardware, etc. to achieve a coordinated installation.
- C. Fixtures, ballasts and individual components shall bear UL label.

PART 2-PRODUCTS

2.1 MATERIALS

- A. Schedule – reference drawings.
- B. Lamp holders shall be highest quality ETL approved.
- C. Where located outside or subject to effect from cold, ballasts shall be low temperature type.
- D. All recessed incandescent fixtures shall be furnished with an automatically resetting thermal protection device.

PART 3-EXECUTION

3.1 INSTALLATION

- A. Fixture Hanging and Supporting:
 - 1. Support each surface mounted or suspended fixture in a minimum of two locations and where fixtures are in a continuous row, they shall be fastened together on each end in two places.
 - 2. Recessed fixtures shall be supported at all four corners. Additionally, securely fasten each fixture to the ceiling framing member by mechanical means such as bolts, screws, rivets or approved clips; install a minimum of one on each of the four sides of fixture. This Contractor shall coordinate fixture locations and fixture weight with the trade installing the ceiling system to assure adequate hangers are installed to support the weight of the ceiling plus twice the weight of each fixture.
 - 3. Surface or flush fluorescent fixtures in ceilings of the suspended lay-in type shall be installed so that the long dimension of the fixture is supported on the main support members of the ceiling system.
- B. Alignment and Cleaning:
 - 1. Fixtures shall be mounted straight, level and true to the building lines. Warped or damaged fixtures shall be replaced or repaired to the satisfaction of the Architect and Owner.
 - 2. Immediately preceding the final inspection, this Contractor shall thoroughly clean all fixtures of dust, dirt, grease, fingermarks, etc. All lamps shall be operating at the time of Owner's acceptance.

3. Coordinate location of fixtures carefully with the Architectural reflected ceiling plan. Verify that no surface mounted fixture interferes with door swings.

C. Battery Powered Emergency Lighting Fixtures:

1. Each unit shall consist of a battery, lights, lamps, automatic controls and connection to the lighting circuit ahead of all switches. Operation shall be such that the battery is maintained constantly charged under normal conditions; upon a loss of normal power, the light shall be switched on and the operating current obtained from the stored energy.
2. Units shall be UL approved. Refer to drawings for mounting, capacity and manufacturer.
3. Fasten battery operated emergency lighting units to wall or ceiling using factory-furnished bracket and make rear concealed electrical connection.
4. Electric source shall be from unswitched active lighting circuits only, to assure that battery will be charged from an active circuit.

END OF SECTION 265100

SECTION 266000- EQUIPMENT HOOK-UP AND FINAL CONNECTION

PART 1-GENERAL

1.1 DESCRIPTION

- A. Contractor shall provide rough-in and final connection for each piece of equipment requiring power, including but not limited to, the following:
 - 1. Fans
 - 2. Sensors
 - 3. Hand dryers
 - 4. Water heaters
 - 5. Pumps and motors

1.2 COORDINATION

- A. This Contractor is responsible for coordinating the electrical requirements of equipment with the supplying Contractor or Manufacturer.

END OF SECTION 26 60 00

SECTION 267000 CONTROL AND INTERLOCK WIRING

PART 1-GENERAL

1.1 SCOPE

- A. Provide all power and control and interlock wiring and conduit, relays, control transformers to provide complete and operating control systems, including low voltage wiring.
- B. Systems shall be wired to perform the operation required.

1.2 WIRING DIAGRAMS

- A. It will be the responsibility of the Contractor to provide a full set of detailed wiring diagrams for the use of the Electrical Contractor.

1.3 ADDITIONAL REMARKS

- A. Electrical Contractor will be responsible for providing any additional relays, auxiliary contacts, control power transformers and fuses required to affect the proper sequence of operation of each equipment subsystem.

END OF SECTION 267000

SECTION 311000 – SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Clear site of plant life, trees and grass.
 - 2. Remove root system of existing shrubs.
 - 3. Remove existing surface debris.

1.2 REGULATORY REQUIREMENTS

- A. Conform to applicable local building code for disposal of debris on site.
- B. Dispose of unsuitable solid waste materials off site in a manner complying with local, state and Federal agencies having jurisdiction over the Work.
- C. Coordinate clearing work with utility companies.

1.3 JOB CONDITIONS

- A. Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent facilities.
- B. Do not close or obstruct streets, walks, or other facilities without permission from appropriate authorities.
- C. Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
- D. Schedule work of this Section so as not to interfere with work required by other Sections.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that soil erosion and water pollution controls are properly located and installed prior to initiating work.

3.2 CLEARING

- A. Clear areas required for access to site and execution of work.
- B. Method of Clearing: Use equipment and procedures as required to complete the work.
- C. Remove existing shrubs, trees and other vegetation within marked areas. Grub out roots and surface rock.
- D. Clear undergrowth and deadwood, without disturbing subsoil.
- E. Existing trees scheduled to remain: Do not tunnel through tree roots; do not nail anything to trees; do not drive trucks over tree root system.
- F. Restore existing materials, systems, or improvements damaged during work of this Section to their original condition as acceptable to Architect at no additional cost to Owner.
- G. Do not burn materials on Owner's property.
- H. Abandonment or removal of certain underground conduit or pipe may be included. Removal of abandoned underground conduit or pipe which interfaces with site clearing is included under scope of this Section.
- I. Do not cover up brush and similar debris with earth.
- J. Refill depressions created by removal of stumps and large roots with suitable compacted earthfill where necessary to bring grade back to its original elevation or final grade.

3.3 PROTECTIONS

- A. Protect above and below grade utilities scheduled to remain.
- B. Protect bench marks from damage or displacement.
- C. Maintain designated site access for vehicle and pedestrian traffic.
- D. Protect exposed bare earth by mulch or other approved method if site clearing operations are completed two days prior to construction, excavation, or utility installations.

3.4 DISPOSAL

- A. Remove existing surface debris from site.
- B. Properly dispose of debris. Verify to Owner in writing the following:
 - 1. Locations where debris was disposed off site.
 - 2. That disposal complied with applicable environmental regulations.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building excavations.
2. Building perimeter backfilling to subgrade elevations.
3. Fill under slabs-on-grade, footings, and foundations.
4. Compaction requirements.

B. Related Requirements:

1. Section 014000 "Quality Requirements".
2. Section 311000 "Site Clearing".
3. Section 312500 "Erosion and Sediment Control".
4. Section 312213 "Rough Grading"
5. Division 22 Plumbing.
6. Division 26 Electrical.

C. Work Excluded:

1. Do excavation, trenching, backfilling, and compacting incidental to underground installations of Divisions 22 and 26 Work by appropriate trade. Coordinate such work with Work of this Section.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Supplement Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All materials, installation and workmanship shall comply with all applicable requirements and standards.

1.4 DEFINITIONS

- A. Borrow: Borrow excavation shall consist of approved select fill material imported from off-site when sufficient approved select fill material is not available from excavations.
- B. Clearing: Clearing shall consist in the felling, cutting up, and satisfactory disposal of trees and other vegetation designation for removal in accordance with these specifications.
- C. Excavation consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.
- D. Fill (in terms of volume): In terms of volume, fill is defined as a compacted post-construction volume in-place.
- E. Grubbing: Grubbing shall consist of the removal of roots 1 ½ inch and larger, organic matter and debris, and stumps having a diameter of three inches or larger, to a depth of at least 18 inches below the surface and or subgrade; whichever is lower, and the disposal thereof.
- F. Base Course: The layer placed between the subgrade and surface pavement in a paving system.
- G. Regular Excavation: Removal and disposal of any and all material above subgrade elevation, except solid rock and undercut excavation, located within the limits of construction.
- H. Rock Excavation: Removal and satisfactory disposal of all unsuitable materials, which, in the opinion of the A/E, cannot be excavated except by drilling, blasting, wedging, jack hammering or hoe ramming. It shall consist of un-decomposed stone, hard enough to ring under hammer. All boulders containing a volume of more than ½ cubic yard and/or solid ledges, bedded deposits, un-stratified masses and conglomerations of material so firmly cemented as to possess the characteristics of solid rock which cannot be removed without systematic drilling, blasting, or hoe ramming will be classified as rock.
- I. Drainage Fill: Course of washed granular material supporting slab on grade placed to cut off upward capillary flow of pore water.
- J. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Owner. Unauthorized excavation, as well as remedial work directed by Owner, shall be at Contractor's expense.
- K. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Owner.
- L. In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Owner.
- M. Select Fill Material: Non-plastic material obtained from roadway cuts, borrow areas, or commercial sources used as foundation for subgrade, shoulder surfacing, fill, backfill, or other specific purposes.
- N. Engineered Fill: Select fill as defined above.

- O. Structures: Incidental buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- P. Topsoil: Topsoil shall consist of friable clay loam, free from roots, stones, and other undesirable material and shall be capable of supporting a good growth of grass.
- Q. Undercut Excavation: Undercut excavation shall consist of the removal and satisfactory disposal of all unsuitable material located below subgrade elevation. Where excavation to the finished grade section results in a subgrade or slopes of muck, peat, matted roots or other unsuitable materials, the Contractor shall immediately notify the A/E.
- R. Additional Excavation: When excavation has reached required subgrade elevations, notify Owner, who will make an inspection of conditions. If Owner determines that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by Owner. The Contract Sum may be adjusted by an appropriate Contract Modification.
- S. Removal of unsuitable material and its replacement as directed will be paid on basis of Conditions of the Contract relative to changes in work.
- T. Subgrade: The undisturbed earth or the compacted soil layer immediately below granular base, drainage fill, or topsoil materials.

1.5 SUBMITTALS

- A. Material Test Reports: Provide from a qualified testing agency test results and interpretation for compliance of the following requirements indicated:
- B. Classification according ASTM D2487 of each on-site or borrow soil proposed for backfill, unless otherwise directed by the A/E.
- C. Laboratory compaction curve according to ASTM D698 for each on-site or borrow soil material proposed for fill or backfill.
- D. Laboratory analysis reports indicating compliance with ODOT gradation and physical properties specifications for all granular materials including bedding, backfill and pavement base.
- E. Field Test Results for each test group as required in item 3.18 of this specification.

1.6 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing as documented according to ASTM D 3740 and ASTM E 548. Comply with all codes, laws, ordinances, and regulations of governmental authorities having jurisdiction over this part of the work.
- B. The Contractor shall comply with the latest revision of the Occupational Safety and Health Standards for the Construction Industry.

- C. Materials and operations shall comply with the latest revision of the Codes and Standards listed below:

Ohio Department of Transportation

ODOT-CMS Construction and Materials Specifications, Current Edition

American Society for Testing and Materials

ASTM C 33 Concrete Aggregates

ASTM C 136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates Sieve Analysis of Fine and Coarse Aggregate

ASTM D 422 Standard Test Method for Particle-Size Analysis of Soils (for classification purposes only)

ASTM D 698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (Standard Proctor)

ASTM D 1556 Standard Method of Test for Density of Soil in Place by the Sand-Cone Method

ASTM D 1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (Modified Proctor)

ASTM D1883 Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils

ASTM D 2049 Standard Method of Test for Relative Density of Cohesionless Soils

ASTM D2167 Standard Method of Test for Density of Soil in Place by the Rubber-Balloon Method

ASTM D 2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D 2922 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM D 4253 Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table

ASTM D 4254 Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density

ASTM D 4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

American Association of State Highway & Transportation Officials

AASHTO T 99 The Moisture-Density Relations of Soils using a 5.5-pound hammer and a 12-inch drop

AASHTO T 180 The Moisture Density Relations of Soils using a 10-pound hammer and an 18-inch drop

ASHTO M 145 The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction

1.7 STANDARD ABBREVIATIONS

ANSI American National Standards Institute

MSDS Material Safety Data Sheets

OSHA Occupational Safety and Health Administration

ODOT Ohio Department of Transportation

1.8 TESTING SERVICES

- A. The Testing Laboratory shall be approved by the A/E and will be responsible for conducting and interpreting tests. The Testing Laboratory shall state in each report whether or not the test specimens conform to all requirements of the Contract Documents and specifically note any deviation.
- B. Specific test and inspection requirements shall be as specified herein.

1.9 PROJECT CONDITIONS

- A. Site Information: Data in subsurface investigation reports was used for the basis of the design and are available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. The Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.
- B. Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.
- C. Existing Utilities: The contractor shall contact the Ohio Utilities Protection Service, the Owner of the Utility, and Locate existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
- D. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility Owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility Owner.
- E. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by Owner and then only after acceptable temporary utility services have been provided.

- F. Provide minimum of 48-hour notice to Owner, and receive written notice to proceed before interrupting any utility.
- G. Demolish and completely remove from Site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.
- H. The use of explosives is not permitted.
- I. Barricade open excavations occurring as part of this work and post with warning lights.
- J. Operate warning lights as recommended by authorities having jurisdiction.
- K. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- L. Perform excavation by hand within dripline of large trees to remain. Protect root systems from damage or dry out to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with moistened burlap.
- M. Geotechnical Investigation
- N. Where a Geotechnical report has been provided to the Contractor, the data on sub-surface soil conditions is not intended as a representation or warranty of the continuity of such conditions between borings or indicated sampling locations. It shall be expressly understood that the Owner will not be responsible for any interpretations or conclusions drawn there from by the Contractor. Data is made available for the convenience of the Contractor.
- O. In addition to any report that may be made available to the Contractor, the Contractor is responsible for performing any other soil investigations he/they feel(s) is necessary for proper evaluation of the site for the purposes of planning and/or bidding the project, at no additional cost to the Owner.
- P. Environmental: Before crossing or entering into any jurisdictional wetlands, Contractor shall verify whether or not a wetlands permit has been obtained for the encroachment and whether special restrictions have been imposed. Care shall be taken to prevent draining or otherwise destroying non-permitted wetlands. Restore as stated on either the project drawings, the contract documents, and/or as noted in the permit.

1.10 COORDINATION

- A. Coordinate tie-ins to municipal system with the utility owner.
- B. When traffic signals or their appurtenances are likely to be damaged or interfered with as a result of the construction, coordinate temporary operation with the Local Traffic Engineer. Provide a minimum of 48 hours' notice prior to anticipated disturbance or interruption.
- C. Benchmark/Monument Protection: Protect and maintain benchmarks, monuments or other established reference points and property corners. If disturbed or destroyed, replace at own expense to full satisfaction of Owner/Jefferson County.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.2 SOIL MATERIALS

- A. Provide approved borrow soil materials from off Site when sufficient approved soil materials are not available from excavations. The contractor shall make their own determination regarding the need to bring in fill or haul off excess material and provide fill or haul-off at no additional cost to the owner.
- B. Satisfactory Soil Materials: ASTM D 2487 soil classification groups (Unified Classification System) GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.
- C. Unsatisfactory Soil Materials: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT; soils that contain rock or gravel larger than 2 inches in any dimension, debris, organic matter, waste, frozen materials, muck, roots, vegetation, and other deleterious matter. Unsatisfactory soils also include satisfactory soils not maintained within 20-percent of optimum moisture content at time of compaction, unless otherwise approved by either the A/E or a Geotechnical Engineer.
- D. Select Fill Material: Sandy clay or clayey sand with a Plasticity Index of between 7 and 20, with a minimum Liquid Limit of 30, with less than 50 percent by weight passing a No. 200 sieve, and free of rock or gravel larger than 2 inches in any dimension, debris, waste, vegetable, or other deleterious matter.
- E. Bedding Material: Unless otherwise indicated; base materials with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Drainage Fill: Uniformly graded mixture of natural or crushed gravel, crushed stone, and natural sand, conforming to the fine aggregate (Concrete Sand) requirements of ASTM C 33 (ODOT 703.02 Aggregate for Portland Cement Concrete A. fine Aggregate), with 100 percent passing a ¼ inch sieve and 2 percent to 10 percent passing a No. 100 sieve.
- G. Filtering Material: Uniformly graded mixture of natural or crushed gravel, or crushed stone and natural sand conforming to ASTM C 33, Coarse Aggregate Size No. 67, with 100 percent passing a 1 inch sieve and 0 percent to 5 percent passing a No. 8 sieve.
- H. Impervious Fill: Lean clay with a Liquid Limit of less than 50 and capable of compacting to a dense composite.
- I. Cement Stabilized Sand Backfill Material: Uniformly graded mixture of natural or crushed stone, crushed slag or natural or crushed sand conforming to the fine aggregate (Concrete Sand) requirements of ASTM C 33 with 100 percent passing a ¼ inch sieve and less than 15 percent passing a No. 200 sieve and not less than 1½ sacks of Portland cement conforming to ASTM C

150, Type 1 requirements per cu. yd. of mixture and enough water free of deleterious materials to produce a mix suitable for mechanical hand compaction. Stamp batch tickets at plant with time of loading. Material not compacted in place 1 1/2 hours after loading or material which has taken an initial set will be rejected and shall be removed from the Project Site.

- J. Topsoil: Topsoil meeting the definition prescribed in paragraph 1.04 and meeting the requirements of specification section SP 32 91 19 Landscape Grading obtained either from on-site or an off-site source.
- K. Rock Channel Protection, Riprap and Riprap Bedding: Per ODOT Item 601.

2.3 ACCESSORIES

- A. A. Detectable Warning Tape: Acid and alkali resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick minimum, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to thirty inches deep.
- B. B. Provide tape colors to utilities as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.

PART 3 - PRODUCTS

3.1 GENERAL

- A. Contractor shall plan construction to minimize disturbance to properties adjacent to the project site and be within the construction limits shown on the plans.
- B. The A/E reserves the right to limit the width of land to be disturbed and to designate on the drawings or in the field certain areas or items within this width to be protected from damage.
- C. The Contractor shall provide any grading or excavation required for equipment travel during the course of construction as well as erosion control, access or haul road installation and removal, restoration, seeding and ground cover.
- D. The Contractor shall be responsible for damage to areas or items designated by the A/E to be protected. Repairs to, replacement of, or reparations for areas or items damaged shall be made at the Contractor's expense and to the satisfaction of the A/E before acceptance of the completed project.
- E. Any fences disturbed by the Contractor shall be repaired to a condition equal to or better than their original condition or to the satisfaction of the A/E at no additional cost.

- F. Contractor shall obtain written permission from property owners for use of any access other than ones located within rights-of-way. Written permission shall contain conditions for use and restoration agreements between property owner and Contractor. No additional compensation will be made for such access.
- G. All areas disturbed shall be restored to a condition equal to or better than their original condition and shall be graded to drain.
- H. The Contractor shall protect, replace or repair all damaged or destroyed property pins or other monumentation.

3.2 PROTECTION OF EXISTING UTILITIES

- A. Contractor is responsible for locating and protecting existing utilities.
- B. If existing utilities are found to interfere with the permanent facilities being constructed under this section, immediately notify the A/E and secure instructions. Do not proceed with permanent relocation of utilities until instructions are received from the A/E.

3.3 TOPSOIL REMOVAL

- A. Remove the existing topsoil to a depth of 12 inches or to the depth encountered from all areas in which excavation will occur. The topsoil shall be stored in stockpiles, separate from the excavated material, if the topsoil is to be re-spread. Otherwise, material shall be disposed of off-site at the Contractor's expense.
- B. The contractor shall employ erosion control methods per specification 31 25 00 Erosion & Sediment Control for all stockpiled material.

3.4 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
- B. All installation shall be in accordance with manufacturer's published recommendations.

3.5 EXCAVATION

- A. Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.
- B. Excavation shall be performed as indicated on the plans or as directed by the A/E to the lines, grades, and elevations, and shall be finished to a reasonable smooth and uniform surface. During the process of excavation, the grade shall be maintained and surface shall be rolled so that it will be well drained at all times.
 - 1. When solid rock is incurred in the excavation, the rock shall be removed to a minimum depth of 12 inches below the surface of the subgrade. Material unsatisfactory for

subgrade foundation shall be removed to a depth specified to provide a satisfactory foundation. The portion so excavated shall be refilled with suitable material obtained from the grading operations or borrow area and thoroughly compacted by rolling. Material obtained from on-site grading operations must be approved by the A/E. For areas that do not require fill, scarify and compact to a depth of 6 inches.

2. Any removal, manipulation, aeration, replacement, and recompacting of suitable materials necessary to obtain the required density shall be considered as incidental to the construction operations, and shall be performed by the Contractor at no additional cost to the Owner.
3. No rock, stone, or rock fragments, larger than 2 inches in their greatest dimension will be permitted in the top 12 inches of the subgrade. No rock, stone, or rock fragments larger than 8 inches in their greatest dimension will be permitted in the remainder of the fill.

3.6 STABILITY OF EXCAVATIONS

- A. Comply with OSHA, local codes, ordinances, and requirements of agencies having jurisdiction.
- B. Slope sides of excavations to comply with OSHA, local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- C. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.
- D. Provide permanent steel sheet piling or pressure creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops a minimum of thirty inches below final grade and leave permanently in place.

3.7 DEWATERING

- A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding Project Site and surrounding area. Provide erosion control methods for dewatering operations in conformance with Specification SP 31 25 00 Erosion & Sediment Controls.
- B. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- C. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

3.8 STORAGE OF EXCAVATED MATERIALS

- A. Stockpile excavated materials acceptable for backfill and fill where directed. Place, grade, and shape stockpiles for proper drainage. Provide erosion control measures as needed per specification SP 31 25 00 Erosion & Sediment Controls.
- B. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.
- C. Dispose of excess excavated soil material and materials not acceptable for use as backfill or fill.

3.9 EXCAVATION FOR STRUCTURES

- A. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection.
- B. Excavations for footings and foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.
- C. For pile foundations, stop excavations from 6 inches to 12 inches above bottom of footing before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
- D. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Structures: Conform to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot; plus a sufficient distance to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection. Do not disturb bottom of excavations, intended for bearing surface.

3.10 EXCAVATION FOR PAVEMENTS

- A. Cut surface under pavements to comply with cross sections, elevations and grades as indicated.
- B. Areas to be Paved: After all excavation, undercutting, and backfilling has been completed, the subgrade shall be properly shaped and thoroughly compacted. The compactive effort shall include all areas beneath pavement and shall extend at least a minimum of 1 foot beyond the paving/berm limits. Compaction shall be in accordance with Table 31 20 00-1.
- C. Curb and Gutter, Sidewalks and Driveway Aprons: The subgrade shall be constructed true to grade and cross section as may be shown on the drawings. Compaction shall be in accordance with Table 31 20 00-1.
- D. All subgrade shall be graded and protected as to prevent an accumulation or standing water, and consequent subgrade saturation, in the event of rain.
- E. Grading Tolerances of Finished Surface: Earthwork shall conform to the lines, grades, and typical cross sections shown on the plans or as established by the A/E. Changes in grade shall be accomplished by smooth curves.

- F. Shape subgrade under pavement and curb and gutter to within ½ inch of required subgrade elevations.
- G. Finish pavement and curb and gutter to within ½ inch of required finish elevations.
- H. Shape subgrade under sidewalks to within 0.10 foot of required subgrade elevations.
- I. Finish sidewalks to within 0.10 foot of required finish elevations.
- J. Backfill of Curb and Gutter and Sidewalks: Immediately after the removal of forms for curb and gutter, sidewalks and driveways, the space between the back of the curb, sidewalks, and driveways shall be backfilled and smoothed off in a manner to prevent the accumulation of standing water.

3.11 TRENCH EXCAVATION FOR PIPES AND CONDUIT

- A. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 6 and a maximum of 12 inches of clearance on both sides of pipe or conduit, unless otherwise specified on the construction drawings.
- B. Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- C. Where rock is encountered, carry excavation 6 inches below required elevation and backfill with a 6-inch layer of crushed stone or gravel prior to installation of pipe.
- D. For pipes or conduit less than 6 inches in nominal size, and for flat bottomed, multiple duct conduit units, do not excavate beyond indicated depths. Hand excavates bottom cut to accurate elevations and support pipe or conduit on undisturbed soil or specified bedding.
- E. For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 90 degrees (bottom 1/4 of the circumference). Fill depressions with specified backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads ensure continuous bearing of pipe barrel on bearing surface.

3.12 EXCAVATING AND PLACING FOUNDATION DRAINAGE SYSTEM

- A. Excavate for foundation drainage system after subgrade material has been compacted but before drainage fill course has been placed. Provide a clear horizontal distance between drain pipe and trench wall on both sides not less than 2 times the diameter of the drain pipe, unless otherwise shown. Grade the bottom of trench excavations to required slope and compact to a firm, solid bed for drain system. Place and compact impervious fill material to raise low areas or where unsatisfactory bearing soil may occur.
- B. After concrete footings have been cured and forms removed, place impervious fill material on the subgrade adjacent to the bottom of the footing. Place and compact impervious fill to the dimensions indicated or, if not indicated, 6 inches deep and 12 inches wide.

- C. Place a supporting layer of drainage fill material over compacted subgrade where drainage pipe is to be laid to the depth indicated or, if not indicated, to a compacted depth of not less than 3 inches, followed by a 6 inch layer of compacted filtering material below pipe.
- D. Place sufficient width of filter fabric in trench to cover perimeter of drainage material plus overlap. Place a supporting layer of drainage fill material over filter fabric where drainage pipe is to be laid to the depth indicated or, if not indicated, to a compacted depth of not less than 2 inches.
- E. Lay drain pipe solidly bedded in drainage fill material. Provide full bearing for each pipe section throughout its length, to true grades and alignment, and continuous slope in the direction of flow.
- F. Lay perforated pipe with perforations down and joints tightly closed in accordance with pipe manufacturer's recommendations. Provide collars and couplings as required.
- G. Provide recesses in the excavation bottom to receive bells for drain pipe having bell and spigot ends. Lay pipe with bells facing up the slope with spigot end entered fully into adjacent bell. Seal joint in accordance with local practices having jurisdiction.
- H. Test or check lines before backfilling to assure free flow. Remove obstructions, replace damaged components, and retest system until satisfactory.
- I. After testing of drain lines, place additional drainage fill material as follows:
 - 1. At exterior perimeter drainage system, completely cover drain lines to a width of at least 6 inches on each side and 12 inches above top of pipe with material unless more coverage is indicated on the Drawings. Place material in layers not exceeding 3 inches in loose depth and compact each layer placed.
 - 2. At under slab drainage system, provide a minimum of 6 inches on top of drains and 12 inches around sides of drains.
- J. Unless otherwise indicated, backfill exterior perimeter drainage system with drainage fill material over filtering material to within 18 inches of indicated finished grade elevations.
- K. Place drainage fill material over underslab drainage system (maximum 6 inch lifts) and compact.
- L. Apply impervious fill material over compacted drainage fill material at exterior perimeter drains, placing the material in layers not exceeding 6 inches in loose depth and thoroughly compacting each layer. Carry impervious fill to indicated finish elevations (except carry to 6 inches below finished grade where indicated to receive topsoil) and slope away from building perimeter.

3.13 BACKFILL AND FILL

- A. Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in Part 2 of this Section unless indicated otherwise on the construction drawings.

1. Under grassed areas, use satisfactory excavated or borrow material.
 2. Under walks and pavements, use base material, satisfactory excavated or borrow material, or a combination.
 3. Under steps, use base material.
 4. Under building slabs, use drainage fill material within 1' under slab, use select fill deeper than 1'.
 5. Under piping and conduit and equipment, use select fill materials where required over rock bearing surface and for correction of unauthorized excavation. Shape excavation bottom to fit bottom 90 degrees of cylinder.
 6. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.
- B. Do not backfill trenches until tests and inspections have been made and backfilling is authorized by Owner. Use care in backfilling to avoid damage or displacement of pipe systems.
- C. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- D. Backfill excavations as promptly as work permits, but not until completion of the following:
1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 2. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.
 3. Removal of concrete formwork.
 4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom structures and remove in manner to prevent settlement of the structure of utilities, or leave in place if required.
 5. Removal of trash and debris from excavation.
 6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

3.14 PLACEMENT AND COMPACTION

- A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
1. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture condition to optimum moisture content, and compact to required depth and percentage of maximum density.
- B. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand operated tampers.
- C. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry

density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

- D. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.
- E. Minimum Compaction Requirements: Compaction percentages are percentages of maximum dry density as determined by indicated ASTM Standards. Unless otherwise recommended by a Geotechnical Engineer and authorized by the A/E, the material shall be placed at plus or minus 3% of optimum moisture content.

Table 31 20 00.1	
Minimum Compaction Limits	
Location	Density
Beneath and within 5 feet of buildings	98% of the maximum dry density by ASTM D 698 (Standard Proctor), AASHTO T-99
Areas under roadway pavement surfaces, shoulders, sidewalks, and curb and gutter	98% of the maximum dry density by ASTM D 698 (Standard Proctor), AASHTO T-99
Under turf, sodded, planted, landscaped, or seeded non-traffic areas	95% of the maximum dry density by ASTM D 698, (Standard Proctor) AASHTO T-99

- F. Compactive Efforts: If compaction efforts should fail to provide a stable subgrade, after subgrade materials have been shaped and brought to optimum moisture, such unstable materials shall be removed to the extent directed by either the Geotechnical Engineer or the A/E and replaced and compacted using new select material.
- G. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
- H. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
- I. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

3.15 GRADING

- A. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades.
- B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from building structures and to prevent ponding. Finish surfaces free from irregular surface changes and as follows:
 - 1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.
 - 2. Walks: Shape surface of areas under walks to line, grade, and cross section, with finish surface not more than 0.10 foot above or below required subgrade elevation.
 - 3. Pavements: Shape surface of areas under pavement to line, grade, and cross section, with finish surface not more than ½ inch above or below required subgrade elevation.
- C. Grading Surface of Fill under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a 10 foot straightedge.
- D. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.16 PAVEMENT BASE COURSE

- A. Base course consists of placing base material, in layers of specified thickness, over subgrade surface to support a pavement base course.

- B. During construction, maintain lines and grades including crown and cross slope.
- C. Place berms, shoulders, or extended base course as indicated on the construction drawings. Construct shoulder subgrade of acceptable soil materials, placed in such quantity to compact to thickness of each subgrade course layer. Compact and roll at least a 12 inch width of shoulder simultaneous with the compaction and rolling of each layer of subgrade course.
- D. Place base course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross section and thickness. Maintain optimum moisture content for compacting subgrade material during placement operations.

3.17 BUILDING SLAB DRAINAGE COURSE

- A. Drainage course consists of placement of drainage fill material, in layers of indicated thickness, over subgrade surface to support concrete building slabs.
- B. Place drainage fill material on prepared subgrade in layers of uniform thickness, conforming to indicated cross section and thickness. Maintain optimum moisture content for compacting material during placement operations.
 - 1. When a compacted drainage course is indicated to be 6 inches thick or less, place material in a single layer. When indicated to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.

3.18 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction: Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.
 - 1. Perform field in place density tests according to ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method), or ASTM D 2937 (drive cylinder method), as applicable.
- B. Field in place density tests may also be performed by the nuclear method according to ASTM D 2922, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. With each density calibration check, check the calibration curves furnished with the moisture gages according to ASTM D 3017.
- C. When field in place density tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Owner.
- D. Minimum Compaction Testing Frequency: A test group shall consist of compaction tests on each layer of fill and backfill material. One (1) test group shall be performed and summarized written results provided at the frequencies and locations as follows:

LOCATION	FREQUENCY
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Buildings and Structures	Every 5,000 square feet
Roads, Drives	Every 300 feet of road, drive
Parking Lots	Every 10,000 square feet of pavement
Unpaved Areas	Every 20,000 square feet
Pipe Trench	Every 300 feet of trench

- E. In the absence of a pre-construction Geotechnical investigation, the Geotechnical testing firm is to perform laboratory Proctor tests to establish a moisture-density relationship for all materials that are proposed to be used as fill.
- F. Contractor shall give a 24-hour notice to Geotechnical testing firm when ready for Proctor, compaction, or subgrade testing and inspection.
- G. Should any moisture-density test fail to meet specification requirements, the Contractor shall perform corrective work necessary to bring the material in compliance and retest the failed area at no additional cost to the Owner.
- H. Footing Subgrade: At footing subgrades, perform at least one test of each soil stratum to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of each subgrade with related tested strata when acceptable to the Owner.
- I. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.

3.19 EROSION CONTROL

- A. Provide erosion control methods in accordance with requirements of authorities having jurisdiction.
- B. The Contractor shall comply with the requirements of the Ohio Environmental Protection Agency Construction Stormwater General Permit (OHC000004), the Ohio Department of Natural Resources “Ohio’s Standards for Storm Water Management, Land Development and Urban Stream Protection”, and any applicable local requirements; latest revision.

3.20 MAINTENANCE

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

- C. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.
- D. Where settling is measurable or observable at excavated areas during general Project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Removal to Designated Areas on Owner's Property: Transport acceptable excess excavated material to designated soil storage areas on Owner's property. Stockpile soil or spread as directed by Owner.
 - 1. Transport waste material, including unacceptable excavated material, trash, and debris to designated spoil areas on Owner's property and dispose of as directed.
- B. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash, and debris, and dispose of it off Owner's property.
 - 1. Remove excess excavated material, trash, debris, and waste materials and dispose of it off Owner's property.

END OF SECTION 312000

SECTION 312213 – ROUGH GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Remove topsoil and stockpile for later reuse. Disperse excess on site.
2. Excavate subsoil and stockpile for later reuse. Disperse excess on site.
3. Grade and rough contour site.

B. Related Sections:

1. Section 311000 - Site Clearing.
2. Section 312500 – Erosion & Sediment Control.

1.2 PROJECT RECORD DOCUMENTS

A. Submit record documents at contract closeout.

B. Accurately record location of utilities remaining, rerouted utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.3 PROTECTION

A. Protect bench marks, roads, sidewalks, paving, curbs, and above and below grade utilities which are to remain.

B. Repair damage caused as result of Work of this Section at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: Excavated material, graded free of roots, rocks larger than 2 inches, subsoil, debris, large weeds, and other extraneous or deleterious matter.

B. Subsoil: Excavated material, graded free of lumps larger than 6 inches, rocks larger than 3 inches, and debris.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Identify and stake lines, levels, contours, known below grade utilities, and datum.
- B. Maintain and protect existing utilities remaining which pass-through work area.
- C. Upon discovery of unknown utility or concealed conditions, immediately discontinue affected work and notify Architect and Construction Manager.
- D. Begin rough grading work only after completion of site clearing work and the installation of all erosion control facilities.
- E. Provide erosion and sedimentary controls where shown on Drawings, and as required by authorities having jurisdiction over the Work.

3.2 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, re-landscaped, re-graded, or designated as a borrow area and stockpile in area designated on site.
- B. Do not excavate wet, excessively dry, or frozen topsoil.
- C. Stockpile topsoil to depth not exceeding 4 feet.

3.3 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be re-landscaped, re-graded, or designated as a borrow area, and stockpile in area designated on site.
- B. Do not excavate wet subsoil.
- C. Stockpile subsoil to depth not exceeding 8 feet.

3.4 TOLERANCES

- A. Top Surface of Subgrade: Plus, or minus two inches.

END OF SECTION 312213

SECTION 312500 – EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Soil erosion.
 - 2. Water pollution control.
- B. Related Sections:
 - 1. Section 31 10 00 - Site Clearing.
 - 2. Section 31 20 00 - Earth Moving

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's data identifying product characteristics and limitations.
- B. Samples: Submit 12" x 12" sample of each type of silt fence to be used.

1.3 REGULATORY REQUIREMENTS

- A. Comply with applicable Federal, State, and Local statutes and regulations.
- B. In the event of a conflict the more restrictive statutes or regulations shall govern.
- C. The Associate will arrange a field pre-construction conference with Contractor and regulatory agencies if required.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Coordinate with permanent erosion control features to extent practical to ensure economical effective, and continuous erosion control throughout construction and post construction period.
- B. Include temporary control measures as required by statutes, regulations, Associate, and State Inspector to protect fish and wildlife, prevent soil erosion, and comply with other pollution control laws as art of Work of this Section.

1.5 SITE CONDITIONS

- A. Schedule and perform Work to minimize amounts and times when soil erosion and water pollution could occur.

- B. Be responsible for executing the plan as prepared for this project. If the Contractor deviates from this plan without the necessary approvals or the Associate observes any unsatisfactory construction procedures or operations, the Associate may suspend the performance of any construction until satisfactory conditions are corrected.
- C. Such suspension shall not be the basis of any claim by Contractor for additional compensation from the Owner nor for an extension of contract time.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Silt Fence (Filter Fabric Fence): Design, construct, and maintain in accordance with Local and State Standards and Specifications.
- B. Straw Bale: Design, construct, and maintain straw barriers in accordance with Local and State Standards and Specifications.
- C. Stakes: Wood, minimum 2 x 2 x 36 inches long.

PART 3 - EXECUTION

3.1 GENERAL STATEMENT

- A. Proposed plan objectives: Minimize erosion and subsequent sedimentation caused by the construction activities outlined in project scope.
- B. Obey following guidelines during construction:
 - 1. Minimize the area and time of exposure.
 - 2. Save existing vegetation, especially trees.
 - 3. Install temporary or permanent measures to control stormwater runoff in order to protect soil bared by construction.
 - 4. Practice proper fine grading and excavation; hold line grading and excavation to a minimum.
 - 5. Establish temporary vegetation until such time that permanent vegetation can be established.
 - 6. Establish permanent vegetation as soon as possible and no later than 10 days after project completion.
 - 7. Lay suitable protection, such as erosion netting, fibermats, etc., over disturbed area when work will cease for a period greater than one day.

3.2 STORMWATER HANDLING

- A. Divert runoff from areas above the project site away from excavation areas, where possible.

- B. Control soil erosion and sedimentation created by stormwater which naturally flows across, over and/or through areas disturbed by construction by use of a sediment basin, straw bale barriers, or silt fences placed along the contour, and in accordance with the temporary erosion control details for disturbed areas perpendicular and parallel to the ground slope, as well as the TEMPORARY EROSION AND SEDIMENTATION CONTROLS portion of this Plan.
- C. Divert stormwater runoff from open excavations or trenches. If any trench or excavation dewatering or well point pumping is necessary, direct pump discharges to a dewatering sediment basin, whenever possible.

3.3 TEMPORARY EROSION AND SEDIMENTATION CONTROLS

- A. Control soil erosion and sedimentation during initial earthmoving by placing filter fabric fence on low side of the limit of area to be disturbed prior to engaging in any such activities.
- B. Use staked straw bale barriers and filter fabric fence to control soil erosion and sedimentation from entering streams during construction activities. Install temporary controls prior to earth disturbance whenever possible.
- C. Install temporary erosion controls for excavation as shown on either of the two typical details, Temporary Erosion Control Perpendicular to Slope and Temporary Erosion Control Parallel to Slope, as shown on Drawings, for whichever slope prevails.
- D. Be responsible for installing and maintaining temporary erosion controls for disturbed areas on this project in accordance with this report and the Erosion & Sediment Pollution Control Plans & Details provided in Contract Drawings.
- E. Where possible, stake straw bale barriers around perimeter of catch basin grates for the purpose of controlling eroded soil and sedimentation from entering the storm sewer inlets.
- F. Excavate a four-inch deep anchoring trench as wide as the bales. Place straw bales in the trench and stake. Place straw bales so that the twine holding the bales together is not in contact with the ground. Drive stakes a minimum 18 inches below ground elevation. Backfill and compact anchoring trench to a density equal to or greater than that of undisturbed site soils.
- G. Inspect straw bale barriers weekly or after every precipitation event, whichever is more frequent. If bales become ineffective, dislodged, clogged, or inoperative, repair or replace immediately. Remove accumulated sediments when their height reaches 1/3 of the minimum above ground height of straw bale barrier. Immediately repair undercutting or erosion of the anchor toe with compacted backfill materials.
- H. Place filter fabric fences on the contour. Extend both ends of a section of fence uphill, 45 degree angles, to the point that the bottom of the fence equals the top of the fence elevation.
- I. Excavate a 6 inch deep by 6 inch wide trench continuously along the bottom of fence. Lay bottom 6 inches of filter fabric fence in the trench and backfill with excavated material. Compact backfill material to a density equal to or greater than that of undisturbed soil.
- J. Inspect filter fabric fence weekly or after every precipitation event, whichever is more frequent. If filter fabric fence becomes ineffective, immediately repair and replace as necessary. Remove

accumulated sediments when their height reaches 1/2 of the above ground height of the fence. Immediately repair undercutting or erosion of the toe anchor with compacted backfill materials.

- K. Leave temporary erosion and sedimentation controls for improved surfaces in place until such time that permanent controls, paving, riprap, etc., are installed. Keep temporary erosion and sedimentation controls for unimproved surfaces in place until such time that a uniform 70 percent vegetative cover is established to stabilize the soil of disturbed area. Once acceptable cover is established, convert sediment basin to permanent detention basin; the details as provided on Drawings and these Specifications.

3.4 EXCAVATION FOR PIPELINES

- A. Excavate depth of trench for pipelines such that pipe in its installed position complies with the line and grades shown on Drawings, or with the line and grades established by Owner's Representative in field.
- B. In excavation for pipelines where made in open cut and where space permits, excavate trench banks from ground surface to a depth not closer than 1 foot above the top of the pipe to non-vertical and nonparallel planes.
- C. Do not permit trench side walls in pipe zone, defined as that trench area below a point 12 inches above the top of pipe in its installed position, to be other than vertical and parallel planes equidistant from the pipe centerline. Horizontal distance between the vertical planes: be no greater than outside diameter of pipe plus 24 inches nor less than outside diameter of pipe plus 12 inches.
- D. Where the available space does not permit and where existing or proposed above ground or underground structures may be endangered, excavate trench sides above the pipe zone to vertical and parallel planes. Horizontal distance between the vertical planes: be no greater than necessary to permit construction of pipeline with required sheeting, shoring, and bracing in place.

3.5 GRADING

- A. Before beginning excavation and filling, strip topsoil from areas to be affected to a depth of at least 6 inches and store at a location approved by Associate or Engineer. Excess topsoil shall be disposed of as discussed in the DISPOSAL OF EXCESS MATERIAL portion of these specifications. Place Filter Fabric Fence around low sides topsoil storage areas. Seed and mulch topsoil storage piles in accordance with SEEDING and MULCHING portions of this Plan.
- B. Prior to beginning excavation on any areas which currently have impervious surfaces, strip the impervious surface and dispose of it separately at an approved site as discussed in the DISPOSAL OF EXCESS MATERIAL portion of this Plan.
- C. After completion of the major construction work, replace topsoil as the upper layer of backfill to a depth of not less than 6 inches so that the final grade will be as required by the Drawings.

- D. In general slope grade away from the installed or existing structures to drainage ditches, storm sewer inlets, or culverts. Thoroughly loosen those areas which are not occupied by structures or pavement by harrowing or discing and then rake by hand. Remove stones over 1&1/2 inches, rubbish, and debris. Uniformly space topsoil in piles and distribute by an approved method.
- E. Supply additional topsoil required over and above that salvaged from site in order to maintain a minimum of 6 inch depth over entire area defined above, if the area is to be seeded. Correct any surface irregularities to prevent formation of low places where surface water may pool. Do not place topsoil when the subgrade is frozen or when it is excessively wet or dry; do not handled when in a frozen or muddy condition.

3.6 VEGETATION

- A. Permanently seed, or if specified, sod grounds disturbed by operations necessary to complete the work for this project, unless occupied by structures or paved. Accomplished as soon as possible after construction and not later than 10 days.
- B. If seeding cannot be completed within the 10 day period due to weather conditions, mulch disturbed area with straw at rate of two bales per 1,000 sq. ft. Anchor straw with mulch netting according to manufacturer's recommendations or other appropriate means.
- C. Use temporary seeding to protect exposed land surfaces which will not be permanently protected for a period more than 10 days. Temporary vegetation will provide short-term rapid cover until permanent vegetation or other protection can be established.

3.7 TEMPORARY SEEDING

- A. Purpose of temporary cover: to provide short-term, rapid cover for control of runoff and erosion until permanent vegetation or other stabilization material can be established. Apply temporary cover on sediment producing areas where the period of exposure will be more than 10 days. Provide mulch cover for no less than two months' exposure.
- B. The site preparation and establishment of temporary cover shall be conducted according to the following guidelines:
 - 1. Install needed surface water control measures.
 - 2. Perform all cultural operations at right angles to the slope.
 - 3. Apply ground limestone according to test or at the rate of 100 lb./1000 sq. yd.
 - 4. Apply uniformly recommended analysis fertilizer according to soil test or 10-10-10 at the rate of 10 lb./1000 sq. yd.
 - 5. Work in lime and fertilizer to a depth of 4 inches using any suitable equipment.
 - 6. Temporary cover seed mixture: consist of 100 percent annual ryegrass; apply seed uniformly at rate of 10 lb./1000 sq.yd.
 - 7. Cover grass seed with 1/2 inches of soil with suitable equipment.
- C. Establish temporary grass cover in the following areas:

1. Seed stockpiles where soil stockpiles are to be exposed for a period greater than 20 days. When the soil stockpile will be exposed for a period greater than two (2) days, but less than twenty (20) days, cover stockpile with mulch or protective erosion control fabric.
2. Where waterways or ditches will be used to divert stormwater entering the work area, seed those waterways along the bottom, sides and 3 feet above and below the waterway. After construction is completed, seed or sod permanent waterways or ditches according to this Plan. Restore temporary waterways or ditches restored to natural grade and permanently seed according to this Plan.
3. Install waterways or ditches on slopes above the work area as required.
4. Where disturbed land surfaces will not be permanently protected for a period of more than ten (10) days.

3.8 PERMANENT GRASS COVER

A. Permanent Materials:

1. Topsoil: be acceptable friable loam; reasonably free of subsoil, clay lumps, brush, roots, weeds, and objectionable organic material stones, other inorganic material larger than two inches in any dimension, litter, and other materials harmful to plant growth.
2. Lime: be pulverized agricultural limestone containing a minimum of 85 percent total carbonates, ground so that at least 90 percent passes a No. 20 sieve and at least 50 percent passes a No. 100 sieve.
3. Commercial fertilizer: be a dry formulation of 10-20-20 analysis delivered in bags showing weight analysis and manufacturer's name; conform to the standards of the Association of Official Agricultural Chemists.
4. Slow-release Nitrogen Fertilizer: conform to Publication of 408, Section 804.2 (a) 3.
5. Clean and fresh grass seed: be premixed packed in sealed bags with inspection tag showing net weight, composition of mix, date of germination tests and supplier's name.
6. Grass seed formula: in accordance with ODOT Construction and Material Specifications.
7. Mulch: in accordance with ODOT Construction and Material Specifications.

B. Application:

1. Topsoil:
 - a. Apply topsoil to all areas to be turfed except slopes 2:1 or greater.
 - b. Prepare areas to receive topsoil by loosening soil to a depth of two inches. Remove stone and other foreign material two inches or larger.
 - c. Spread and compact to a uniform six inch depth. Compact with a roller, weighing not over 120 lbs. per foot or roller, or by other acceptable methods.
 - d. Excess topsoil if any, becomes property of Owner; stockpile and stabilize as directed by Associate.
2. Lime and Fertilizer:
 - a. Apply pulverized agricultural limestone at a rate of 800 lbs. per 1000 S.Y.
 - b. Apply 10-20-20 analysis commercial fertilizer at a rate of 140 lbs. per 1000 S.Y.
 - c. Work lime and fertilizer into soil to two inch minimum depth by raking, discing, or harrowing.

3. Seeding:
 - a. Apply in accordance with ODOT Construction and Material Specifications.
4. Mulching:
 - a. Apply mulch within 48 hours after seeding in accordance with ODOT Construction and Material Specifications.
- C. Maintenance: Reseed areas and spots damaged or gullied or otherwise not showing a catch of grass. Repeat until a complete coverage is obtained. Keep seeded areas moist until 70 percent catch of grass is established. Mow areas where weeds are smothering new grass seedlings.

3.9 PROTECTION OF STREAM BANKS

- A. Clean and grub right-of-way according to above procedures.
- B. Earthmoving vehicles: Do not discharge any petroleum product or accumulated sediment to the stream.
- C. Store excavated soil on side of trench farthest from stream.
- D. If a pipe trench or excavation is dewatered during construction, remove water from pipe trench or keep excavation free of suspended sediment prior to entering any established drainage way. To remove suspended sediment, pump water into sediment basin as discussed in the DEWATERING portion of this Plan.
- E. Construction activities within surface water conveyance channels: require utilization of erosion control measures to protect stream banks and stream bed.

3.10 RESTORATION OF DRAINAGE CHANNELS, AND OTHER UNIMPROVED AREAS DISTURBED DURING CONSTRUCTION

- A. Hydromulch, fertilizer and seed unimproved areas disturbed during construction, including all drainage channels, as soon after completion of backhoe operations as is practicable; establish a growth, and minimize pollution of streams from erodible fill, backfill, and other materials.
- B. Employ a satisfactory method of sowing using hydraulic seeders and other approved equipment where applicable.
- C. Drainage channel seeding mixture: consist of 45 percent winter rye, 45 percent tall fescue, and 10 percent perennial ryegrass, or an equivalent ryegrass base formula suitable for drainage channels. Apply drainage channel seed at rate of 3-5 lb./1000 sq. yd. Do seeding only at such times as climatic condition, temperature, and moisture are suitable for growth.
- D. Stabilize channels which cannot be stabilized with vegetation with jute matting or specifically designed products approved by Associate.

3.11 DISPOSAL OF EXCESS MATERIAL

- A. Disposal of excess material resulting from project construction.
- B. Excess material includes but may not be limited to: material resulting from excess material resulting from imbalance of cuts and fills; that material within the pipe zone; material deemed by Associate to be unsuitable for use as backfill material; excavated pavement material; excess material resulting from use of select backfill i.e. beneath improved surfaces; and excavated areas being replaced with a rock riprap lining.
- C. Secure an approved on-site waste area for disposal of these materials. If sufficient area is not available on-site, the contractor shall secure an approved off-site waste area for disposal of the excess materials.

3.12 FINAL GRADING

- A. Areas Disturbed by Contractor's Operation. Bring areas, including those areas used for storage of excavated material, equipment, etc., up to within 6 inches of final grade indicated on Drawings by methods specified. Where not indicated on Drawings, establish final grade equivalent to existing grade unless otherwise specified in field by Owner's Representative. In general slope grade away from the installed or existing structures to drainage ditches, storm sewer inlets or culverts. Thoroughly loosen those areas which are not occupied by structures or pavement by harrowing or discing and then rake by hand. Remove stones over 1 1/2 inches, rubbish, or debris. Uniformly space topsoil spaced in piles and distribute by an approved method.
- B. Additional Topsoil Required. Provide additional topsoil required over and above that salvaged from the site in order to maintain a minimum of 6 inches of depth over the entire area defined above if the area is to be seeded, or 4 inches of depth if the area is to be sodded or planted. Correct surface irregularities to prevent formation of low places where surface water may pool. Do not place topsoil when the subgrade is frozen or when it is excessively wet or dry; do not handle when in frozen or muddy condition.

3.13 CONTRACTOR'S ASSEMBLY/STOCK YARD

- A. Be responsible for securing and maintaining an assembly/stock yard for storing equipment and materials for use on this project. Provide such secured areas with their own erosion and sedimentation control plans submitted to Ohio Environmental Protection Agency for review and approval if necessary.
- B. Be responsible for obtaining necessary approvals and permits required for such areas. Utilize and maintain such areas in accordance with laws, rules, and regulations of agencies having jurisdiction over the same.

3.14 IMPLEMENTATION OF THE PLAN

- A. The foregoing procedures and requirements of these Specifications are contractual obligations of Contractor performing actual construction work. Said requirements also apply to subcontractors working on the project.
- B. At such time, review in detail the final standards and specifications concerning seeding mixtures, cover requirements, barrier and sediment basin location, and any other such items as may be required to complete the Contract work in accordance with the rules and regulations of that agency, and in accordance with the laws, rules, and regulations of other authorities having jurisdiction over the required construction work.
- C. The requirements relative to temporary control measures, early permanent restoration, minimizing work areas, are of the most important factors affecting construction performance. In view of those circumstances, it is believed that this particular plan, on this particular project, will be implemented throughout the course of work.

3.15 USE OF THIS PLAN

- A. As previously stated herein, this Stormwater Pollution Prevention Plan has been prepared in response to and in accordance with certain rules and regulations promulgated by Ohio Environmental Protection Agency.
- B. The handling of stormwater, the topographic features described, the staging of earthwork, the temporary and permanent control measures, and the interpretations and opinions stated in the foregoing pages are to be used only for the purpose of eliminating, minimizing and/or controlling pollution of the streams and waterways from materials anticipated to be eroded from the earthwork to be disturbed as a result of construction of the Contract.

3.16 GENERAL NOTES

- A. Make periodic inspections to determine if proper vegetative growth is taking place. Reseed and mulch areas as needed.
- B. Remove and restore rock construction entrances when access provided by the entrance is no longer necessary.
- C. Store topsoil along side the trench in a separate pile from other excavated material. Store no material within two feet of trench excavation.

SECTION 329200 - SEEDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Seeding.
 - 2. Hydroseeding.
 - 3. Turf renovation.
- B. Related Sections:
 - 1. Earth Moving for excavation, filling and backfilling, and rough grading.

1.3 DEFINITIONS

- A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
- H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

- I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
 1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 1. Certification of each seed mixture for turfgrass sod and/or plugs. Include identification of source and name and telephone number of supplier.
- C. Qualification Data: For qualified landscape Installer.
- D. Product Certificates: For soil amendments and fertilizers, from manufacturer.
- E. Material Test Reports: For standardized ASTM D 5268 topsoil, existing native surface topsoil, existing in-place surface soil, and/or imported or manufactured topsoil; depending on what is proposed to be utilized for final topsoil.
 1. Test Reports need to show any required amendments to optimize topsoil for turf and grass type crop growth.
- F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf and meadows during a calendar year. Submit before expiration of required initial maintenance periods.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf and meadow establishment.
 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
 2. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."
 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

- a. Certified Landscape Technician - Exterior, with installation, maintenance with an irrigation specialty area(s) if irrigation system is included, designated CLT-Exterior.
 - b. Certified Turfgrass Professional, designated CTP.
 - c. Certified Turfgrass Professional of Cool Season Lawns, designated CTP-CSL.
- 5. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
- 6. Pesticide Applicator: State licensed, commercial.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.
 - 1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
 - 2. The Contractor shall submit a soil sampling exhibit showing depth, location, and number of samples taken per instructions from Landscape Architect. A minimum of three representative samples shall be taken from varied locations, each soil type to be used, and any amended soils to produce topsoil for planting purposes.
 - 3. Report suitability of tested soil for turf growth.
 - a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
- D. Pre-installation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
- B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.
- C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.7 PROJECT CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.
1. Spring Planting: April (after the last freeze) – June 1st
 2. Fall Planting: Mid-August – September 30th (Soil Temperatures between 55 and 75 degrees).
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

- A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:
1. Seeded Turf: 60 days from date of Substantial Completion.
 - a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.
 2. Sodded Turf: 30 days from date of Substantial Completion.
- B. Initial Meadow Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable meadow is established, but for not less than 60 days from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances and consists of only seed ranked in the top 10 seed species per the current NTEP report.
- B. Seed Species: State-certified and top 10 NTEP ranked grass species as follows:
- C. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:
 - 1. Full Sun: Proportioned by weight as follows:
 - a. Kentucky bluegrass (*Poa pratensis*), a minimum of two "Improved" cultivars.
 - b. Perennial Ryegrass, three "Improved" cultivars.
 - 2. Sun and Partial Shade: Proportioned by weight as follows:
 - a. Kentucky bluegrass (*Poa pratensis*), minimum of two "Improved" cultivars.
 - b. Chewings red fescue (*Festuca rubra* variety).
 - c. Perennial ryegrass (*Lolium perenne*).
 - d. Redtop (*Agrostis alba*).
 - 3. Shade: Proportioned by weight as follows:
 - a. Chewings red fescue (*Festuca rubra* variety), a minimum of two "Improved" cultivars.
Rough bluegrass (*Poa trivialis*).
 - b. Redtop (*Agrostis alba*).

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 - 1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
 - 2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
 - 3. Provide lime in form of ground dolomitic limestone.
- B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

- D. Aluminum Sulfate: Commercial grade, unadulterated.
- E. Perlite: Horticultural perlite, soil amendment grade.
- F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.
- G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.
- H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
- I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.3 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - 1. Organic Matter Content: 50 to 60 percent of dry weight.
 - 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
- B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.
- C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.
- D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.
 - 1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.
- E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.4 FERTILIZERS

- A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 10 percent phosphoric acid.

- B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.
- C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.5 PLANTING SOILS

- A. Planting Soil (Manufactured): ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth. Mix ASTM D 5268 topsoil with the following soil amendments and fertilizers as directed in the Soil Testing Report's recommended quantities to produce planting soil:
 - 1. Ratio of Loose Compost to Topsoil by Volume: Per Soils Testing Report.
 - 2. Ratio of Loose Sphagnum Peat to Topsoil by Volume: Per Soils Testing Report.
 - 3. Ratio of Loose Wood Derivatives to Topsoil by Volume: Per Soils Testing Report.
 - 4. Weight of Lime per 1000 Sq. Ft.: Per Soils Testing Report.
 - 5. Weight of Sulfur per 1000 Sq. Ft.: Per Soils Testing Report.
 - 6. Weight of Agricultural Gypsum per 1000 Sq. Ft.: Per Soils Testing Report.
 - 7. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: Per Soils Testing Report.
 - 8. Weight of Bonemeal per 1000 Sq. Ft.: Per Soils Testing Report.
 - 9. Weight of Superphosphate per 1000 Sq. Ft.: Per Soils Testing Report.
 - 10. Weight of Commercial Fertilizer per 1000 Sq. Ft.: Per Soils Testing Report.
 - 11. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: Per Soils Testing Report.
- B. Planting Soil (Native / Virgin): Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation or grading processes. Verify suitability of native surface topsoil to produce viable planting soil through required soil testing. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
 - 1. Supplement with amendments and fertilizers as directed in the Soil Testing Report's recommended quantities to produce planting soil when existing quantities are insufficient.
 - 2. Mix existing, native surface topsoil with the following soil amendments and fertilizers as directed in the Soil Testing Report's recommended quantities to produce planting soil:

- a. Ratio of Loose Compost to Topsoil by Volume: Per Soils Testing Report.
- b. Ratio of Loose Sphagnum Peat to Topsoil by Volume: Per Soils Testing Report.
- c. Ratio of Loose Wood Derivatives to Topsoil by Volume: Per Soils Testing Report.
- d. Weight of Lime per 1000 Sq. Ft.: Per Soils Testing Report.
- e. Weight of Sulfur per 1000 Sq. Ft.: Per Soils Testing Report.
- f. Weight of Agricultural Gypsum per 1000 Sq. Ft.: Per Soils Testing Report.
- g. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: Per Soils Testing Report.
- h. Weight of Bonemeal per 1000 Sq. Ft.: Per Soils Testing Report.
- i. Weight of Superphosphate per 1000 Sq. Ft.: Per Soils Testing Report.
- j. Weight of Commercial Fertilizer per 1000 Sq. Ft.: Per Soils Testing Report.
- k. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: Per Soils Testing Report.

C. Planting Soil (Existing Non-Native/Virgin): Existing, in-place surface soil. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the following soil amendments and fertilizers as directed in the Soil Testing Report's recommended quantities to produce planting soil::

1. Ratio of Loose Compost to Topsoil by Volume: Per Soils Testing Report.
2. Ratio of Loose Sphagnum Peat to Topsoil by Volume: Per Soils Testing Report.
3. Ratio of Loose Wood Derivatives to Topsoil by Volume: Per Soils Testing Report.
4. Weight of Lime per 1000 Sq. Ft.: Per Soils Testing Report.
5. Weight of Sulfur per 1000 Sq. Ft.: Per Soils Testing Report.
6. Weight of Agricultural Gypsum per 1000 Sq. Ft.: Per Soils Testing Report.
7. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: Per Soils Testing Report.
8. Weight of Bonemeal per 1000 Sq. Ft.: Per Soils Testing Report.
9. Weight of Superphosphate per 1000 Sq. Ft.: Per Soils Testing Report.
10. Weight of Commercial Fertilizer per 1000 Sq. Ft.: Per Soils Testing Report.
11. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: Per Soils Testing Report.

D. Planting Soil (Imported): Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and brome grass; not infested with nematodes, grubs, other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled, pore-space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.

2. Mix imported topsoil or manufactured topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
 - a. Ratio of Loose Compost to Topsoil by Volume: Per Soils Testing Report.
 - b. Ratio of Loose Sphagnum Peat to Topsoil by Volume: Per Soils Testing Report.
 - c. Ratio of Loose Wood Derivatives to Topsoil by Volume: Per Soils Testing Report.
 - d. Weight of Lime per 1000 Sq. Ft.: Per Soils Testing Report.
 - e. Weight of Sulfur, Iron Sulfate, or Aluminum Sulfate per 1000 Sq. Ft.: Per Soils Testing Report.
 - f. Weight of Agricultural Gypsum per 1000 Sq. Ft.: Per Soils Testing Report.
 - g. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: Per Soils Testing Report.
 - h. Weight of Bonemeal per 1000 Sq. Ft.: Per Soils Testing Report.
 - i. Weight of Superphosphate per 1000 Sq. Ft.: Per Soils Testing Report.
 - j. Weight of Commercial Fertilizer per 1000 Sq. Ft.: Per Soils Testing Report.
 - k. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: Per Soils Testing Report.

2.6 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.
- C. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 1. Organic Matter Content: 50 to 60 percent of dry weight.
 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
- D. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- E. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.
- F. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.7 PESTICIDES

- A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as

required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

- B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.8 EROSION-CONTROL MATERIALS

- A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.
- B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.
- C. Erosion-Control Mats: Cellular, non-biodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of 3-inch nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Invisible Structures, Inc.; Slopetame 2.
 - b. Presto Products Company, a business of Alcoa; Geoweb.
 - c. Tenax Corporation - USA; Tenweb.

2.9 GRASS-PAVING MATERIALS

- A. Grass Paving: Cellular, non-biodegradable plastic mats, designed to contain small areas of soil and enhance the ability of turf to support vehicular and pedestrian traffic, of 2-inch nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Grid Technologies, Inc.; Netlon 50.
 - b. Invisible Structures, Inc.; Grasspave2.
 - c. NDS, Inc.; Grassroad Paver8 Plus.
 - d. Presto Products Company, a business of Alcoa; Geoblock Porous Pavement System.
 - e. RK Manufacturing, Inc.; Grassy Pavers.
- B. Base Course: Sound crushed stone or gravel complying with Division 31 Section "Earth Moving" for base-course material.

- C. Sand: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33 for fine aggregate.
- D. Proprietary Growing Mix: As submitted and acceptable to Architect.
- E. Sandy Loam Soil Mix: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33 for fine aggregate blended with planting soil as specified. Use blend consisting of 1/2 sand and 1/2 planting soil.
- F. Soil for Paving Fill: Planting soil as specified.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 - 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
 - 2. Protect grade stakes set by others until directed to remove them.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

- A. Limit turf subgrade preparation to areas to be planted.

- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
1. Apply fertilizer directly to subgrade before loosening.
 2. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
 - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - b. Mix lime with dry soil before mixing fertilizer.
 3. Spread planting soil to a depth of 4 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.
 - b. Reduce elevation of planting soil to allow for soil thickness of sod.
- C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 2. Loosen surface soil to a depth of at least 6 inches.
 3. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches of soil. Till soil to a homogeneous mixture of fine texture.
 - a. Apply fertilizer directly to surface soil before loosening.
 4. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
 5. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

- A. Prepare area as specified in "Turf Area Preparation" Article.

- B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.
- C. Fill cells of erosion-control mat with planting soil and compact before planting.
- D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.
- E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 PREPARATION FOR GRASS-PAVING MATERIALS

- A. Reduce subgrade elevation soil to allow for thickness of grass-paving system. Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade so that installed paving is within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions.
- B. Install base course and sandy loam soil mix as recommended by paving-material manufacturer for site conditions; comply with details shown on Drawings. Compact according to paving-material manufacturer's written instructions.
- C. Install paving mat and fasten according to paving-material manufacturer's written instructions.
- D. Before planting, fill cells of paving mat with sandy loam soil mix and compact according to manufacturer's written instructions.
- E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.6 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - 1. Do not use wet seed or seed that is moldy or otherwise damaged.
 - 2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Sow seed at a total rate 6 to 8 lb/1000 sq. ft.
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets and 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.

- E. Protect seeded areas with erosion-control mats where shown on Drawings; install and anchor according to manufacturer's written instructions.
- F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
 - 1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
 - 2. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./1000 sq. ft.. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.
- G. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.7 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
 - 1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
 - 2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.
 - 3. Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 1000 lb/acre.

3.8 TURF RENOVATION

- A. Renovate existing turf.
- B. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
 - 1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
 - 2. Install new planting soil as required.
- C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.
- D. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.
- E. Mow, dethatch, core aerate, and rake existing turf.

- F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.
- I. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.
- J. Apply seed and protect with straw mulch or sod as required for new turf.
- K. Water newly planted areas and keep moist until new turf is established.

3.9 TURF MAINTENANCE

- A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
 - 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 - 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 - 3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches through required maintenance period.
 - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 - 2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
 - 3. Water sourcing is the responsibility of the contractor; unless arrangements are made with owner.
- C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
 - 1. Mow Kentucky bluegrass, annual ryegrass, chewings red fescue to a height of 3 to 4 inches.
 - 2. Mow turf-type tall fescue to a height of 3 to 4 inches.

- D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.
 - 1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.10 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:
 - 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
 - 2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
 - 3. Satisfactory Plugged Turf: At end of maintenance period, the required number of plugs has been established as well-rooted, viable patches of grass, and areas between plugs are free of weeds and other undesirable vegetation.
 - 4. Satisfactory Sprigged Turf: At end of maintenance period, the required number of sprigs has been established as well-rooted, viable plants, and areas between sprigs are free of weeds and other undesirable vegetation.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.11 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.12 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200

SECTION 331000 – WATER UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section. Water Distribution Materials and installation shall comply with City of Bowling Green Division of Water requirements, standard drawings, and specifications.

1.2 SUMMARY

- A. This Section includes piping and specialties for combined potable-water and fire-protection water service outside the building.

1.3 DEFINITIONS

- A. The following are industry abbreviations for plastic and rubber materials:
 - 1. NP: Nylon.
 - 2. PE: Polyethylene.
 - 3. PP: Polypropylene.
 - 4. PTFE: Polytetrafluoroethylene.
 - 5. PVC: Polyvinyl chloride.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressures: The following are minimum pressure requirements for piping and specialties, unless otherwise indicated:
 - 1. Combined Potable-Water and Fire-Protection Water Service: 160 psig (1100 kPa).
 - 2. Potable-Water Service: 160 psig (1100 kPa).
 - 3. Fire-Protection Water Service: 150 psig (1035 kPa).

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Pipe and fittings.
 - 2. Flexible pipe fittings.
 - 3. Valves.
- B. Record Drawings: At Project closeout of installed water-service piping according to Division 1 Section "Contract Closeout."

- C. Test Reports: As specified in "Field Quality Control" Article in Part 3.
- D. Purging and Disinfecting Reports: As specified in "Cleaning" Article in Part 3.
- E. Maintenance Data: For specialties to include in the maintenance manuals specified in Division 1. Include data for the following:
 - 1. Valves.
 - 2. Fire hydrants.

1.6 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of water-service piping specialties and are based on specific types and models indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
- B. Comply with requirements of utility supplying water. Include tapping of water mains and backflow prevention.
- C. Comply with standards of authorities having jurisdiction for potable water-service piping. Include materials, installation, testing, and disinfection.
- D. Comply with NSF 61, "Drinking Water System Components--Health Effects," for materials for potable water.
- E. Comply with standards of authorities having jurisdiction for fire-protection water-service piping. Include materials, hose threads, installation, and testing.
- F. Comply with NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances," for materials, installations, tests, flushing, and valve and hydrant supervision.
- G. Comply with ASTM F 645, "Guide for Selection, Design, and Installation of Thermoplastic Water Pressure Piping Systems."
- H. Comply with NFPA 70, "National Electrical Code," for electrical connections between wiring and electrically operated devices.
- I. Provide listing/approval stamp, label, or other marking on piping and specialties made to specified standards.
- J. Listing and Labeling: Provide electrically operated specialties and devices specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
 2. Protect valves against damage to threaded ends and flange faces.
 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
1. Do not remove end protectors, unless necessary for inspection; then reinstall for storage.
 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.8 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.
- B. Site Information: Reports on subsurface condition investigations made during design of Project are available for informational purposes only; data in reports are not intended as representations or warranties of accuracy or continuity of conditions between soil borings. Owner assumes no responsibility for interpretations or conclusions drawn from this information.

1.9 SEQUENCING AND SCHEDULING

- A. Coordinate connection to water main with utility company.
- B. Coordinate piping materials, sizes, entry locations, and pressure requirements with building water distribution piping.
- C. Coordinate piping materials, sizes, entry locations, and pressure requirements with building fire-protection water piping.
- D. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Drilling-Machine, Sleeves, and Corporation Stops:
 - a. Ford Meter Box Co., Inc.
 - b. Grinnell Corp.; Mueller Co.; Water Products Div.
 - c. Lee Brass Co.
 - 2. Pipe and Fittings:
 - a. American Cast Iron Pipe Co.; Waterous Co.
 - b. Grinnell Corp.; Mueller Co.; Water Products Div.
 - c. McWane, Inc.; Clow Valve Co. Div.
 - d. McWane, Inc.; Kennedy Valve Div.
 - e. United States Pipe & Foundry Co.
 - 3. Bronze Corporation Stops and Valves:
 - a. Ford Meter Box Co., Inc.
 - b. Grinnell Corp.; Mueller Co.; Water Products Div.
 - c. Lee Brass Co.
 - d. Master Meter, Inc.
 - e. McDonald: A.Y. McDonald Mfg. Co. or Equal.
 - f. Red Hed Manufacturing Co.
 - g. Watts Industries, Inc.; James Jones Co.
 - 4. Tapping Sleeves and Valves:
 - a. American Cast Iron Pipe Co.; Waterous Co.
 - b. East Jordan Iron Works, Inc.
 - c. Grinnell Corp.; Mueller Co.; Water Products Div.
 - d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa)
 - e. McWane, Inc.; Kennedy Valve Div.
 - f. United States Pipe & Foundry Co.
 - 5. Gate Valves:
 - a. American Cast Iron Pipe Co.; Waterous Co.
 - b. East Jordan Iron Works, Inc.
 - c. Grinnell Corp.; Mueller Co.; Water Products Div.
 - d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa)
 - e. McWane, Inc.; Kennedy Valve Div.
 - f. United States Pipe & Foundry Co.
 - 6. Indicator Posts and Indicator Gate Valves:
 - a. American Cast Iron Pipe Co.; American Flow Control Div.
 - b. American Cast Iron Pipe Co.; Waterous Co.

- c. Grinnell Corp.; Grinnell Supply Sales Co.
- d. Grinnell Corp.; Mueller Co.; Water Products Div.
- e. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa)
- f. McWane, Inc.; Kennedy Valve Div.
- g. Nibco, Inc.
- h. Penn-Troy Machine Co.
- i. Stockham Valves & Fittings, Inc.
- j. United States Pipe & Foundry Co.

7. Dry-Barrel, Post Fire Hydrants:

- a. American Flow Control
- b. Mueller Co., Water Products Division
- c. Kennedy
- d. Clow

2.2 PIPES

- A. General: Applications of the following pipe and tube materials are indicated in Part 3 "Piping Applications" Article.
- B. Ductile-Iron, Push-on-Joint Pipe: Sizes 3" through 10", use AWWA C151, Class 53, with cement-mortar lining and seal coat according to AWWA C104. Include rubber compression gasket according to AWWA C111. Sizes 12" through 24", use AWWA C151, Class 54, with cement-mortar lining and seal coat according to AWWA C104. Include rubber compression gasket according to AWWA C111.

2.3 PIPE FITTINGS

- A. General: Applications of the following pipe and tube fitting materials are indicated in Part 3 "Piping Applications" Article.
- B. Ductile-Iron, Mechanical-Joint Fittings: AWWA C153, ductile-iron, compact type. Include cement-mortar lining and seal coat according to AWWA C104 and glands, rubber gaskets, and bolts and nuts according to AWWA C111. Include 250-psig (1725-kPa) minimum working-pressure rating; cement-mortar lining or epoxy, interior coating according to AWWA C550
- C. Polyvinyl Chloride Pipe: 4" to 12", AWWA C900, DR18; 14" or larger, AWWA C905, Fittings: AWWA C153, Ductile Iron; Joints: AWWA C111, Trace wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "water service" in large letters.
- D. fitting with sleeve and flexing sections, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include 250-psig (1725-kPa) minimum working-pressure rating; cement-mortar lining or epoxy, interior coating according to AWWA C550; deflection of at least 20 degrees (0.34 radians); and glands, rubber gaskets, and bolts and nuts according to AWWA C111.

2.4 JOINING MATERIALS

- A. General: Applications of the following piping joining materials are indicated in Part 3 "Piping Applications" Article.

- B. Refer to Division 2 Section "Utility Materials" for commonly used joining materials.
- C. Ductile-Iron Piping: The following materials apply:
 - 1. Push-on Joints: AWWA C111 rubber gaskets and lubricant.
 - 2. Mechanical Joints: AWWA C153 ductile-iron or gray-iron glands, high-strength steel bolts and nuts, and rubber gaskets.
- D. Pipe Couplings: Iron-body sleeve assembly, fabricated to match OD of pipes to be joined.
 - 1. Sleeve: ASTM A 126, Class B, gray iron.
 - 2. Followers: ASTM A 47, malleable iron; or ASTM A 536, ductile iron.
 - 3. Gaskets: Rubber.
 - 4. Bolts and Nuts: AWWA C111.
 - 5. Finish: Enamel paint

2.5 PIPING SPECIALTIES

- A. Flexible Connectors for Nonferrous, Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends; brazed to hose.
- B. Flexible Connectors for Ferrous Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1 threaded steel pipe nipples or ASME B16.5 steel pipe flanges; welded to hose.
- C. Dielectric Fittings: Assembly or fitting with insulating material isolating joined dissimilar metals to prevent galvanic action and corrosion.
 - 1. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
 - 2. Dielectric Unions: Factory-fabricated union assembly, designed for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C). Include insulating material isolating dissimilar metals and ends with inside threads according to ASME B1.20.1.
 - 3. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum pressure to suit system pressures.
 - 4. Dielectric-Flange Insulation Kits: Field-assembled companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - a. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure to suit system pressures.
 - 5. Dielectric Couplings: Galvanized-steel couplings with inert and noncorrosive thermoplastic lining, with threaded ends and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).
 - 6. Dielectric Nipples: Electroplated steel nipples with inert and noncorrosive thermoplastic lining, with combination of plain, threaded, or grooved end types and 300-psig (2070-kPa) working pressure at 225 deg F (107 deg C).

2.6 PE ENCASUREMENT

- A. PE Encasement for Ductile-Iron Piping: ASTM A 674 or AWWA C105, PE film, 0.008-inch (0.20-mm) minimum thickness, tube or sheet.

2.7 VALVES

- A. Nonrising-Stem, Resilient-Seated Gate left hand open Valves, 3-Inch NPS and Larger: AWWA C509 or AWWA C500 gray- or ductile-iron body and bonnet; double disc, parallel seats, with bronze or gray- or ductile-iron gate, or resilient seats, bronze stem, and stem nut. Include 200-psig minimum working-pressure design, interior coating according to AWWA C550, and push-on- or mechanical-joint ends.
- B. Valve Boxes: Cast-iron box with top section and cover with lettering "WATER," bottom section with base of size to fit over valve and barrel approximately 5 inches (125 mm) in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.
 - 1. Provide steel tee-handle operating wrench with each valve box. Include tee handle with one pointed end, stem of length to operate valve, and socket-fitting valve-operating nut.
- C. Indicator Posts: UL 789, FM-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of bury of valve.
- D. Curb Stops: Bronze body ball, and wide tee head, with inlet and outlet to match service piping material.
- E. Service Boxes for Curb Stops: Cast-iron box with telescoping top section of length required for depth of bury of valve. Include cover with lettering "WATER," and bottom section with base of size to fit over curb-stop and barrel approximately 3 inches (75 mm) in diameter.
 - 1. Provide steel tee-handle shutoff rod with each service box. Include tee handle with one pointed end, stem of length to operate curb stop, and slotted end fitting curb-stop head.
- F. Tapping Sleeve and Tapping Valve: Complete assembly, including tapping sleeve, tapping valve, and bolts and nuts. Use sleeve and valve compatible with tapping machine.
 - 1. Tapping Sleeve: Cast- or ductile-iron, 2-piece bolted sleeve with flanged outlet for new branch connection. Sleeve may have mechanical-joint ends with rubber gaskets or sealing rings in sleeve body. Include sleeve matching size and type of pipe material being tapped and of outlet flange required for branch connection.
- G. Service Clamps and Corporation Stops: Complete assembly, including service clamp, corporation stop, and bolts and nuts. Include service clamp and stop compatible with drilling machine.
 - 1. Service Clamp: Stainless Steel with gasket and AWWA C800 threaded outlet for corporation stop, and threaded end straps.
 - 2. Corporation Stops: Bronze body and ground-key plug, with AWWA C800 threaded inlet and outlet matching service piping material.
 - 3. Manifold: Copper with 2 to 4 inlets as required, with ends matching corporation stops and outlet matching service piping.
- H. Ball Valves: AWWA C507, Class 250. Include interior coating according to AWWA C550.
- I. Butterfly Valves: AWWA C504, with 150-psig (1035-kPa) working-pressure rating. Include interior coating according to AWWA C550.

- J. Butterfly Valves: UL 1091, with 175-psig (1200-kPa) working-pressure rating.
- K. Check Valves: AWWA C508, with 175-psig (1200-kPa) working-pressure rating. Include interior coating according to AWWA C550.
- L. Check Valves: UL 312, with swing clapper and 175-psig (1200-kPa) working-pressure rating.

2.8 FIRE HYDRANTS

- A. Description: AWWA C502, one 4" Nozzle, 6-inch NPS ductile iron mechanical-joint inlet. Include 200-psig minimum working-pressure design and interior coating according to AWWA C550. Contractor to verify type, outlet size and thread with Local Fire Department and local Water Department prior to ordering hydrants. Due to standardization by the City Water Division, only the following types of hydrants will be permitted as follows: Mueller Centurion, American Darling MK 73, Kennedy K-10-B, and Clow "Eddy 4Z5"; Hydrant shall be Cast-iron body, compression-type valve, opening with or against pressure, 6-inch (DN150) mechanical-joint inlet, and 150-psig (1035-kPa) minimum working-pressure design.
- B. Watch Valve: Each hydrant setting shall include one 6-inch diameter watch valve between the water main and the hydrant.
- C. Outlet Threads: Jasper Township Thread (Verify size and thread used by local fire department and Division of Water before ordering) Include cast-iron caps with steel chains.
- D. Operating and Cap Nuts: Square 7/8" at top, taper to 1" at bottom; 1 1/4" high.
- E. Depth of Bury: 5 feet standard, unless otherwise shown.
- F. Direction of Opening: Open hydrant valve by turning operating nut to right or clockwise.
- G. Exterior Finish: Yellow alkyd-gloss enamel paint. Verify paint color with Division of Water.

2.9 FIRE SERVICE MAIN ACCESSORIES

- A. Hose House: 16-gauge steel with red baked enamel finish, hoses, and nozzles.
- B. Alarm Devices: UL 753 and FM approved including water flow indicators, supervisory switches, and pressure switches.

2.10 ANCHORAGES

- A. Clamps, Straps, and Washers: ASTM A 506, steel.
- B. Rods: ASTM A 575, steel.
- C. Rod Couplings: ASTM A 197, malleable iron.
- D. Bolts: ASTM A 307, steel.
- E. Cast Iron Washers: ASTM A 126, gray iron.

- F. Concrete Reaction Backing: ASTM C 150, Type I Portland cement for 3000 psi, 28 day minimum compressive strength.
- G. Meg-a-lug restraint joint system may be used on Ductile Iron Pipe only. Use a full-circumference grip joint restraining device for PVC pipe.

2.11 IDENTIFICATION

- A. Refer to Division 2 Section "Earthwork" for underground warning tape materials.
- B. Install detectable warning tapes made of solid blue film with metallic core and continuously printed black-letter caption "CAUTION--WATER LINE BURIED BELOW."
- C. Nonmetallic Piping Label: Engraved, plastic-laminate label at least 1 by 3 inches (25 by 75 mm), with caption "CAUTION--THIS STRUCTURE HAS NONMETALLIC WATER-SERVICE PIPING," for installation on main electrical meter panel.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Section "Earth Moving" for excavation, trenching, and backfilling.
- B. Refer to Division 2 Section "Hot-Mix Asphalt Paving" for cutting and patching of existing paving.
- C. Refer to Division 2 Section "Portland Cement Concrete Paving" for cutting and patching of paving.

3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications:
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.
- C. Do not use flanges or keyed couplings for underground piping.
 - 1. Exception: Piping in boxes and structures, but not buried, may be joined with flanges or keyed couplings instead of joints indicated.
- D. Flanges, keyed couplings, and special fittings may be used on aboveground piping.
- E. Potable Water-Service Piping: Use the following:
 - 1. 4-Inch NPS (DN100): Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed joints.
 - 2. 4-Inch NPS (DN100): Copper tube, Type K (Type A); copper fittings; and soldered joints.
 - 3. 4-Inch NPS (DN100): Copper tube, Type L (Type B); copper fittings; and soldered joints.

4. 6-Inch NPS (DN150): Ductile-iron, push-on-joint pipe; ductile-iron, mechanical joint fittings; and gasketed joints.
 5. 5- and 6-Inch NPS (DN125 and DN150): Copper tube, Type K (Type A); copper fittings; and brazed joints.
 6. 5- and 6-Inch NPS (DN125 and DN150): Copper tube, Type L (Type B); copper fittings; and brazed joints.
 7. 8-Inch NPS (DN200): Ductile-iron, push-on-joint pipe; ductile-iron, mechanical joint fittings; and gasketed joints.
- F. Fire-Protection Water-Service Piping: Use the following:
1. 4- to 8-Inch NPS (DN100 to DN200): Ductile-iron, push-on-joint pipe; ductile-iron, mechanical joint fittings; and gasketed joints.
 2. 10- and 12-Inch NPS (DN250 and DN300): Ductile-iron, push-on-joint pipe; ductile-iron, mechanical joint fittings; and gasketed joints.
- G. Combined Potable-Water and Fire-Protection Water-Service Piping: Use the following:
1. 6- to 12-Inch NPS (DN150 to DN300): Ductile-iron, push-on-joint pipe; ductile-iron, mechanical joint fittings; and gasketed joints.

3.3 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
1. Underground Valves, 3-Inch NPS (DN80) and Larger: AWWA C509 gate valves, non-rising stem, with valve box.

3.4 JOINT CONSTRUCTION

- A. Refer to Division 2 Section "Utility Materials" for basic piping joint construction.
- B. Ductile-Iron Piping, Gasketed Joints: According to AWWA C600.
- C. Ductile-Iron Piping, Gasketed Joints for Fire-Service Piping: According to UL 194 and AWWA C600.
- D. Flanged Joints: Align flanges and install gaskets. Assemble joints by sequencing bolt tightening. Use lubricant on bolt threads.
- E. Threaded Joints: Thread pipes with tapered pipe threads according to ASME B1.20.1, apply tape or joint compound, and apply wrench to fitting and valve ends into which pipes are being threaded.
- F. Ductile-Iron, Keyed-Coupling Joints: Cut-groove pipes. Assemble joints with keyed couplings, gaskets, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- G. Copper Tubing, Brazed Joints: According to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
- H. Copper Tubing, Soldered Joints: According to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube."

- I. Copper Tubing, Soldered Joints: According to CDA's "Copper Tube Handbook."

3.5 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General Locations and Arrangements: Drawings indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.
- B. Install piping at indicated slope.
- C. Install components with pressure rating equal to or greater than system operating pressure.
- D. Install piping free of sags and bends.
- E. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- F. Install fittings for changes in direction and branch connections.
- G. Piping Connections: Unless otherwise indicated, make piping connections as specified below:
 - 1. Install unions, in piping 2 inches (50 mm) and smaller, adjacent to each valve and at final connection to each piece of equipment having 2-inch (50 mm) or smaller threaded pipe connections.
 - 2. Install flanges, in piping 2-1/2 inches (65 mm) and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
 - 3. Install dielectric fittings to connect piping of dissimilar metals.

3.6 ENTRANCE PIPING

- A. Extend water-service piping and connect to water-supply source and building water piping systems at outside face of building wall in locations and pipe sizes indicated.
 - 1. Terminate water-service piping 5 feet outside building wall until building water piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building water piping systems when those systems are installed.
- B. Sleeves and mechanical sleeve seals are specified in Division 15 Section "Basic Mechanical Materials and Methods."
- C. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
- D. Anchor service-entry piping to building wall.

3.7 PIPING INSTALLATION

- A. Water-Main Connection: Tap water main with size and in location as indicated according to requirements of water utility.

- B. Make connections larger than 2-inch NPS (DN50) with tapping machine according to the following:
 - 1. Install tapping sleeve and tapping valve according to manufacturer's written instructions.
 - 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 - 3. Install gate valve onto tapping sleeve. Comply with AWWA C600. Install valve with stem pointing up and with cast-iron valve box.
 - 4. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
- C. Comply with NFPA 24 for fire-protection water-service piping materials and installation.
- D. Install ductile-iron piping according to AWWA C600.
 - 1. Encase piping with PE film according to ASTM A 674 or AWWA C105.
- E. Install copper tube and fittings according to CDA's "Copper Tube Handbook."
- F. Install AWWA PVC plastic pipe according to AWWA M23 and ASTM F 645.
- G. Install PE plastic pipe according to ASTM D 2774, ASTM F 645, and manufacturer's written instructions.
- H. Install PEX plastic tubing according to ASTM D 2774, ASTM F 645, and manufacturer's written instructions.
- I. Bury piping with depth of cover over top at least 42 inches (750 mm), with top at least 12 inches (300 mm) below level of maximum frost penetration, and according to the following:
 - 1. Under Driveways: With at least 42 inches (900 mm) cover over top.
 - 2. Under Railroad Tracks: With at least 48 inches (1200 mm) cover over top.
- J. Install piping under streets and other obstructions that cannot be disturbed, by tunneling, jacking, or combination of both.

3.8 ANCHORAGE INSTALLATION

- A. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
 - 1. Gasketed-Joint, Ductile-Iron, Potable-Water Piping: According to AWWA C600.
 - 2. Gasketed-Joint, PVC Potable-Water Piping: According to AWWA M23.
 - 3. Fire-Service Piping: According to NFPA 24.
- B. Apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of installed ferrous anchorage devices.

3.9 VALVE INSTALLATION

- A. General Application: Use mechanical-joint-end valves for 3-inch NPS (DN80) and larger underground installation. Use threaded- and flanged-end valves for installation in pits. Use nonrising-stem UL/FM

gate valves for installation with indicator posts. Use bronze corporation stops and valves, with ends compatible with piping, for 2-inch NPS (DN50) and smaller installation.

- B. AWWA-Type Gate Valves: Comply with AWWA C600. Install underground valves with stem pointing up and with cast-iron valve box.
- C. UL/FM-Type Gate Valves: Comply with NFPA 24. Install underground valves and valves in pits with stem pointing up and with vertical cast-iron indicator post.
- D. Bronze Corporation Stops and Curb Stops: Comply with manufacturer's written instructions. Install underground curb stops with head pointed up and with cast-iron curb box.

3.10 FIRE HYDRANT INSTALLATION

- A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints and anchoring tee, thrust blocks, and support in upright position. Wrap hydrant barrel, valve, and supply line to ground level in P.E. encasement. Back fill with granular material and compact to support hydrant.
- B. AWWA-Type Fire Hydrants: Comply with AWWA M17.
- C. UL/FM-Type Fire Hydrants: Comply with NFPA 24.

3.11 IDENTIFICATION INSTALLATION

- A. Install continuous plastic underground warning tape and Magnetic detectable 14 gauge conductor trace wire. during back-filling of trench for underground water-service piping. Locate 16 inches to 24 inches below finished grade, directly over piping.
- B. Attach nonmetallic piping label permanently to main electrical meter panel.

3.12 FIELD QUALITY CONTROL

- A. Water main testing shall be performed in accordance with local agency jurisdiction.
- B. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- C. Disinfection, Flushing, Sampling, Hydrostatic Testing:
 - 1. Disinfect the pipeline installation in accordance with AWWA C651, except that liquid chlorine shall not be used. Special attention is directed to applicable sections of A.W.W.A. C-651, particularly for flushing and for disinfecting valves and fire hydrants. All laboratory tests associated with verify proper disinfection shall be paid for by the Contractor.
 - 2. Upon completion of the retention period required for disinfection, flush the pipeline until the chlorine concentration of water leaving the pipeline is no higher than that generally prevailing in the existing system or is acceptable for domestic use.
 - 3. Dispose of the chlorinated water in conformance with all Federal, State and Municipal laws, ordinances, rules, and regulations. If there is any possibility that the chlorinated discharge

will cause damage to the environment, then a neutralizing chemical shall be applied to the chlorinated water to neutralize thoroughly the chlorine residual remaining in the water.

4. After final flushing and before the pipeline is connected to the existing system, or placed in service, the Contractor shall employ an approved independent testing laboratory to sample, test and certify the water for conformance with the purity standards of the utility company, the United States Environmental Protection Agency, and the Federal Clean Water Act Health Standards. The Architect/Engineer shall be furnished with a copy of such certification by the testing laboratory, and no installation will be approved without such certification.
 5. Hydrostatic Testing: A hydrostatic test as required in applicable Sections of A.W.W.A. specification C-600 shall be applied to the water utility at no less than 1-1/2 times the working pressure of 150psi, whichever is greater. If there are indications of leaks under this pressure test, the Contractor shall locate and repair them at his cost and expense until the leakage is within the specified allowance. All bends, joint deflections and hydrants, shall have appropriate thrust blocking. The Architect/Engineer shall be furnished with a copy of the hydrostatic test certification.
- D. Prepare reports for testing activities and submit results to the Architect/Engineer prior to placing system into service.

END OF SECTION 331000

SECTION 333000 – SANITARY SEWERAGE UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section. Materials and installation shall comply with City Sewerage and Drainage requirements, standard drawings, and specifications.

1.2 SUMMARY

- A. This Section includes sanitary sewerage outside the building including gravity flow lines, pressure lines, manholes, cleanouts, frames, covers, structures, appurtenances.
- B. Related Sections include the following:
 - 1. Division 3 Section "Cast-in-Place Concrete" for concrete structures.

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. EPDM: Ethylene-propylene-diene-monomer rubber.
- C. PE: Polyethylene plastic.
- D. PVC: Polyvinyl chloride plastic.

1.4 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Non-Pressure-Piping Pressure Ratings: At least equal to system test pressure.
- B. Force-Main Pressure Ratings: At least equal to system operating pressure, but not less than 150 psig

1.5 QUALITY ASSURANCE

- A. Environmental Agency Compliance: Comply with regulations pertaining to sanitary sewer systems.
- B. Utility Compliance: Comply with regulations pertaining to sanitary sewer systems.

1.6 SUBMITTALS

- A. Product Data: Submit manufacturer's literature and data including full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity for the following:
- B. Shop Drawings: Include plans, elevations, details, and attachments for the following:
 - 1. Precast concrete manholes, including frames and covers.
- C. Coordination Drawings: Show manholes and other structures, pipe sizes, locations, and elevations. Include details of underground structures and connections. Show other piping in same trench and clearances from sewerage system piping. Indicate interface and spatial relationship between piping and proximate structures.
- D. Coordination Profile Drawings: If profiles are not shown on the construction documents, show system piping in elevation; horizontal scale of not less than 1-inch equals 50 feet and vertical scale of not less than 1-inch equals 5 feet. Indicate underground structures and pipe. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- E. Design Mix Reports and Calculations: For each class of cast-in-place concrete.
- F. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic structures, pipe, and fittings in direct sunlight, and protect pipe, fittings, and seals from dirt and damage.
- B. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

1.8 PROJECT CONDITIONS

- A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.
- B. Locate existing structures and piping to be closed and abandoned.
- C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without the Architect's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Gray-Iron Backwater Valves and Cleanouts:
 - a. Josam Co.
 - b. McWane, Inc.; Tyler Pipe; Wade Div.
 - c. Smith: Jay R. Smith Mfg. Co.
 - d. Watts Industries, Inc.; Ancon Drain Div.
 - e. Watts Industries, Inc.; Enpoco, Inc. Div.
 - f. Zurn Industries, Inc.; Hydromechanics Div.
 - 2. PVC Backwater Valves and Cleanouts:
 - a. Canplas, Inc.
 - b. IPS Corp.
 - c. NDS, Inc.
 - d. Plastic Oddities, Inc.
 - e. Sioux Chief Manufacturing Co., Inc.
 - 3. Manhole Cover Inserts:
 - a. FRW Industries, Inc.
 - b. Knutson Manufacturing Co.
 - c. Parson Environmental Products, Inc.
 - d. LFM Manufacturing Inc.
 - 4. Casing Pipe Spacers and End Boots
 - a. Advanced Products & Systems
 - b. Pipeline Seal and Insulator, Inc.
 - c. Cascade Waterworks Manufacturing

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials.

2.3 PIPES AND FITTINGS

- A. Gravity Flow:
 - 1. Polyvinyl Chloride (PVC) Sewer Pipe and Fittings:
 - a. 4-inch to 15-inch Diameter: ASTM D 3034, SDR 35, gasketed joints, ASTM D 3212, with cell classification of ASTM B or C 12454.
 - 1) Gaskets: ASTM F 477, elastomeric seals.

- b. 18-inch to 36-inch diameter: shall be solid wall or have a corrugated or ribbed exterior profile and smooth interior. Pipe shall conform to the following:
 - 1) Pipe and fittings shall conform to ASTM F949 corrugated sewer pipe with smooth interior. The corrugated outer wall shall be fused to the smooth inner wall at the corrugation valley. Pipe and fitting shall have a smooth bell, elastomeric joints conforming to ASTM D3212, and shall have a minimum pipe stiffness of 50 psi at 5 percent deflection when tested in accordance with ASTM D2412. Corrugation shall be perpendicular to the axis of the pipe to allow gaskets to be installed on field cut sections of pipe without the requirement of special fittings.
 - 2) Ribbed wall PVC pipe and fittings shall conform to ASTM F794 ribbed sewer pipe with smooth interior pipe. Fittings shall have a smooth bell, elastomeric joints conforming to ASTM D3212, and shall have a minimum pipe stiffness of 46 psi when tested in accordance with ASTM D2412 at 5 percent vertical deflection.
 - 3) Solid wall pipe and fittings shall conform to ASTM F679 SDR 35. Fittings shall have gaskets conforming to ASTM F477 and shall be able to withstand a hydrostatic pressure of 50 psi.
- 2. High Density Polyethylene (HDPE) pipe and fittings shall conform to ASTM F894. Pipe and fittings shall have a smooth interior wall and profile exterior, and be Class as noted on the drawings. Joints shall be water tight elastomeric gaskets in accordance with ASTM D3212, or thermal welded joints.
- 3. Extra-Strength Vitrified Clay Pipe and Fittings: According to the following: Extra-Strength Vitrified Clay Pipe and Fittings, ASTM C700, with joints conforming to ASTM C425. Gaskets shall be O-ring, compression type.

B. Pressure (Force Main) Lines:

- 1. All pipe and fittings used in the construction of force mains shall be rated for a minimum of 150 psi.
- 2. Polyvinyl Chloride (PVC): PVC pipe 4-inch to 12-inch shall conform to AWWA C900, Class 150 (DR18). PVC greater than 12-inch shall conform to AWWA C905, Class 165 (DR25). Fittings for PVC pipe shall be ductile iron conforming to AWWA C153 or AWWA C110.
- 3. High Density Polyethylene (HDPE) pipe and fittings:
 - a. 4" and larger shall be manufactured from PE 3608, high density, extra high molecular weight polyethylene meeting the requirements of ASTM D3350. Pipe shall be manufactured in accordance with ASTM F714, and shall be Class 160 (DR11). Molded fittings shall be manufactured in accordance with ASTM D3261 and subject to the test required under ASTM D3261. Fabricated fittings shall be made by heat fusion jointing of machined shapes cut from pipe, sheet stock, or molded fittings. Molded and fabricated fittings shall be rated for a minimum working pressure equivalent to the pipe. Joints shall be heat fusion butt joints, flange adapters, or mechanical couplings. All HDPE directional Bores larger than 2" diameter shall have fusion welded fittings and ends for connection.

- 1) Flange adapter shall have adequate through-bore length to be clamped in a butt fusion jointing machine without the use of a stub-end holder. The sealing surface of the flange shall be machined with a series of V-shaped grooves to restrain the gasket against blow out. Back-up rings and flange bolts shall be rated equal to or greater than the mating pipe. All flange adapters shall be equipped with a stainless steel internal pipe stiffener.
- 2) Mechanical couplings shall be sleeve style, restrained coupling.
 - b. Smaller than 4" shall be PE 3408/4710 Dual Rated per ATAM D3035 DR11/160 psi.
4. Anchorages for Sewer Force Main shall be Concrete Thrust Backing: ASTM C150, Type 1 Portland Cement for 3000 psi, 28-day minimum compressive strength. ODOT Class QC-1.

2.4 SPECIAL PIPE COUPLINGS AND FITTINGS

- A. Sleeve-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric sleeve and band assembly fabricated to mate with OD of pipes to be joined, for nonpressure joints.
 1. Sleeve Material for Concrete Pipe: ASTM C 443, rubber.
 2. Sleeve Material for Cast-Iron Soil Pipe: ASTM C 564, rubber.
 3. Sleeve Material for Plastic Pipe: ASTM F 477, elastomeric seal.
 4. Sleeve Material for Dissimilar Pipe: Compatible with pipe materials being joined.
 5. Bands: Stainless steel, at least one at each pipe insert.
- B. Bushing-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric bushing fabricated to mate with OD of smaller pipe and ID of adjoining larger pipe, for nonpressure joints.
 1. Material for Concrete Pipe: ASTM C 443 (ASTM C 443M), rubber.
 2. Material for Cast-Iron Soil Pipe: ASTM C 564, rubber.
 3. Material for Plastic Pipe: ASTM F 477, elastomeric seal.
 4. Material for Dissimilar Pipe: Compatible with pipe materials being joined.
- C. Pressure-Type Pipe Couplings: AWWA C219, iron-body sleeve assembly matching OD of pipes to be joined, with AWWA C111 rubber gaskets, bolts, and nuts. Include PE film, pipe encasement.
- D. Ductile-Iron, Flexible Expansion Joints: Compound fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections, rated for 250-psig (1725-kPa) minimum working pressure and for offset and expansion indicated. Include PE film, pipe encasement.
- E. Ductile-Iron Deflection Fittings: Compound coupling fitting with ball joint, flexing section, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include rating for 250-psig (1725-kPa) minimum working pressure and for up to 15 degrees deflection. Include PE film, pipe encasement.

- F. Ductile-Iron Expansion Joints: Three-piece assembly of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Include rating for 250-psig (1725-kPa) minimum working pressure and for expansion indicated. Include PE film, pipe encasement.

2.5 PE FILM, PIPE ENCASEMENT

- A. ASTM A 674 or AWWA C105; PE film, tube, or sheet; 8-mil thickness (for Ductile Iron Pipe only)

2.6 MANHOLES

- A. Normal-Traffic Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with rubber gasketed joints.

1. Inside Diameter: 48 inches minimum, unless otherwise indicated.
2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
3. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (100-mm) minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
4. Riser Sections: 4-inch (100-mm) minimum thickness, and lengths to provide depth indicated.
5. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
6. Gaskets: ASTM C 443 (ASTM C 443M), rubber.
7. Grade Rings: Include no more than two reinforced-concrete rings, of 6 inch total thickness, that match 24-inch- diameter frame and cover.
8. Steps: Aluminum, individual steps. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12- to 16-inch (300- to 400-mm) intervals. Omit steps for manholes less than 60 inches deep.
9. Steps: ASTM C 478 individual steps or ladder. Omit steps for manholes less than 60 inches deep.
10. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

- B. Manhole Frames and Covers: Conform to City of Bowling Green standards. Covers for private manholes shall include indented top design with lettering "SANITARY SEWER" cast into cover and shall omit City of Bowling Green name and seal design.

- C. Manhole Cover Inserts: Manufactured, plastic form, of size to fit between manhole frame and cover and designed to prevent storm water inflow. Include handle for removal and gasket for gastight sealing.

1. Type: Solid.
2. Type: With drainage and vent holes.
3. Type: With valve.

2.7 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
1. Cement: ASTM C 150, Type II.
 2. Fine Aggregate: ASTM C 33, sand.
 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.
1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.
- C. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio. Include channels and benches in manholes.
1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - a. Invert Slope: 1 percent through manhole.
 - b. Invert Slope: 2 percent through manhole.
 2. Benches: Concrete, sloped to drain into channel.
 - a. Slope: 8 percent.
 - b. Slope: 4 percent.
- D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious materials ratio.
1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 deformed steel.
- E.

2.8 BACKWATER VALVES

- A. Gray-Iron Backwater Valves: ASME A112.14.1, gray-iron body and bolted cover, with bronze seat.
1. Horizontal Type: With swing check valve and hub-and-spigot ends.
 2. Combination Horizontal and Manual Gate-Valve Type: With swing check valve, integral gate valve, and hub-and-spigot ends.
 3. Terminal Type: With bronze seat, swing check valve, and hub inlet.
- B. PVC Backwater Valves: Similar to ASME A112.14.1, horizontal type; with PVC body, PVC removable cover, and PVC swing check valve.

2.9 CLEANOUTS

- A. PVC Cleanouts: PVC body with PVC threaded plug with Cast Iron adapter. Include PVC sewer pipe fitting and riser to clean out of same material as sewer piping.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

3.2 IDENTIFICATION

- A. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.
 - 1. Use warning tape or detectable warning tape over ferrous piping.
 - 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.3 PIPING APPLICATIONS

- A. General: Include watertight joints.
- B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to applications indicated.
- C. Gravity-Flow Piping: Use the following:
 - 1. Sizes 4" through 15":
 - a. Ductile-iron sewer pipe; standard-pattern, ductile-iron fittings; gaskets; and gasketed joints.
 - b. PVC sewer pipe and fittings, gasketed joints.
 - 2. Sizes 18" to 36":
 - a. PVC solid wall or corrugated/ribbed exterior.
 - b. HDPE pipe per ASTM F894.
- D. Force-Main Piping: Use the following:
 - 1. Sizes 4" through 12":
 - a. Ductile-iron sewer pipe; standard- or compact-pattern, ductile-iron fittings; gaskets; and gasketed joints.
 - b. PVC pressure pipe, PVC pressure fittings, gaskets, and gasketed joints.
 - c. HDPE PE 3608 / ASTM 3350.

2. Smaller than 4": HDPE PE 3408/4710 Dual Rates per ASTM D3035.

3.4 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS

- A. Special Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.
 1. Use the following pipe couplings for non-pressure applications:
 - a. Sleeve type to join piping, of same size, or with small difference in OD.
 - b. Increaser/reducer-pattern, sleeve type to join piping of different sizes.
 - c. Bushing type to join piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
 2. Use pressure-type pipe couplings for force-main joints. Include PE film, pipe encasement.
- B. Special Pipe Fittings: Use where indicated. Include PE film, pipe encasement.

3.5 INSTALLATION, GENERAL

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.
- D. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Install gravity-flow piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
 1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.
 2. Install piping with 36-inch minimum cover.
- F. Install force-main piping between and connect to building's sanitary-drainage force main and termination point indicated.
 1. Install piping with restrained joints at horizontal and vertical changes in direction. Use cast-in-place concrete supports and anchors or corrosion-resistant rods and clamps.
 2. Install piping with 36-inch minimum cover.

- G. Extend sanitary sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
- H. Install ductile-iron, force-main piping according to AWWA C600.
- I. Install PVC force-main piping according to AWWA M23.
- J. Install force-main piping between and connect to building's force main and termination point indicated.
- K. Install force-main piping between and connect to packaged sewage pump station outlet and termination point indicated.
- L. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both. Casing pipe shall be steel pipe meeting ASTM specifications, 35,000 psi yield strength and 60,000 psi tensile strength to serve as a casing for the sewer and shall be installed within the limits and at the location shown on the construction drawings. The casing pipe shall be bituminous coated inside and out, and conform to ASTM A 123. The casing pipe shall have a minimum wall thickness as indicated in the table. Spacers and End Boots shall be as manufactured by Advanced Products & Systems. Joint restraints meeting the pipe manufacturers specifications shall be used on the carrier pipe.

3.6 PIPE JOINT CONSTRUCTION AND INSTALLATION

- A. General: Join and install pipe and fittings according to installations indicated.
- B. Refer to Division 2 Section "Utility Materials" for basic piping joint construction and installation.
- C. Ductile-Iron Sewer Pipe with Ductile-Iron Fittings: According to AWWA C600.
 - 1. Install PE film, pipe encasement over ductile-iron sewer pipe and ductile-iron fittings according to ASTM A 674 or AWWA C105.
- D. PVC Pressure Pipe and Fittings: Join and install according to AWWA M23.
- E. PVC Sewer Pipe and Fittings: As follows:
 - 1. Join pipe and gasketed fittings with gaskets according to ASTM D 2321.
 - 2. Install according to ASTM D 2321.
- F. System Piping Joints: Make joints using system manufacturer's couplings, unless otherwise indicated.
- G. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.
- H. Install with top surfaces of components, except piping, flush with finished surface.

3.7 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Form continuous concrete channels and benches between inlets and outlet.
- C. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.
- D. Install pre-cast concrete manhole sections with gaskets according to ASTM C 891.

3.8 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318 and ACI 350R.

3.9 BACKWATER VALVE INSTALLATION

- A. Install horizontal units in piping where indicated.
- B. Install combination units in piping and in structures where indicated.
- C. Install terminal units on end of piping and in structures where indicated. Secure units to structure walls.

3.10 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extension from sewer pipe to clean out at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.11 TAP CONNECTIONS

- A. Make connections to existing piping and underground structures so finished Work complies as nearly as practical with requirements specified for new Work.
- B. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and use a sleeve type coupling with gasket joints to insure a water tight connection.
- C. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.12 CLOSING ABANDONED SANITARY SEWERAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 - 1. Close open ends of piping with at least 8-inch- (200-mm-) thick, brick masonry bulkheads.
 - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Structures: Excavate around structure as required and use one procedure below:
 - 1. Remove structure and close open ends of remaining piping.
 - 2. Remove top of structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, gravel, or compacted dirt.
 - 3. Backfill to grade according to Division 2 Section "Earthwork."

3.13 FIELD QUALITY CONTROL

- A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.
 - 1. Place plug in end of incomplete piping at end of day and when work stops.
 - 2. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.
- B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again 30 days after completion of installation and placement of backfill.
 - 1. Submit separate reports for each system inspection.
 - 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 95 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 - 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 - 4. Reinspect and repeat procedure until results are satisfactory.
- C. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 - 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to authorities having jurisdiction or those requirements shown on the drawings, whichever is more stringent.
 - 3. Schedule tests and inspections by authorities having jurisdiction with at least 48 hours' advance notice.

4. Submit separate reports for each test.
5. Perform tests meeting Ohio EPA, the Ten States Standards, and the requirements of local authorities, or the tests shown on the drawings, whichever is more stringent.
 - a. Sanitary Sewerage: Perform hydrostatic test.
 - b. Sanitary Sewerage: Perform air test according to UNI-B-6.
 - 1) Option: Test concrete piping according to ASTM C 924
 - c. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than one times maximum system operating pressure, but not less than 150 psig (1035kPa)
 - 1) Ductile-Iron Piping: Test according to AWWA C600, Section "Hydraulic Testing."
 - 2) PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.
6. Manholes: Perform vacuum test according to ASTM C 1244-93
7. Leaks and loss in test pressure constitute defects that must be repaired.
8. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 333000