PROJECT MANUAL

Update CCC Restroom and
Renovate Washington State Park
CCC Restroom into Cabin

Washington State Park

Designed By: CORE10 Architecture, Inc.
4501 Lindell Boulevard, Suite 1a
St. Louis, MO 63108

Date Issued: April 29, 2026

Project No.: X2337-01

STATE *of* MISSOURI

OFFICE *of* ADMINISTRATION
Facilities Management, Design and Construction

SECTION 000107 - SEALS PAGE

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CIVIL ENGINEER	CIVIL DESIGN INC. THE FOLLOWING SECTIONS: DIV 30 THRU 34 U.N.O.	

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NOTICE TO BIDDERS

The following procurement forms can be found on our website at:
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and shall be submitted with your bid to FMDCBids@oa.mo.gov

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SECTION 000115 - LIST OF DRAWINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section provides a comprehensive list of the drawings that comprise the Bid Documents for this project.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.01 LIST OF DRAWINGS

A. The following list of drawings is a part of the Bid Documents:

SHEET	DATE
GENERAL	
G-000 COVER SHEET	04/29/26
G-001 PROJECT DESCRIPTION	04/29/26
CIVIL	
C-001 GENERAL INFORMATION	04/29/26
C-002 GENERAL INFORMAITON	04/29/26
C-101 DEMO PLAN THUNDERBIRD	04/29/26
C-102 DEMO PLAN BUGHOUSE	04/29/26
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C-202 SITE PLAN BUGHOUSE	04/29/26
C-203 GRADING PLAN BUGHOUSE	04/29/26
C-301 DETAILS	04/29/26
C-302 DETAILS	04/29/26
STRUCTURAL	
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S-203 STRUCTURAL DETAILS	04/29/26

ARCHITECTURAL	
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A-101 BUG HOUSE - FLOOR PLANS	04/29/26
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A-503 SITE DETAILS	04/29/26
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P-101 BUGHOUSE / THUNDERBIRD - SCHEDULES / DETAILS	04/29/26
P-102 BUGHOUSE / THUNDERBIRD - FLOOR PLANS	04/29/26
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M-101 BUGHOUSE / THUNDERBIRD - SCHEDULES / DETAILS	04/29/26
M-102 BUGHOUSE / THUNDERBIRD - FLOOR PLANS	04/29/26
ELECTRICAL	
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E-102 BUGHOUSE / THUNDERBIRD - FLOOR PLANS	04/29/26

END OF SECTION 000115

SECTION 001116 - INVITATION FOR BID

1.0 OWNER:

A. The State of Missouri
Office of Administration,
Division of Facilities Management, Design and Construction
Jefferson City, Missouri

2.0 PROJECT TITLE AND NUMBER:

A. Update CCC Restroom and Renovate Washington State Park CCC Restroom into Cabin
Washington State Park
Desoto, Missouri
Project No.: X2337-01

3.0 BIDS WILL BE RECEIVED:

A. Until: 1:30 PM, December 3, 2026

B. **Only electronic bids sent to FMDCBids@oa.mo.gov shall be accepted: (See Instructions to Bidders for further detail)**

4.0 DESCRIPTION:

A. Scope: The project includes restoration of the historic restroom building near the Visitor Center and rehabilitation of the restroom near Thunderbird Lodge.

B. MBE/WBE/SDVE/HDVE Goals: MBE **0%**, WBE **0%**, and SDVE **3%** or HDVE **3%**. **NOTE: Only MBE/WBE firms certified by the State of Missouri Office of Equal Opportunity as of the date of bid opening, or SDVE(s)/HDVE(s)meeting the requirements of Section 34.069, RSMo, Section 34.074, RSMo and 1 CSR 30-5.010, can be used to satisfy the MBE/WBE/SDVE/HDVE participation goals for this project.**

5.0 PRE-BID MEETING:

A. Place/Time**:** 11 AM, November 17, 2026, at Maintenance Shop, Washington State Park, 13041 State Highway 104, De Soto, Missouri 63020-7000. Parking will be at the Vietnam Memorial, up the hill from the shop.

B. Access to State of Missouri property requires presentation of a photo ID by all persons.

6.0 HOW TO GET PLANS & SPECIFICATIONS:

A. View Only Electronic bid sets are available at no cost or paper bid sets for a deposit of **$100.00** from American Document Solutions (ADS). MAKE CHECKS PAYABLE TO: American Document Solutions. Mail to: American Document Solutions, 1400 Forum Blvd., Suite 7A, Columbia, Missouri 65203. Phone 573-446-7768, Fax 573-355-5433, https://www.adsplanroom.net. NOTE: Prime contractors will be allowed a maximum of two bid sets at the deposit rate shown above. Other requesters will be allowed only one bid set at this rate. Additional bid sets or parts thereof may be obtained by any bidder at the cost of printing and shipping by request to American Document Solutions at the address shown above. Bidder must secure at least one bid set to become a planholder.

B. **Refunds: Return plans and specifications in unmarked condition within 15 working days of bid opening to American Document Solutions, 1400 Forum Blvd., Suite 7A, Columbia, Missouri 65203. Phone 573-446-7768, Fax 573-355-5433. Deposits for plans not returned within 15 working days shall be forfeited.**

C. Information for upcoming bids, including downloadable plans, specifications, Invitation for Bid, bid tabulation, award, addenda, and access to the ADS planholders list, is available on the Division of Facilities Management, Design and Construction's web site: https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans.

7.0 POINT OF CONTACT:

A. Project Manager: Sandra Walther,573-257-7322, email: sandra.walther@oa.mo.gov

8.0 GENERAL INFORMATION:

A. The State reserves the right to reject any and all bids and to waive all informalities in bids. No bid may be withdrawn for a period of 20 working days subsequent to the specified bid opening time. The contractor shall pay not less than the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed, as determined by the Missouri Department of Labor and Industrial Relations and as set out in the detailed plans and specifications.

B. Bid results will be available at https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans after it is verified that at least one bid is awardable and affordable.

SECTION 002113 – INSTRUCTIONS TO BIDDERS

1.0 - SPECIAL NOTICE TO BIDDERS

A. If awarded a contract, the Bidder's employees, and the employees of all subcontractors, who perform the work on the project must adhere to requirements in Section 013513 – Site Security and Health Requirements as applicable per Agency.

B. The Bidder's prices shall include all city, state, and federal sales, excise, and similar taxes that may lawfully be assessed in connection with the performance of work, and the purchased of materials to be incorporated in the work. **THIS PROJECT IS NOT TAX EXEMPT.**

2.0 - BID DOCUMENTS

A. The number of sets obtainable by one (1) party may be limited in accordance with available supply.

B. For the convenience of contractors, subcontractors and suppliers, bidding documents are available on the Owner's website at https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans.

3.0 - BIDDERS' OBLIGATIONS

A. Bidders must carefully examine the entire site of the work and shall make all reasonable and necessary investigations to inform themselves thoroughly as to the facilities available as well as to all the difficulties involved in the completion of all work in accordance with the specifications and the plans. Bidders are required to examine all maps, plans and data mentioned in the specifications. No plea of ignorance concerning observable existing conditions or difficulties that may be encountered in the execution of the work under this contract will be accepted as an excuse for any failure or omission on the part of the successful Bidder (contractor) to fulfill every detail of the requirements of the contract, nor accepted as a basis for any claims for extra compensation or time extension.

B. Under no circumstances will Bidders give their plans and specifications to other Bidders. It is highly encouraged, but not required, that all Bidders be on the official planholders list to receive project updates including but not limited to any addenda that are issued during the bidding process.

4.0 - INTERPRETATIONS

A. No Bidder shall be entitled to rely on oral or written representations from any person as to the meaning of the plans and specifications or the acceptability of alternate products, materials, form or type of construction.

B. Bidders shall make all requests for interpretations in writing and submit all requests to the Project Manager identified in Section 007300 – Supplementary Conditions with all necessary supporting documentation no less than five (5) working days before opening of bids. Responses to requests for interpretation will be issued via a written addendum and will be sent as promptly as is practicable to all official planholders and posted on the Owner's website. All such addenda shall become part of the bid and contract documents.

C. Bidders shall make all requests for an "Acceptable Substitution" on the Section 006325 Substitution Request Form. The request shall be emailed to the Project Manager identified in Section 007300 – Supplementary Conditions no less than five (5) working days before opening of bids. Responses to requests for substitutions will be issued via a written addendum and will be sent as promptly as is practicable to all official planholders and posted on the Owner's website. All such addenda shall become part of the bid and contract documents.

D. An "Acceptable Substitution" requested after the award of bid will only be approved if proven to the satisfaction of the Owner and the Designer that the product is acceptable in design, strength, durability, usefulness, and convenience for the purpose intended. Approval of the substitution after award is at the sole discretion of the Owner and all requests of this nature must be submitted in accordance with Article 3.1 of the General Conditions.

5.0 - BIDS AND BIDDING PROCEDURE

A. Bidders shall submit all submission forms and accompanying documents listed in Section 004113 – Bid Form, Article 5.0, Attachments to Bid by the stated time on the bid documents or the bid will be rejected for being non-responsive.

B. Depending on the specific project requirements, **the following is a GENERIC list** of all possible bid forms that may be due with bid submittals. Bidders must verify each specific project's requirements in Section 004113 to ensure they have provided all the required documentation with their submission.

Bid Submittal – due before stated date and time of bid opening (see IFB):

004113	Bid Form (all pages are always required)
004322	Unit Prices Form
004336	Proposed Subcontractors Form
004337	MBE/WBE/SDVE/HDVE Compliance Evaluation Form
004338	MBE/WBE/SDVE/HDVE Eligibility Determination for Joint Ventures
004339	MBE/WBE/SDVE/HDVE GFE Determination
004340	SDVE Business Form
004340.1	HDVE Business Form
004541	Affidavit of Work Authorization
004545	Anti-Discrimination Against Israel Act Certification form

C. The Bidder shall submit its bid on the forms provided by the Owner in the same file format (PDF) with each space fully and properly completed, typewritten or legibly printed, including all amounts required for alternate bids, unit prices, cost accounting data, etc. The Owner will reject bids that are not on the Owner's forms and that do not contain all requested information. All forms can be found on the Owner's website at https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans and shall be submitted to FMDCBids@oa.mo.gov.

D. All bids shall be submitted without additional terms and conditions, modifications, or reservations. The completed forms shall not include interlineations, alterations, or erasures. Bids not in compliance with the requirements of this paragraph will be rejected as non-responsive.

E. All bids shall be accompanied by a bid bond executed by the bidder and a duly authorized surety company, certified check, cashier's check or bank draft made payable to the Division of Facilities Management, Design and Construction, State of Missouri, in the amount indicated in the bid documents in Section 004113. Failure of the Bidder to submit the duly authorized bid bond or the full amount required shall be sufficient cause to reject his bid. The Bidder agrees that the proceeds of the check, draft, or bond shall become the property of the State of Missouri, if for any reason the Bidder withdraws his bid after bid closing or if the Bidder, within ten (10) working days after notification of award, refuses or is unable to 1) execute the tendered contract, 2) provide an acceptable performance and payment bond, or 3) provide evidence of required insurance coverage.

F. The bid bond check or draft submitted by the successful Bidder will be returned after the receipt of an acceptable performance and payment bond and execution of the formal contract. Checks or drafts of all other Bidders will be returned within a reasonable time after it is determined that the bid represented by same will receive no further consideration by the State of Missouri.

6.0 - SIGNING OF BIDS

A. A bid shall contain the full and correct legal name of the Bidder. If the Bidder is an entity registered with the Missouri Secretary of State, the Bidder's name on the bid form shall appear as shown in the Secretary of State's records. If the Bidder is an entity organized in a state other than Missouri, the Bidder must provide a Certificate of Authority to do business in the State of Missouri.

B. If the successful Bidder is doing business in the State of Missouri under a fictitious name, the Bidder shall furnish to Owner, attached to the Bid Form, a properly certified copy of the certificate of Registration of Fictitious Name from the State of Missouri, and such certificate shall remain on file with the Owner.

C. A bid from an individual shall be signed as noted on the Bid Form.

D. A bid from a partnership or joint venture shall require only one signature of a partner, an officer of the joint venture authorized to bind the venture, or an attorney-in-fact. If the bid is signed by an officer of a joint venture or an attorney-in-fact, a document evidencing the individual's authority to execute contracts should be included with the bid form.

E. A bid from a limited liability company (LLC) shall be signed by a manager or a managing member of the LLC.

F. A bid from a corporation shall have the correct corporate name thereon and the signature of an authorized officer of the corporation. Title of office held by the person signing for the corporation shall appear, along with typed name of said individual and the corporate license number shall be provided. In addition, for corporate proposals, the President or Vice-President listed per the current filing with the Missouri Secretary of State should sign as the Bidder. If the signatory is other than the corporate president or vice president, the bidder must provide satisfactory evidence that the signatory has the legal authority to bind the corporation.

7.0 - RECEIVING BID SUBMITTALS

A. It is the Bidder's sole responsibility to ensure receipt of the bid submittals by Owner on or before the date and time specified in the Invitation for Bid or as modified via written addenda. Bids received after the date and time specified will not be considered by the Owner.

B. All bids shall be received via email at FMDCBids@oa.mo.gov. A bid submitted through any other means, including hard copies, will not be considered and will be discarded by the Owner unopened.

8.0 - MODIFICATION AND WITHDRAWAL OF BIDS

A. Bidder may withdraw a bid at any time prior to the scheduled closing time for receipt of bids, but no bidder may withdraw his bid for a period of twenty (20) working days after the scheduled closing time for receipt of bids.

B. Bidder may modify a bid until the scheduled closing time by sending a revised bid to FMDCBids@oa.mo.gov with a note in the subject line and body of the email that it is a revised bid. A revised bid sent via any other method will not be considered.

9.0 - AWARD OF CONTRACT

A. The Owner reserves the right to reject any and/or all bids and further to waive all informalities in bidding when deemed in the best interest of the State of Missouri.

B. The Owner reserves the right to let other contracts in connection with the work including, but not limited to, contracts for the furnishing and installation of furniture, equipment, machinery, appliances and other apparatuses.

C. The Owner will award a contract to the lowest, responsive, and responsible Bidder in accordance with Section 8.250, RSMo. No contract will be awarded to any Bidder who has had a contract with the Owner terminated within the preceding twelve months for material breach of contract or who has been suspended or debarred by the Owner.

D. Award of alternates, if any, will be made in numerical order unless all bids received are such that the order of acceptance of alternates does not affect the determination of the lowest, responsive, responsible bidder.

E. No award shall be considered binding upon the Owner until the written contract has been properly executed and the following documentation has been provided: 1) performance and payment bond consistent with Article 6.1 of the General Conditions; 2) proof of the required insurance coverage; 3) an executed Section 004541 - Affidavit of Work Authorization form; and 4) documentation evidence enrollment and participation in a federal work authorization program.

F. Failure to execute and return the contract and associated documents within the prescribed period shall be treated, at the option of the Owner, as a breach of Bidder's obligation and the Owner shall be under no further obligation to Bidder.

G. Transient employers subject to Sections 285.230 and 285.234, RSMo, (out-of-state employers who temporarily transact any business in the State of Missouri) may be required to file a bond with the

Missouri Department of Revenue. No contract will be awarded by the Owner unless the successful Bidder certifies that he has complied with all applicable provisions of Section 285.230-234.

H. Sections 285.525 and 285.530, RSMo, require business entities to enroll and participate in a federal work authorization program in order to be eligible to receive award of any state contract in excess of $5,000. Bidders should submit with their bid an Affidavit of Work Authorization (Section 004541) along with appropriate documentation evidencing such enrollment and participation. Bidders must also submit an E-Verify Memorandum before the Owner may award a contract to the Bidder. Information regarding E-Verify is located at https://www.e-verify.gov/employers/enrolling-in-e-verify. The contractor shall be responsible for ensuring that all subcontractors and suppliers associated with this contract enroll in E-Verify.

I. The successful Bidder must be registered in MissouriBUYS powered by MOVERS at https://missouribuys.mo.gov/supplier-registration# as an approved vendor prior to being issued a contract.

10.0 - CONTRACT SECURITY

A. The successful Bidder shall furnish a performance/payment bond as set forth in General Conditions Article 6.1 prior to the State executing the contract and issuing a notice to proceed.

11.0 - WORKING DAYS

A. Contract duration time is stated in working days and will use the following definition in determining the actual calendar date for contract completion:

1. Working days are defined as all calendar days except Saturdays, Sundays and the following State of Missouri observed holidays: New Year's Day, Martin Luther King, Jr. Day, Lincoln Day, Washington's Birthday, Truman Day, Memorial Day, Juneteenth, Independence Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day and Christmas Day.

12.0 - AMERICAN AND MISSOURI - MADE PRODUCTS AND FIRMS

A. By signing the bid form and submitting a bid on this project, the Bidder certifies that it will use American and Missouri products as set forth in Article 1.7 of the General Conditions. Bidders are advised to review those requirements carefully prior to bidding.

B. A preference shall be given to Missouri firms, corporations or individuals, or firms, corporations or individuals that maintain Missouri offices or places of business, when the quality of performance promised is equal or better and the price quoted is the same or less.

C. Pursuant to Section 34.076, RSMo, a contractor or Bidder domiciled outside the boundaries of the State of Missouri shall be required, in order to be successful, to submit a bid the same percent less than the lowest bid submitted by a responsible contractor or Bidder domiciled in Missouri as would be required for such a Missouri domiciled contractor or Bidder to succeed over the bidding contractor or Bidder domiciled outside Missouri on a like contract or bid being let in the Bidder's domiciliary state and, further, the contractor or Bidder domiciled outside the boundaries of Missouri shall be required to submit an audited financial statement as would be required of a Missouri domiciled contractor or Bidder on a like contract or bid being let in the domiciliary state of that contractor or Bidder.

13.0 – ANTI-DISCRIMINATION AGAINST ISRAEL ACT CERTIFICATION:

A. If the Bidder meets the section 34.600, RSMo., definition of a "company" and the Bidder has ten or more employees, the Bidder must certify in writing that the Bidder is not currently engaged in a boycott of goods or services from the State of Israel and shall not engage in a boycott of goods or services from the State of Israel, if awarded a contract, for the duration of the contract. The Bidder is required to complete and submit the applicable portion of Section 004545 - Anti-Discrimination Against Israel Act Certification with its Bid Form. The applicable portion of the exhibit must be submitted prior to execution of a contract by the Owner and issuance of Notice to Proceed.

14.0 - MBE/WBE/SDVE/HDVE INSTRUCTIONS

A. Definitions:

1. **"MBE"** means a Minority Business Enterprise.

2. **"MINORITY"** has the same meaning as set forth in 1 CSR. 10-17.010.

3. **"MINORITY BUSINESS ENTERPRISE"** has the same meaning as set forth in section 37.020, RSMo.

4. **"WBE"** means a Women's Business Enterprise.

5. **"WOMEN'S BUSINESS ENTERPRISE"** has the same meaning as set forth in section 37.020, RSMo.

6. **"SDVE"** means a Service-Disabled Veterans Enterprise.

7. **"SERVICE-DISABLED VETERAN"** has the same meaning as set forth in section 34.074, RSMo.

8. **"SERVICE-DISABLED VETERAN ENTERPRISE"** has the same meaning as "Service-Disabled Veteran Business" set forth in section 34.074, RSMo.

9. **"HDVE" means an Honorably Discharged Veteran Enterprise**

10. **"Honorably Discharged Veteran" has the same meaning as set forth in section 34.069, RSMo.**

11. **"Honorably Discharged Veteran Enterprise"** has the same meaning as "Honorably Discharged Veteran Business" set forth in section 34.069, RSMo.

B. MBE/WBE/SDVE/HDVE General Requirements:

1. For all bids greater than $100,000, the Bidder shall obtain MBE, WBE, SDVE or HDVE participation in an amount equal to or greater than the percentage goals set forth in the Invitation for Bid and the Bid Form, unless the Bidder is granted a Good Faith Effort waiver by the Director of the Division, as set forth below. If the Bidder does not meet the MBE, WBE, SDVE or HDVE goals, or make a good faith effort to do so, the Bidder shall be nonresponsive, and its bid shall be rejected.

2. The Bidder should submit with its bid all the information requested in the MBE/WBE/SDVE/HDVE Compliance Evaluation Form for every MBE, WBE, SDVE, or HDVE subcontractor or material supplier the Bidder intends to use for the contract work. The Bidder is required to submit all MBE/WBE/SDVE/HDVE documentation before the stated time and date set forth in the Invitation for Bid. If the Bidder fails to provide such information by the specified date and time, the Owner shall reject the bid.

3. The Director reserves the right to request additional information from a Bidder to clarify the Bidder's proposed MBE, WBE, SDVE, or HDVE participation. The Bidder shall submit the clarifying information requested by the Owner within two (2) working days of receiving the request for clarification.

4. Pursuant to section 34.069, RSMo and section 34.074, RSMo, a Prime Bidder that qualifies as an SDVE or HDVE shall receive a three-percentage point bonus preference in the contract award evaluation process. The bonus preference will be calculated and applied by reducing the bid amount of the eligible SDVE or HDVE by three percent of the apparent low responsive Bidder's bid. Based on this calculation, if the eligible SDVE's or HDVE's evaluation is less than the apparent low responsive Bidder's bid, the eligible SDVE's or HDVE's bid will become the apparent low responsive bid. This reduction is for evaluation purposes only and will have no impact on the actual amount(s) of the bid or the amount(s) of any contract awarded. In order to be eligible for the SDVE or HDVE preference, the Bidder must complete and submit with its bid the Missouri Service-Disabled Veteran Business Form or the Missouri Honorably Discharged Veterans Business Form, and any information required by the form.

C. Computation of MBE/WBE/SDVE/HDVE Goal Participation:

1. A Bidder who is a MBE, WBE, SDVE, or HDVE may count 100% of the contract towards the MBE, WBE, SDVE, or HDVE goal, less any amounts awarded to another MBE, WBESDVE, or HDVE. (NOTE: a MBE firm that bids as general contractor must obtain WBE and SDVE or HDVE participation; a WBE firm that bids as a general contractor must obtain MBE and SDVE or HDVE participation; and a SDVE or HDVE firm that bids as general contractor must obtain

MBE and WBE participation.) For the remaining contract amount to be counted towards the MBE, WBE or SDVE goal, the Bidder must complete the MBE/WBE/SDVE/HDVE Compliance Evaluation Form (Section 004337) identifying itself as an MBE, WBE, SDVE or HDVE.

2. The total dollar value of the work granted to a certified MBE, WBE, SDVE or HDVE by the Bidder shall be counted towards the applicable goal.

3. Expenditures for materials and supplies obtained from a certified MBE, WBE, SDVE, or HDVE supplier or manufacturer may be counted towards the MBE, WBE, SDVE or HDVE goals, if the MBE, WBE, SDVE, or HDVE assumes the actual and contractual responsibility for the provision of the materials and supplies.

4. The total dollar value of the work granted to a second or subsequent tier subcontractor or a supplier may be counted towards a Bidder's MBE, WBE, SDVE or HDVE goals, if the MBE, WBE, SDVE or HDVE properly assumes the actual and contractual responsibility for the work.

5. The total dollar value of work granted to a certified joint venture equal to the percentage of the ownership and control of the MBE, WBE, SDVE or HDVE partner in the joint venture may be counted towards the MBE/WBE/SDVE/HDVE goals.

6. Only expenditures to a MBE, WBE, SDVE or HDVE that performs a commercially useful function in the work may be counted towards the MBE, WBE, SDVE or HDVE goals. A MBE, WBE, SDVE or HDVE performs a commercially useful function when it is responsible for executing a distinct element of the work and carrying out its responsibilities by performing, managing and supervising the work or providing supplies or manufactured materials.

D. Certification of MBE/WBE/SDVE/HDVE Subcontractors:

1. In order to be counted towards the goals, an MBE or WBE must be certified by the State of Missouri Office of Equal Opportunity and an SDVE/HDVE must be certified by the State of Missouri, Office of Equal Opportunity or by the Federal U.S. Small Business Administration directory.

2. The Bidder may determine the certification status of a proposed MBE or WBE subcontractor or supplier by referring to the Office of Equal Opportunity (OEO)'s online MBE/WBE directory https://apps1.mo.gov/MWBCertifiedFirms/. The Bidder may determine the eligibility of a SDVE/HDVE subcontractor or supplier by referring to the Office of Equal Opportunity online SDVE/HDVE directory at https://oeo.mo.gov/sdve-certification-program/ or the Federal U.S. Small Business Administration directory https://veterans.certify.sba.gov/#search.

3. Additional information, clarifications, or other information regarding the MBE/WBE/SDVE/HDVE listings in the directories may be obtained by contacting the Contract Specialist of record as shown in the Supplementary Conditions (Section 007300).

E. Waiver of MBE/WBE/SDVE/HDVE Participation:

1. If a Bidder has made a good faith effort to secure the required MBE, WBE, SDVE or HDVE participation and has failed, the Bidder shall submit with its bid the information requested in MBE/WBE/SDVE/HDVE Good Faith Effort (GFE) Determination form. The Director will determine if the Bidder made a good faith effort to meet the applicable goals. If the Director determines that the Bidder did not make a good faith effort, the bid shall be rejected as being nonresponsive to the bid requirements. Bidders who demonstrate that they have made a good faith effort to include MBE, WBE, SDVE or HDVE participation will be granted a waiver and will be considered to be responsive to the applicable participation goals, regardless of the percent of actual participation obtained, if the bid is otherwise acceptable.

2. In determining whether a Bidder has made a good faith effort to obtain MBE, WBE, SDVE or HDVE participation, the Director may evaluate the factors set forth in 1 CSR 30-5.010(6)(C) and the following:

   a. The amount of actual participation obtained;

b. How and when the Bidder contacted potential MBE, WBE, SDVE, or HDVE subcontractors and suppliers;

c. The documentation provided by the Bidder to support its contacts, including whether the Bidder provided the names, addresses, phone numbers, and dates of contact for MBE/WBE/SDVE/HDVE firms contacted for specific categories of work;

d. If project information, including plans and specifications, were provided to MBE/WBE/SDVE/HDVE subcontractors;

e. Whether the Bidder made any attempts to follow-up with MBE, WBE, SDVE or HDVE firms prior to bid;

f. Amount of bids received from any of the subcontractors and/or suppliers that the Bidder contacted;

g. The Bidder's stated reasons for rejecting any bids;

F. Contractor MBE/WBE/SDVE/HDVE Obligations

1. If awarded a contract, the Bidder will be contractually required to subcontract with or obtain materials from the MBE, WBE, SDVE, HDVE firms listed in its bid, in amounts equal to or greater than the dollar amount in the bid, unless the amount is modified in writing by the Owner.

2. If the Contractor fails to meet or maintain the participation requirements contained in the Contractor's bid, the Contractor must satisfactorily explain to the Director why it cannot comply with the requirement and why failing meeting the requirement was beyond the Contractor's control. If the Director finds the Contractor's explanation unsatisfactory, the Director may take any appropriate action including, but not limited to:

   a. Declaring the Contractor ineligible to participate in any contracts with the Division for up to twelve (12) months (suspension); and/or

   b. Declaring the Contractor be nonresponsive to the Invitation for Bid, or in breach of contract and rejecting the bid or terminating the contract.

3. If the Contractor replaces an MBE, WBE, SDVE or HDVE during the course of the contract, the Contractor shall replace it with another MBE, WBE, SDVE or HDVE or make a good faith effort to do so. All MBE, WBE, SDVE or HDVE substitutions must be approved by the Director in writing.

4. The Contractor shall provide the Owner with regular reports on its progress in meeting its MBE/WBE/SDVE/HDVE obligations. At a minimum, the Contractor shall report the dollar-value of work completed by each MBE, WBE, SDVE or HDVE during the preceding month and the cumulative total of work completed by each MBE, WBE, SDVE or HDVE to date with each monthly application for payment. The Contractor shall also make a final report, which shall include the total dollar-value of work completed by each MBE, WBE, SDVE or HDVE during the entire contract.

State of Missouri
Construction Contract

THIS AGREEMENT is made (DATE) by and between:

Contractor Name and Address

hereinafter called the "Contractor," and the **State of Missouri**, hereinafter called the **"Owner"**, represented by the Office of Administration, Division of Facilities Management, Design and Construction.

WITNESSETH, that the Contractor and the Owner, for the consideration stated herein agree as follows:

ARTICLE 1. STATEMENT OF WORK

The Contractor shall furnish all labor and materials and perform all work required for furnishing and installing all labor, materials, equipment and transportation and everything necessarily inferred from the general nature and tendency of the plans and specifications for the proper execution of the work for:

Project Name: **Update CCC Restroom and Renovate Washington State Park CCC Restroom into Cabin**
Washington State Park
Desoto, Missouri

Project Number: **X2337-01**

in strict accordance with the Contract Documents as enumerated in Article 7, all of which are made a part hereof.

ARTICLE 2. TIME OF COMPLETION

The contract performance time is **130 working days** from the transmittal date of this agreement. The contract completion date is **MONTH, DAY, YEAR**. This time includes ten (10) working days for the Contractor to receive, sign and return the contract form along with required bonding and insurance certificates. Failure of the Contractor to provide correct bonding and insurance within the ten (10) working days shall not be grounds for a time extension. Receipt of proper bonding and insurance is a condition precedent to the formation of the contract and if not timely received, may result in forfeiture of the Contractor's bid security. Work may not commence until the Owner issues a written Notice to Proceed and must commence within seven (7) working days thereafter.

ARTICLE 3. LIQUIDATED DAMAGES

Whenever time is mentioned in this contract, time shall be and is of the essence of this contract. The Owner would suffer a loss should the Contractor fail to have the work embraced in this contract fully completed on or before the time above specified. THEREFORE, the parties hereto realize in order to adjust satisfactorily the damages on account of such failure that it might be impossible to compute accurately or estimate the amount of such loss or damages which the Owner would sustain by reason of failure to complete fully said work within the time required by this contract. The Contractor hereby covenants and agrees to pay the Owner, as and for **liquidated damages, the sum of $1,000** per day for each and every day, Sunday and legal holidays excepted, during which the work remains incomplete and unfinished. Any sum which may be due the Owner for such damages shall be deducted and retained by the Owner from any balance which may be due the Contractor when said work shall have been finished and accepted. But such provisions shall not release the Bond of the Contractor from liability according to its terms. In case of failure to complete, the Owner will be under no obligation to show or prove any actual or specific loss or damage.

SAMPLE

ARTICLE 4. CONTRACT SUM

The Owner shall pay the Contractor for the prompt, faithful and efficient performance of the conditions and undertakings of this contract, subject to additions, and deductions as provided herein, in current funds the sum of:

Base Bid: $

Accepted Alternates, if applicable to the Project and accepted by the Owner.

TOTAL CONTRACT AMOUNT: ($CONTRACT AMOUNT)

UNIT PRICES: The Owner accepts the following Unit Prices:

For changing specified quantities of work from those indicated by the contract drawings and specifications, upon written instructions of Owner, the following unit prices shall prevail. The unit prices include all labor, overhead and profit, materials, equipment, appliances, bailing, shoring, shoring removal, etc., to cover the finished work of the several kinds of work called for. Only a single unit price shall be given and it shall apply for either MORE or LESS work than that shown on the drawings and called for in the specifications or included in the Base Bid. In the event of more or less units than so indicated or included, change orders may be issued for the increased or decreased amount.

ARTICLE 5. PREVAILING WAGE RATE

MISSOURI PREVAILING WAGE LAW (Sections 290.210 to 290.340, RSMo): The Contractor shall pay not less than the specified hourly rate of wages, as set out in the wage order attached to and made part of the specifications for work under this contract, to all workers performing work under the contract, in accordance with sections 290.210 to 290.340, RSMo. The Contractor shall forfeit a penalty to the Owner of one hundred dollars per day (or portion of a day) for each worker that is paid less than the specified rates for any work done under the contract by the Contractor or by any subcontractor, in accordance with section 290.250, RSMo.

DAVIS-BACON ACT: If this Project is financed in whole or in part from Federal funds (as indicated in the Instructions to Bidders or other bid or contract documents for this Project), then this contract shall be subject to all applicable federal labor statutes, rules and regulations, including provisions of the Davis-Bacon Act, 40 U.S.C. §3141 et seq., and the "Federal Labor Standards Provisions," as further set forth in Section 007333 – Supplementary General Conditions for Federally Funded/Assisted Construction Projects, which is incorporated into the contract by reference. Where the Missouri Prevailing Wage Law and the Davis-Bacon Act require payment of different wages for work performed under this contract, the Contractor and all Subcontractors shall pay the greater of the wages required under either law, on a classification-by-classification basis.

ARTICLE 6. MINORITY/WOMEN/SERVICE DISABLED VETERAN BUSINESS ENTERPRISE PARTICIPATION

The Contractor has been granted a waiver of the 0% MBE, 0% WBE, and 3% SDVE or HDVE 3% participation goals. The Contractor agrees to secure the MBE/WBE/SDVE/HDVE participation amounts for this project as follows: (OR)

The Contractor has met the MBE/WBE/SDVE/HDVE participation goals and agrees to secure the MBE/WBE/SDVE/HDVE participation amounts for this project as follows:

MBE/WBE/SDVE/HDVE Firm: Subcontract Amt:$
MBE/WBE/SDVE/HDVE Firm: Subcontract Amt:$
MBE/WBE/SDVE/HDVE Firm: Subcontract Amt:$
Total $

MBE/WBE/SDVE/HDVE assignments identified above shall not be changed without a contract change signed by the Owner.

The Director of the Division of Facilities Management, Design and Construction or his Designee shall be the final authority to resolve disputes and disagreements between the Contractor and the MBE/WBE/SDVE/HDVE firms listed above when such disputes impact the subcontract amounts shown above.

SAMPLE

ARTICLE 7. CONTRACT DOCUMENTS

The following documents are hereby incorporated into this contract by reference (all division/section numbers and titles are as utilized in the Project Manual published by the Owner for this Project):

1. Division 0 – Procurement and Contracting Information, including, but not limited to:
    a. Invitation for Bid (Section 001116)
    b. Instructions to Bidders (Section 002113)
    c. Supplementary Instructions to Bidders (if applicable) (Section 002213)
    d. The following documents as completed and executed by the Contractor and accepted by the Owner, if applicable:
        i. Bid Form (Section 004113)
        ii. Unit Prices (Section 004322)
        iii. Proposed Contractors Form (Section 004336)
        iv. MBE, WBE, SDVE, HDVE Compliance Evaluation Form(s) (Section 004337)
        v. MBE, WBE, SDVE, HDVE Eligibility Determination Form for Joint Ventures (Section 004338)
        vi. MBE, WBE, SDVE, HDVE Good Faith Effort (GFE) Determination Form (Section 004339)
        vii. Missouri Service-Disabled Veteran Business Form (Section 004340)
        viii. Missouri Honorably Discharged Veteran Business Form (Section 004340.1)
        ix. Affidavit of Work Authorization (Section 004541)
    e. Performance and Payment Bond, completed and executed by the Contractor and surety (Section 006113)
    f. General Conditions (Section 007213)
    g. Supplementary Conditions (Section 007300)
    h. Supplementary General Conditions for Federally Funded/Assisted Construction Projects (Section 007333), if applicable
    i. Wage Rate(s) (Section 007346)
2. Division 1 – General Requirements
3. All Drawings identified in the Project Manual
4. All Technical Specifications included in the Project Manual
5. Addenda, if applicable

ARTICLE 8 – CERTIFICATION

By signing this contract, the Contractor hereby re-certifies compliance with all legal requirements set forth in Section 6.0, Bidder's Certifications of the Bid Form.

By signature below, the parties hereby execute this contract document.

APPROVED:

_____
Crystal Wessing, Director
Division of Facilities Management,
Design and Construction

_____
Contractor's Authorized Signature

I, Corporate Secretary, certify that I am Secretary of the corporation named above and that (CONTRACTOR NAME), who signed said contract on behalf of the corporation, was then (TITLE) of said corporation and that said contract was duly signed for and in behalf of the corporation by authority of its governing body, and is within the scope of its corporate powers.

_____
Corporate Secretary

SAMPLE

Bond No._____

SECTION 006113 - PERFORMANCE AND PAYMENT BOND FORM

KNOW ALL MEN BY THESE PRESENTS, THAT we _____

as principal, and _____

_____as Surety, are held and firmly bound unto the

STATE OF MISSOURI. in the sum of _____ Dollars ($)

for payment whereof the Principal and Surety bind themselves, their heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

WHEREAS, the Principal has, by means of a written agreement dated the _____

day of_____, 20_____, enter into a contract with the State of Missouri for

_____

_____

_____

(Insert Project Title and Number)

NOW, THEREFORE, if the Principal shall faithfully perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the State of Missouri, with or without notice to the Surety and during the life of any guaranty required under the contract; and shall also faithfully perform and fulfill all undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said contract that may hereafter be made with or without notice to the Surety; and shall also promptly make payment for materials incorporated, consumed or used in connection with the work set forth in the contract referred to above, and all insurance premiums, both compensation and all other kinds of insurance, on said work, and for all labor performed on such work, whether by subcontractor or otherwise, at not less than the prevailing hourly rate of wages for work of a similar character (exclusive of maintenance work) in the locality in which the work is performed and not less than the prevailing hourly rate of wages for legal holiday and overtime work (exclusive of maintenance work) in the locality in which the work is performed both as determined by the Department of Labor and Industrial Relations or determined by the Court of Appeal, as provided for in said contract and in any and all duly authorized modifications of said contract that may be hereafter made, with or without notice to the Surety, then, this obligation shall be void and of no effect, but it is expressly understood that if the Principal should make default in or should fail to strictly, faithfully and efficiently do, perform and comply with any or more of the covenants, agreements, stipulations, conditions, requirements or undertakings, as specified in or by the terms of said contract, and with the time therein named, then this obligation shall be valid and binding upon each of the parties hereto and this bond shall remain in full force and effect; and the same may be sued on at the instance of any material man, laborer, mechanic, subcontractor, individual, or otherwise to whom such payment is due, in the name of the State of Missouri, to the use of any such person.

AND, IT IS FURTHER specifically provided that any modifications which may hereinafter be made in the terms of the contract or in the work to be done under it or the giving by the Owner of any extension of the time for the performance of the contract or any other forbearance on the part of either the Owner or the Principal to the other, shall not in any way release the Principal and the Surety, or either or any of them, their heirs, executors, administrators and successors, from their liability hereunder, notice to the Surety of any such extension, modifications or forbearance being hereby waived.

IN WITNESS WHEREOF, the above bounden parties have executed the within instrument this _____ day of _____, 20 ____.

AS APPLICABLE:

AN INDIVIDUAL

Name: _____

Signature: _____

A PARTNERSHIP

Name of Partner: _____

Signature of Partner: _____

Name of Partner: _____

Signature of Partner: _____

CORPORATION

Firm Name: _____

Signature of President: _____

SURETY

Surety Name: _____

Attorney-in-Fact: _____

Address of Attorney-in-Fact: _____

_____

Telephone Number of Attorney-in-Fact: _____

Signature Attorney-in-Fact: _____

NOTE: Surety shall attach Power of Attorney

STATE OF MISSOURI
OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

PRODUCT SUBSTITUTION REQUEST

PROJECT NUMBER

PROJECT TITLE AND LOCATION

CHECK APPROPRIATE BOX

☐ SUBSTITUTION PRIOR TO BID OPENING
(Minimum of (5) working days prior to receipt of Bids as per Article 4 – Instructions to Bidders)

☐ SUBSTITUTION FOLLOWING AWARD
(Maximum of (20) working days from Notice to Proceed as per Article 3 – General Conditions)

FROM: BIDDER/CONTRACTOR (PRINT COMPANY NAME)

TO: ARCHITECT/ENGINEER (PRINT COMPANY NAME)

Bidder/Contractor hereby requests acceptance of the following product or systems as a substitution in accordance with provisions of Division One of the Bidding Documents:

SPECIFIED PRODUCT OR SYSTEM

SPECIFICATION SECTION NO.

SUPPORTING DATA

☐ Product data for proposed substitution is attached (include description of product, standards, performance, and test data)

☐ Sample ☐ Sample will be sent, if requested

QUALITY COMPARISON

	SPECIFIED PRODUCT	SUBSTITUTION REQUEST
NAME, BRAND		
CATALOG NO.		
MANUFACTURER		
VENDOR		

PREVIOUS INSTALLATIONS

PROJECT	ARCHITECT/ENGINEER	
LOCATION		DATE INSTALLED

SIGNIFICANT VARIATIONS FROM SPECIFIED PRODUCT

REASON FOR SUBSTITUTION

DOES PROPOSED SUBSTITUTION AFFECT OTHER PARTS OF WORK?

☐ YES ☐ NO

IF YES, EXPLAIN

SUBSTITUTION REQUIRES DIMENSIONAL REVISION OR REDESIGN OF STRUCTURE OR A/E WORK

☐ YES ☐ NO

BIDDER'S/CONTRACTOR'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENT:

We have investigated the proposed substitution. We believe that it is equal or superior in all respects to specified product, except as stated above; that it will provide the same Warranty as specified product; that we have included complete implications of the substitution; that we will pay redesign and other costs caused by the substitution which subsequently become apparent; and that we will pay costs to modify other parts of the Work as may be needed, to make all parts of the Work complete and functioning as a result of the substitution.

BIDDER/CONTRACTOR	DATE

REVIEW AND ACTION

☐ Resubmit Substitution Request with the following additional information:

☐ Substitution is accepted.

☐ Substitution is accepted with the following comments:

☐ Substitution is not accepted.

ARCHITECT/ENGINEER	DATE

STATE OF MISSOURI
OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

FINAL RECEIPT OF PAYMENT AND RELEASE

PROJECT NUMBER

KNOW ALL MEN BY THESE PRESENT THAT: hereinafter called "Subcontractor" who heretofore entered into an agreement with hereinafter called "Contractor", for the performance of work and/or furnishing of material for the construction of the project entitled

(PROJECT TITLE, PROJECT LOCATION, AND PROJECT NUMBER)

at

(ADDRESS OF PROJECT)

for the State of Missouri (Owner) which said subcontract is by this reference incorporated herein, in consideration of such final payment by Contractor.

DOES HEREBY:

1. ACKNOWLEDGE that they have been **PAID IN FULL** all sums due for work and materials contracted or done by their Subcontractors, Material Vendors, Equipment and Fixture Suppliers, Agents and Employees, or otherwise in the performance of the Work called for by the aforesaid Contract and all modifications or extras or additions thereto, for the construction of said project or otherwise.
2. RELEASE and fully, finally, and forever discharge the Owner from any and all suits, actions, claims, and demands for payment for work performed or materials supplied by Subcontractor in accordance with the requirements of the above referenced Contract.
1. REPRESENT that all of their Employees, Subcontractors, Material Vendors, Equipment and Fixture Suppliers, and everyone else has been **paid in full** all sums due them, or any of them, in connection with performance of said Work, or anything done or omitted by them, or any of them in connection with the construction of said improvements, or otherwise.

DATED this day of , 20 .

NAME OF SUBCONTRACTOR

BY (TYPED OR PRINTED NAME)

SIGNATURE

TITLE

ORIGINAL: FILE/Closeout Documents

STATE OF MISSOURI
OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT,
DESIGN AND CONSTRUCTION

PAY APP NO.	PROJECT NUMBER
CHECK IF FINAL ☐**FINAL**	DATE

MBE/WBE/SDVE/HDVE PROGRESS REPORT

Remit with **ALL** Progress and Final Payments

(Please check appropriate box) ☐CONSULTANT ☐CONSTRUCTION

PROJECT TITLE	
PROJECT LOCATION	
FIRM	
ORIGINAL CONTRACT SUM (Same as Line Item 1. on Form A of Application for Payment) **$**	TOTAL CONTRACT SUM TO DATE (Same as Line Item 3. on Form A of Application for Payment) **$**

THE TOTAL MBE/WBE/SDVE/HDVE PARTICIPATION DOLLAR AMOUNT OF THIS PROJECT AS INDICATED IN THE ORIGINAL CONTRACT: **$**

SELECT MBE, WBE, SDVE, HDVE	ORIGINAL CONTRACT PARTICIPATION AMOUNT	PARTICIPATION AMOUNT PAID-TO-DATE (includes approved contract changes)	CONSULTANT/SUBCONSULTANT OR CONTRACTOR/SUBCONTRACTOR/SUPPLIER COMPANY NAME
☐ MBE ☐ WBE ☐ SDVE ☐ HDVE	$	$	
☐ MBE ☐ WBE ☐ SDVE ☐ HDVE	$	$	
☐ MBE ☐ WBE ☐ SDVE ☐ HDVE	$	$	
☐ MBE ☐ WBE ☐ SDVE ☐ HDVE	$	$	
☐ MBE ☐ WBE ☐ SDVE ☐ HDVE	$	$	
☐ MBE ☐ WBE ☐ SDVE ☐ HDVE	$	$	

INSTRUCTIONS FOR MBE/WBE/SDVE/HDVE PROGRESS REPORT

CONTRACTOR OR CONSULTANT TO FILL OUT AND REMIT WITH EACH PAY APPLICATION:

The MBE/WBE/SDVE/HDVE Progress Report for the project is issued with the contract comprising values reported in the consultant's Proposal or on the successful contractor's Section 004337 Compliance Evaluation Forms.

At Initial Pay Application fill in the following:

1. Pay App No. Start with 1.
2. Fill in the Project Number and Date.
3. Enter Project Title, Project Location, and Firm.
4. Fill in the "Original Contract Sum" and "Total Contract Sum To Date" (Reference applicable Line Items on Form A of Application for Payment).
5. Indicate the Total Participation Dollar Amount from the Original Contract.
6. Select MBE, WBE, SDVE, or HDVE for each Consultant/Subconsultant or Contractor/Subcontractor/Supplier.
7. Enter the "Total Amount of Subcontract", "$ Amount (Paid-To-Date)", and Company Name.

For all subsequent Pay Applications fill in the following:

1. Pay App No.
2. If Final Pay App, check box.
3. Fill in the Project Number and Date.
4. Enter Project Title, Project Location, and Firm
5. At each Pay App fill in the "Original Contract Sum" and "Total Contract Sum To Date" (reference applicable Line Items on Form A of Application for Payment).
6. Indicate the Total Participation Dollar Amount from the Original Contract.
7. Select MBE, WBE, SDVE, or HDVE for each Consultant/Subconsultant or Contractor/Subcontractor/Supplier
8. Enter the "Total Amount of Subcontract", "$ Amount (Paid-To-Date)", and Company Name.

STATE OF MISSOURI
OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION
AFFIDAVIT – COMPLIANCE WITH PREVAILING WAGE LAW

PROJECT NUMBER

Before me, the undersigned Notary Public, in and for the County of _____

State of _____ personally came and appeared _____
(NAME)

_____ of the _____
(POSITION) (NAME OF THE COMPANY)

(a corporation) (a partnership) (a proprietorship) and after being duly sworn did depose and say that all provisions and requirements set out in Chapter 290, Sections 290.210 through and including 290.340, Missouri Revised Statutes, pertaining to the payment of wages to workmen employed on public works project have been fully satisfied and there has been no exception to the full and completed compliance with said provisions and requirements and with Wage Determination No: _____ issued by the Department of Labor and Industrial Relations, State of Missouri on the _____ day of _____ 20 __ in carrying out the contract and working in connection with _____
(NAME OF PROJECT)

Located at _____ in _____ County
(NAME OF THE INSTITUTION)

Missouri, and completed on the _____ day of _____ 20 __

SIGNATURE

NOTARY INFORMATION

NOTARY PUBLIC EMBOSSER OR BLACK INK RUBBER STAMP SEAL	STATE		COUNTY (OR CITY OF ST. LOUIS)
	SUBSCRIBED AND SWORN BEFORE ME, THIS DAY OF YEAR		**USE RUBBER STAMP IN CLEAR AREA BELOW**
	NOTARY PUBLIC SIGNATURE	MY COMMISSION EXPIRES	
	NOTARY PUBLIC NAME (TYPED OR PRINTED)		

FILE: Closeout Documents

GENERAL CONDITIONS

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6. Bond and Insurance

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7. Termination or Suspension of Contract

7.1. For Site Conditions

7.2. For Cause

7.3. For Convenience

A. These General Conditions apply to each section of these specifications. The Contractor is subject to the provisions contained herein.

B. The General Conditions are intended to define the relationship of the Owner, the Designer and the Contractor thereby establishing certain rules and provisions governing the operation and performance of the work so that the work may be performed in a safe, orderly, expeditious and workmanlike manner.

ARTICLE 1 – GENERAL PROVISIONS

ARTICLE 1.1 - DEFINITIONS

As used in these contract documents, the following terms shall have the meanings and refer to the parties designated in these definitions.

1. **"COMMISSIONER":** The Commissioner of the Office of Administration.
2. **"CONSTRUCTION DOCUMENTS":** The "Construction Documents" shall consist of the Project Manual, Drawings and Addenda.
3. **"CONSTRUCTION REPRESENTATIVE:"** Whenever the term "Construction Representative" is used, it shall mean the Owner's Representative at the work site.
4. **"CONTRACTOR"**: Party or parties who have entered into a contract with the Owner to furnish work under these specifications and drawings.
5. **"DESIGNER"**: When the term "Designer" is used herein, it shall refer to the Architect, Engineer, or Consultant of Record specified and defined in Paragraph 2.0 of the Supplemental Conditions, or his duly authorized representative. The Designer may be either a consultant or state employee.
6. **"DIRECTOR"**: Whenever the term "Director" is used, it shall mean the Director of the Division of Facilities Management, Design and Construction or his Designee, representing the Office of Administration, State of Missouri. The Director is the agent of the Owner.
7. **"DIVISION":** Shall mean the Division of Facilities Management, Design and Construction, State of Missouri.
8. **"INCIDENTAL JOB BURDENS":** Shall mean those expenses relating to the cost of work, incurred either in the home office or on the job-site, which are necessary in the course of doing business but are incidental to the job. Such costs include office supplies and equipment, postage, courier services, telephone expenses including long distance, water and ice and other similar expenses.
9. **"JOINT VENTURE"**: An association of two (2) or more businesses to carry out a single business enterprise for profit for which purpose they combine their property, capital, efforts, skills and knowledge.
10. **"OWNER"**: Whenever the term "Owner" is used, it shall mean the State of Missouri. Acting by and through the Office of Administration, Division of Facilities Management, Design and Construction.
11. **"PROJECT"**: Wherever the term "Project" is used, it shall mean the work required to be completed by the construction contract.
12. **"PROJECT MANUAL"**: The "Project Manual" shall consist of Introductory Information, Invitation for Bid, Instructions to Bidders, Bid Documents, Additional Information, Standard Forms, General Conditions, Supplemental General Conditions, General Requirements and Technical Specifications.
13. **"SUBCONTRACTOR"**: Party or parties who contract under, or for the performance of part or this entire Contract between the Owner and Contractor. The subcontract may or may not be direct with the Contractor.
14. **"WORK"**: All supervision, labor, materials, tools, supplies, equipment, and any incidental operations and/or activities required by or reasonably inferable from the Contract Documents necessary to construct the Project and to produce the results intended by the Contract Documents in a safe, expeditious, orderly, and workmanlike manner so that the project shall be complete and finished in the best manner known to each respective trade.
15. "**WORKING DAYS**": are all calendar days except Saturdays, Sundays and the following holidays: New Year's Day, Martin Luther King, Jr. Day, Lincoln Day, Washington's Birthday (observed), Truman Day, Memorial Day, Juneteenth, Independence Day, Labor Day, Columbus Day, Veterans Day (observed), Thanksgiving Day, Christmas Day.

ARTICLE 1.2 DRAWINGS AND SPECIFICATIONS

A. In case of discrepancy between drawings and specifications, specifications shall govern. Should discrepancies in architectural drawings, structural drawings and mechanical drawings occur, architectural drawings shall govern and, in case of conflict between structural and mechanical drawings, structural drawings shall govern.

B. Specifications are separated into titled divisions for convenience of reference only and to facilitate letting of contracts and subcontracts. The Contractor is responsible for establishing the scope of work for subcontractors, which may cross titled divisions. Neither the Owner nor Designer will establish limits and jurisdiction of subcontracts.

C. Figured dimensions take precedence over scaled measurements and details over smaller scale general drawings. In the event of conflict between any of the documents contained within the contract, the documents shall take precedence and be controlling in the following sequence: addenda, supplementary general conditions, general conditions, division 1 specifications, technical division specifications, drawings, bid form and instructions to bidders.

D. Anything shown on drawings and not mentioned in these specifications or vice versa, as well as any incidental work which is obviously necessary to complete the project within the limits established by the drawings and specifications, although not shown on or described therein, shall be performed by the Contractor at no additional cost as a part of his contract.

E. Upon encountering conditions differing materially from those indicated in the contract documents, the Contractor shall promptly notify the Designer and Construction Representative in writing before such conditions are disturbed. The Designer shall promptly investigate said conditions and report to the Owner, with a recommended course of action**.** If conditions do materially differ and cause an increase or decrease in contract cost or time required for completion of any portion of the work, a contract change will be initiated as outlined in Article 4 of these General Conditions.

E. Only work included in the contract documents is authorized, and the Contractor shall do no work other than that described therein or in accordance with appropriately authorized and approved contract changes.

ARTICLE 1.3 - COMPLIANCE WITH LAWS, PERMITS, REGULATIONS AND INSPECTIONS

A. Since the Owner is the State of Missouri, municipal or political subdivisions, zoning ordinances, construction codes (other than licensing of trades), and other like ordinances are not applicable to construction on Owner's property, and Contractor will not be required to submit drawings and specifications to any municipal or political subdivision, authority, obtain construction permits or any other licenses (other than licensing of trades) or permits from or submit to inspections by any municipality or political subdivision relating to the construction for this project. All permits or licenses required by municipality or political subdivision for operation on property not belonging to Owner shall be obtained by and paid for by Contractor. Each Contractor shall comply with all applicable laws, ordinances, rules and regulations that pertain to the work of this contract.

B. Contractors, subcontractors and their employees engaged in the businesses of electrical, mechanical, plumbing, carpentry, sprinkler system work, and other construction related trades shall be licensed to perform such work by the municipal or political subdivision where the project is located, if such licensure is required by local code. Local codes shall dictate the level (master, journeyman, and apprentice) and the number, type and ratio of licensed tradesmen required for this project within the jurisdiction of such municipal or political subdivision.

C. Equipment and controls manufacturers and their authorized service and installation technicians that do not maintain an office within the jurisdiction of the municipal or political subdivision but are a listed or specified contractor or subcontractor on this project are exempt from Paragraph 1.3 B above.

D. The Contractor shall post a copy of the wage determination issued for the project and included as a part of the contract documents, in a prominent and easily accessible location at the site of construction for the duration of the project.

E. Any contractor or subcontractor to such contractor at any tier signing a contract to work on this project shall provide a ten-hour Occupational Safety and Health Administration (OSHA) construction safety program for their on-site employees which includes a course in construction safety and health approved by OSHA or a similar program approved by the Department of Labor and Industrial Relations which is at least as stringent as an approved OSHA program. The contractor shall forfeit as a penalty to the public body on whose

behalf the contract is made or awarded, two thousand five hundred dollars plus one hundred dollars for each employee employed by the contractor or subcontractor, for each calendar day, or portion thereof, such employee is employed without the required training.

ARTICLE 1.4 - NONDISCRIMINATION IN EMPLOYMENT

A. The Contractor and his subcontractors will not discriminate against individuals based on race, color, religion, national origin, sex, disability, or age, but may use restrictions which relate to bona fide occupational qualifications. Specifically, the Contractor and his subcontractors shall not discriminate:

1. Against recipients of service on the basis of race, color, religion, national origin, sex, disability or age.
2. Against any employee or applicant, for employment on the basis of race, color, religion, national origin, sex or otherwise qualified disability status.
3. Against any applicant for employment or employee on the basis of age, where such applicant or employee is between ages 40 and 70 and where such Contractor employs at least 20 persons.
4. Against any applicant for employment or employee on the basis of that person's status as a disabled or Vietnam-era veteran.

The Contractor and his Subcontractors will ensure applicants for employment and employees are treated equally without regard to race, color, religion, national origin, sex, disability, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion and transfer; recruitment or recruitment advertising; and selection for training, including apprenticeship. The Contractor and his Subcontractors will give written notice of their commitments under this clause to any labor union with which they have bargaining or other agreements under this clause to any labor union with which they have bargaining or other agreements.

B. In the event of the Contractor's or his subcontractor's noncompliance with any provisions of this Article of the Contract, the Owner may cancel this contract in whole or in part or require the Contractor to terminate his contract with the subcontractor.

ARTICLE 1.5 - ANTI-KICKBACK

No employee of the division, shall have or acquire any pecuniary interest, whether direct or indirect, in this contract or in any part hereof. No officer, employee, designer, attorney, or administrator of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project, shall have or acquire any pecuniary interest, whether direct or indirect, in this contract, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.

ARTICLE 1.6 - PATENTS AND ROYALTIES

A. The Contractor shall hold and save the Owner and its officers, agents, servants, and employees harmless from liabilities of any nature or kind, including cost and expenses, for, or on account of, any patented or unpatented invention, process, article or appliance manufactured or used in the performance of this contract, including its use by the Owner, unless otherwise specifically stipulated in the contract documents.

B. If the Contractor uses any design, device or materials covered by letters, patent or copyright, the Contractor shall provide for such use by suitable agreement with the Owner of such patented or copyrighted design, device or material. It is mutually agreed and understood, without exception, that the contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his sureties shall indemnify and save harmless the Owner of the project from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this contract and shall indemnify the Owner for any cost, expense or damage it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

ARTICLE 1.7 - PREFERENCE FOR AMERICAN AND MISSOURI PRODUCTS AND SERVICES

A. By virtue of statutory authority a preference will be given to Missouri labor and to products of mines, forests and quarries of the state of Missouri when they are found in marketable quantities in the state, and all such materials shall be of the best quality and suitable character that can be obtained at reasonable market prices, all as provided for in Section 8.280, Missouri Revised Statutes and Cumulative Supplements.

B. Furthermore, pursuant to Section 34.076 Missouri Revised Statutes and Cumulative Supplements, a preference shall be given to those persons doing business as Missouri firms, corporations, or individuals, or which maintain Missouri offices or places of business, when the quality of performance promised is equal or better and the price quoted is the same or less. In addition, in order for a non-domiciliary bidder to be successful, his bid must be that same percentage lower than a domiciliary Missouri bidder's bid, as would be required for a Missouri bidder to successfully bid in the non-domiciliary state.

C In accordance with the Missouri Domestic Products Procurement Act Section 34.350 RSMo and Cumulative Supplements any manufactured goods or commodities used or supplied in the performance of this contract or any subcontract thereto shall be manufactured, assembled or produced in the United States, unless the specified products are not manufactured, assembled or produced in the United States in sufficient quantities to meet the agency's requirements or cannot be manufactured, assembled or produced in the United States within the necessary time in sufficient quantities to meet the contract requirements, or if obtaining the specified products manufactured, assembled or produced in the United States would increase the cost of this contract for purchase of the product by more than ten percent.

ARTICLE 1.8 - COMMUNICATIONS

A. All notices, requests, instructions, approvals, and claims must be in writing and shall be delivered to the Designer and copied to the Construction Representative for the project except as required by Article 1.12 Disputes and Disagreements, or as otherwise specified by the Owner in writing as stated in Section 012600. Any such notice shall be deemed to have been given as of the time of actual receipt.

B. The Contractor shall attend on-site progress and coordination meetings, as scheduled by the Construction Representative, no less than once a month.

C. The Contractor shall ensure that major subcontractors and suppliers shall attend monthly progress meetings as necessary to coordinate the work, and as specifically requested by the Construction Representative.

ARTICLE 1.9 - SEPARATE CONTRACTS AND COOPERATION

A. The Owner reserves the right to let other contracts in connection with this work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate his work with theirs.

B. The Contractor shall consult the drawings for all other contractors in connection with this work. Any work conflicting with the above shall be brought to the attention of the Owner’s Representative before the work is performed. If the Contractor fails to do this, and constructs any work which interferes with the work of another contractor, the Contractor shall remove any part so conflicting and rebuild same, as directed by the Owner’s Representative at no additional cost to the Owner.

C. Each contractor shall be required to coordinate his work with other contractors so as to afford others reasonable opportunity for execution of their work. No contractor shall delay any other contractor by neglecting to perform contract work at the proper time. If any contractor causes delay to another, they shall be liable directly to that contractor for such delay in addition to any liquidated damages which might be due the Owner.

D. Should the Contractor or project associated subcontractors refuse to cooperate with the instructions and reasonable requests of other Contractors or other subcontractors in the overall coordinating of the work, the Owner may take such appropriate action and issue directions, as required, to avoid unnecessary and unwarranted delays.

E. Each Contractor shall be responsible for damage done to Owner's or other Contractor's property by him/her or workers in his employ through their fault or negligence.

F. Should a Contractor sustain any damage through any act or omission of any other Contractor having a contract with the Owner, the Contractor so damaged shall have no claim or cause of action against the Owner for such damage, but shall have a claim or cause of action against the other Contractor to recover any and all damages sustained by reason of the acts or omissions of such Contractor. The phrase "acts or omissions" as used in this section shall be defined to include, but

not be limited to, any unreasonable delay on the part of any such contractors.

ARTICLE 1.10 - ASSIGNMENT OF CONTRACT

A. No assignment by Contractor of any amount or any part of this contract or of the funds to be received there under will be recognized unless such assignment has had the written approval of the Director and the surety has been given due notice of such assignment and has furnished written consent thereto. In addition to the usual recitals in assignment contracts, the following language must be set forth: "It is agreed that the funds to be paid to the assignee under this assignment are subject to performance by the Contractor of this contract and to claims or liens for services rendered or materials supplied for the performance of the work called for in said contract in favor of all persons, firms or corporations rendering such services or supplying such materials."

ARTICLE 1.11 - INDEMNIFICATION

A. Contractor agrees to indemnify and save harmless Owner and its respective commissioners, officers, officials, agents, consultants and employees and Designer, their agents, servants and employees, from and against any and all liability for damage arising from injuries to persons or damage to property occasioned by any acts or omissions of Contractor, any subcontractors, agents, servants or employees, including any and all expense, legal or otherwise, which may be incurred by Owner or Designer, its agents, servants or employees, in defense of any claim, action or suit.

B. The obligations of the Contractor under this paragraph shall not extend to the liability of the Designer, his agents or employees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, contract changes, design or specifications, or (2) giving of or the failure to give directions or instructions by the Designer, his agents or employees as required by this contract documents provided such giving or failure to give is the primary cause of the injury or damage.

ARTICLE 1.12 - DISPUTES AND DISAGREEMENTS

It is hereby expressly agreed and understood that in case any controversy or difference of opinion arises during construction, best efforts will be given to resolution at the field level. Should those efforts be unsuccessful, the Contractor has the right to appeal in writing, the decision of the Director's Designee to the Director at Room 730 Truman Building, P.O. Box 809, Jefferson City, Missouri 65102. The decision of the Director shall be final and binding on all parties.

ARTICLE 2 -- OWNER/DESIGNER RESPONSIBILITIES

A. The Owner shall give all orders and directions contemplated under this contract relative to the execution of the work. During progress of work the Owner will be represented at the project site by the Construction Representative and/or Designer, whose responsibilities are to see that this contract is properly fulfilled.

B. The Owner shall at all times have access to the work whenever it is in preparation or progress. The Contractors shall provide proper facilities for such access and for inspection and supervision.

C. All materials and workmanship used in the work shall be subject to the inspection of the Designer and Construction Representative, and any work which is deemed defective shall be removed, rebuilt or made good immediately upon notice. The cost of such correction shall be borne by the Contractor. Contractor shall not be entitled to an extension of the contract completion date in order to remedy defective work. All rejected materials shall be immediately removed from the site of the work.

D. If the Contractor fails to proceed at once with the correction of rejected defective materials or workmanship, the Owner may, by separate contract or otherwise, have the defects remedied or rejected. Materials removed from the site and charge the cost of the same against any monies which may be due the Contractor, without prejudice to any other rights or remedies of the Owner.

E. Failure or neglect on the part of Owner to observe faulty work, or work done which is not in accordance with the drawings and specifications shall not relieve the Contractor from responsibility for correcting such work without additional compensation.

F. The Owner shall have the right to direct the Contractor to uncover any completed work.

1. If the Contractor fails to adequately notify the Construction Representative and/or Designer of an inspection as required by the Contract Documents, the Contractor shall, upon written request, uncover the work. The Contractor shall bear all costs associated with uncovering and again covering the work exposed.

2. If the Contractor is directed to uncover work, which was not otherwise required by the Contract Documents to be inspected, and the work is found to be defective in any respect, no compensation shall be allowed for this work. If, however, such work is found to meet

the requirements of this contract, the actual cost of labor and material necessarily involved in the examination and replacement plus 10% shall be allowed the Contractor.

G. The Designer shall give all orders and directions contemplated under this contract relative to the scope of the work and shall give the initial interpretation of the contract documents.

H. The Owner may file a written notice to the Contractor to dismiss immediately any subcontractors, project managers, superintendents, foremen, workers, watchmen or other employees whom the Owner may deem incompetent, careless or a hindrance to proper or timely execution of the work. The Contractor shall comply with such notice as promptly as practicable without detriment to the work or its progress.

I. If in the Owner's judgment it becomes necessary at any time to accelerate work, when ordered by the Owner in writing, the Contractor shall redirect resources to such work items and execute such portions of the work as may be required to complete the work within the current approved contract schedule.

ARTICLE 3 -- CONTRACTOR RESPONSIBILITIES

The Contractor shall register and utilize the Owner's eBuilder digital project management system for submission of documents described in the following sections. This includes but is not limited to submittals as required by designer, payment applications, Request for Information (RFI), construction change orders, Request for Proposals (RFP), Designer Supplemental Instructions (DSI), etc.

ARTICLE 3.1 -- ACCEPTABLE SUBSTITUTIONS

A. The Contractor may request use of any article, device, product, material, fixture, form or type of construction which in the judgment of the Owner and Designer is equal in all respects to that named. Standard products of manufacturers other than those specified will be accepted when, prior to the ordering or use thereof, it is proven to the satisfaction of the Owner and Designer that they are equal in design, strength, durability, usefulness and convenience for the purpose intended.

B. Any changes required in the details and dimensions indicated on the drawings for the substitution of products other than those specified shall be properly made at the expense of the Contractor requesting the substitution or change.

C. The Contractor shall submit a request for such substitutions in writing to the Owner and Designer within twenty (20) working days after the date of the "Notice to Proceed." Thereafter no consideration will be given to alternate forms of accomplishing the work. This Article does not preclude the Owner from exercising the provisions of Article 4 hereof.

D. Any request for substitution by the Contractor shall be submitted in accordance with SECTION 002113 - INSTRUCTIONS TO BIDDERS.

E. When a material has been approved, no change in brand or make will be permitted unless:

1. Written verification is received from the manufacturer stating they cannot make delivery on the date previously agreed, or
2. Material delivered fails to comply with contract requirements.

ARTICLE 3.2 -- SUBMITTALS

A. The Contractor's submittals must be submitted with such promptness as to allow for review and approval so as not to cause delay in the work. The Contractor shall coordinate preparation and processing of submittals with performance of construction activities.

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

Submit four (4) copies to the Designer and additional copies as required for the subcontractors and material suppliers. Also provide copies to meet the requirements for maintenance manuals.

B. All subcontractors' shop drawings and schedules shall be submitted by the Contractor and shall bear evidence that Contractor has received, reviewed, and approved them. Any shop drawings and schedules submitted without this evidence will be returned to the Contractor for resubmission.

C. The Contractor shall include with the shop drawing, a letter indicating any and all deviations from the drawings and/or specifications. Failure to notify the Designer of such deviations will be grounds for subsequent rejection of the related work or materials. If, in the opinion of the Designer, the deviations are not acceptable, the Contractor will be required to furnish the item as specified and indicated on the drawings.

D. The Designer shall check shop drawings and schedules with reasonable promptness and approve them only if they conform to the design concept of the project and comply with the information given in the contract documents. The approval shall not relieve the Contractor from the responsibility to comply with the drawings and specifications, unless the Contractor has called the Designer's attention to the deviation, in writing, at the time of

submission and the Designer has knowingly approved thereof. An approval of any such modification will be given only under the following conditions:

1. It is in the best interest of the Owner
2. It does not increase the contract sum and/or completion time
3. It does not deviate from the design intent
4. It is without prejudice to any and all rights under the surety bond.

E. No extension of time will be granted because of the Contractor's failure to submit shop drawings and schedules in ample time to allow for review, possible resubmission, and approval. Fabrication of work shall not commence until the Contractor has received approval. The Contractor shall furnish prints of approved shop drawings and schedules to all subcontractors whose work is in any way related to the work under this contract. Only prints bearing this approval will be allowed on the site of construction

F. The Contractor shall maintain a complete file on-site of approved shop drawings available for use by the Construction Representative.

ARTICLE 3.3 – AS-BUILT DRAWINGS

A. The Contractor shall update a complete set of the construction drawings, shop drawings and schedules of all work monthly by marking changes, and at the completion of their work (prior to submission of request for final payment) note all changes and turn the set over to the Construction Representative. The updates shall show all addenda, all field changes that were made to adapt to field conditions, changes resulting from contract changes or supplemental instructions, and all locations of structures, buried installations of piping, conduit, and utility services. All buried and concealed items both inside and outside shall be accurately located as to depth and referenced to permanent features such as interior or exterior wall faces and dimensions shall be given in a neat and legible manner in a contrasting colored pencil or ink. If approved by the Designer, an electronic file format may be provided.

ARTICLE 3.4 – GUARANTY AND WARRANTIES

A. General Guaranty

1. Neither the final certificate of payment nor any provision in the contract documents nor partial use or occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with contract requirements.
2. The Contractor or surety shall remedy any defects in the work and pay for any damage to property resulting there from which shall appear within a period of one (1) year from the date of substantial completion unless a longer period is otherwise specified or a differing guaranty period has been established in the substantial completion certificate. The Owner will give notice of observed defects with reasonable promptness.
3. In case of default on the part of the Contractor in fulfilling this part of this contract, the Owner may correct the work or repair the damage and the cost and expense incurred in such event shall be paid by or recoverable from the Contractor or surety.
4. The work will be free from defects not inherent in the quality required or permitted, and that the Work will conform to the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's guaranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment

B. Extended Warranty

Manufacturer's certificates of warranty shall be obtained for all major equipment. Warranty shall be obtained for at least one year. Where a longer period is offered at no additional cost or called for in the specific equipment specifications, the longer period shall govern.

ARTICLE 3.5 -- OPERATION AND MAINTENANCE MANUALS

A. Immediately after equipment submittals are approved and no later than ten (10) working days prior to the substantial completion inspection, the Contractor shall provide to the Designer three (3) copies of operating instructions and service manuals, containing the following:

1. Start-up and Shut-down Procedures: Provide a step-by-step write up of all major equipment. When manufacturer’s printed start-up, trouble shooting and shut-down procedures are available; they may be incorporated into the operating manual for reference.

2. Operating Instructions: Written operating instructions shall be included for the efficient and safe operation of all equipment.

3. Equipment List: List of all major equipment as installed shall be prepared to include model number, capacities, flow rate, name place data, shop drawings and air and water balance reports.

4. Service Instructions: Provide the following information for all pieces of equipment.

   a. Recommended spare parts including catalog number and name of local supplier or factory representative.

   b. Belt sizes, types, and lengths.

   c. Wiring diagrams.

5. Manufacturer's Certificate of Warranty as described in Article 3.4.

6. Prior to the final payment, furnish to the Designer three (4) copies of parts catalogs for each piece of equipment furnished by him/her on the project with the components identified by number for replacement ordering.

B. Submission of operating instructions shall be done in the following manner.

1. Manuals shall be in quadruplicate, and all materials shall be bound into volumes of standard 8½" x 11" hard binders. Large drawings too bulky to be folded into 8½" x 11" shall be separately bound or folded and in envelopes, cross referenced and indexed with the manuals.

2. The manuals shall identify project name, project number, and include the name and address of the Contractor, subcontractors and manufacturers who were involved with the activity described in that particular manual.

3. Internally subdivide the binder contents with permanent page dividers, logically organized with tab titles clearly printed under reinforced laminated plastic tabs.

4. Contents: Prepare a Table of Contents for each volume, with each product or system description identified.

ARTICLE 3.6 – OTHER CONTRACTOR RESPONSIBILITIES

A. The Contractor shall keep on site, during progress of the work, a competent superintendent satisfactory to the Construction Representative. The superintendent shall represent the Contractor and all agreements made by the superintendent shall be binding. The superintendent shall carefully study and compare all drawings, specifications and other instructions and shall promptly notify the Construction Representative and Designer, in writing, any error, inconsistency or omission which may be discovered. The superintendent shall coordinate all work on the project. Any change of the superintendent shall be approved by the Construction Representative.

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

C. The Contractor shall supply sufficient labor, material, plant and equipment and pay when due any laborer, subcontractor or supplier for supplies furnished and otherwise prosecute the work with diligence to prevent work stoppage and ensure completion thereof within the time specified.

D. The Contractor and each of his subcontractors shall submit to the Construction Representative, through the Designer such schedules of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning work performed or to be performed under this contract.

E. The Contractor, subcontractors, and material suppliers shall upon written request, give the Owner access to all time cards, material invoices, payrolls, estimates, profit and loss statements, and all other direct or indirect costs related to this work.

F. The Contractor shall be responsible for laying out all contract work such as layout of architectural, structural, mechanical and electrical work, which shall be coordinated with layouts of subcontractors for general construction work. The Contractor is also responsible for unloading, uncrating and handling of all materials and equipment to be erected or placed by him/her, whether furnished by Contractor or others. No extra charges or compensation will be allowed as a result of failure to verify dimensions before ordering materials or fabricating items.

G. The Contractor must notify the Construction Representative at least one working day before placing concrete or burying underground utilities, pipelines, etc.

H. Contractors shall prearrange time with the Construction Representative for the interruption of any facility operation. Unless otherwise specified in these documents, all connections, alterations or relocations as well as all other portions of the work will be performed during normal working hours.

I. The Contractor shall coordinate all work so there will not be prolonged interruptions of existing equipment operation. Any existing plumbing, heating, ventilating, air conditioning or electrical disconnections necessary for the project, which affect portions of this construction or building or any other building must be scheduled with the Construction Representative to minimize or avoid any disruption of facility operations. In no case, unless previously approved in writing by the Construction Representative, shall utilities be left disconnected at the end of a work day or over a weekend. Any interruption of utilities either intentionally or accidentally shall not relieve the Contractor responsible for the interruption from the responsibility to repair and restore the utility to normal service. Repairs and restoration shall be made before the workers responsible for the repair and restoration leave the job.

J. Contractors shall limit operations and storage of materials to the area within the project, except as necessary to connect to existing utilities, and shall not encroach on neighboring property. The Contractor shall be responsible for repair of their damage to property on or off the project site occurring during construction of project. All such repairs shall be made to the satisfaction of the property owner.

K. Unless otherwise permitted, all materials shall be new and both workmanship and materials shall be of the best quality.

L. Unless otherwise provided and stipulated within these specifications, the Contractor shall furnish, construct, and/or install and pay for materials, devices, mechanisms, equipment, all necessary personnel, utilities including, but not limited to water, heat, light and electric power, transportation services, applicable taxes of every nature, and all other facilities necessary for the proper execution and completion of the work.

M. Contractor shall carefully examine the plans and drawings and shall be responsible for the proper fitting of his material, equipment and apparatus into the building.

N. The Contractor or subcontractors shall not overload, or permit others to overload, any part of any structure during the performance of this contract.

O. All temporary shoring, bracing, etc., required for the removal of existing work and/or for the installation of new work shall be included in this contract. The Contractor shall make good, at no cost to the Owner, any damage caused by improper support or failure of shoring in any respect. Each Contractor shall be responsible for shoring required to protect his work or adjacent property and improvements of Owner and shall be responsible for shoring or for giving written notice to adjacent property owners. Shoring shall be removed only after completion of permanent supports.

P. The Contractor shall provide at the proper time such material as is required for support of the work. If openings are required, whether shown on drawings or not, the Contractor shall see that they are properly constructed.

Q. During the performance of work the Contractor shall be responsible for providing and maintaining warning signs, lights, signal devices, barricades, guard rails, fences and other devices appropriately located on site which will give proper and understandable warning to all persons of danger of entry onto land, structure or equipment.

R. The Contractor shall be responsible for protection, including weather protection, and proper maintenance of all equipment and materials.

S. The Contractor shall be responsible for care of the finished work and shall protect same from damage or defacement until substantial completion by the Owner. If the work is damaged by any cause, the Contractor shall immediately begin to make repairs in accordance with the drawings and specifications. Contractor shall be liable for all damage or loss unless attributable to the acts or omissions of the Owner or Designer. Any claim for reimbursement shall be submitted in accordance with Article 4. After substantial completion the Contractor will only be responsible for damage resulting from acts or omissions of the Contractor or subcontractors through final warranty.

T. In the event the Contractor encounters an unforeseen hazardous material, the Contractor shall immediately stop work in the area affected and report the condition to the Owner and Designer in writing. The Contractor shall not be required, pursuant to Article 4, to perform, any work relating to hazardous materials.

U. 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 4.

V. Before commencing work, Contractors shall confer with the Construction Representative and facility representative and review any facility rules and regulations which may affect the conduct of the work.

W. Project signs will only be erected on major projects and only as described in the specifications. If no sign is specified, none shall be erected.

ARTICLE 3.7 -- SUBCONTRACTS

A. Subcontractor assignments as identified in the bid form shall not be changed without written approval of the Owner. The Owner will not approve changes of a listed subcontractor unless the Contractor documents, to the satisfaction of the Owner that the subcontractor cannot or will not perform the work as specified.

B. The Contractor is fully responsible to the Owner for the acts and omissions of all subcontractors and of persons either directly or indirectly employed by them.

C. Every subcontractor shall be bound by the applicable terms and provisions of these contract documents, but no contractual relationship shall exist between any subcontractor and the Owner unless the right of the Contractor to proceed with the work is suspended or this contract is terminated as herein provided, and the Owner in writing elects to assume the subcontract.

D. The Contractor shall upon receipt of "Notice to Proceed" and prior to submission of the first payment request, notify the Designer and Construction Representative in writing of the names of any subcontractors to be used in addition to those identified in the bid form and all major material suppliers proposed for all parts of the work.

ARTICLE 4 -- CHANGES IN THE WORK

4.1 CHANGES IN THE WORK

A. The Construction Representative, without giving notice to the surety and without invalidating this contract, may order extra work or make changes by altering, adding to or deducting from the work, this contract sum being adjusted accordingly. All such work shall be executed under the conditions of the original contract. A claim for extension of time caused by any change must be adjusted at the time of ordering such change. No future request for time will be considered.

B. Each Contract Change shall include all costs required to perform the work including all labor, material, equipment, overheads and profit, delay, disruptions, or other miscellaneous expenses. No subsequent requests for additional compensation including claims for delay, disruption, or reduced efficiency as a result of each change will be considered. Values from the Schedule of Values will not be binding as a basis for additions to or deductions from the contract price.

C. The amount of any adjustment in this contract price for authorized changes shall be agreed upon before such changes become effective and shall be determined, through submission of a request for proposal, as follows:

1. By an acceptable fixed price proposal from the Contractor. Breakdowns shall include all takeoff sheets of each Contractor and subcontractor. Breakdown shall include a listing of each item of material with unit prices and number of hours of labor for each task. Labor costs per hour shall be included with labor burden identified, which shall be not less than the prevailing wage rate, etc. Overhead and profit shall be shown separately for each subcontractor and the Contractor.

2. By a cost-plus-fixed-fee (time and material) basis with maximum price, total cost not to exceed said maximum. Breakdown shall include a listing of each item of material with unit prices and number of hours of labor for each task. Labor costs per hour shall be included with labor burden identified, which shall be not less than the prevailing wage rate, etc. Overhead and profit shall be shown separately for each subcontractor and the Contractor.

3. By unit prices contained in Contractor's original bid form and incorporated in the construction contract.

D. Overhead and Profit on Contract Changes shall be applied as follows:

1. The overhead and profit charge by the Contractor and all subcontractors shall be considered to include, but is not limited to: incidental job burdens, small truck (under 1 ton) expense, mileage, small hand tools, warranty costs, company benefits and general office overhead. Project supervision including field supervision and job site office expense shall be considered a part of overhead and profit unless a compensable time extension is granted.

2. The percentages for overhead and profit charged on Contract Changes shall be subject to the following limits: (a) the percentage mark-up for the Contractor shall be limited to the Contractor’s fee: (b) fifteen percent (15%) maximum for Work directly performed by employees of a subcontractor, or sub-subcontractor; (c) five percent (5%) maximum for the Work performed or passed through to the Owner by the Contractor; (d) five percent (5%) maximum subcontractor’s mark-up for

Work performed by a sub-subcontractor and passed through to the Owner by the subcontractor and Contractor; and (e) in no case shall the total overhead and profit paid by the Owner on any Contract Changes exceed twenty-five percent (25%) of the cost of materials, labor and equipment (exclusive of Contractor or any Subcontractor overhead and profit) necessary to put the contract change work in place.

3. The Contractor will be allowed to add the cost of Contractor's payment and performance bonding, builder's risk insurance, and general liability insurance to their cost of work. The above listed bonding and insurance cost shall not exceed two percent (2%) and shall be allowed on the total cost of the added work, including overhead and profit.

4. On proposals covering both increases and decreases in the amount of this contract, the application of overhead and profit shall be on the net change in the cost of the work.

5. The percentage(s) for overhead and profit to be credited to the Owner on Contract Changes that are solely decreases in the quantity of work or materials shall be the same as those for additive Contract Changes provided above.

E. No claim for an addition to this contract sum shall be valid unless authorized as aforesaid in writing by the Owner. In the event that none of the foregoing methods are agreed upon, the Owner may order the Contractor to perform work on a time and material basis. The cost of such work shall be determined by the Contractor's actual labor and material cost to perform the work plus overhead and profit as outlined herein. The Designer and Construction Representative shall approve the Contractor's daily time and material invoices for the work involved.

F. If the Contractor claims that any instructions involve extra cost under this contract, the Contractor shall give the Owner's Representative written notice thereof within a reasonable time after the receipt of such instructions, and in any event before proceeding to execute the work. No such claim shall be valid unless so made and authorized by the Owner, in writing.

G. In an emergency affecting the safety of life or of the structure or of adjoining property, the Contractor, without special instruction or authorization from the Construction Representative, is hereby permitted to act at their discretion to prevent such threatened loss or injury. The Contractor shall submit a claim for compensation for such emergency work in writing to the Owner's Representative.

ARTICLE 4.2 – CHANGES IN COMPLETION TIME

A. Extension of the number of work days stipulated in the Contract for completion of the work with compensation may be made when:

1. The contractor documents that proposed Changes in the work, as provided in Article 4.1, extends construction activities critical to contract completion date, OR

2. The Owner suspends all work for convenience of the Owner as provided in Article 7.3, OR

3. An Owner caused delay extends construction activities critical to contract completion (except as provided elsewhere in these General Conditions). The Contractor is to review the work activities yet to begin and evaluate the possibility of rescheduling the work to minimize the overall project delay.

B. Extension of the number of work days stipulated in the Contract for completion of the work <u>without</u> compensation may be made when:

1. Weather-related delays occur, subject to provisions for the inclusion of a specified number of "bad weather" days when provided for in Section 012100-Allowances, OR

2. Labor strikes or acts of God occur, OR

3. The work of the Contractor is delayed on account of conditions which were beyond the control of the Contractor, subcontractors or suppliers, and were not the result of their fault or negligence.

C. No time extension or compensation will be provided for delays caused by or within the control of the Contractor, subcontractors or suppliers and for concurrent delays caused by the Owner.

D. The Contractor shall notify the Owner promptly of any occurrence or conditions which in the Contractor's opinion results in a need for an extension of time. The notice shall be in writing and shall include all necessary supporting materials with details of any resultant costs and be submitted in time to permit full investigation and evaluation of the Contractor's claim. The Owner shall promptly acknowledge the Contractor's notice and, after recommendation from the Owner's Representative and/or Designer, shall provide a decision to the Contractor. Failure on the part of the Contractor to provide such notice and to detail the costs shall constitute a waiver by the Contractor of any claim. Requests for extensions of time shall be for working days only.

ARTICLE 5 - CONSTRUCTION AND COMPLETION

ARTICLE 5.1 – CONSTRUCTION COMMENCEMENT

A. Upon receipt of the "Intent to Award" letter, the Contractor must submit the following properly executed instruments to the Owner:

1. Contract;
2. Performance/payment bond as described in Article 6.1;
3. Certificates of Insurance, or the actual policies themselves, showing that the Contractor has obtained the insurance coverage required by Article 6.2.

Above referenced items must be received by the Owner within ten (10) working days after the effective date of the contract. If not received, the Owner may treat the failure to timely submit them as a refusal by the Contractor to accept a contract for this work and may retain as liquidated damages the Contractor's bid bond, cashier's check or certified check as provided in the Instructions to Bidders. Upon receipt the Owner will issue a "Notice to Proceed" with the work to the Contractor.

B. Within the time frame noted in Section 013200 - Schedules, following receipt of the "Notice to Proceed", the Contractor shall submit to the Owner a progress schedule and schedule of values, showing activities through the end of the contract period. Should the Contractor not receive written notification from the Owner of the disapproval of the schedule of values within fifteen (15) working days, the Contractor may consider it approved for purpose of determining when the first monthly Application and Certification for Payment may be submitted.

C. The Contractor may commence work upon receipt of the Division of Facilities Management, Design and Construction's "Notice to Proceed" letter. Contractor shall prosecute the work with faithfulness and energy, and shall complete the entire work on or before the completion time stated in the contract documents or pay to the Owner the damages resulting from the failure to timely complete the work as set out within Article 5.4.

ARTICLE 5.2 -- PROJECT CONSTRUCTION

A. Each Contractor shall submit for the Owner's approval, in reproducible form, a progress schedule showing the rate of progress and the order of the work proposed to carry on various phases of the project. The schedule shall be in conformance with the requirements outlined in Section 013200 – Schedules.

B. Contractor shall employ and supply a sufficient force of workers, material, and equipment and shall pay when due, any worker, subcontractor or supplier and otherwise prosecute the work with such diligence so as to maintain the rate of progress indicated on the progress schedule, prevent work stoppage, and insure completion of the project within the time specified.

ARTICLE 5.3 -- PROJECT COMPLETION

A. Substantial Completion. A Project is substantially complete when construction is essentially complete and work items remaining to be completed can be done without interfering with the Owner's ability to use the Project for its intended purpose.

1. Once the Contractor has reached what they believe is Substantial Completion, the Contractor shall notify the Designer and the Construction Representative of the following:
   a. That work is essentially complete with the exception of certain listed work items. The list shall be referred to as the "Contractor's Punch."
   b. That all Operation and Maintenance Manuals have been assembled and submitted in accordance with Article 3.5A.
   c. That the Work is ready for inspection by the Designer and Construction Representative. The Owner shall be entitled to a minimum of ten working days notice before the inspection shall be performed.
2. If the work is acceptable, the Owner shall issue a Certificate of Substantial Completion, which shall set forth the responsibilities of the Owner and the Contractor for utilities, security, maintenance, damage to the work and risk of loss. The Certificate shall also identify those remaining items of work to be performed by the Contractor. All such work items shall be complete within 30 working days of the date of the Certificate, unless the Certificate specifies a different time. If the Contractor shall be required to perform tests that must be delayed due to climatic conditions, it is understood that such tests and affected equipment will be identified on the Certificate and shall be accomplished by the Contractor at the earliest possible date. Performance of the tests may not be required before Substantial Completion can be issued. The date of the issuance of the Certificate of

Substantial Completion shall determine whether or not the work was completed within the contract time and whether or not Liquidated Damages are due.

3. If the work is not acceptable, and the Owner does not issue a Certificate of Substantial Completion, the Owner shall be entitled to charge the Contractor with the Designer's and Owner's costs of re-inspection, including time and travel.

B. Partial Occupancy. Contractor agrees that the Owner shall be permitted to occupy and use any completed or partially completed portions of the Project, when such occupancy and use is in the Owner's best interest. Owner shall notify Contractor of its desire and intention to take Partial Occupancy as soon as possible but at least ten (10) working days before the Owner intends to occupy. If the Contractor believes that the portion of the work the Owner intends to occupy is not ready for occupancy, the Contractor shall notify the Owner immediately. The Designer shall inspect the work in accordance with the procedures above. If the Contractor claims increased cost of the project or delay in completion as a result of the occupancy, he shall notify the Owner immediately but in all cases before occupancy occurs.

C. Final Completion. The Project is finally complete when the Certificate of Substantial Completion has been issued and all work items identified therein as incomplete have been completed, and when all administrative items required by the contract have been completed. Final Completion entitles the Contractor to payment of the outstanding balance of the contract amount including all change orders and retainage. Within five (5) working days of the date of the Certificate of Substantial Completion, the Contractor shall identify the cost to complete any outstanding items of work. The Designer shall review the Contractor's estimate and either approve it or provide an independent estimate for all such items. If the Contractor fails to complete the remaining items within the time specified in the Certificate, the Owner may terminate the contract and go to the surety for project completion in accordance with Article 7.2 or release the contract balance to the Contractor less 150% of the approved estimate to complete the outstanding items. Upon completion of the outstanding items, when a final cost has been established, any monies remaining shall be paid to the Contractor. Failure to complete items of work does not relieve the Contractor from the obligation to complete the administrative requirements of the contract, such as the provisions of Article 5.3 FAILURE TO COMPLETE ALL ITEMS OF WORK UNDER THE CONTRACT SHALL BE CONSIDERED A DEFAULT AND BE GROUNDS FOR CONTRACT TERMINATION AND DEBARMENT.

D. Liquidated Damages. Contractor agrees that the Owner may deduct from the contract price and retain as liquidated damages, and not as penalty or forfeiture, the sum stipulated in this contract for each work day after the Contract Completion Day on which work is not Substantially Complete. Assessment of Liquidated Damages shall not relieve the Contractor or the surety of any responsibility or obligation under the Contract. In addition, the Owner may, without prejudice to any other rights, claims, or remedies the Owner may have including the right to Liquidated Damages, charge the Contractor for all additional expenses incurred by the Owner and/or Designer as the result of the extended contract period through Final Completion. Additional Expenses shall include but not be limited to the costs of additional inspections.

E. Early Completion. The Contractor has the right to finish the work before the contract completion date; however, the Owner assumes no liability for any hindrances to the Contractor unless Owner caused delays result in a time extension to the contract completion date. The Contractor shall not be entitled to any claims for lost efficiencies or for delay if a Certificate of Substantial Completion is given on or before the Contract Completion Date.

ARTICLE 5.4 -- PAYMENT TO CONTRACTOR

A. Payments on account of this contract will be made monthly in proportion to the work which has been completed. Request for payment must be submitted on the Owner's forms. No other pay request will be processed. Supporting breakdowns must be in the same format as Owner's forms and must provide the same level of detail. The Designer will, within 5 working days from receipt of the contractor's request for payment either issue a Certificate for Payment to the Owner, for such amount as the Designer determines is properly due, or notify the Contractor in writing of reasons for withholding a Certificate. The Owner shall make payment within 30 calendar days after the "Application and Certification for Payment" has been received and certified by the Designer. The following items are to be attached to the contractor's pay request:

1. Updated construction schedule
2. Certified payrolls consisting of name, home addresses of all workers, occupation and craft, number of hours worked and actual wages paid for each individual employee, of the Contractor and all subcontractors working on the project

B. The Owner shall retain 5 percent of the amount of each such payment application, except as allowed by Article 5.4, until final completion and acceptance of all work covered by this contract.

C. Each payment made to Contractor shall be on account of the total amount payable to Contractor and all material and work covered by paid partial payment shall thereupon become the sole property of Owner. This provision shall not be construed as relieving Contractor from sole responsibility for care and protection of materials and work upon which payments have been made or restoration of any damaged work or as a waiver of the right of Owner to require fulfillment of all terms of this contract.

D. Materials delivered to the work site and not incorporated in the work will be allowed in the Application and Certification for Payment on the basis of one hundred (100%) percent of value, subject to the 5% retainage providing that they are suitably stored on the site or in an approved warehouse in accordance with the following requirements:

1. Material has previously been approved through submittal and acceptance of shop drawings conforming to requirements of Article 3.2 of General Conditions.

2. Delivery is made in accordance with the time frame on the approved schedule.

3. Materials, equipment, etc., are properly stored and protected from damage and deterioration and remain so - if not, previously approved amounts will be deleted from subsequent pay applications.

4. The payment request is accompanied by a breakdown identifying the material equipment, etc. in sufficient detail to establish quantity and value.

E. The Contractor shall be allowed to include in the Application and Certification for Payment, one hundred (100%) of the value, subject to retainage, of major equipment and material stored off the site if all of the following conditions are met:

1. The request for consideration of payment for materials stored off site is made at least 15 working days prior to submittal of the Application for Payment including such material. Only materials inspected will be considered for inclusion on Application for Payment requests.

2. Materials stored in one location off site are valued in excess of $25,000.

3. That a Certificate of Insurance is provided indicating adequate protection from loss, theft conversion or damage for materials stored off site. This Certificate shall show the State of Missouri as an additional insured for this loss.

4. The materials are stored in a facility approved and inspected, by the Construction Representative.

5. Contractor shall be responsible for, Owner costs to inspect out of state facilities, and any delays in the completion of the work caused by damage to the material or for any other failure of the Contractor to have access to this material for the execution of the work.

F. The Owner shall determine the amount, quality and acceptability of the work and materials which are to be paid for under this contract. In the event any questions shall arise between the parties, relative to this contract or specifications, determination or decision of the Owner or the Construction Representative and the Designer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this contract affected in any manner or to any extent by such question.

G. Payments Withheld: The Owner may withhold or nullify in whole or part any certificate to such extent as may be necessary to protect the Owner from loss on account of:

1. Defective work not remedied. When a notice of noncompliance is issued on an item or items, corrective action shall be undertaken immediately. Until corrective action is completed, no monies will be paid and no additional time will be allowed for the item or items. The cost of corrective action(s) shall be borne by the Contractor.

2. A reasonable doubt that this contract can be completed for the unpaid balance.

3. Failure of the Contractor to update as-built drawings monthly for review by the Construction Representative.

4. Failure of the Contractor to update the construction schedule.

When the Construction Representative is satisfied the Contractor has remedied above deficiencies, payment shall be released.

H. Final Payment: Upon receipt of written notice from the Contractor to the Designer and Project Representative that the work is ready for final inspection and acceptance, the Designer and Project Representative, with the Contractor, shall promptly make such inspection. If the work is acceptable and the contract fully performed, the Construction Representative shall complete a final acceptance report and the Contractor will be

directed to submit a final Application and Certification for Payment. If the Owner approves the same, the entire balance shall be due and payable, with the exception of deductions as provided for under Article 5.4.

1. Where the specifications provide for the performance by the Contractor of (certain tests for the purpose of balancing and checking the air conditioning and heating equipment and the Contractor shall have furnished and installed all such equipment in accordance with the specifications, but said test cannot then be made because of climatic conditions, such test shall may be considered as required under the provisions of the specifications, Section 013300 and this contract may be substantial Full payment will not be made until the tests have been made and the equipment and system is finally accepted. If the tests are not completed when scheduled, the Owner may deduct 150% of the value of the tests from the final payment.
2. The final payment shall not become due until the Contractor delivers to the Construction Representative:

    a) A complete file of releases, on the standard form included in the contract documents as "Final Receipt of Payment and Release Form", from subcontractors and material suppliers evidencing payment in full for services, equipment and materials, as the case may require, if the Owner approves, or a consent from the Surety to final payment accepting liability for any unpaid amounts.

    b) An Affidavit of Compliance with Prevailing Wage Law, in the form as included in this contract specifications, properly executed by each subcontractor, and the Contractor

    c) Certified copies of all payrolls

    d) As-built drawings

3. If any claim remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such a claim including all costs and a reasonable attorney's fee.
4. Missouri statute requires prompt payment from the Owner to the Contractor within thirty calendar days and from the Contractor to his subcontractors within fifteen calendar days. Failure to make payments within the required time frame entitles the receiving party to charge interest at the rate of one and one half percent per month calculated from the expiration of the statutory time period until paid.
5. The value of all unused unit price allowances and/or 150% of the value of the outstanding work items, and/or liquidated damages may be deducted from the final pay request without executing a Contract Change. Any unit price items which exceed the number of units in the contract may be added by Contract Change.

ARTICLE 6 -- INSURANCE AND BONDS

ARTICLE 6.1 -- BOND

A. Contractor shall furnish a performance/payment bond in an amount equal to 100% of the contract price to guarantee faithful performance of the contract and 100% of the contract price to guarantee the payment of all persons performing labor on the project and furnishing materials in connection therewith under this contract as set forth in the standard form of performance and payment bond included in the contract documents. The surety on such bond shall be issued by a surety company authorized by the Missouri Department of Insurance to do business in the state of Missouri.

B. All Performance/Payment Bonds furnished in response to this provision shall be provided by a bonding company with a rating of B+ or higher as established by A.M. Best Company, Inc. in their most recent publication.

ARTICLE 6.2 – INSURANCE

A. The successful Contractor shall procure and maintain for the duration of the contract issued a policy or policies of insurance for the protection of both the Contractor and the Owner and their respective officers, officials, agents, consultants and employees. The Owner requires certification of insurance coverage from the Contractor prior to commencing work.

B. Minimum Scope and Extent of Coverage

1. General Liability

Commercial General Liability, ISO coverage form number or equivalent CG 00 01 ("occurrence" basis), or I-SO coverage form number CG 00 02, or ISO equivalent.

If ISO equivalent or manuscript general liability coverage forms are used, minimum coverage will be as follows: Premises/Operations; Independent Contractors; Products/Completed Operations; personal Injury; Broad Form Property Damage including Completed Operations; Broad Form Contractual Liability Coverage to include Contractor's obligations under Article 1.11 Indemnification and any other Special Hazards required by the work of the contract.

2. Automobile Liability

Business Automobile Liability Insurance, ISO Coverage form number or equivalent CA 00 01 covering automobile liability, code 1 "ANY AUTO".

3. Workers' Compensation and Employer's Liability

Statutory Workers' Compensation Insurance for Missouri and standard Employer's Liability Insurance, or the authorization to self-insure for such liability from the Missouri Division of Workers' Compensation.

4. Builder's Risk or Installation Floater Insurance

Insurance upon the work and all materials, equipment, supplies, temporary structures and similar items which may be incident to the performance of the work and located at or adjacent to the site, against loss or damage from fire and such other casualties as are included in extended coverage in broad "All Risk" form, including coverage for Flood and Earthquake, in an amount not less than the replacement cost of the work or this contact price, whichever is greater, with loss payable to Contractor and Owner as their respective interests may appear.

Contractor shall maintain sufficient insurance to cover the full value of the work and materials as the work progresses, and shall furnish Owner copies of all endorsements. If Builder's Risk Reporting- Form of Endorsement is used, Contractor shall make all reports as required therein so as to keep in force an amount of insurance which will equal the replacement cost of the work, materials, equipment, supplies, temporary structures, and other property covered thereby; and if, as a result of Contractor's failure to make any such report, the amount of insurance so recoverable shall be less than such replacement cost, Contractor's interest in the proceeds of such insurance, if any, shall be subordinated to Owner's interest to the end that Owner may receive full reimbursement for its loss.

C. Minimum Limits of Insurance

1. General Liability

Contractor

$2,000,000	combined single limit per occurrence for bodily injury, personal injury, and property damage
$2,000,000	annual aggregate

2. Automobile Liability

$2,000,000	combined single limit per occurrence for bodily injury and property damage

3. Workers' Compensation and Employers Liability

Workers' Compensation limits as required by applicable State Statutes (generally unlimited) and minimum of $1,000,000 limit per accident for Employer's Liability.

General Liability and Automobile Liability insurance may be arranged under individual policies for the full limits required or by a combination of underlying policies with the balance provided by a form-following Excess or Umbrella Liability policy.

D. Deductibles and Self-Insured Retentions

All deductibles, co-payment clauses, and self-insured retentions must be declared to and approved by the Owner. The Owner reserves the right to request the reduction or elimination of unacceptable deductibles or self-insured retentions, as they would apply to the Owner, and their respective officers, officials, agents, consultants and employees. Alternatively, the Owner may request Contractor to procure a bond guaranteeing

payment of losses and related investigations, claims administration, and defense expenses.

E. Other Insurance Provisions and Requirements

The respective insurance policies and coverage, as specified below, must contain, or be endorsed to contain the following conditions or provisions:

1. General Liability

The Owner, and its respective commissioners, officers, officials, agents, consultants and employees shall be endorsed as additional insured's by ISO form CG 20 26 Additional Insured - Designated Person or Organization. As additional insured's, they shall be covered as to work performed by or on behalf of the Contractor or as to liability which arises out of Contractor's activities or resulting from the performance of services or the delivery of goods called for by the Contract.

Contractor's insurance coverage shall be primary with respect to all additional insured's. Insurance of self-insurance programs maintained by the designated additional -insured's shall be excess of the Contractor's insurance and shall not contribute with it.

Additionally, the Contractor and Contractor's general liability insurer shall agree to waive all rights of subrogation against the Owner and any of their respective officers, officials, agents, consultants or employees for claims, losses, or expenses which arise out of Contractor's activities or result from the performance of services or the delivery of goods called for by the Contract.

Contractor's failure to comply with the terms and conditions of these insurance policies shall not affect or abridge coverage for the Owner, or for any of their officers, officials, agents, consultants or employees.

2. Automobile Insurance

The Owner, and their respective officers, officials, agents, consultants and employees shall be endorsed as additional insured's by ISO form CG 20 26 - Additional Insured Designated Person or Organization. As additional insured's, they shall be covered as to work performed by or on behalf of the Contractor or as to liability which arises out of Contractor's activities or resulting from the performance of services or the delivery of goods called for by the Contract.

Contractor's insurance coverage shall be primary with respect to all additional insured's. Insurance or self-insurance programs maintained by the designated additional insured's shall be in excess of the Contractor's insurance and shall not contribute with it.

Additionally, the Contractor and Contractor's automobile insurer shall agree to waive all rights of subrogation against the Owner and any of their respective officers, officials, agents, consultants or employees for claims, losses, or expenses which arise out of Contractor's activities or result from the performance of services or the delivery of goods called for by the Contract.

Contractor's failure to comply with the terms and conditions of these insurance policies shall not affect or abridge coverage for the Owner or for any of its officers, officials, agents, consultants or employees.

3. Workers' Compensation/Employer's Liability

Contractor's workers' compensation insurance shall be endorsed with NCCI form WC 00 03 01 A - Alternative Employer Endorsement. The Alternative Employer Endorsement shall designate the Owner as "alternate employers."

4. All Coverages

Each insurance policy required by this section of the Contract shall contain a stipulation, endorsed if necessary, that the Owner will receive a minimum of a thirty (30) calendar day advance notice of any policy cancellation. Ten (10) calendar days advance notice is required for policy cancellation due to non-payment of premium.

F. Insurer Qualifications and Acceptability

Insurance required hereunder shall be issued by an A.M. Best, "B+" rated, Class IX insurance company approved to conduct insurance business in the state of Missouri.

G. Verification of Insurance Coverage

Prior to Owner issuing a Notice to Proceed, the Contractor-shall furnish the Owner with Certificate(s) of Insurance and with any applicable original endorsements evidencing the required insurance coverage. The insurance certificates and endorsements are to be signed by a person authorized by that insurer to bind coverage on its behalf. All certificates and endorsements received by the Owner are subject to review and approval by the Owner. The Owner reserves the right to require certified copies of all required policies at any time. If the scope of this contract will exceed one (1) year - or, if any of Contractor's applicable insurance coverage expires prior to completion of the work or services required under this contract -

the Contractor will provide a renewal or replacement certificate before continuing work or services hereunder. If the Contractor fails to provide documentation of required insurance coverage, the Owner may issue a stop work order and no additional contract completion time and/or compensation shall be granted as a result thereof.

ARTICLE 7 – SUSPENSION OR TERMINATION OF CONTRACT

ARTICLE 7.1 - FOR SITE CONDITIONS

When conditions at the site of the proposed work are considered by the Owner to be unsatisfactory for prosecution of the work, the Contractor may be ordered in writing to suspend the work or any part thereof until reasonable conditions exist. When such suspension is not due to fault or negligence of the Contractor, time allowed for completion of such suspended work will be extended by a period of time equal to that lost due to delay occasioned by ordered suspension. This will be a no cost time extension.

ARTICLE 7.2 - FOR CAUSE

A. Termination or Suspension for Cause:

1. If the Contractor shall file for bankruptcy, or should make a general assignment for the benefit of the creditors, or if a receiver should be appointed on account of insolvency, or if the contractor should persistently or repeatedly refuse or fail to supply enough properly skilled workers or proper materials, or if the contractor should fail to make prompt payment to subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the Owner, or otherwise be guilty of a substantial violation of any provision of this contract, then the Owner may serve notice on the Contractor and the surety setting forth the violations and demanding compliance with this contract. Unless within ten (10) consecutive calendar days after serving such notice, such violations shall cease and satisfactory arrangements for correction be made, the Owner may suspend the Contractor's right to proceed with the work or terminate this contract.

2. In the event the Owner suspends Contractor's right to proceed with the work or terminates the contract, the Owner may demand that the Contractor's surety take over and complete the work on this contract, after the surety submits a written proposal to the Owner and receives written approval and upon the surety's failure or refusal to do so within ten (10) consecutive calendar days after demand therefore, the Owner may take over the work and prosecute the same to completion by bid or negotiated contract, or the Owner may elect to take possession of and utilize in completing the work such materials, supplies, appliances and plant as may be on the site of the work, and all subcontractors, if the Owner elects, shall be bound to perform their contracts.

B. The Contractor and its surety shall be and remain liable to the Owner for any excess cost or damages occasioned to the Owner as a result of the actions above set forth.

C. The Contractor in the event of such suspension or termination shall not be entitled to receive any further payments under this contract until the work is wholly finished. Then if the unpaid balance under this contract shall exceed all expenses of the Owner as certified by the Director, such excess shall be paid to the Contractor; but, if such expenses shall exceed the unpaid balance as certified by the Director, the Contractor and their surety shall be liable for and shall pay the difference and any damages to the Owner.

D. In exercising Owner's right to secure completion of the work under any of the provisions hereof, the Director shall have the right to exercise Owner's sole discretion as to the manner, methods and reasonableness of costs of completing the work.

E. The rights of the Owner to suspend or terminate as herein provided shall be cumulative and not exclusive and shall be in addition to any other remedy provided by law.

F. The Contractor in the event of such suspension or termination may be declared ineligible for Owner contracts for a minimal period of twelve (12) months. Further, no contract will be awarded to any Contractor who lists in their bid form any subcontractor whose prior performance has contributed, as determined by the Owner, to a breach of a contract. In order to be considered for state-awarded contracts after this period, the Contractor/subcontractor will be required to forward acceptance reports to the Owner regarding successful completion of non-state projects during the intervening twelve (12) months from the date of default. No contracts will be awarded to a subcontractor/Contractor until the ability to perform responsibly in the private sector has been proven to the Owner.

ARTICLE 7.3 -- FOR CONVENIENCE

A. The Owner may terminate or suspend the Contract or any portion of the Work without cause at any time, and at the Owner's convenience. Notification of a termination or suspension shall be in writing

and shall be given to the Contractor and their surety. If the Contract is suspended, the notice will contain the anticipated duration of the suspension or the conditions under which work will be permitted to resume. If appropriate, the Contractor will be requested to demobilize and re-mobilize and will be reimbursed time and costs associated with the suspension.

B. Upon receipt of notification, the Contractor shall:

1. Cease operations when directed.

2. Take actions to protect the work and any stored materials.

3. Place no further subcontracts or orders for material, supplies, services or facilities except as may be necessary to complete the portion of the Contract that has not been terminated. No claim for payment of materials or supplies ordered after the termination date shall be considered.

4. Terminate all existing subcontracts, rentals, material, and equipment orders.

5. Settle all outstanding liabilities arising from termination with subcontractors and suppliers.

6. Transfer title and deliver to the Owner, work in progress, completed work, supplies and other material produced or acquire for the work terminated, and completed or partially completed plans, drawings information and other property that, if the Contract had been completed, would be required to be furnished to the Owner.

C. For termination without cause and at the Owner's convenience, in addition to payment for work completed prior to date of termination, the Contractor may be entitled to payment of other documented costs directly associated with the early termination of the contract. Payment for anticipated profit and unapplied overhead will not be allowed.

SECTION 007300 - SUPPLEMENTARY CONDITIONS

1.0 GENERAL:

A. These Supplementary General Conditions clarify, add, delete, or otherwise modify standard terms and conditions of DIVISION 00, BIDDING AND CONTRACTING REQUIREMENTS.

2.0 CONTACTS:

Project Manager:

Sandra Walther
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, MO 65101
Telephone: 573-257-7322
Email: sandra.walther@oa.mo.gov

3.0 NOTICE: ALL BID MATERIALS ARE DUE AT THE TIME OF BID SUBMITTAL. THERE IS NO SECOND SUBMITTAL FOR THIS PROJECT.

4.0 FURNISHING CONSTRUCTION DOCUMENTS:

A. The Owner will furnish the Contractor with approximately 3 complete sets of drawings and specifications at no charge.

B. The Owner will furnish the Contractor with approximately 3 sets of explanatory or change drawings at no charge.

C. The Contractor may make copies of the documents as needed with no additional cost to the Owner.

5.0 SAFETY REQUIREMENTS

Contractor and subcontractors at any tier shall comply with RSMo 292.675 and Article 1.3, E, of Section 007213, General Conditions.

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MIKE KEHOE, Governor

Annual Wage Order No. 33

Section 114
WASHINGTON COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by
Logan Hobbs, Director
Division of Labor Standards

Filed With Secretary of State: **March 10, 2026**

Last Date Objections May Be Filed: **April 9, 2026**

Prepared by Missouri Department of Labor and Industrial Relations

WASHINGTON COUNTY

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$23.65*
Boilermaker	$23.65*
Bricklayer - Stone Mason	$23.65*
Carpenter	$63.17
Lather	
Linoleum Layers & Cutter	
Millwright	
Pile Driver	
Cement Mason	$23.65*
Plasterer	
Communication Technician	$23.65*
Electrician (Inside Wireman)	$76.23
Electrician (Outside Lineman)	$23.65*
Outside - Groundman	
Outside - Groundman Tree Trimmer	
Outside - Lineman Operator	
Outside - Lineman Tree Trimmer	
Elevator Constructor	$23.65*
Glazier	$23.65*
Iron Worker	$75.32
Laborer	$50.45
Laborer - First Semi-Skilled	
Laborer - General	
Laborer - Second Semi-Skilled	
Laborer - Skilled	
Mason	$23.65*
Marble Finisher	
Marble Mason	
Terrazzo Finisher	
Terrazzo Worker	
Tile Finisher	
Tile Setter	
Operating Engineer	$23.65*
Operating Engineer - Group I	
Operating Engineer - Group II	
Operating Engineer - Group III	
Operating Engineer - Group III - A	
Operating Engineer - Group IV	
Operating Engineer - Group V	
Painter	$23.65*
Plumber	$83.69
Pipe Fitter	
Roofer/WaterProofer	$23.65*
Sheet Metal Worker	$80.76
Sprinkler Fitter - Fire Protection	$23.65*
Truck Driver	$23.65*
Truck Control Service Driver	
Truck Driver, Teamsters Group I	
Truck Driver, Teamsters Group II	
Truck Driver, Teamsters Group III	
Truck Driver, Teamsters Group IV	

*** The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.**

****The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in RSMo Section 290.210.**

WASHINGTON COUNTY

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	$23.65*
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$23.65*
Outside - Groundman	
Outside - Groundman Tree Trimmer	
Outside - Lineman Operator	
Outside - Lineman Tree Trimmer	
Laborer	$55.73
Laborer - General	
Laborer - Skilled	
Operating Engineer	$71.20
Oiler-Driver	
Operating Engineer - Group I	
Operating Engineer - Group II	
Operating Engineer - Group III	
Operating Engineer - Group IV	
Truck Driver	$23.65*
Truck Control Service Driver	
Truck Driver, Teamsters Group I	
Truck Driver, Teamsters Group II	
Truck Driver, Teamsters Group III	
Truck Driver, Teamsters Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance iwth the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title shown on the Building Construction Rate Sheet.

***The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.**

****The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.**

OVERTIME
and
HOLIDAYS

OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, **"overtime work"** shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

SECTION 011000 - SUMMARY OF WORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The Project consists of renovations to the CCC restroom near the Visitor Center and CCC restroom near Thunderbird Lodge.
   1. Project Location: Washington State Park, De Soto, MO.
   2. Owner: State of Missouri, Office of Administration, Division of Facilities Management, Design and Construction, Harry S Truman State Office Building, Post Office Box 809, 301 West High Street, Jefferson City, Missouri 65102.

B. Contract Documents, dated 4/29/26 were prepared for the Project by CORE10 Architecture.

C. The Work consists of renovations to the CCC restroom near the Visitor Center to meet current requirements and renovations to the CCC restroom near Thunderbird Lodge to create a new cabin.
   1. The Work includes:
      a. Renovations to the restroom near the Visitor Center shall include the demolition of the interior to the building shell and removing the interior concrete slab and all existing interior plumbing and electric system components. The new restroom layout shall include the relocation of lavatories to a new interior wall in each space. The entry doors shall be relocated to the interiors of each restroom and provide a simple and ornamental iron security gate at each architectural arched entry location. The restroom shall have a new concrete slab throughout with an epoxy-sealed finish. A new plumbing chase shall be built on the Men's restroom side of the demising wall to conceal the water and vent piping. An on-demand water heating system shall be included in the lavatories as a possible alternative. New electric service shall also be provided to the restroom building. New LED puck lighting shall be designed for both restroom spaces. Site work shall include a new driveway from the State highway and a parking area with the required accessible parking spaces and a walkway to and from the parking lot to the restroom building.
      b. Renovations to the restroom near the Thunderbird Lodge shall include the demolition of the exterior concrete stairs and wood deck and demolition of the interior to the building shell, which includes removal of fixtures, partitions, interior block walls, concrete slab, and all existing interior plumbing and electric lines. New electrical service shall be provided to the cabin include reconfiguration of the electrical service entrance. Uphill site work will be required work to improve site safety and eliminate hazards. Plumbing work will provide new concealed water and vent piping for new building use; confirmation and reactivation of water and sewer service lines; and energy-efficient HVAC design alternatives that follow the State Building Energy Efficiency Design Standards. Other site work will include reconfiguration of the stairs and pathways to the cabin, respecting the historic elements, and re-establishing the original entry procession per CCC archive drawings.

c. The historical character of the exterior of both restroom buildings shall be preserved to the greatest extent possible. Roof work on both buildings shall include the removal of the existing shingles down to the roof deck and a new synthetic shake roof with roof framing and deck repairs as needed. Conservation work will include stone masonry restoration and cleaning, exterior door and window repair, and repair and painting of all exterior wood surfaces. Overall site work for both buildings will include exterior access, lighting provisions, designated parking, and adequate stormwater drainage from all sides of the buildings.

D. The Work will be constructed under a single prime contract.

1.03 WORK SEQUENCE

A. The Work will be conducted in a single phase.

B. Work of this phase shall be substantially complete, ready for occupancy within **130 working days** from the date the Notice of Intent to Award is issued.

1.04 CONTRACTOR USE OF PREMISES

A. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
   1. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.05 OCCUPANCY REQUIREMENTS

A. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.
   1. The Designer will prepare a Certificate of Partial Occupancy for each specific portion of the Work to be occupied prior to substantial completion.
   2. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy, the Owner will operate and maintain mechanical and electrical systems serving occupied portions for the building.
   3. Upon occupancy, the Owner will assume responsibility for maintenance and custodial service for occupied portions for the building.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 012100 - ALLOWANCES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.
   1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:
   1. Not used.
   2. Weather allowances.

C. Related Sections include the following:
   1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.

1.03 WEATHER ALLOWANCE

A. Included within the completion period for this project are a specified number of “bad weather” days (see Schedule of Allowances).

B. The Contractor’s progress schedule shall clearly indicate the bad weather day allowance as an “activity” or “activities”. In the event weather conditions preclude performance of critical work activities for 50% or more of the Contractor’s scheduled workday, that day shall be declared unavailable for work due to weather (a “bad weather” day) and charged against the above allowance. Critical work activities will be determined by review of the Contractor’s current progress schedule.

C. The Contractor’s Representative and the Construction Representative shall agree monthly on the number of “bad weather” days to be charged against the allowance. This determination will be documented in writing and be signed by the Contractor and the Construction Representatives. If there is a failure to agree on all or part of the “bad weather” days for a particular month, that disagreement shall be noted on this written document and signed by each party’s representative. Failure of the Contractor’s representative to sign the “bad weather” day documentation after it is presented, with or without the notes of disagreement, shall constitute agreement with the “bad weather” day determination contained in that document.

D. There will be no modification to the time of contract performance due solely to the failure to deplete the “bad weather” day allowance.

E. Once this allowance is depleted, a no cost Change Order time extension will be executed for "bad weather" days, as defined above, encountered during the remainder of the Project.

1.04 NOT USED

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SCHEDULE OF ALLOWANCES

A. Weather Allowance: Include within the completion period for this Project 15 "bad weather" days.

END OF SECTION

SECTION 012300 - ALTERNATES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative and procedural requirements governing Alternates.

1.03 DEFINITIONS

A. Definition: An alternate is an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents..
   1. The cost for each alternate is the net addition to the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.

B. No additional time will be allowed for alternate work unless the number of work days is so stated on the bid form.

1.04 PROCEDURES

A. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate the Alternate Work into the Project.
   1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

B. Notification: The award of the Contract will indicate whether alternates have been accepted or rejected.

C. Execute accepted alternates under the same conditions as other Work of this Contract.

D. See Drawings Sheet G-001 for Alternates Schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Synthetic shake shingles at both Thunderbird and Bug House in lieu of asphalt shingles base bid.

B. Alternate No. 2: Stone sills and countertops in lieu of quartz as base bid.

C. Alternate No. 3: Field stone at retaining walls in lieu of media blasted concrete as base bid.

D. Alternate No. 4: Wall mounted service equipment at entry to women's restroom at Bug House in lieu of at the rear of the building.

END OF SECTION 012300

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract Modifications.

B. Related Sections include the following:
   1. Division 1, Section 013115 "Project Management Communications" for administrative requirements for communications.

1.03 REQUESTS FOR INFORMATION

A. In the event that the Contractor or Subcontractor, at any tier, determines that some portion of the Drawings, Specifications, or other Contract Documents requires clarification or interpretation, the Contractor shall submit a "Request for Information" (RFI) in writing to the Designer. A RFI may only be submitted by the Contractor and shall only be submitted on the RFI forms provided by the Owner. The Contractor shall clearly and concisely set forth the issue for which clarification or interpretation is sought and why a response is needed. In the RFI, the Contractor shall set forth an interpretation or understanding of the requirement along with reasons why such an understanding was reached.

B. Responses to RFI shall be issued within ten (10) working days of receipt of the Request from the Contractor unless the Designer determines that a longer time is necessary to provide an adequate response. If a longer time is determined necessary by the Designer, the Designer will, within five (5) working days of receipt of the request, notify the Contractor of the anticipated response time. If the Contactor submits a RFI on a time sensitive activity on the current project schedule, the Contractor shall not be entitled to any time extension due to the time it takes the Designer to respond to the request provided that the Designer responds within the ten (10) working days set forth above.

C. Responses from the Designer will not change any requirement of the Contract Documents. In the event the Contractor believes that a response to a RFI will cause a change to the requirements of the Contract Document, the Contractor shall give written notice to the Designer requesting a Change Order for the work. Failure to give such written notice within ten (10) working days, shall waive the Contractor's right to seek additional time or cost under Article 4, "Changes in the Work" of the General Conditions.

1.04 MINOR CHANGES IN THE WORK

A. Designer will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Amount or the Contract Time, on "Designer's Supplemental Instructions" (DSI).

1.05 PROPOSAL REQUESTS

A. The Designer or Owner Representative will issue a detailed description of proposed Changes in the Work that may require adjustment to the Contract Amount or the Contract Time. The proposed Change Description will be issued using the "Request for Proposal" (RFP) form. If necessary, the description will include supplemental or revised Drawings and Specifications.
   1. Proposal Requests issued by the Designer or Owner Representative are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
   2. Within ten (10) working days after receipt of Proposal Request, submit a proposal for the cost adjustments to the Contract Amount and the Contract Time necessary to execute the Change. The Contractor shall submit his proposal on the appropriate Change Order Detailed Breakdown form. Subcontractors may use the appropriate Change Order Detailed Breakdown form or submit their proposal on their letterhead provided the same level of detail is included. All proposals shall include:
      a. A detailed breakdown of costs per Article 4.1 of the General Conditions.
      b. If requesting additional time per Article 4.2 of the General Conditions, 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.

1.06 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, the Designer or Owner Representative will issue a Change Order for signatures of Owner and Contractor on the "Change Order" form.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 013100 - COORDINATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Projects including, but not limited to, the following:
   1. Coordination Drawings.
   2. Administrative and supervisory personnel.
   3. Project meetings.

B. Each Contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific Contractor.

C. Related Sections include the following:
   1. Division 1, Section 013200 "Schedules" for preparing and submitting Contractor's Construction Schedule.

1.03 COORDINATION

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

B. Prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
   1. Prepare similar memoranda for Owner and separate Contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other Contractors 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. Startup and adjustment of systems.
   8. Project Closeout activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
   1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.04 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

B. Key Personnel Names: Within fifteen (15) work days of starting construction operations, submit a list of key personnel assignments including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
   1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.05 PROJECT MEETINGS

A. The Owner's Construction Representative will schedule a Pre-Construction Meeting prior to beginning of construction. The date, time, and exact place of this meeting will be determined after Contract Award and notification of all interested parties. The Contractor shall arrange to have the Job Superintendent and all prime Subcontractors present at the meeting. During the Pre-Construction Meeting, the construction procedures and information necessary for submitting payment requests will be discussed and materials distributed along with any other pertinent information.
   1. Minutes: Designer will record and distribute meeting minutes.

B. Progress Meetings: The Owner's Construction Representative will conduct Monthly Progress Meetings as stated in Articles 1.8.B and 1.8.C of Section 007213 "General Conditions".
   1. Minutes: Designer will record and distribute to Contractor the meeting minutes.

C. Preinstallation Conferences: Contractor shall conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
   1. Attendees: Installer and representatives of Manufacturers and Fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Designer and Construction Representative of scheduled meeting dates.
   2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration including requirements for the following:
      a. Contract Documents
      b. Options
      c. Related RFIs
      d. Related Change Orders
      e. Purchases
      f. Deliveries
      g. Submittals
      h. Review of mockups
      i. Possible conflicts

j. Compatibility problems
k. Time schedules
l. Weather limitations
m. Manufacturer's written recommendations
n. Warranty requirements
o. Compatibility of materials
p. Acceptability of substrates
q. Temporary facilities and controls
r. Space and access limitations
s. Regulations of authorities having jurisdiction
t. Testing and inspecting requirements
u. Installation procedures
v. Coordination with other Work
w. Required performance results
x. Protection of adjacent Work
y. Protection of construction and personnel

3. Contractor shall record significant conference discussions, agreements, and disagreements including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
6. Revise paragraph below if Project requires holding progress meetings at different intervals. Insert special intervals such as "every third Tuesday" to suit special circumstances.
7. Project name
8. Name and address of Contractor
9. Name and address of Designer
10. RFI number including RFIs that were dropped and not submitted
11. RFI description
12. Date the RFI was submitted
13. Date Designer's response was received
14. Identification of related DSI or Proposal Request, as appropriate

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 013115 - PROJECT MANAGEMENT COMMUNICATIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Division 1, Section 013300 - Submittals.

C. Division 1, Section 012600 – Contract Modification Procedures.

1.02 SUMMARY

A. Project Management Communications: The Contractor shall use the Internet web based project management communications tool, E-Builder® ASP software, and protocols included in that software during this project. The use of project management communications as herein described does not replace or change any contractual responsibilities of the participants.
   1. Project management communications is available through E-Builder® as provided by "e-Builder®" in the form and manner required by the Owner.
   2. The project communications database is on-line and fully functional. User registration, electronic and computer equipment, and Internet connections are the responsibility of each project participant. The sharing of user accounts is prohibited

B. Support: E-Builder® will provide on-going support through on-line help files.

C. Copyrights and Ownership: Nothing in this specification or the subsequent communications supersedes the parties' obligations and rights for copyright or document ownership as established by the Contract Documents. The use of CAD files, processes or design information distributed in this system is intended only for the project specified herein.

D. Purpose: The intent of using E-Builder® is to improve project work efforts by promoting timely initial communications and responses. Secondly, to reduce the number of paper documents while providing improved record keeping by creation of electronic document files

E. Authorized Users: Access to the web site will be by individuals who are authorized users.
   1. Individuals shall complete the E-Builder New Company/User Request Form located at the following web site: https://oa.mo.gov/facilities/vendor-links/contractor-forms. Completed forms shall be emailed to the following email address: OA.FMDCE-BuilderSupport@oa.mo.gov.
   2. Authorized users will be contacted directly and assigned a temporary user password.
   3. Individuals shall be responsible for the proper use of their passwords and access to data as agents of the company in which they are employed.

F. Administrative Users: Administrative users have access and control of user licenses and all posted items. DO NOT POST PRIVATE OR YOUR COMPANY CONFIDENTIAL ITEMS IN THE DATABASE! Improper or abusive language toward any party or repeated posting of items intended to deceive or disrupt the work of the project will not be tolerated and will result in deletion of the offensive items and revocation of user license at the sole discretion of the Administrative User(s).

G. Communications: The use of fax, email and courier communication for this project is discouraged in favor of using E-Builder® to send messages. Communication functions are as follows:
   1. Document Integrity and Revisions:
      a. Documents, comments, drawings and other records posted to the system shall remain for the project record. The authorship time and date shall be recorded for each document submitted to the system. Submitting a new document or record with a unique ID, authorship, and time stamp shall be the method used to make modifications or corrections.
      b. The system shall make it easy to identify revised or superseded documents and their predecessors.
      c. Server or Client side software enhancements during the life of the project shall not alter or restrict the content of data published by the system. System upgrades shall not affect access to older documents or software.
   2. Document Security:
      a. The system shall provide a method for communication of documents. Documents shall allow security group assignment to respect the contractual parties communication except for Administrative Users. DO NOT POST PRIVATE OR YOUR COMPANY CONFIDENTIAL ITEMS IN THE DATABASE!
   3. Document Integration:
      a. Documents of various types shall be logically related to one another and discoverable. For example, requests for information, daily field reports, supplemental sketches and photographs shall be capable of reference as related records.
   4. Reporting:
      a. The system shall be capable of generating reports for work in progress, and logs for each document type. Summary reports generated by the system shall be available for team members.
   5. Notifications and Distribution:
      a. Document distribution to project members shall be accomplished both within the extranet system and via email as appropriate. Project document distribution to parties outside of the project communication system shall be accomplished by secure email of outgoing documents and attachments, readable by a standard email client.
   6. Required Document Types:
      a. RFI, Request for Information.
      b. Submittals, including record numbering by drawing and specification section.
      c. Transmittals, including record of documents and materials delivered in hard copy.
      d. Meeting Minutes.
      e. Application for Payments (Draft or Pencil).
      f. Review Comments.
      g. Field Reports.
      h. Construction Photographs.
      i. Drawings.
      j. Supplemental Sketches.
      k. Schedules.
      l. Specifications.
      m. Request for Proposals
      n. Designer's Supplemental Instructions
      o. Punch Lists

H. Record Keeping: Except for paper documents, which require original signatures and large format documents (greater than 8½ x 11 inches), all other 8½ x 11 inches documents shall be submitted by transmission in electronic form to the E-Builder® web site by licensed users.

a. The Owner and his representatives, the Designer and his consultants, and the Contractor and his Sub Contractors and suppliers at every tier shall respond to documents received in electronic form on the web site, and consider them as if received in paper document form.
b. The Owner and his representatives, the Designer and his consultants, and the Contractor and his Sub Contractors and suppliers at every tier reserves the right to and shall reply or respond by transmissions in electronic form on the web site to documents actually received in paper document form.
c. The Owner and his representatives, the Designer and his consultants, and the Contractor and his Sub Contractors and suppliers at every tier reserves the right to and shall copy any paper document into electronic form and make same available on the web site.

I. Minimum Equipment and Internet Connection: In addition to other requirements specified in this Section, the Owner and his representatives, the Construction Manager and his representatives, the Architect and his consultants, and the Contractor and his sub-contractors and suppliers at every tier required to have a user license(s) shall be responsible for the following:
   1. Providing suitable computer systems for each licensed user at the users normal work location1 with high-speed Internet access, i.e. DSL, local cable company's Internet connection, or T1 connection.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE.)

END OF SECTION

SECTION 013200 - SCHEDULE - BAR CHART

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes requirements for a Bar Chart Schedule for the project construction activities, schedule of submittals, and schedule for testing.

PART 2 PRODUCTS – (NOT APPLICABLE)

PART 3 EXECUTION

3.01 SUBMITTAL PROCEDURES

A. The Contractor shall submit to the Designer, within ten (10) working days following the Notice to Proceed, a Progress Schedule including Schedule of Values showing the rate of progress the Contractor agrees to maintain and the order in which he proposed to carry out the various phases of Work. No payments shall be made to the Contractor until the Progress Schedule has been approved by the Owner.
   1. The Schedule of Values must have the following line items included with the value of the item as indicated below:
      a. O&M's (Owner's Manual)
         1) $1,000,000.00 (One million) and under – 2% of the total contract amount
         2) Over $1,000,000.00 (One million) – 1% of the total contract amount
      b. Close Out Documents
         1) $1,000,000.00 (One million) and under – 2% of the total contract amount
         2) Over $1,000,000.00 (One million) – 1% of the total contract amount
      c. General Conditions
         1) No more than 10%

B. The Contractor shall submit an updated Schedule for presentation at each Monthly Progress Meeting. The Schedule shall be updated by the Contractor as necessary to reflect the current Schedule and its relationship to the original Schedule. The updated Schedule shall reflect any changes in the logic, sequence, durations, or completion date. Payments to the Contractor shall be suspended if the Progress Schedule is not adequately updated to reflect actual conditions.

C. The Contractor shall submit Progress Schedules to Subcontractors to permit coordinating their Progress Schedules to the general construction Work. The Contractor shall coordinate preparation and processing of Schedules and reports with performance of other construction activities.

3.02 CONSTRUCTION PROGRESS SCHEDULE – BAR CHART SCHEDULE

A. Bar-Chart Schedule: The Contractor shall prepare a comprehensive, fully developed, horizontal bar chart-type Contractor's Construction Schedule. The Contractor for general construction shall prepare the Construction Schedule for the entire Project. The Schedule shall show the percentage of work to be completed at any time, anticipated monthly payments by Owner, as well as significant dates (such as completion of excavation, concrete foundation work, underground lines, superstructure, rough-ins, enclosure, hanging of fixtures, etc.) which shall serve as check points to determine compliance with the approved Schedule. The Schedule shall also include an activity for the number of "bad" weather days specified in Section 012100 – Allowances.
   1. The Contractor shall provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week.
      a. If practical, use the same Schedule of Values breakdown for schedule time bars.
   2. The Contractor shall provide a base activity time bar showing duration for each construction activity. Each bar is to indicate start and completion dates for the activity. The Contractor is to place a contrasting bar below each original schedule activity time for indicating actual progress and planned remaining duration for the activity.
   3. The Contractor shall prepare the Schedule on a minimal number of separate sheets to readily show the data for the entire construction period.
   4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on schedule with other construction activities. Include minor elements involved in the overall sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.
   5. Coordinate the Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other required schedules and reports.
   6. Indicate the Intent to Award and the Contract Substantial Completion dates on the schedule.

B. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by the following:
   1. Requirement for Phased completion
   2. Work by separate Contractors
   3. Work by the Owner
   4. Pre-purchased materials
   5. Coordination with existing construction
   6. Limitations of continued occupancies
   7. Un-interruptible services
   8. Partial Occupancy prior to Substantial Completion
   9. Site restrictions
   10. Provisions for future construction
   11. Seasonal variations
   12. Environmental control

C. Work Stages: Use crosshatched bars to indicate important stages of construction for each major portion of the Work. Such stages include, but are not necessarily limited to, the following:
   1. Subcontract awards
   2. Submittals
   3. Purchases
   4. Mockups
   5. Fabrication
   6. Sample testing
   7. Deliveries

8. Installation
9. Testing
10. Adjusting
11. Curing
12. Startup and placement into final use and operation

D. Area Separations: Provide a separate time bar to identify each major area of construction for each major portion of the Work. For the purposes of this Article, a "major area" is a story of construction, a separate building, or a similar significant construction element.
   1. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
      a. Structural completion.
      b. Permanent space enclosure
      c. Completion of mechanical installation
      d. Completion of the electrical portion of the Work
      e. Substantial Completion

3.03 SCHEDULE OF SUBMITTALS

A. Upon acceptance of the Construction Progress Schedule, prepare and submit a complete schedule of submittals. Coordinate the submittal schedule with Section 013300 SUBMITTALS, the approved Construction Progress Schedule, list of subcontracts, Schedule of Values and the list of products.

B. Prepare the schedule in chronological order. Provide the following information
   1. Scheduled date for the first submittal
   2. Related Section number
   3. Submittal category
   4. Name of the Subcontractor
   5. Description of the part of the Work covered
   6. Scheduled date for resubmittal
   7. Scheduled date for the Designer's final release or approval

C. Distribution: Following the Designer's response to the initial submittal schedule, print and distribute copies to the Designer, Owner, subcontractors, and other parties required to comply with submittal dates indicated.
   1. Post copies in the Project meeting room and temporary field office.
   2. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned part of the Work and are no longer involved in construction activities.

D. Schedule Updating: Revise the schedule after each meeting or other activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

3.04 SCHEDULE OF INSPECTIONS AND TESTS

A. Prepare a schedule of inspections, tests, and similar services required by the Contract Documents. Submit the schedule with (15) days of the date established for commencement of the Contract Work. The Contractor is to notify the testing agency at least (5) working days in advance of the required tests unless otherwise specified.

B. Form: This schedule shall be in tabular form and shall include, but not be limited to, the following:
   1. Specification Section number

2. Description of the test
3. Identification of applicable standards
4. Identification of test methods
5. Number of tests required
6. Time schedule or time span for tests
7. Entity responsible for performing tests
8. Requirements for taking samples
9. Unique characteristics of each service

C. Distribution: Distribute the schedule to the Owner, Architect, and each party involved in performance of portions of the Work where inspections and tests are required.

END OF SECTION

SECTION 013300 - SUBMITTALS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Division 1, Section 013115 "Project Management Communications" for administrative requirements for communications.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for submittals required for performance of the Work including the following:
   1. Shop Drawings.
   2. Product Data.
   3. Samples.
   4. Quality Assurance Submittals.
   5. Construction Photographs.
   6. Operating and Maintenance Manuals.
   7. Warranties.

B. Administrative Submittals: Refer to General and Supplementary Conditions other applicable Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:
   1. Construction Progress Schedule including Schedule of Values.
   2. Performance and Payment Bonds.
   3. Insurance Certificates.
   4. Applications for Payment.
   5. Certified Payroll Reports.
   6. Partial and Final Receipt of Payment and Release Forms.
   7. Affidavit – Compliance with Prevailing Wage Law.
   8. Record Drawings.
   9. Notifications, Permits, etc..

C. The Contractor is obliged and responsible to check all shop drawings and schedules to assure compliance with contract plans and specifications. The Contractor is responsible for the content of the shop drawings and coordination with other contract work. Shop drawings and schedules shall indicate, in detail, all parts of an Item or Work including erection and setting instructions and integration with the Work of other trades.

D. The Contractor shall at all times make a copy, of all approved submittals, available on site to the Construction Representative.

1.03 SUBMITTAL PROCEDURES

A. The Contractor shall comply with the General and Supplementary Conditions and other applicable sections of the Contract Documents. The Contractor shall submit, with such promptness as to cause no delay in his work or in that of any other contractors, all required submittals indicated in Part 3.1 of this section and elsewhere in the Contract Documents. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
      a. The Designer reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

B. Each drawing and/or series of drawings submitted must be accompanied by a letter of transmittal giving a list of the titles and numbers of the drawings. Each series shall be numbered consecutively for ready reference and each drawing shall be marked with the following information:
   1. Date of Submission.
   2. Name of Project.
   3. Location.
   4. Section Number of Specification.
   5. State Project Number.
   6. Name of Submitting Contractor.
   7. Name of Subcontractor.
   8. Indicate if Item is submitted as specified or as a substitution.

1.04 SHOP DRAWINGS

A. Comply with the General Conditions, Article 3.2.

B. The Contractor shall submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.

C. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings including the following information:
   1. Dimensions.
   2. Identification of products and materials included by sheet and detail number.
   3. Compliance with specified standards.
   4. Notation of coordination requirements.
   5. Notation of dimensions established by field measurement.
   6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8½”x11” but no larger than 36”x48”.

1.05 PRODUCT DATA

A. The Contractor shall comply with the General Conditions, Article 3.2.

B. The Contractor shall collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.
   1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information including the following information:
      a. Manufacturer's printed recommendations.
      b. Compliance with Trade Association standards.
      c. Compliance with recognized Testing Agency standards.
      d. Application of Testing Agency labels and seals.
      e. Notation of dimensions verified by field measurement.
      f. Notation of coordination requirements.
   2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

1.06 SAMPLES

A. The Contractor shall comply with the General Conditions, Article 3.2.

B. The Contractor shall submit full-size, fully fabricated samples, cured and finished as specified, and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
   1. The Contractor shall mount or display samples in the manner to facilitate review of qualities indicated. Prepare samples to match the Designer's sample including the following:
      a. Specification Section number and reference.
      b. Generic description of the Sample.
      c. Sample source.
      d. Product name or name of the Manufacturer.
      e. Compliance with recognized standards.
      f. Availability and delivery time.
   2. The Contractor shall submit samples for review of size, kind, color, pattern, and texture. Submit samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
      a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least three (3) multiple units that show approximate limits of the variations.
      b. Refer to other Specification Sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
      c. Refer to other Sections for samples to be returned to the Contractor for incorporation in the Work. Such samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of sample submittals.
      d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.
   3. Field samples are full-size examples erected onsite to illustrate finishes, coatings, or finish materials and to establish the Project standard.

a. The Contractor shall comply with submittal requirements to the fullest extent possible. The Contractor shall process transmittal forms to provide a record of activity.

1.07 QUALITY ASSURANCE DOCUMENTS

A. The Contractor shall comply with the General Conditions, Article 3.2.

B. The Contractor shall submit quality control submittals including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.

C. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the Manufacturer certifying compliance with specified requirements.
   1. Signature: Certification shall be signed by an officer of the Manufacturer or other individual authorized to contractually bind the Company.

D. Inspection and Test Reports: The Contractor shall submit the required inspection and test reports from independent testing agencies as specified in this Section and in other Sections of the Contract Documents.

E. Construction Photographs: The Contractor shall submit record construction photographs as specified in this Section and in other Sections of the Contract Documents.
   1. The Contractor shall submit digital photographs. The Construction Administrator shall determine the quantity and naming convention at the preconstruction meeting.
   2. The Contractor shall identify each photograph with project name, location, number, date, time, and orientation.
   3. The Contractor shall submit progress photographs monthly unless specified otherwise. Photographs shall be taken one (1) week prior to submitting.
   4. The Contractor shall take four (4) site photographs from differing directions and a minimum of five (5) interior photographs indicating the relative progress of the Work.

1.08 OPERATING AND MAINTENANCE MANUALS AND WARRANTIES

A. The Contractor shall submit all required manufacturer's operating instructions, maintenance/service manuals, and warranties in accordance with the General Conditions, Article 3.5, and Supplementary Conditions along with this and other Sections of the Contract Documents.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.01 REQUIRED SUBMITTALS

A. Contractor shall submit the following information for materials and equipment to be provided under this contract.

B. Sample Register below. See E-Builder for current register of submittals for this project.

SPEC SECTION	TITLE	CATEGORY
013200:OA	Schedules	Construction Schedule
013200:OA	Schedules	Schedule of Values
013200:OA	Schedules	List of Subcontractors
013200:OA	Schedules	Major Material Suppliers
013300:OA	Submittals	Operation / Maintenance Manual
015000:OA.2	Construction Facilities and Temporary	Test Report
015000:OA.2	Construction Facilities and Temporary	Construction Schedule
017900:OA	Demonstration and Training	Operation / Maintenance Manual
017900:OA	Demonstration and Training	List of Subcontractors
017900:OA	Demonstration and Training	Test Report
017900:OA	Demonstration and Training	Operation / Maintenance Manual
030100:RIB	Maintenance of Concrete	Product Data
030100:RIB	Maintenance of Concrete	Mock up
033000:RIB	Cast-In-Place Concrete	Product Data
033000:RIB	Cast-In-Place Concrete	Sample
033000:RIB	Cast-In-Place Concrete	Sample
033000:RIB	Cast-In-Place Concrete	Sample
033000:RIB	Cast-In-Place Concrete	Test Report
033511:RIB	Concrete Floor Finishes	Warranty
033511:RIB	Concrete Floor Finishes	Warranty
033511:RIB	Concrete Floor Finishes	Warranty
033523:RIB	Exposed Aggregate Concrete Finishing	Mock up
033533:RIB	Stamped Concrete Finishing	Product Data
033533:RIB	Stamped Concrete Finishing	Shop Drawings
033533:RIB	Stamped Concrete Finishing	Sample
033533:RIB	Stamped Concrete Finishing	Mock up
040300:RIB	Conservation Treatment for Period Masonry	Product Data
040300:RIB	Conservation Treatment for Period Masonry	List of Subcontractors
040300:RIB	Conservation Treatment for Period Masonry	Mock up
042000:RIB	Unit Masonry	Product Data
044313:RIB	Stone Masonry Veneer (Alternate)	Product Data
044313:RIB	Stone Masonry Veneer (Alternate)	Sample
044313:RIB	Stone Masonry Veneer (Alternate)	Mock up
047200:RIB	Cast Stone Masonry	Product Data
047200:RIB	Cast Stone Masonry	Shop Drawings
055213:RIB	Pipe and Tube Railings	Shop Drawings
062000:RIB	Finish Carpentry	Shop Drawings
064100:RIB	Architectural Wood Casework	Product Data
064100:RIB	Architectural Wood Casework	Shop Drawings
064100:RIB	Architectural Wood Casework	Shop Drawings
064200:RIB	Wood Paneling	Shop Drawings
064200:RIB	Wood Paneling	Sample
064200:RIB	Wood Paneling	Mock up
071616:RIB	Crystalline Waterproofing	Product Data
072119:RIB	Foamed-In-Place Insulation	Product Data

SPEC SECTION	TITLE	CATEGORY
072119:RIB	Foamed-In-Place Insulation	Operation / Maintenance Manual
072119:RIB	Foamed-In-Place Insulation	Operation / Maintenance Manual
072500:RIB	Weather Barriers	Product Data
073110:RIB	Synthetic Shingles	Product Data
073110:RIB	Synthetic Shingles	Shop Drawings
073110:RIB	Synthetic Shingles	Sample
073113:RIB	Asphalt Shingles	Product Data
073113:RIB	Asphalt Shingles	Shop Drawings
073113:RIB	Asphalt Shingles	Sample
074623:RIB	Wood Siding	Mock up
076200:RIB	Sheet Metal Flashing and Trim	Shop Drawings
076200:RIB	Sheet Metal Flashing and Trim	Sample
080300:RIB	Conservation Treatment for Period Openings	Product Data
080300:RIB	Conservation Treatment for Period Openings	Sample
080300:RIB	Conservation Treatment for Period Openings	Sample
080300:RIB	Conservation Treatment for Period Openings	Operation / Maintenance Manual
080300:RIB	Conservation Treatment for Period Openings	Operation / Maintenance Manual
081113:RIB	Hollow Metal Doors and Frames	Product Data
081113:RIB	Hollow Metal Doors and Frames	Shop Drawings
081433:RIB	Stile and Rail Wood Doors	Product Data
081433:RIB	Stile and Rail Wood Doors	Shop Drawings
081433:RIB	Stile and Rail Wood Doors	Warranty
085200:RIB	Wood Windows	Product Data
085200:RIB	Wood Windows	Warranty
085200:RIB	Wood Windows	Warranty
087100:RIB	Door Hardware	Product Data
087100:RIB	Door Hardware	Shop Drawings
088000:RIB	Glazing	Product Data
088000:RIB	Glazing	Product Data
088000:RIB	Glazing	Sample
093000:RIB	Tiling	Product Data
093000:RIB	Tiling	Shop Drawings
099113:RIB	Exterior Painting	Product Data
099113:RIB	Exterior Painting	Sample
099123:RIB	Interior Painting	Product Data
099123:RIB	Interior Painting	Sample
102113.19:RIB	Plastic Toilet Compartments	Product Data
102113.19:RIB	Plastic Toilet Compartments	Shop Drawings
102113.19:RIB	Plastic Toilet Compartments	Sample
102800:RIB	Toilet, Bath, and Laundry Accessories	Product Data
102800:RIB	Toilet, Bath, and Laundry Accessories	Sample
123600:RIB	Countertops	Product Data
123600:RIB	Countertops	Shop Drawings
123600:RIB	Countertops	Sample
123600:RIB	Countertops	Test Report

SPEC SECTION	TITLE	CATEGORY
220000:CL	Plumbing	Product Data
220000:CL	Plumbing	Product Data
220000:CL	Plumbing	Operation / Maintenance Manual
220000:CL	Plumbing	Warranty
230000:CL	Heating, Ventilation, and Air-Conditioning	Product Data
230000:CL	Heating, Ventilation, and Air-Conditioning	Shop Drawings
230000:CL	Heating, Ventilation, and Air-Conditioning	Operation / Maintenance Manual
230000:CL	Heating, Ventilation, and Air-Conditioning	Warranty
230000:CL	Heating, Ventilation, and Air-Conditioning	Product Data
230000:CL	Heating, Ventilation, and Air-Conditioning	Sample
230000:CL	Heating, Ventilation, and Air-Conditioning	Product Data
230000:CL	Heating, Ventilation, and Air-Conditioning	Shop Drawings
230000:CL	Heating, Ventilation, and Air-Conditioning	Product Data
230000:CL	Heating, Ventilation, and Air-Conditioning	Operation / Maintenance Manual
230000:CL	Heating, Ventilation, and Air-Conditioning	Warranty
230000:CL	Heating, Ventilation, and Air-Conditioning	Product Data
230000:CL	Heating, Ventilation, and Air-Conditioning	Shop Drawings
230000:CL	Heating, Ventilation, and Air-Conditioning	Certification
230000:CL	Heating, Ventilation, and Air-Conditioning	Warranty
260000:CL	Electrical	Shop Drawings
260000:CL	Electrical	Product Data
260000:CL	Electrical	Certification
260000:CL	Electrical	Product Data
260000:CL	Electrical	Operation / Maintenance Manual
260000:CL	Electrical	Product Data
260000:CL	Electrical	Certification
260000:CL	Electrical	Product Data
260000:CL	Electrical	Shop Drawings
260000:CL	Electrical	Product Data
260000:CL	Electrical	Product Data
260000:CL	Electrical	Shop Drawings
260000:CL	Electrical	Operation / Maintenance Manual
311000:CDI	Site Clearing	Test Report
311000:CDI	Site Clearing	Certification
311000:CDI	Site Clearing	Certification
311000:CDI	Site Clearing	Product Data
312100:CDI	Excavation and Fill	Sample
312100:CDI	Excavation and Fill	Test Report
312100:CDI	Excavation and Fill	Test Report
321123:CDI	Aggregate Base Courses	Product Data
321123:CDI	Aggregate Base Courses	Certification
321123:CDI	Aggregate Base Courses	Test Report
321216:CDI	Asphalt Paving	Shop Drawings
321216:CDI	Asphalt Paving	Shop Drawings
321216:CDI	Asphalt Paving	Product Data

SPEC SECTION	TITLE	CATEGORY
321216:CDI	Asphalt Paving	Test Report
321313:CDI	Concrete Paving	Product Data
321313:CDI	Concrete Paving	Shop Drawings
321313:CDI	Concrete Paving	Test Report
321313:CDI	Concrete Paving	Certification
323223:CDI	Modular Block Retaining Walls	Product Data
323223:CDI	Modular Block Retaining Walls	Certification
323223:CDI	Modular Block Retaining Walls	Certification
323223:CDI	Modular Block Retaining Walls	Certification
323223:CDI	Modular Block Retaining Walls	Certification
323223:CDI	Modular Block Retaining Walls	Sample
323223:CDI	Modular Block Retaining Walls	Certification
333100:CDI	Sanitary Utility Sewerage Piping	Product Data
333100:CDI	Sanitary Utility Sewerage Piping	Shop Drawings
334100:CDI	Storm Utility Drainage	Product Data
334100:CDI	Storm Utility Drainage	Shop Drawings
334100:CDI	Storm Utility Drainage	Test Report

SECTION 013513.31 - SITE SECURITY AND HEALTH REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes general Institution rules.

B. This Section includes requirements for environments that employees are domiciled in, or public participation in program activities in or adjacent to the Scope of Work area:
   1. The Contractor shall have the applicable measures specified below in-place any time demolition or construction activities occur in occupied or non-occupied project work areas.
   2. The Contractor shall complete all specified cleaning procedures and receive clearance from the Construction Representative prior to removing any barriers and other precautionary measures – even for areas that the employees or public do not occupy during construction.

1.03 SUBMITTALS

A. List of required submittals:
   1. Materials Safety Data Sheets for all hazardous materials to be brought onsite.
   2. Schedule of proposed shutdowns, if applicable.
   3. A list of the names of all employees who will submit fingerprints for a background check, and the signed privacy documents identified below for each employee.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.01 ACCESS TO THE SITE

A. The Contractor shall arrange with Facility Representatives to establish procedures for the controlled entry of workers and materials into the work areas at the Facility.

B. The Contractor shall establish regular working hours with Facility Representatives. The Contractor must report changes in working hours or overtime to Facility Representatives and obtain approval twenty-four (24) hours ahead of time. The Contractor shall report emergency overtime to Facility Representatives as soon as it is evident that overtime is needed. The Contractor must obtain approval from Facility Representatives for all work performed after dark.

C. The Contractor shall provide the name and phone number of the Contractor's employee or agent who is in charge onsite; this individual must be able to be contacted in case of emergency. The Contractor must be able to furnish names and address of all employees upon request.

D. All construction personnel shall visibly display issued identification badges.

3.02 FIRE PROTECTION, SAFETY, AND HEALTH CONTROLS

A. The Contractor shall take all necessary precautions to guard against and eliminate possible fire hazards.
   1. Onsite burning is prohibited.
   2. The Contractor shall store all flammable or hazardous materials in proper containers located outside the buildings or offsite, if possible.
   3. The Contractor shall provide and maintain, in good order, during construction fire extinguishers as required by the National Fire Protection Association. In areas of flammable liquids, asphalt, or electrical hazards, 15-pound carbon dioxide or 20-pound dry chemical extinguishers shall be provided.

B. The Contractor shall not obstruct streets or walks without permission from the Owner's Construction Representative and Facility Representatives.

C. The Contractor's personnel shall not exceed the speed limit of 15 mph while at the Facility unless otherwise posted.

D. The Contractor shall take all necessary, reasonable measures to reduce air and water pollution by any material or equipment used during construction. The Contractor shall keep volatile wastes in covered containers and shall not dispose of volatile wastes or oils in storm or sanitary drains.

E. The Contractor shall keep the project site neat, orderly, and in a safe condition at all times. The Contractor shall immediately remove all hazardous waste and shall not allow rubbish to accumulate. The Contractor shall provide onsite containers for collection of rubbish and shall dispose of it at frequent intervals during the progress of the Work.

F. Fire exits, alarm systems, and sprinkler systems shall remain fully operational at all times, unless written approval is received from the Owner's Construction Representative and the appropriate Facility Representative at least twenty-four (24) hours in advance. The Contractor shall submit a written time schedule for any proposed shutdowns.

G. For all hazardous materials brought onsite, Material Safety Data Sheets shall be on site and readily available upon request at least a day before delivery.

H. Alcoholic beverages or illegal substances shall not be brought upon the Facility premises. The Contractor's workers shall not be under the influence of any intoxicating substances while on the Facility premises.

3.03 DISRUPTION OF UTILITIES

A. The Contractor shall give a minimum of seventy-two (72) hours written notice to the Construction Representative and the Facility Representative before disconnecting electric, gas, water, fire protection, or sewer service to any building.

B. The Contractor shall give a minimum of seventy-two (72) hours written notice to the Construction Representative and Facility Representative before closing any access drives, and shall make temporary access available, if possible. The Contractor shall not obstruct streets, walks, or parking.

3.04 PROTECTION OF PERSONS AND PROPERTY

A. SAFETY PRECAUTIONS AND PROGRAMS

1. The Contractor shall at all times conduct operations under this Contract in a manner to avoid the risk of bodily harm to persons or risk of damage to any property. The Contractor shall promptly take precautions which are necessary and adequate against conditions created during the progress of the Contractor's activities hereunder which involve a risk of bodily harm to persons or a risk of damage to property. The Contractor shall continuously inspect Work, materials, and equipment to discover and determine any such conditions and shall be solely responsible for discovery, determination, and correction of any such conditions. The Contractor shall comply with applicable safety laws, standards, codes, and regulations in the jurisdiction where the Work is being performed, specifically, but without limiting the generality of the foregoing, with rules regulations, and standards adopted pursuant to the Williams-Steiger Occupational Safety and Health Act of 1970 and applicable amendments.
2. All contractors, subcontractors and workers on this project are subject to the Construction Safety Training provisions 292.675 RSMo.
3. In the event the Contractor encounters on the site, material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), lead, mercury, or other material known to be hazardous, which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner's Representative and the Architect in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner's Representative and Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless by written agreement of the Owner's Representative and the Contractor. “Rendered Harmless” shall mean that levels of such materials are less than any applicable exposure standards, including but limited to OSHA regulations.

B. SAFETY OF PERSONS AND PROPERTY

1. The Contractor shall take reasonable precautions for safety of, and shall provide protection to prevent damage, injury, or loss to:
   a. clients, staff, the public, construction personnel, and other persons who may be affected thereby;
   b. 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 or the Contractor's Subcontractors of any tier; and
   c. 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.
2. The Contractor shall give notices and comply with applicable laws, standards, codes, ordinances, rules, regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury, or loss.
3. The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, safeguards for safety and protection, including, but not limited to, posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities.
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 the highest degree of care and carry on such activities under supervision of properly qualified personnel.

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 this Section caused in whole or in part by the Contractor, a Subcontractor of any tier, 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 this Section, except damage or loss attributable solely to acts or omissions of Owner or the 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 other obligations stated elsewhere in the Contract.
6. The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents, and the maintaining, enforcing and supervising of safety precautions and programs. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner's Representative and Architect. The Contractor shall hold regularly scheduled safety meetings to instruct Contractor personnel on safety practices, accident avoidance and prevention, and the Project Safety Program. The Contractor shall furnish safety equipment and enforce the use of such equipment by its employees and its subcontractors of any tier.
7. The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.
8. The Contractor shall promptly report in writing to the Owner all accidents arising out of or in connection with the Work which cause death, lost time injury, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately.
9. The Contractor shall promptly notify in writing to the Owner of any claims for injury or damage to personal property related to the work, either by or against the Contractor.
10. The Owner assumes no responsibility or liability for the physical condition or safety of the Work site, or any improvements located on the Work site. The Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or Contract Time concerning any failure by the Contractor or any Subcontractor to comply with the requirements of this Paragraph.
11. In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.
12. The Contractor shall maintain at his own cost and expense, adequate, safe and sufficient walkways, platforms, scaffolds, ladders, hoists and all necessary, proper, and adequate equipment, apparatus, and appliances useful in carrying on the Work and which are necessary to make the place of Work safe and free from avoidable danger for clients, staff, the public and construction personnel, and as may be required by safety provisions of applicable laws, ordinances, rules regulations and building and construction codes.

END OF SECTION 013513.31

SECTION 015000 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes requirements for construction facilities and temporary controls including temporary utilities, support facilities, security, and protection.

B. Temporary utilities include, but are not limited to, the following:
   1. Water service and distribution
   2. Temporary electric power and light
   3. Temporary heat
   4. Ventilation
   5. Telephone service
   6. Sanitary facilities, including drinking water
   7. Storm and sanitary sewer

C. Support facilities include, but are not limited to, the following:
   1. Field offices and storage sheds
   2. Temporary roads and paving
   3. Dewatering facilities and drains
   4. Temporary enclosures
   5. Hoists and temporary elevator use
   6. Temporary project identification signs and bulletin boards
   7. Waste disposal services
   8. Rodent and pest control
   9. Construction aids and miscellaneous services and facilities

D. Security and protection facilities include, but are not limited to, to following:
   1. Temporary fire protection
   2. Barricades, warning signs, and lights
   3. Sidewalk bridge or enclosure fence for the site
   4. Environmental protection

1.03 SUBMITTALS

A. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

B. Implementation and Termination Schedule: Within (15) days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each temporary utility.

1.04 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations including, but not limited to, the following:
   1. Building code requirements
   2. Health and safety regulations
   3. Utility company regulations
   4. Police, fire department, and rescue squad rules
   5. Environmental protection regulations

B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations". ANSI A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities".
   1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code".

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

1.05 PROJECT CONDITIONS

A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist onsite.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: Provide new materials. If acceptable to the Designer, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.

B. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry".
   1. For job-built temporary office, shops, and sheds within the construction area, provide UL-labeled, fire-treated lumber and plywood for framing, sheathing, and siding.
   2. For signs and directory boards, provide exterior-type, Grade B-B high-density concrete form overlay plywood of sized and thicknesses indicated.
   3. For fences and vision barriers, provide minimum 3/9" (9.5mm) thick exterior plywood.
   4. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8" (16mm) thick exterior plywood.

C. Gypsum Wallboard: Provide gypsum wallboard on interior walls of temporary offices.

D. Roofing Materials: Provide UL Class A standard-weight asphalt shingles or UL Class C mineral-surfaced roll roofing on roofs of job-built temporary office, shops, and shed.

E. Paint: Comply with requirements of Division 9 Section "Painting".
   1. For job-built temporary offices, shops, sheds, fences, and other exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.
   2. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
   3. For interior walls of temporary offices, provide two (2) quarts interior latex-flat wall paint.

F. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of (15) or less. For temporary enclosures, provide translucent, nylon-reinforced laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.

G. Water: Provide potable water approved by local health authorities.

H. Open-Mesh Fencing: Provide 0.120" (3mm) thick, galvanized 2" (50mm) chainlink fabric fencing 6' (2m) high with galvanized steel pipe posts, 1½" (38mm) ID for line posts and 2½" (64mm) ID for corner posts.

2.02 EQUIPMENT

A. General: Provide new equipment. If acceptable to the Designer, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.

B. Water Hoses: Provide ¾" (19mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100' (30m) long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.

C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110 to 120V plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.

D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage rating.

E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixture where exposed to moisture.

F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.

G. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.

H. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated re-circulation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

I. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers, or a combination of extinguishers of NFPA-recommended classes for the exposures.
   1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 EXECUTION

3.01 INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each Facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
   1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
   2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
   3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.
   4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Designer. Neither the Owner nor Designer will accept cost or use charges as a basis of claims for Change Order.

B. Temporary Water Service: The Owner will provide water for construction purposes from the existing building system. All required temporary extensions shall be provided and removed by the Contractor. Connection points and methods of connection shall be designated and approved by the Construction Representative.

C. Temporary Electric Power Service: The Owner will provide electric power for construction lighting and power tools. Contractors using such services shall pay all costs of temporary services, circuits, outlet, extensions, etc.

D. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching.
   1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

E. Temporary Heating: The normal heating and/or cooling system of the building may be used during the construction. Where necessary, provide temporary heat as required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
   1. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP gas or fuel-oil heaters with individual space thermostatic control.
   2. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.

F. Temporary Telephones: The Owner will not provide telephones at the project site. The Contractor shall provide their phone communications throughout the construction period for all supervisory personnel engaged in construction activities. Phone number(s) shall be given to the Owner's Construction Representative and Architect.

G. Temporary Telephon

H. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a health and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.
   1. Provide paper towels or similar disposable materials for each facility.
   2. Provide covered waste containers for used material.
   3. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

I. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled-water drinking-water units, including paper supply.
   1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45°F to 55°F (7°C to 13°C).

J. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

3.03 SUPPORT FACILITIES INSTALLATION

A. General: Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.
   1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

B. Temporary Paving: Construct and maintain temporary roads and paving to support the indicated loading adequately and to withstand exposure to traffic during the construction period. Locate temporary paving for roads, storage areas, and parking where the same permanent facilities will be located. Review proposed modifications to permanent paving with the Designer.
   1. Paving: Comply with Division 2 Section "Hot-Mixed Asphalt Paving" for construction and maintenance of temporary paving.
   2. Coordinate temporary paving development with subgrade grading, compaction, installation and stabilization of subbase, and installation of base and finish courses of permanent paving.
   3. Install temporary paving to minimize the need to rework the installations and to result in permanent roads and paved areas without damage or deterioration when occupied by the Owner.

4. Delay installation of the final course of permanent asphalt concrete paving until immediately before Substantial Completion. Coordinate with weather conditions to avoid unsatisfactory results.
5. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration, and supervision.

C. Construction Parking: Parking at the site will be provided in the areas designated at the Pre-Construction Meeting.

D. Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations, and construction free of water.

E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and materials drying or curing requirements to avoid dangerous conditions and effects.
2. Install tarpaulins securely with incombustible wood framing and other materials. Close openings of 25SqFt (2.3SqM) or less with plywood or similar materials.
3. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
4. Where temporary wood or plywood enclosure exceeds 100SqFt (9.2SqM) in area, use UL-labeled, fire-retardant-treated material for framing and main sheathing.

F. Project Identification and Temporary Signs: Prepare project identification and other signs of size required. Install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.
1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.
2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

G. Temporary Exterior Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.

H. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) days during normal weather or three (3) days when the temperature is expected to rise above 80°F (27°C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

I. Rodent Pest Control: Before deep foundation work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Employ this service to perform extermination and control procedures are regular intervals so the Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Designer.

B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonable predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations".
   1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one (1) extinguisher on each floor at or near each usable stairwell.
   2. Store combustible materials in containers in fire-safe locations.
   3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
   4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

C. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting including flashing red or amber lights.

D. Enclosure Fence: Before demolition begins, install an enclosure fence to enclose the entire site or the portion determined sufficient to accomodate construction operations. Install in a manner that will prevent unauthorized people from easily or unintentionally entering the site.
   1. Provide open-mesh orange plastic "snow fencing" with steel posts spaced not more than 6' (2 m) apart.

E. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
   1. Storage: Where materials and equipment must be stored and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

F. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.05 OPERATION, TERMINATION AND REMOVAL

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

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
   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.

2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the Designer requests that it be maintained longer, remove each temporary facility when the need has ended, when 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 the 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 the Contractor's property. The Owner reserves the right to take possession of project identification signs.
   2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. 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 the temporary entrances as required by the governing authority.
   3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
      a. Replace air filters and clean inside of ductwork and housing.
      b. Replace significantly worn parts and parts subject to unusual operating conditions.
      c. Replace lamps burned out or noticeably dimmed by hours of use.

END OF SECTION

SECTION 017400 - CLEANING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for cleaning during the Project.

B. Environmental Requirements: Conduct cleaning and waste-disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.
   1. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
   2. Burning or burying of debris, rubbish, or other waste material on the premises is not permitted.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by the manufacturer or fabricator for the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 EXECUTION

3.01 PROGRESS CLEANING

A. General
   1. Retain all stored items in an orderly arrangement allowing maximum access, not impending drainage or traffic, and providing the required protection of materials.
   2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
   3. At least each month, and more often if necessary, completely remove all scrap, debris, and waste material from the jobsite.
   4. Provide adequate storage for all items awaiting removal from the jobsite, observing all requirements for fire protection and protection of the ecology.

B. Site
   1. Daily, inspect the site and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.

2. Weekly, inspect all arrangements of materials stored onsite. Re-stack, tidy, or otherwise service all material arrangements.
3. Maintain the site in a neat and orderly condition at all times.

C. Structures
1. Daily, inspect the structures and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.
2. Weekly, sweep all interior spaces clean. "Clean" for the purposes of this paragraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and handheld broom.
3. In preparation for installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.
4. Following the installation of finish floor materials, clean the finish floor daily while work is being performed in the space in which finish materials have been installed. "Clean" for the purposes of this subparagraph, shall be interpreted as meaning free from all foreign material which, in the opinion of the Construction Representative, may be injurious to the finish of the finish floor material.

3.02 FINAL CLEANING

A. General: Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for the entire Project or a portion of the Project.
1. Clean the Project Site, yard and grounds, in areas disturbed by construction activities including landscape development areas, of rubbish, waste material, litter, and foreign substances.
2. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
3. Remove petrochemical spills, stains, and other foreign deposits.
4. Remove tools, construction equipment, machinery, and surplus material from the site.
5. Remove snow and ice to provide safe access to the building.
6. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
7. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
8. Broom clean concrete floors in unoccupied spaces.
9. Vacuum clean carpet and similar soft surfaces removing debris and excess nap. Shampoo, if required.
10. Clean transparent material, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
11. Remove labels that are not permanent labels.

12. 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.
    a. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
13. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
14. Clean plumbing fixtures to a sanitary condition free of stains, including stains resulting from water exposure.
15. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
16. Clean ducts, blowers, and coils if units were operated without filters during construction
17. Clean food-service equipment to a sanitary condition, ready and acceptable for its intended use.
18. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures.
19. Leave the Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests. Comply with regulations of local authorities.

D. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.

E. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of lawfully.
    1. Where extra materials of value remain after Final Acceptance by the Owner, they become the Owner's property.

END OF SECTION

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 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.

1.02 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.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Demonstration and training video recordings.

1.03 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

B. Attendance Record: For each training module, submit list of participants and length of instruction time.

C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.04 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies 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 Construction Manager.
      e. Name of Contractor.
      f. Date of video recording.
   2. 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.
   3. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

1.05 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 experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "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.

1.06 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.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 PRODUCTS

2.01 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. Documentation: Review the following items in detail:

a. Emergency manuals.
b. Operations manuals.
c. Maintenance manuals.
d. Project record documents.
e. Identification systems.
f. Warranties and bonds.
g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
4. 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.
5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. 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.
8. 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

3.01 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 007213 "General Conditions".

B. Set up instructional equipment at instruction location.

3.02 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
   1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
   2. Owner will furnish an instructor to describe Owner's operational philosophy.
   3. Owner will furnish Contractor with names and positions of participants.

B. 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 with at least seven days' advance notice.

C. 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.

D. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.03 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
   1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video: Provide minimum 1920 x 1080 video resolution converted to format file type acceptable to Owner, on electronic media.
   1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
   2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
   3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
   4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training Video that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
      a. Name of Contractor/Installer.
      b. Business address.
      c. Business phone number.
      d. Point of contact.

e. E-mail address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
1. Film training session(s) in segments not to exceed 15 minutes.
a. Produce segments to present a single significant piece of equipment per segment.
b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION

SECTION 020342 - REMOVAL AND SALVAGE OF PERIOD CONSTRUCTION MATERIALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Work includes deconstruction and salvage of identified historic items and materials and removal of rubbish and debris.

B. Specified procedures required for preservation, rehabilitation, restoration, and reconstruction treatment areas.

C. Historic items and materials are indicated on drawings.

1.02 RELATED REQUIREMENTS

A. Section 024100 - Demolition: Selective demolition of nonhistoric, built site elements.

B. Exhibit B - NPS Preservation Brief.

1.03 FIELD CONDITIONS

A. Protection of Existing Historic Property: Before beginning removal, salvage, or demolition work, survey the site and examine the drawings and specifications to determine the extent of the work. Take necessary precautions to avoid damage to existing items to remain in place, be reused, or remain Owner's property. Repair or restore to original condition items damaged by Contractor, using approved means, methods, and techniques. Replace items that cannot be successfully repaired or restored to original condition.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL PROCEDURES

A. Drawings indicating existing construction, building services, and site utilities are based on casual field observation and existing record documents only.
   1. Report discrepancies to Architect before disturbing existing historic elements.
   2. Beginning of work constitutes acceptance of existing conditions that are apparent upon examination at that time.

B. Separate spaces in which removals and salvage operations are conducted from occupied spaces.
   1. Provide, erect, and maintain temporary dustproof partitions; see Section 015000.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; exercise care to prevent water and humidity damage.

D. See Section 024100 for selective demolition of nonhistoric elements.

3.02 ENVIRONMENTAL CONTROLS

A. Comply with federal, state, and local regulations pertaining to water, air, solid waste, recycling, chemical waste, sanitary waste, sediment, and noise pollution.

3.03 ITEMS TO BE SALVAGED

A. General: Salvage elements and components to the maximum extent possible. Maintain a chain of custody of salvaged materials, including the condition of such materials before and after salvage operations.
   1. Remove furnishings, equipment, and materials not scheduled for salvage or recycling prior to initiating salvaging procedures.
   2. Take care not to damage historic portions of the structure scheduled to remain or items identified for salvage.

3.04 MATERIALS TO BE REMOVED

A. Remove existing nonhistoric elements as indicated and as required to allow direct access to period construction elements indicated to be restored or salvaged for reuse.

B. Protect existing historic elements.
   1. Prevent movement of structure; provide temporary, removable shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly, minimizing overcutting.

3.05 MATERIALS TO BE RECYCLED

A. Recycle removed nonhistoric materials to the maximum extent possible. Remove recyclable materials by hand wherever possible.

B. Recycle paper and cardboard, glass, and metals.

END OF SECTION 020342

SECTION 024100 - DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: Limitations on Contractor's use of site and premises.

B. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

C. Section 020342 - Removal and Salvage of Period Construction Materials.

D. Exhibit A - Limited Asbestos and Lead-Based Paint Survey.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   5. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
   6. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
   7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements to remain in place and not removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

3.02 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
   1. Verify construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Maintain weatherproof exterior building enclosure, except for interruptions required for replacement or modifications; prevent water and humidity damage.

C. Remove existing work as indicated and required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction indicated.
   2. Remove items indicated on drawings.

D. Services including, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
   1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.

E. Protect existing work to remain.
   1. Prevent movement of structure. Provide shoring and bracing as required.
   2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch to match new work.

3.03 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 024100

SECTION 028200 - ASBESTOS ABATEMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section includes requirements for removal, handling, packaging, transportation, disposal, cleaning, air monitoring coordination, and closeout documentation for asbestos-containing materials and asbestos-contaminated waste associated with the Work.

1.02 SCOPE OF WORK

A. Contractor shall furnish all labor, materials, equipment, supervision, temporary facilities, containment systems, decontamination facilities, personal protective equipment, waste containers, transportation, disposal, documentation, and incidentals required to complete asbestos abatement in the areas identified by the Owner or Consultant.

B. Contractor shall verify quantities and site conditions before beginning Work and shall not disturb suspect materials outside the authorized work limits without written direction.

C. The Contractor shall perform the work in accordance with applicable local, state, and federal regulations for the abatement of asbestos-containing materials and for other work as specified in this section or as indicated in associated drawings, sketches, or reports of the work.

D. All fees required for notification requirements, renotifications, and/or inspections by the regulatory agencies shall be paid by the Contractor. Bulk sample analysis information required by the Missouri Department of Natural Resources, U.S. Environmental Protection Agency or local authority having jurisdiction in conjunction with the notification shall also be provided by the Contractor unless provided within this section

E. The work shall include the removal and legal disposal of non-friable asbestos-containing materials including window caulk and glazing. These same materials can be included in both the friable asbestos section and the non-friable asbestos section in that the window caulking and glazing can both be considered friable and non-friable depending on the method of removal.

F. Non-Friable asbestos:
   1. The contractor shall remove and legally dispose of the following non-friable asbestos-containing materials for the:
      a. Each window in the Thunderbird Restroom with asbestos-containing window glazing.
      b. Caulking/roof flashing around chimneys at both Thunderbird and Bug House Restrooms assumed to contain asbestos.
      c. Each window in the Bug House Restroom with asbestos-containing glazing.
      d. No roofing felts were found at the Thunderbird Restroom during the asbestos survey. However, if found during renovation activities they must be assumed to contain asbestos or be analyzed for asbestos content prior to removal/disposal.

1.03 REGULATORY REFERENCES

A. General Applicability of Codes, Regulations and Standards - All applicable codes, regulations, standards, statutes, laws, and rules have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith. Where conflicts arise, the most stringent specification shall apply.
   1. OSHA asbestos construction standard, 29 CFR 1926.1101.
   2. EPA National Emission Standard for Hazardous Air Pollutants for asbestos, 40 CFR Part 61, Subpart M.
   3. EPA asbestos-related rules under the Toxic Substances Control Act, where applicable.
   4. Missouri Department of Natural Resources asbestos demolition, renovation, notification, inspection, and abatement requirements.
   5. Applicable disposal facility, transportation, local building, fire, and environmental requirements.

B. Contractor Responsibility - The Contractor shall assume full responsibility and liability for the compliance with all applicable federal, state, and local regulations pertaining to work practices, hauling, disposal and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable federal, state, and local regulations. The Contractor shall hold the owner harmless for failure to comply with any applicable work, hauling, disposal, safety, health, or other regulations on the part of the contractor, contractor's employees, or contractor's subcontractors.

1.04 FEDERAL AND STATE REQUIREMENTS WHICH GOVERN ASBESTOS ABATEMENT WORK OR HAULING AND DISPOSAL OF ASBESTOS WASTE MATERIALS INCLUDE BUT ARE NOT LIMITED TO THE FOLLOWING:

A. U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) including but not limited to:
   1. Title 29, Part 1910, Section 1001 and Part 1926, Section 1101 of the Code of Federal Regulations.
   2. Respiratory Protection, Title 29, Part 1910, Section 134 of the Code of Federal Regulations.
   3. Construction Industry, Title 29. Part 1926, of the Code of Federal Regulations.
   4. Access to Employee Exposure and Medical Records, Title 29, Part 1910, Section 2 of the Code of Federal Regulations.
   5. Hazard Communication, Title 29, Part 1910, Section 1200 of the Code of Federal Regulations.
   6. Specifications for Accident Prevention Signs and Tags, Title 29, Part 1910, Section 145 of the Code of Federal Regulations.

B. U.S. Environmental Protection Agency (EPA) including but not limited to:
   1. National Emission Standards for Hazardous Air Pollutants (NESHAPS) Title 40, Part 61, Subpart M, Code of Federal Regulations.

C. U.S. Department of Transportation (DOT) including but not limited to:
   1. Title 49, Part 172, Section 101 of the Code of Federal Regulations.

D. State of Missouri including but not limited to:
   1. H.B. 77, 85th General Assembly.
   2. Missouri Air Conservation Law Chapter 643.
   3. Missouri Department of Natural Resources, Division 10, Chapter 6 of the Code of State Regulations as follows:
      a. 10 CSR 10-6.020, Definitions

b. 10 CSR 10-6.080, Emission Standards for Hazardous Air Pollutants
c. 10 CSR 10-6.230, Administrative Penalties
d. Volume 18, Missouri Register, Page 44
e. 10 CSR 10-6.250, Asbestos Abatement Projects - Certification, Accreditation, and Business Exemption Requirements

1.05 DEFINITIONS

A. Abatement - Procedures to decrease or eliminate the source of fiber release from asbestos containing building materials. Includes encapsulation, enclosure, and removal.

B. Adequately Wet - To sufficiently mix or penetrate with liquid to prevent the release of particulates.

C. Aggressive Air Sampling - Sweeping of floors, ceilings and walls and other surfaces with the exhaust of a minimum of one (1) horsepower leaf blower or equivalent immediately prior to air monitoring.

D. Approved Waste Disposal Site - A solid waste disposal area that is authorized by the Department of Natural Resources to receive asbestos containing solid wastes.

E. Asbestos - The asbestiform varieties of serpentine (chrysotile, antigorite), riebeckite (crocidolite), cummintonite-grumerite (amosite), anthophyllite, and actinolite-tremolite.

F. Asbestos Abatement Supervisor - An individual who directs, controls, or supervises others in asbestos abatement projects.

G. Asbestos-Containing Material (ACM) - Any material containing more than 1 percent asbestos.

H. Asbestos-Containing Building Material (ACBM) - Surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.

I. Barrier - Any surface that seals off the work area to inhibit the movement of fibers.

J. Category I Nonfriable ACM - Asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products containing more than one percent (1%) asbestos as determined using the method specified in 40 CFR part 763, subpart F, Appendix A, section 1, Polarized Light Microscopy.

K. Category II Nonfriable ACM - Any material, excluding category I nonfriable ACM, containing more than one percent (1%) asbestos as determined using the methods specified in 40 CFR part 763, subpart F, Appendix A, section 1, Polarized Light Microscopy that, when dry, cannot be crumbled, pulverized or reduced to powder by hand pressure.

L. Containment - Area where asbestos abatement project is conducted. Area must be enclosed either by a glove bag or plastic sheeting barrier.

M. Contractor's Competent Person (Qualified Person) - One who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy

N. Regulated asbestos-containing material (RACM): Friable ACM or nonfriable ACM that has become or will become friable or otherwise regulated because of demolition, renovation, cutting, grinding, sanding, or similar disturbance.

O. Demolition - the wrecking or taking out of any load bearing structural member of a facility together with any related handling operations.

P. Disposal Bag - A properly labeled 6 mil. thick, leak-tight plastic bag used for transporting asbestos waste from work area to disposal site.

Q. Encapsulant (Sealant) - A liquid material which can be applied to asbestos- containing material and which prevents the release of asbestos fibers from the material either by creating a membrane over the surface or by penetrating into the material and binding its components together.

R. Encapsulation - Treatment of asbestos-containing materials with an encapsulant.

S. Enclosure - The construction of an airtight, impermeable, permanent barrier around asbestos containing material to control the release of asbestos fibers into the air.

T. Friable Asbestos Material - Any material containing more than one percent asbestos as determined using the method specified in appendix A, subpart F, 40 CFR part 763 section 1, Polarized Light Microscopy, that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

U. Glove Bag - A manufactured or fabricated device, typically constructed of six (6) mil transparent polyethylene or polyvinyl chloride plastic. This device consists of two (2) inward projecting long sleeves, an internal tool pouch and an attached, labeled receptacle for asbestos waste.

V. Homogeneous Work Site - Continuous areas with the same type of ACM and in which one type of abatement process is performed.

W. Negative Initial Exposure Assessment - An assessment by a "Competent Person" in which it is concluded that employee exposures during the job are likely to be consistently below the Permissible Exposure Levels.

X. Outside Air - Air outside of the containment.

Y. Owner's Air Monitoring Firm - Air Monitoring conducted by a person who is not under the direct control of the person carrying out the asbestos abatement project and who has been selected by the Owner.

Z. Owner's Air Sampling Professional - An individual who holds a valid certification from the State of Missouri. The individual shall conduct, oversee, or be responsible for air monitoring of asbestos abatement projects before, during, and after the project has been completed. The air sampling professional must be a State of Missouri certified Asbestos Air Sampling Professional or equivalent training and supervised by the Owner's Certified Industrial Hygienist (C.I.H).

AA. Owner's Air Sampling Technician - An individual who has been trained by and is under the supervision of an air sampling professional to do air monitoring before, during, and after the asbestos abatement project. The air sampling technician must have a State of Missouri asbestos certificate or equivalent training and be supervised by the Owner's Certified Industrial Hygienist (C.I.H.).

BB. Owner's Certified Industrial Hygienist (C.I.H.) - an Industrial Hygienist, Certified in Comprehensive Practice by the American Board of Industrial Hygiene. The Owner's C.I.H. must also be certified by the Missouri Department of Natural Resources as an air sampling professional and should hold a 40-hour AHERA Asbestos Contractor/Supervisor Certificate. The Owner will identify C.I.H. before application for permit.

CC. Personal Monitoring - Sampling of the asbestos fiber concentrations within the breathing zone.

DD. Regulated Asbestos-Containing Material (RACM) - Friable asbestos material; Category I nonfriable ACM that has become friable; Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

EE. Remove - To take out RACM or facility components that contain or are covered with RACM from any facility.

FF. Renovation - Altering a facility or one or more facility components in any way, including the stripping or removal of RACM from a facility component.

GG. Repair - The restoration of asbestos material that has been damaged. Repair consists of the application of rewettable glass cloth, canvas, cement or other suitable material. It may also involve filling damaged areas with non-asbestos substitutes and re- encapsulating or painting previously encapsulated materials.

HH. Strip - To take off RACM from any part of a facility or facility components.

II. Waste Shipment Record - The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos containing waste material.

JJ. Work Area - A specific isolated area, other than the space enclosed within a glove bag, in which friable asbestos-containing materials is required to be handled. The area is designated as a work area from the time that the area is secured, and access restrictions are in place. The area remains designated as a work area until the time that it has been cleaned in accordance with any requirements applicable to the operations conducted.

1.06 NOTIFICATIONS AND SUBMITTALS

A. Notifications meeting the requirements of Volume 18, Missouri Register, page 44, shall be completed and sent by the Contractor not less than ten (10) days before the intended starting date of the project. Send notification to the following:

Department of Natural Resources
Air Pollution Control Program (Asbestos) P.O. Box 176
Jefferson City, Missouri 65102

U.S. Environmental Protection Agency
Region VII
Air & Toxic Division, Air Branch
ATTN: Air Compliance
726 Minnesota Avenue
Kansas City, Kansas 66101

1. Provide a copy to the Owner's Representative. Five (5) day notification to the Owner's Representative is required on jobs less than the reportable quantity.
2. If the project is under the jurisdiction of the Kansas City Air Quality Section, St. Louis County Air Pollution Control Branch, or the Springfield-Green County Air Pollution Control Authority, send notification directly to the appropriate agency.

1.07 THE FOLLOWING WILL BE SUBMITTED BY CONTRACTOR PRIOR TO COMMENCEMENT OF WORK FOR APPROVAL BY THE OWNER'S CERTIFIED INDUSTRIAL HYGIENIST (ONE COPY FOR THE OWNER'S REPRESENTATIVE). OWNER'S C.I.H. WILL RETURN REVIEWED COPIES TO CONTRACTOR AND OWNER'S REPRESENTATIVE.

A. One copy of safety data sheets (SDS) for products to be used by the Contractor in the performance of his work. Contractor will also maintain copies of SDS on site per OSHA.

B. One copy of the notifications to, or any correspondence with, the regulatory agencies. Submit a listing of all prior regulatory violations.

C. Friable Abatement:
   1. Current Certificates of training and statement of qualifications for the project asbestos abatement supervisor and the Missouri Asbestos Occupational Certificates for all project personnel. List a summary of project personnel and contact phone numbers.
   2. Name, address, and contact person's name of testing laboratory or laboratories to be utilized analyzing samples for bulk analysis or air samples.
   3. Submit a detailed plan of the procedures proposed for use in complying with requirements of this specification and Volume 18, Missouri Register, page 44, and 29 CFR 1926.1101. Include in the plan the layout and location of barriers, decontamination units, route of ingress and egress for work area, methods used to assure safety of building occupants and visitors, methods used to isolate or closing out of HVAC system, personal air monitoring strategy, method of removal of material, and engineering controls utilized to prevent emissions from the work area.
   4. Provide a disposal plan to detail type of disposal container, method of transportation to disposal site, waste hauler, and disposal site.
   5. Copy of notifications required as part of the emergency notification plan.

D. Non-Friable Abatement:
   1. Submit a detailed plan of the procedures proposed to minimize emissions and to prevent the material from becoming friable during removal.
   2. Copy of emergency protection plan to be used if the nonfriable material should become friable during removal.
   3. Current Certificates of training and statement of qualifications for the "Competent Person".

E. One copy of the Negative Initial Exposure Assessment.

F. Upon completion of the abatement work, the following information shall be submitted to the Owner's Representative.
   1. Waste disposal receipts and waste shipment record on all asbestos waste removed from the project.

G. Upon completion of the abatement work, the following information shall be submitted by the Owner's Air Sampling Firm to the Contractor.
   1. Air sampling test results for personal (non-OSHA) and final clearance air samples taken under the supervision of Owner's Certified Industrial Hygienist. Results must be in writing in final report form.
   2. Written certification from the Owner's Air Sampling Firm.

1.08 QUALITY ASSURANCE

A. Perform Work using qualified, licensed, and trained personnel in accordance with applicable federal, state, and local requirements, including OSHA asbestos construction requirements, EPA asbestos NESHAP requirements, Missouri Department of Natural Resources requirements, and project-specific contract documents.

B. Before disturbance of suspect material, confirm that affected work areas have been inspected by a qualified asbestos inspector and that laboratory results, assumptions, or project documents clearly identify the materials to be abated.

C. Submit required regulatory notifications within the required lead time, including notification at least 10 working days before regulated demolition or abatement work begins where required by Missouri regulations.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Provide polyethylene sheeting, critical barrier materials, tape, glove bags where permitted, warning signs, labels, waste bags, rigid containers, impermeable wrapping, and other materials required to maintain containment and package asbestos waste.

B. Provide HEPA-filtered vacuums, HEPA-filtered negative air machines, air filtration devices, pressure differential monitoring devices, decontamination equipment, and wetting equipment suitable for asbestos abatement operations.

C. Provide amended water, encapsulants, lock-down sealants, surfactants, and other chemical products compatible with the substrate and approved for the intended use. Submit safety data sheets before use.

PART 3 - EXECUTION

3.01 SUPERVISION OF ABATEMENT

A. The Contractor shall designate a competent supervisor subject to the approval of the Owner's C.I.H. and the Owner's Representative. The supervisor shall be the Contractor's representative on the project and shall meet the requirements of all applicable regulations and perform the following minimum requirements.
   1. Be Certified by the State of Missouri as an Asbestos Abatement Supervisor, a minimum of one year prior full time experience in asbestos abatement work and a minimum of two years' experience as a supervisor and be qualified as a Competent Person in accordance with OSHA regulation 1926.1101.
   2. Be on site and supervise all abatement work in accordance with OSHA and Volume 18, Missouri Register, page 44.
   3. Conduct all OSHA required air monitoring.
   4. Maintain a daily log on the project documenting events, visitations, problems, equipment failures, accidents, and inspections.
   5. Be responsible for implementation of first aid, safety training, respiratory protection, and ensuring all workers are trained in emergency procedures.
   6. Be responsible for conducting a visual inspection of the work area prior to a visual inspection by the Owner's Air Sampling Firm. Inspection shall be documented.

3.02 NEGATIVE INITIAL EXPOSURE ASSESSMENT

A. The Contractor must conduct a Negative Initial Exposure Assessment (non-friable asbestos) prior to removal of the asbestos material. The Negative Initial Exposure Assessment shall be performed by a "Competent Person" to determine whether the material may be removed and maintained in a nonfriable condition. If the material cannot be removed without becoming friable then the contractor shall comply to the requirements in this specification at no additional cost to the Owner.

B. The method of removal is the Contractor's option. However, in the event of any of the following:
   1. Visible emissions are observed
   2. Sanding, grinding, cutting, or abrading of the material
   3. Air samples exceed 0.1 f/cc

C. The contractor shall immediately stop work, implement corrective work practices, make any necessary notifications to all regulatory agencies of the changes in work practices and material conditions, and comply with the requirements as set forth in this specification.

3.03 WORKER PROTECTION AND TRAINING

A. The Contractor shall be responsible for providing his employees with proper respiratory protection, respiratory training, written respirator program, medical examinations, maintaining medical records, and protective clothing and equipment to comply with OSHA requirements.

B. The Contractor shall be responsible for all testing and costs incurred for complying with requirements of OSHA regulations for Personal Air Sampling.

C. All workers shall be trained in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and protective measures.

D. All workers shall hold valid diplomas as accredited Asbestos Abatement Workers as required by 10 CSR 10-6.250.

3.04 INDEPENDENT TESTING LABORATORY

A. Testing Laboratories utilized by the Contractor for sample analysis during the project shall meet the following minimum requirements and be approved by the Owner. This information shall be submitted to the Owner's Representative for review.
   1. All air monitoring samples shall be analyzed by a testing laboratory accredited by the American Industrial Hygiene Association (AIHA) or by an individual who is currently on the Asbestos Analyst Registry.
   2. All bulk samples shall be analyzed by a testing laboratory accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

3.05 OWNER'S AIR SAMPLING PROFESSIONAL OR CIH

A. It will be the Owner's responsibility to hire an Air Sampling Professional and/or Certified Industrial Hygienist. The Air Sampling Professional & Industrial Hygienist will also be required to perform the following duties as a minimum:
   1. Approval of the Contractor's work plan and methods of abatement to meet regulatory requirements and ensure the health and safety of Park employees and visitors.
   2. Verify that the contractor is satisfactorily performing personal air monitoring as directed by OSHA regulations.

3. Visual inspection of the work area and final clearance air monitoring.
4. Certify in writing that the Contractor's procedures, methods and practices were, to the best of my knowledge and belief, in compliance with current EPA, OSHA, State and/or applicable local regulations and that the work areas meet the requirements for final clearance testing and account of any known deviations.
5. Issue final air clearance certifications/notifications.

3.06 EMERGENCY PROTECTION PLAN

A. The contractor shall be responsible for developing a written Emergency Protection Plan and shall maintain this plan on site. The plan shall include considerations of asbestos leakage from the site, fire, explosion, toxic atmospheres, electrical hazards, slips, falls, and heat related injury. All employees shall be instructed and trained in the procedures.

B. Emergency protection plan shall also include written notification of police, fire and medical personnel of the planned abatement activities, work schedule, and layout of work area, particularly barriers that may affect response capabilities.

3.07 LOCAL AREA PROTECTION & SITE SECURITY

A. The contractor shall be responsible for all areas of the building used by him and/or subcontractors in the performance of the work. Contractor shall exert full control over the actions of all employees and other persons with respect to the use and preservation of the existing building, except such controls as may be specifically reserved to the owner.

B. Contractor has the right to exclude from the work area all persons who have no purpose related to the work or its inspection and shall require all persons in the work area to observe the same regulations required of Contractor's employees.

C. The contractor shall have control of site security during abatement operations in order to protect work environment and equipment. Contractor shall have the owner’s assistance in notifying building occupants of impending activity and enforcement of restricted access by owner’s employees.

D. The contractor shall keep a minimum of two 10-lbs. type ABC fire extinguishers on site. One shall be maintained outside the work area and one inside the work area. The employees shall be trained in the operation of extinguishers.

E. Where areas cannot be isolated by existing walls and doors from employees, clients, or the public, barriers must be constructed of 1/2" plywood and 2"x4" framing 16" o.c. to isolate the area. The barriers must be installed in such a manner to prevent damage to existing walls, floors, or ceilings. Barrier may have a lockable door.

F. The contractor shall maintain the work area free from rubbish, debris, and dirt and keep a clean, safe working area.

G. The Contractor shall provide warning signage around the regulated area as required by OSHA.

H. The Contractor shall isolate any and all air supply and returns to the abatement space as required by OSHA. Contractor shall coordinate with the Owner's Representative.

I. The Contractor shall keep all areas where adhesive stripper is in use (such as mastic removal) under negative pressure and exhausted to the outside ambient air

3.08 FINAL CLEARANCE REQUIREMENTS (FRIABLE ASBESTOS)

A. Upon completion of the abatement work, the supervisor shall perform a visual inspection of the work area. If satisfactory, the supervisor shall then request the Owner's Air Sampling Firm to perform a visual inspection. When the Owner's Air Sampling Firm feels the area is ready based on the results of their visual inspection, the Contractor shall apply a lockdown encapsulant. Following application of lockdown encapsulant, the Owner's Air Sampling Firm shall perform the final clearance sampling for airborne fiber concentrations.

B. The Owner's Air Sampling Firm or designee will perform final clearance testing per the following requirements:
   1. Aggressive sampling shall be required for all areas where removal has taken place with the exception of glove bag projects where nonaggressive sampling is permitted.
   2. P.C.M. samples analyzed on site shall be analyzed by an accredited registered microscopist.

C. Any work areas failing to meet the clearance requirements of this section shall be recleaned and retested at the contractor's expense until satisfactory levels are obtained.

D. The Owner's Air Sampling Professional shall provide a written report of the air monitoring activities to the contractor within 7 days after the final clearance testing.

3.09 FINAL CLEARANCE REQUIREMENTS (NON-FRIABLE ASBESTOS)

A. Upon completion of the abatement work, the supervisor shall perform a visual inspection of the work area. If satisfactory, the supervisor shall then request the Owner's Air Sampling Firm to perform a visual inspection. When the Owner's Air Sampling Firm feels the area is ready based on the results of their visual inspection, the Owner's Air Sampling Firm will perform the final clearance sampling for airborne fiber concentrations.

B. The Owner's Air Sampling Firm or designee will perform final clearance testing per the following requirements:
   1. Aggressive sampling shall be required for all areas where removal has taken place with the exception of glove bag projects where nonaggressive sampling is permitted.
   2. P.C.M. samples analyzed on site shall be analyzed by an accredited registered microscopist.

C. Any work areas failing to meet the clearance requirements of <0.01 fibers/cc shall be recleaned and retested at the contractor's expense until satisfactory levels are obtained.

D. The Owner's Air Sampling Firm shall provide a written report of the air monitoring activities to the contractor within 7 days after the final clearance testing.

3.10 REESTABLISHMENT OF THE WORK AREA AND SYSTEMS

A. Reestablishment of the work area shall only occur after the contractor has received final clearance in writing from the Owner's C.I.H.

B. All damage to finishes, equipment, and/or the area affected by the abatement shall be repaired by the contractor to equal or better condition as it was prior to the work, at no cost to the owner.

3.11 WASTE DISPOSAL

A. All asbestos-containing waste and/or asbestos contaminated debris shall, as a minimum, be double bagged in approved 6 mil. disposal bags. Each bag shall be tagged to meet requirements of NESHAPS with an asbestos caution label and a source identification label.

B. Transportation shall meet the requirements of all regulatory agencies for asbestos- containing materials and shall be transported in an enclosed truck.

C. The waste disposal site shall be approved by the Missouri Department of Natural Resources for asbestos disposal. A chain of custody letter/waste shipment record and disposal receipts shall be provided to the owner for all materials disposed of.

3.12 DRAWINGS

A. Drawings, when provided, are not intended to be used for anything but a "reference" to the work area. Information is not specific to quantities or to exact location of ACM unless explicitly noted. Contractor will be required to field verify the conditions and quantities.

3.13 REPORTS

A. Reports, when provided, are intended to be used as a basis for the type and composition of the asbestos present for both bidding purposes and for the information required for the notifications to the governing agencies.

END OF SECTION

SECTION 028300 - LEAD-BASED PAINT ABATEMENT

PART 1 – GENERAL

1.01 SCOPE OF WORK - GENERAL

A. Provide all labor, materials, containment, worker protection, exposure assessment, lead hazard control, waste management, cleaning, clearance and documentation required for lead-painted components identified by the June 7, 2024, survey. Bug House includes lead-painted interior masonry walls (presumed), roof decking, roof trusses, headers, window frames and north exterior window frame. Thunderbird includes south door frame, east door/window framing and north exterior door frame. Existing recommendations from DNR include removal of moving wood elements such as window sashes and door leaves for off-site abatement/restoration where practical and encapsulation of remaining painted wood after stabilization.

1.02 BUG HOUSE RESTROOM

A. Based on XRF survey results, lead-based paint was identified at the following locations:
   1. Foyer
      a. Interior wood roof decking.
      b. Interior wood roof trusses.
      c. Interior wood window and door header areas.
   2. Men's Restroom
      a. Painted brick walls.
      b. Wood window headers.
      c. Wood window frames.
      d. Wood window sash.
      e. Wood roof decking.
      f. Wood roof trusses.
   3. Building Exterior
      a. North exterior wood window frame.

B. Presumed Lead-Based Paint
   1. The report concludes that historic paint layers were found in isolated locations and that lead-positive results were identified within various areas of the men's restroom walls. Due to multiple paint layers and inconsistent XRF findings, the consultant recommended treating all painted wall surfaces within both men's and women's restroom areas as lead-containing paint.
   2. Accordingly, all painted masonry wall surfaces within the Bug House restroom shall be considered lead-containing paint for bidding and abatement purposes.

1.03 THUNDERBIRD RESTROOM

A. Based upon XRF testing, lead-based paint was identified only on exterior wood components. No interior lead-based paint was identified.

B. Lead-containing paint was identified at:
   1. South exterior wood door frame.
   2. East exterior wood door/window framing.

3. North exterior wood door frame.

C. All associated painted wood framing connected to identified positive assemblies shall be considered lead-containing paint unless stripped, removed, or tested otherwise by the Contractor at the Contractor's expense.

1.04 REFERENCES

A. OSHA 29 CFR 1926.62, OSHA 1910.134, OSHA 1910.1200,

B. EPA 40 CFR 745,

C. HUD Lead Guidelines,

D. Missouri lead licensing requirements and applicable waste regulations.

1.05 DEFINITIONS

A. Action Level - Employee exposure of 30 µg/m³ as an 8-hour TWA.

B. Competent Person - Individual capable of identifying lead hazards and authorized to implement corrective measures.

C. Regulated Area - A designated area established by the Contractor where lead-based paint abatement or lead-disturbing activities are performed and where airborne lead concentrations may exceed regulatory exposure limits.

D. HEPA Vacuum – A vacuum cleaner equipped with a High-Efficiency Particulate Air (HEPA) filtration system capable of capturing and retaining at least 99.97 percent of airborne particles measuring 0.3 micrometers in diameter.

E. Lead-Based Paint - Paint or surface coating containing lead at concentrations meeting or exceeding applicable regulatory criteria.

F. Lead Hazard - Condition causing exposure to lead-contaminated dust, debris, paint chips, or airborne lead particles.

G. Dust Wipe Sampling - A sampling procedure used to collect settled dust from a known surface area utilizing approved wipe materials and methods for the purpose of determining lead loading expressed as micrograms of lead per square foot (µg/ft²). Dust wipe samples may be collected as part of risk assessment, hazard evaluation, ongoing monitoring, or clearance examinations following lead-based paint abatement activities

H. Encapsulation - The treatment of a lead-painted surface with a specialized coating or covering system designed and warranted for use as a lead-based paint encapsulant.

I. Enclosure - The installation of a durable, rigid, and mechanically fastened barrier over a lead-painted surface so that the lead-containing material is permanently isolated from occupant access and environmental exposure.

J. Negative Exposure Assessment - Documentation demonstrating that a lead-related work activity will not expose employees to airborne lead concentrations exceeding the OSHA Permissible Exposure Limit based on objective data or employee exposure monitoring.

K. Stabilization - The repair of deteriorated lead-based paint through the elimination of the causes of paint failure, preparation of the affected surface, removal of loose paint, and application of suitable coating systems to prevent further deterioration.

L. Clearance Examination - The process of determining whether a work area where lead-based paint hazard reduction or abatement activities have been conducted is safe for reoccupancy.

M. Permissible Exposure Limit (PEL) - Employee exposure of 50 µg/m³ as an 8-hour TWA.

N. TCLP - The Toxicity Characteristic Leaching Procedure, an EPA test method used to determine whether lead-containing waste has the potential to leach hazardous concentrations of contaminants and requires management as hazardous waste.

O. Waste Profile - Documentation used to characterize and classify waste for transportation and disposal, including waste descriptions, analytical testing results, hazardous waste determinations, and disposal facility approval requirements.

1.06 SUBMITTALS

A. Worker and supervisor certifications, respiratory program, containment plan, exposure assessment, waste plan, emergency procedures, daily reports, manifests, clearance documentation and final report.
   1. Detailed Lead-Based Paint Abatement Work Plan.
   2. Sequence of operations and construction schedule.
   3. Description of containment systems and isolation methods.
   4. Occupant protection plan, where occupied facilities are involved.
   5. Emergency response procedures.
   6. Decontamination procedures for workers, equipment, and waste.

B. Contractor Qualifications
   1. Five years minimum lead abatement experience. Competent Person and Lead Supervisor required onsite during disturbance of lead-painted materials.
      a. Copies of current federal, state, and local licenses, certifications, and accreditations required for lead-based paint abatement activities.
      b. Certifications for Lead Abatement Contractor, Project Supervisor and Lead Workers, as applicable.
      c. Copies of notifications submitted to regulatory agencies prior to commencement of work.
      d. Evidence of worker medical surveillance and respiratory protection compliance, where required by OSHA regulations.

C. Submit a list of proposed materials to be utilized on site during abatement activities including containment, removal, cleanup, clearance and waste disposal activities.

PART 2 - PRODUCTS

2.01 MATERIALS TO BE UTILIZED ON SITE DURING ABATEMENT ACTIVITIES INCLUDING CONTAINMENT, REMOVAL, CLEANUP, CLEARANCE AND WASTE DISPOSAL ACTIVITIES.

A. Cleaning products and supplies suitable for lead-based paint.

B. Encapsulants suitable for lead-based paint.

C. Containment materials - including but not limited to 6 mil. Poly sheeting.

D. HEPA equipment.

E. Personal Protective Equipment – Respiratory protection shall be selected based on exposure assessments and OSHA requirements.

F. Other required materials.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify existing conditions and locations of lead-based paint identified in the contract documents and lead inspection report. Establish regulated areas. Protect adjacent historic stone, wood and architectural features. Isolate occupied and public areas. Install signage and critical barriers.

B. The quantities identified in the June 7, 2024, survey report are provided for bidding purposes only. The Contractor shall field verify conditions. Positive lead-based paint locations identified in the report and presumed lead-containing painted surfaces described herein shall be included in the Contract Sum.

3.02 NOTIFICATIONS

A. Contractor shall comply with project requirements, maintain documentation, and perform work in accordance with referenced OSHA, EPA, HUD and Missouri requirements.

3.03 INDEPENDENT MONITORING

A. Contractor shall comply with project requirements, maintain documentation, and perform work in accordance with referenced OSHA, EPA, HUD and Missouri requirements

3.04 EXTERIOR HISTORIC PRESERVATION CONSIDERATIONS

A. Contractor shall comply with project requirements, maintain documentation, and perform work in accordance with referenced OSHA, EPA, HUD and Missouri requirements.

3.05 PROHIBITED PRACTICES

A. Open flame burning

B. Torch cutting painted surfaces

C. Dry sanding with HEPA controls

D. Uncontrolled abrasive blasting

E. Compressed-air cleaning

F. Dry sweeping

3.06 BUG HOUSE LEAD ABATEMENT

A. Treat all painted masonry wall systems in both restroom areas as lead-containing based on consultant recommendation. Disturbance of roof decking, trusses, headers, window assemblies and exterior north window frame shall be completed under lead-safe work practices. Moving elements including window sash and door leaves should be removed for restoration where feasible.

3.07 THUNDERBIRD LEAD ABATEMENT

A. Manage south exterior door frame, east door/window framing and north exterior door frame as lead-containing. Protect historic wood features and minimize removal impacts.

3.08 DUST CONTROL

A. Use wet methods continuously. HEPA shrouded tools required. No dry sweeping, uncontrolled sanding, compressed air cleaning, torch burning or open flame paint removal. Provide continuous housekeeping. Exterior work shall use ground cover sufficient to collect falling debris and suspend work during windy conditions.

3.09 WORKER PROTECTION

A. Provide respiratory protection, hygiene facilities, hand washing, training, exposure assessment and medical surveillance as required by OSHA.

B. Site-specific Health and Safety Plan (HASP).

C. Hazard communication procedures.

D. Respiratory protection program.

E. Personal protective equipment requirements.

F. Exposure monitoring procedures.

G. Air monitoring protocols, if required.

3.10 EXPOSURE ASSESSMENT

A. Contractor shall comply with project requirements, maintain documentation, and perform work in accordance with referenced OSHA, EPA, HUD and Missouri requirements.

3.11 RESPIRATORY PROTECTION

A. Contractor shall comply with project requirements, maintain documentation, and perform work in accordance with referenced OSHA, EPA, HUD and Missouri requirements.

3.12 EMERGENCY PROTECTION PLAN

A. Contractor shall comply with project requirements, maintain documentation, and perform work in accordance with referenced OSHA, EPA, HUD and Missouri requirements.

3.13 CLEARANCE

A. Final cleaning shall consist of HEPA vacuuming, wet washing and second HEPA vacuuming. Owner consultant will perform visual inspection and dust wipe clearance testing.

B. The Owners representative on site, a Missouri licensed lead inspector will perform the following:
   1. Visual inspections of the abatement areas
   2. Dust wipe sampling
   3. Additional air monitoring, if deemed necessary

C. Areas failing clearance testing shall be re-cleaned and re-tested at no additional cost to the Owner.

3.14 WASTE MANAGEMENT

A. Characterize waste as required. Perform TCLP sampling necessary to determine disposal classification. Containerize debris daily and dispose at approved facilities. Submit manifests and disposal receipts.

B. Waste Management Plan.

C. Waste characterization procedures.

D. Waste Profile forms.

E. TCLP analytical results, when required.

F. Transporter licenses and permits.

G. Disposal facility permits and approvals.

H. Waste shipment records and manifests.

3.15 CLOSEOUT

A. Submit all documentation necessary to demonstrate compliance with OSHA 29 CFR 1926.62, EPA lead-based paint requirements, HUD Guidelines where applicable, and all state and local regulations. No abatement work shall commence until required submittals have been reviewed and accepted by the Owner or Owner's Representative.

B. Final project report.

C. Waste disposal documentation.

D. Waste manifests and receipts.

E. Clearance examination report.

F. Final air monitoring and dust wipe sampling results.

G. Certification that work was completed in accordance with contract documents and applicable regulations.

3.16 RECORDKEEPING

A. Contractor shall comply with project requirements, maintain documentation, and perform work in accordance with referenced OSHA, EPA, HUD and Missouri requirements.

END OF SECTION

SECTION 030100 - MAINTENANCE OF CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cleaning of existing concrete surfaces.

B. Repair of exposed structural, shrinkage, and settlement cracks.

C. Resurfacing of concrete surfaces having spalled areas and other damage.

D. Repair of deteriorated concrete.

E. Scope of Work: As indicated on drawings.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-In-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

1.03 REFERENCE STANDARDS

A. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2024.

B. ASTM C928/C928M - Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs; 2025.

C. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; 2013.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.

1.05 MOCK-UPS

A. Test each type of maintenance procedure required on each type of existing construction, to determine the most appropriate procedures to use and as a record of expected results.

B. Crack Injection: Prepare one sample of each type of injection.

C. Horizontal Surface Repair: Total of 10 foot (3 m) square area, demonstrating each type of repair.

D. Where color or texture matching is required, first prepare a small size sample on cementitious board.

E. Locate mock-up(s) where directed.

F. Re-work mock-up(s) until satisfactory to Owner.

G. Satisfactory mock-up(s) may remain as part of the work.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS

A. Degreaser:
   1. Manufacturers:
      a. Euclid Chemical Company; Euco Clean and Strip: www.euclidchemical.com.
      b. LATICRETE International, Inc; CITREX: www.laticrete.com.
      c. Nox-Crete, Inc; Bio-Clean Plus: www.nox-crete.com.
      d. SpecChem, LLC; Orange Peel-Citrus Cleaner: www.specchemllc.com.
      e. W. R. Meadows, Inc; Ultrite Degreaser: www.wrmeadows.com.

B. Detergent: Non-ionic detergent.

2.02 CEMENTITIOUS PATCHING AND REPAIR MATERIALS

A. Manufacturers:
   1. Adhesives Technology Corporation: www.atcepoxy.com.
   2. ARDEX Engineered Cements: www.ardexamericas.com.
   3. Dayton Superior Corporation: www.daytonsuperior.com.
   4. Euclid Chemical Company: www.euclidchemical.com.
   5. Kaufman Products Inc: www.kaufmanproducts.net.
   6. Mapei Corporation: www.mapei.com.
   7. Master Builders Solutions: www.master-builders-solutions.com/en-us.
   8. The QUIKRETE Companies: www.quikrete.com.
   9. SpecChem, LLC: www.specchemllc.com.
   10. Stauf USA LLC: www.staufusa.com.
   11. W. R. Meadows, Inc: www.wrmeadows.com.

B. Cementitious Resurfacing Mortar: One- or two-component, factory-mixed, polymer-modified cementitious mortar designed for continuous thin-coat application.
   1. In-place material resistant to freezing conditions.
   2. Mixed with water or latex type bonding agent in proportions as recommended by manufacturer.
   3. Integral corrosion inhibitor.
   4. Recommended Thickness: Feather edge to 1/8 inch (Feather edge to 3 mm).

C. Cementitious Repair Mortar, Trowel Grade: One- or two-component, factory-mixed, polymer-modified cementitious mortar.
   1. In-place material resistant to freezing conditions.
   2. Mixed with water or latex type bonding agent in proportions as recommended by manufacturer.

3. Dry Material: Complies with ASTM C928/C928M.
4. Integral corrosion inhibitor.

D. Pre-Blended Concrete Mix for Small Projects: Construction-grade Portland cement uniformly blended with aggregates and other approved concrete ingredients, requiring only the addition of water.
   1. Compressive Strength: 4,000 psi (27.6 MPa), minimum, at 28 days, when tested in accordance with ASTM C39/C39M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

A. Prepare concrete surfaces to be repaired according to ICRI 310.2R.

3.03 CLEANING EXISTING CONCRETE

A. Clean concrete surfaces of dirt or other contamination using the gentlest method that is effective.
   1. Try the gentlest method first, then, if not clean enough, use a less gentle method taking care to watch for impending damage.
   2. Clean out cracks and voids using same methods.

B. The following are acceptable cleaning methods, in order from gentlest to less gentle:
   1. Water washing using low-pressure, maximum of 100 psi, and, if necessary, brushes with natural or synthetic bristles.
   2. Increasing the water washing pressure to maximum of 400 psi.
   3. Adding detergent to washing water; with final water rinse to remove residual detergent.
   4. Steam-generated low-pressure hot-water washing.

3.04 CONCRETE SURFACE REPAIR USING CEMENTITIOUS MATERIALS

A. Clean concrete surfaces, cracks, and joints of dirt, laitance, corrosion, and other contamination using method(s) specified above and allow to dry.

B. Apply coating of bonding agent to entire concrete surface to be repaired.

C. Fill voids with cementitious mortar flush with surface.

D. Apply repair mortar by steel trowel to a minimum thickness of 1/4 inch (6 mm) over entire surface, terminating at a vertical change in plane on all sides.

E. Trowel finish to match adjacent concrete surfaces.

END OF SECTION 030100

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork.

B. Floors and slabs on grade.

C. Concrete reinforcement.

D. Joint devices associated with concrete work.

E. Concrete curing.

1.02 RELATED REQUIREMENTS

A. Section 033511 - Concrete Floor Finishes: Densifiers, hardeners, applied coatings, and polishing (for new interior floor surfaces).

B. Section 033523 - Exposed Aggregate Concrete Finishing(abrasive blasting for exposed new concrete retaining wall surfaces).

C. Section 033533 - Stamped Concrete Finishing(for new exterior horizontal concrete patios and walkway surfaces).

1.03 REFERENCE STANDARDS

A. ACI PRC-302.1 - Guide to Concrete Floor and Slab Construction; 2015.

B. ACI PRC-304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).

C. ACI PRC-308 - Guide to External Curing of Concrete; 2016.

D. ACI SPEC-301 - Specifications for Concrete Construction; 2020.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2026.

F. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2024a.

G. ASTM C150/C150M - Standard Specification for Portland Cement; 2024.

H. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2024.

I. ASTM D2103 - Standard Specification for Polyethylene Film; 2023a.

J. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2024.

K. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017 (Reapproved 2023).

L. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; 2013.

1.04 SUBMITTALS

A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

B. Samples for Pigment Color Selection: Submit manufacturer's complete sample chip set, including pigment number and required dosage rate for each color.

C. Verification Samples: Submit sample chips of specified colors indicating pigment numbers and required dosage rates, for subsequent comparison to installed concrete.

D. Samples: Submit samples of underslab vapor retarder to be used.

E. Test Reports: Submit report for each test or series of tests specified.

PART 2 PRODUCTS

2.01 FORMWORK

A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches (38 mm) of concrete surface.

2.02 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
   1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C33/C33M.
   1. Acquire aggregates for entire project from same source.

C. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.
   1. Color(s): As selected by Architect from manufacturer's full range.

2.03 ACCESSORY MATERIALS

A. Underslab Vapor Retarder:
   1. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.

2.04 BONDING AND JOINTING PRODUCTS

A. Slab Isolation Joint Filler: 1/2-inch (13 mm) thick, height equal to slab thickness, with removable top section forming 1/2-inch (13 mm) deep sealant pocket after removal.

B. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa).
   1. Type: Deformed billet-steel bars.
   2. Finish: Unfinished, unless otherwise indicated.

C. Polyethylene Film: ASTM D2103, 4 mil, 0.004 inch (0.102 mm) thick, clear.

PART 3 EXECUTION

3.01 PREPARATION

A. Formwork: Comply with requirements of ACI SPEC-301. Design and fabricate forms to support all applied loads until concrete is cured and for easy removal without damage to concrete.

B. Prepare existing concrete surfaces to be repaired according to ICRI 310.2R.

C. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.

D. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches (150 mm). Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.02 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI SPEC-301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

3.03 PLACING CONCRETE

A. Place concrete in accordance with ACI PRC-304.

3.04 SLAB JOINTING

A. Locate joints as indicated on drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

3.05 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Exposed and Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch (6 mm) or more in height.

C. Concrete Slabs: Finish to requirements of ACI PRC-302.1 and as follows:
   1. Decorative Exposed Surfaces: Trowel as described in ACI PRC-302.1; take measures necessary to avoid black-burnish marks; decorative exposed surfaces include surfaces to be stained or dyed, pigmented concrete, surfaces to receive liquid hardeners, surfaces to receive dry-shake hardeners, surfaces to be polished, and all other exposed slab surfaces.
   2. Exterior Slabs with Decorative Patterning: Trowel as described in ACI PRC-302.1; where indicated and where replacing or extending existing flagstone slabs, stoops, and steps, hand tool wet concrete in approved pattern to emulate adjacent flagstone jointing.

D. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.

3.06 CURING AND PROTECTION

A. Comply with requirements of ACI PRC-308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.07 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests as required by Owner.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

3.08 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

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

END OF SECTION 033000

SECTION 033511 - CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Polished concrete.

1.02 SUBMITTALS

A. Specimen warranty.

B. Executed warranty.

1.03 WARRANTY

A. Finish Warranty: Provide five-year manufacturer warranty against excessive degradation of finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Unless otherwise indicated, all interior exposed concrete floors are to be finished using polished concrete finish.

2.02 POLISHED CONCRETE SYSTEM

A. Description: Materials, equipment, and procedures designed and furnished by single manufacturer to produce densely polished concrete of specified sheen.
   1. Products:
      a. LATICRETE L&M; FGS Permashine Concrete Polishing System: www.lmcc.com.
      b. PROSOCO, Inc; Consolideck Polished Concrete System: www.prosoco.com/consolideck.
      c. W. R. Meadows, Inc; Induroshine and Bellatrix Concrete Enhancer: www.wrmeadows.com.

PART 3 EXECUTION

3.01 GENERAL

A. Apply materials in accordance with manufacturer's instructions.

3.02 CONCRETE POLISHING

A. Execute using materials, equipment, and procedures specified by manufacturer, using manufacturer approved installer.

END OF SECTION 033511

SECTION 033523 - EXPOSED AGGREGATE CONCRETE FINISHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Abrasive-blasted exposed aggregate concrete finish.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-In-Place Concrete.

1.03 MOCK-UPS

A. Construct mock-up comprised of one vertical field sample panel, 3 feet (1 m) long by 3 feet (1 m) wide, with full aggregate color range represented.

B. Locate where directed.

C. Mock-up may remain as part of the Work.

PART 2 PRODUCTS

2.01 EXPOSED AGGREGATE CONCRETE FINISHING

2.02 ACCESSORIES

A. Abrasive Blast Media:
   1. Coal slag, garnet, glass, sand, or aluminum oxide as selected by the Contractor to achieve desired finish.

PART 3 EXECUTION

3.01 AGGREGATE EXPOSURE

A. Leave formwork in place until concrete has attained 75 percent of design compressive strength.

3.02 ABRASIVE BLAST FINISH:

A. Abrasive Blasting Operations and Requirements:
   1. Apply blasted finish to exposed exterior concrete retaining wall surfaces and where indicated.
   2. Perform abrasive blasting at least 72 hours after placement of concrete. Coordinate with formwork construction, concrete placement schedule, and formwork removal to ensure that surfaces to be blast finished are blasted at the same age for uniform results.

3. Determine type of nozzle, nozzle pressure, and blasting techniques required to match the Architect's control samples.
4. Abrasive blast corners and edge of patterns carefully, using back-up boards, to maintain uniform corner or edge line.

B. Surface Continuity: Perform blast finishing in as continuous an operation as possible, utilizing the same work crew to maintain continuity of finish on each surface or area of work. Maintain patterns of variances in depths of cuts as indicated.

C. Finishing:
1. Blast to achieve a Light or Brush finish: Remove surface "cement skin," dirt, and sealers without significantly altering the profile.
2. Construction Joints: Use technique acceptable to the Architect to achieve uniform treatment of construction joints.

D. Protection and Repair:
1. Protect adjacent materials and finishes from dust, dirt, and other surface or physical damage during abrasive blast finishing operations. Provide protection as required and remove from site at completion of the work.
2. Repair or replace other work damaged by finishing operations.

E. Clean-up: Maintain control of concrete chips, dust, and debris in each area of the work.
1. Clean up and remove such material at the completion of each day of operation. Prevent migration of airborne materials by use of tarpaulins, wind breaks, and similar containing devices.

3.03 CLEANING

A. When desired finish is achieved, wash and rinse exposed aggregate surfaces.

END OF SECTION 033523

SECTION 033533 - STAMPED CONCRETE FINISHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stamping of new full-depth concrete on new exterior concrete surfaces.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-In-Place Concrete: Concrete mix design; bonding and chemical admixtures; mixing; placement; finishing of concrete surface to tolerance: floating, troweling, and similar operations; frequency and treatment of control joints.

1.03 REFERENCE STANDARDS

A. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2024a.

B. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete; 2025.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to start of work of this section.
   1. Require attendance of parties directly affecting work of this section, including:
      a. Installer.
      b. Contractor's representative.
      c. Owner's representative.
   2. Review mock-ups, material sequence, preparation and application, cleaning, protection and coordination with other work.

1.05 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Shop Drawings: Indicate location of construction and control joints.

C. Patterns for Selection: Submit product data showing available natural stone stamp patterns and indicating actual size of pattern, depth of embossing, detail of field surface, edge and joint treatment options, and interlocking pattern of each stamp for Architect's selection.

1.06 MOCK-UPS

A. Construct mock-up(s) of stamped concrete to serve as basis for evaluation of workmanship.
   1. Number of Mock-Ups to be Prepared: One.
   2. Use same materials and methods for use in the work.
   3. Record technique, timed procedures and material used.
   4. Locate where directed.
   5. Minimum Size: 4 by 4 feet (1220 by 1220 mm).

B. Obtain approval of mock-up by Architect before proceeding with work.

C. Retain mock-up(s) until completion of work for use as quality standard.

PART 2 PRODUCTS

2.01 STAMPED CONCRETE APPLICATIONS

A. Full Depth Stamped Concrete Slab: Patterned new concrete.
   1. Application(s): As indicated on drawings.
   2. Coloring: None, natural cement gray.
   3. Before curing, add slip-resistant texture by light brooming to match approved mockup.
   4. As last step, apply combination curing compound / clear sealer.
   5. Provide all chemical components from a single manufacturer.

2.02 FULL-DEPTH CONCRETE SLAB MATERIALS

A. See other section(s) for concrete design mix, mixing, forming, and reinforcement.

B. Slump: 4.0 inches (101.6 mm) maximum.

C. Do not use calcium chloride or admixtures containing calcium chloride.

D. Aggregates: Use non-reactive fine and coarse aggregates free from deleterious material and complying with ASTM C33/C33M.

2.03 STAMPING MATERIALS

A. Stamping Mats: Mat type imprinting tools for texturing freshly placed concrete, in pattern and texture to achieve required surface profile and design.
   1. Mat Composition: Polyurethane.
   2. Pattern: To be selected by Architect from manufacturer's full line of natural stone patterns.
   3. Basis of Design Products:
      a. BRICKFORM; Standard Texture Mats FM-Series: www.brickform.com.

B. Release Agent: Bond breaker compound capable of releasing stamping forms from concrete without creating surface defects or leaving any residue; type as recommended by stamping mat manufacturer; compatible with concrete, form materials and specified coloring agents.

2.04 ACCESSORY MATERIALS

A. Curing and Sealing Compound: Clear, non-yellowing, non-staining, breathable, UV stable curing agent and sealer, complying with ASTM C1315 and compatible with all components of stamped concrete systems.

B. Concrete Cleaner: Biodegradable cleaning and neutralizing agent for removal of curing compounds.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces and areas to receive stamped concrete.

B. Verify that utility penetrations and peripheral work are complete.

C. Notify Architect of conditions that would adversely affect application or subsequent use.

D. Do not begin preparation or application until unacceptable conditions are corrected.

3.02 PREPARATION

A. Protect adjacent surfaces, areas, adjoining walls, and landscaping from overspray, blown dry materials, and damage due to work of this section.

3.03 FULL-DEPTH CONCRETE SLABS INSTALLATION

A. See other section(s) for concrete forming and placement.

3.04 STAMPING

A. Match approved mock-ups for pattern, color, texture, and workmanship.

B. Use stamping mats to create patterns in concrete as indicated on drawings; comply with manufacturer's recommendations and instructions.

C. Use release agent to prevent damage to concrete surface or creation of bugholes during mat removal.

D. After removal of stamping mats, make minor surface repairs as required.

3.05 CURING

A. Protect recently placed materials from premature drying, excessive hot or cold temperatures and mechanical injury until fully cured.

3.06 SURFACE TREATMENTS

A. Match approved mock-ups for pattern, color, texture, and workmanship.

B. Wait at least 28 days before applying any surface treatment materials or mechanical finishing.

C. Clean curing agent residue off surface prior to application of surface treatment materials.

1. Apply concrete cleaner in accordance with manufacturer's instructions to remove excess form release agent, efflorescence, cement scale and curing agents.

D. Sealer/Coating Application: Apply uniformly over entire surface in accordance with manufacturer's instructions.

END OF SECTION 033533

SECTION 040300 - CONSERVATION TREATMENT FOR PERIOD MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cleaning of existing masonry surfaces.

B. Replacement of existing masonry units.

C. Repair of damaged existing masonry.

D. Raking and repointing of existing mortar joints.

1.02 RELATED REQUIREMENTS

A. Exhibit B - NPS Preservation Brief.

1.03 REFERENCE STANDARDS

A. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2024.

B. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

1.04 SUBMITTALS

A. Product Data: Provide data on cleaning compounds.

1.05 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

B. Restorer Qualifications: Company specializing in period masonry restoration with minimum five years of documented experience.

1.06 MOCK-UPS

A. Restore and repoint existing masonry wall defined below. Include mortar, accessories, wall openings, and flashings.
   1. Repointing Mortar Joints:
      a. Minimum Dimensions: 12 feet (4 m) long; 2/3 of length for horizontal joints and 1/3 of length for vertical joints.
   2. Retooling Stone Masonry In-Situ: Demonstrate retooling of three deteriorated stone faces in-situ in historic profile textures indicated on drawings.
   3. Masonry Removal and Replacement: Remove masonry and replace to match existing dimensions and texture, unless indicated otherwise. Size shall represent typical conditions.

4. Application of Repair Materials:
    a. Patching: Apply repair material on minimum two masonry units of type scheduled for repair.
        1) Demonstrate removal of previous patching and application of new patching on one masonry unit.
5. Crack Repair: Repair one crack, 24 inches (610 mm) long, for each indicated method.
    a. Repair with dispersed hydrated lime injection with appropriate repair material.
6. Surface Treatments: Install minimum 16 sq ft (1.5 sq m) mock-up for each type of surface treatment on each type of substrate to be treated. For water repellents and consolidants, demonstrate the equipment and installation procedure. Allow 48 hours for limewash applications to dry to their final color and appearance.

B. Clean a 10-foot (3 m) by 10-foot (3 m) panel of wall of each type of period masonry.

C. Locate mock-up areas where directed.

D. Notify Architect at least 48 hours prior to start of mock-ups and again when all mock-up work under this section is completed. Architect will review on-site no sooner than 24 hours after work is completed to allow full drying of all mortar materials.

E. Approved restoration mock-up areas, including results of procedures employed, will remain and become the quality standard for work of this section.

1.07 FIELD CONDITIONS

A. Cold and Hot Weather Requirements for Masonry Work: Comply with requirements of TMS 402/602.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS

A. Cleaning Agent: Detergent type.

B. Poultice Materials: Commercially available or custom-prepared materials that adhere to and peel off paint or other coatings without damaging underlying masonry,
    1. Water-Based Type: Proprietary, odorless, nonacidic blend of dry absorbent natural or artificial clays and biodegradable detergents, mixed on-site with potable water.

2.02 MORTAR MATERIALS

A. Hydrated Lime: ASTM C207, Type S.

B. Sand: Washed Play Sand sold specifically for children's play areas to provide larger graded aggregates emulating historic mortar mixes, select color to approximate historic mortar aggregate.

C. Mortar Mixing:
    1. General Requirements:
        a. Do not use modern additives unless permitted in writing by Architect.
        b. Match the historic mortar in color, texture, and tooling.
        c. Provide mortar that has same vapor permeability and same or slightly lower compressive strength than the historic mortar.

2. Mortar for Stone:
   a. Use lime and sand mortars with compressive strength approximately 1/3 of compressive or crushing strength of stone units.
   b. Do not use portland cement mortars.

2.03 MASONRY UNIT MATERIALS

A. Replacement Stone: Match existing historic stone elements' grade, type, color, shape, size, texture, finish profile, and general appearance.

2.04 STONE PATCHING MATERIALS

A. Fine-Grained Stone: Products and materials designed for mixing with stone aggregate for patching fine-grained natural stone, including granite, marble, and honed-finish limestone.

PART 3 EXECUTION

3.01 PERIOD TREATMENT, GENERAL

A. See Section 013591 for special procedure requirements related to elements and features of historical significance and value.

3.02 EXAMINATION

A. Verify that surfaces to be cleaned and restored are ready for work of this section.

3.03 PREPARATION

A. Protect other elements from damage that may result from restoration procedures.

B. Carefully remove and store identified items located in areas to be restored including, but not limited to, fixtures, fittings, finish hardware, and accessories; reinstall upon completion of restoration work.

C. Protect nonrestoration areas from restoration areas to prevent damage.

D. When using liquid cleaning methods, provide drainage devices to prevent runoff over adjacent surfaces, unless those surfaces are impervious to damage from runoff.

E. Do not allow cleaning runoff to drain into sanitary or storm sewers.

3.04 INSTALLATION

A. Do not mix or apply materials when the ambient temperature or humidity are outside of range recommended by their manufacturers.

B. Schedule conservation treatments to be carried out during appropriate environmental conditions to avoid weather-related failures.

3.05 REPAIR

A. Stone Masonry Unit Patching: Patch units indicated on drawings.
   1. Patching Compound:
      a. Mask off areas to be kept free of compound.
      b. Apply with trowel or similar implement into and over area to be repaired.

3.06 RESTORATION CLEANING

A. Preclean surfaces and remove large particles with wood scrapers or nonferrous wire brush.

B. Restoration Cleaners:
   1. Do not use acidic chemical cleaners on limestone, marble, concrete, or other calcareous masonry materials.
   2. Apply restoration cleaner on masonry using brush or roller in accordance with manufacturer's instructions.
   3. Allow sufficient time, as recommended by manufacturer, for solution to remain on masonry.

C. Washing or Rinsing Vertical Surfaces:
   1. Rinse from the bottom up with potable water applied at 600 psi (4140 kPa) and at a rate of 6 gpm (24 L/min) through a 15 to 45 degree fan spray tip.
      a. Use adjustable equipment capable of reducing water pressure and flow rate as needed for sensitive surfaces.
      b. Rinse with water and pressure sufficient to flush restoration cleaner and dissolved soiling from the masonry surface and surface pores without damaging masonry. Do not leave cleaning procedure residues on masonry.

3.07 AGING

A. Rub in new masonry work to match adjacent historic work and the approved mock-up.
   1. Use carbon black in small amounts, rubbing in well with burlap rags.

B. After each application, dust off surplus and wash down with low-pressure hose. Allow surface to dry before proceeding with succeeding applications.

C. Match mock-up approved by Architect.

3.08 CLEANING

A. Remove stains, efflorescence, or other excess resulting from the work of this section. Do without delay to avoid penetration and setting.

B. Remove excess mortar, smears, and droppings as work proceeds and upon completion.

C. Clean surrounding surfaces.

END OF SECTION 040300

SECTION 042000 - UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

B. Mortar and grout.

C. Reinforcement and anchorage.

1.02 REFERENCE STANDARDS

A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2026.

B. ASTM C90 - Standard Specification for Dry-Cast Loadbearing Concrete Masonry Units; 2024a.

C. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.

D. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2025.

E. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

F. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.

G. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

H. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

1.03 SUBMITTALS

A. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

1.04 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches (400 by 200 mm) and nominal depths as indicated on drawings for specific locations.

2. Load-Bearing Units: ASTM C90, normal weight.
   a. Hollow block, as indicated.
   b. Exposed Faces: Manufacturer's standard color and texture where indicated.

2.02 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C91/C91M, Type N.

B. Mortar Aggregate: ASTM C144.

C. Grout Aggregate: ASTM C404.

D. Water: Clean and potable.

2.03 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa), deformed billet bars; galvanized.

B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

2.04 MORTAR AND GROUT MIXING

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
   1. Interior, loadbearing masonry: Type N.

B. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches (50 mm) or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches (50 mm).

C. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches (200 mm).
   3. Mortar Joints: Concave.

3.02 REINFORCEMENT AND ANCHORAGE - GENERAL AND SINGLE WYTHE MASONRY

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches (400 mm) on center.

B. Place continuous joint reinforcement in first and second joint below top of walls.

C. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch (16 mm) mortar cover on each side.

D. Lap joint reinforcement ends minimum 6 inches (150 mm).

3.03 GROUTED COMPONENTS

A. Lap splices minimum 24 bar diameters.

B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.

C. Place and consolidate grout fill without displacing reinforcing.

3.04 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

END OF SECTION 042000

SECTION 044313 - STONE MASONRY VENEER (ALTERNATE)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Adhered cut stone veneer at exterior walls.

B. Setting mortar.

1.02 REFERENCE STANDARDS

A. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2019.

B. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

C. ASTM C568/C568M - Standard Specification for Limestone Dimension Stone; 2022.

D. ASTM C1242 - Standard Guide for Selection, Design, and Installation of Dimension Stone Attachment Systems; 2025b.

E. ASTM C1528/C1528M - Standard Guide for Selection of Dimension Stone; 2020, with Editorial Revision (2025).

F. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2019a.

G. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

1.03 SUBMITTALS

A. Product Data: Provide data on stone units, mortar, and reinforcement.

B. Samples: Submit two stone samples illustrating minimum and maximum stone sizes, color range, texture, and markings.

1.04 QUALITY ASSURANCE

A. Stone Fabricator Qualifications: Company specializing in fabricating cut stone with minimum ten years of experience.

B. Installer Qualifications: Company specializing in performing work of the type required by this section, with minimum three years of experience.

1.05 MOCK-UP

A. Construct stone wall mock-up, 6 feet (2 m) tall by 3 feet (1 m) wide; include corner condition in mock-up.

B. Locate where directed.

C. Mock-up may remain as part of the Work.

1.06 FIELD CONDITIONS

A. Cold Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

B. Maintain materials and ambient air at minimum of 40 degrees F (5 degrees C) prior to, during, and for 48 hours after completion of work.

PART 2 PRODUCTS

2.01 STONE

A. Stone, General: See recommendations in ASTM C1528/C1528M.

B. Dolomitic Limestone: variety to match existing; complying with ASTM C568/C568M Classification II - Medium Density.
   1. Color, Grain, and Finish: To match existing.

2.02 MORTAR APPLICATIONS

A. At Contractor's option, mortar may be field-mixed from packaged dry materials, made from factory premixed dry materials with addition of water only, or ready-mixed.

2.03 MORTAR MIXES

A. Packaged Dry Material for Mortar for Unit Masonry: Premixed masonry cement and mason's sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   1. Color: Standard gray.

B. Packaged Mortar and Grout Material for Masonry Veneer Units: Premixed Portland cement, hydrated lime, water repellents, and aggregates; complying with ASTM C1714/C1714M and capable of producing mortar and grout of specified strength in accordance with ASTM C270 and ANSI A118.6.

C. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

2.04 STONE FABRICATION - ADHERED VENEER

A. Comply with ASTM C1242 requirements for adhered stone system without mechanical anchors for maximum stone weight and maximum individual stone panel size.

B. Comply with TMS 402/602 size requirements for adhered stone veneer units for maximum thickness, maximum face dimension, maximum face area and maximum weight per square foot.

C. Nominal Thickness: 3/4 inch to 1-1/4 inches (19 mm to 32 mm).

D. Style: As indicated on drawings.

E. Fabricate for 3/8 inch (10 mm) beds and joints.

F. Backs: Sawn.

G. Form stone corners to irregular joint profile. Clean jagged corners from stone in preparation for setting.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that support work and site conditions are ready to receive work of this section.

B. Verify that substrates to receive mortar scratch coat or setting bed comply with stone veneer manufacturer's instructions.
   1. Concrete: Verify surfaces are flat, honeycomb is filled flush, and surface is ready to receive mortar setting bed. Verify no bituminous, water repellent, or form release agents exist on concrete surface that are detrimental to mortar setting bed.

3.02 PREPARATION - ADHERED VENEER

A. Dampen masonry surfaces to reduce excessive suction.

B. Clean concrete surfaces of foreign matter using approved acid solutions, solvents, or detergents, and then rinse surfaces thoroughly with clean water.

C. Roughen smooth concrete surfaces and apply bonding compound in accordance with manufacturer's written installation instructions.

D. Apply dash bond coat to solid bases and moist cure for at least 24 hours before applying setting bed.

3.03 INSTALLATION - ADHERED VENEER

A. Install thin stone veneer with a cementitious mortar setting bed to a scratch coat backing surface, in accordance with stone fabricator's instructions and applicable sections of the ICC (IBC), TMS 402/602 and ASTM C1242 that apply to adhered masonry veneer.

3.04 INSTALLATION - MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.

END OF SECTION 044313

SECTION 047200 - CAST STONE MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Architectural cast stone.

B. Units required are indicated on drawings as "cast stone" or "precast".

1.02 RELATED REQUIREMENTS

A. Section 042000 - Unit Masonry: Installation of cast stone in conjunction with masonry.

1.03 REFERENCE STANDARDS

A. ACI CODE-318 - Building Code for Structural Concrete—Code Requirements and Commentary; 2025.

B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2026.

C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2024.

D. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2025.

E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2024.

F. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2024a.

G. ASTM C150/C150M - Standard Specification for Portland Cement; 2024.

H. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

I. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2024.

J. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2025.

1.04 SUBMITTALS

A. Product Data: Test results of cast stone components made previously by the manufacturer.

B. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Current producer member of the Cast Stone Institute or the Architectural Precast Association.
   2. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.

PART 2 PRODUCTS

2.01 ARCHITECTURAL CAST STONE

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural granite, complying with ASTM C1364.
   1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
   2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
   3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet (6 meters).
   4. Remove cement film from exposed surfaces before packaging for shipment.

B. Shapes: Provide shapes indicated on drawings.
   1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch (3 mm) or length divided by 360, whichever is greater, but not more than 1/4 inch (6 mm).
   2. Unless otherwise indicated on drawings, provide:
      a. Wash or slope of 1:12 on exterior horizontal surfaces.
      b. Drips on projecting components, wherever possible.
      c. Raised fillets at back of sills and at ends to be built in.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI CODE-318.

2.02 MATERIALS

A. Portland Cement: ASTM C150/C150M.
   1. For Mortar: Type I or II, except Type III may be used in cold weather.

B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.

C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.

D. Admixtures: ASTM C494/C494M.

E. Water: Potable.

F. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa), deformed bars, galvanized.
   1. Galvanized in accordance with ASTM A767/A767M, Class I.

G. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.

H. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.

I. Mortar: Portland cement-lime, as recommended for Period Masonry ; do not use masonry cement.

J. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install cast stone components in conjunction with masonry, complying with requirements of Section 042000.

B. Mechanically anchor cast stone units indicated; set remainder in mortar.

C. Setting:
1. Drench cast stone components with clear, running water immediately before installation.
2. Set units in a full bed of mortar unless otherwise indicated.
3. Fill vertical joints with mortar.
4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.02 TOLERANCES

A. Joints: Make all joints 3/8 inch (9.5 mm), except as otherwise detailed.
1. Rake mortar joints 3/4 inch (19 mm) for pointing.
2. Remove excess mortar from face of stone before pointing joints.
3. Point joints with mortar in layers 3/8 inch (9.5 mm) thick and tool to a slight concave profile.
4. Leave the following joints open for sealant:
   a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
   b. Joints in projecting units.
   c. Joints between rigidly anchored units, including soffits, panels, and column covers.
   d. Joints below lugged sills and stair treads.
   e. Joints below ledge and relieving angles.
   f. Joints labeled "expansion joint".

B. Installation Tolerances:
1. Variation from Plumb: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.
2. Variation from Level: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.
3. Variation in Joint Width: Not more than 1/8 inch in 36 inches (3 mm in 900 mm) or 1/4 of nominal joint width, whichever is less.
4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch (1.5 mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.03 CLEANING

A. Clean completed exposed cast stone after mortar is thoroughly set and cured.
   1. Wet surfaces with water before applying cleaner.
   2. Apply cleaner to cast stone in accordance with manufacturer's instructions.
   3. Remove cleaner promptly by rinsing thoroughly with clear water.
   4. Do not use acidic cleaners.

3.04 PROTECTION

A. Protect completed work from damage.

B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION 047200

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall mounted handrails.

B. Stair railings and guardrails.

C. Free-standing railings at steps.

1.02 REFERENCE STANDARDS

A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.

B. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2024.

1.03 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1.04 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.

B. Fabricator Qualifications:
   1. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.

B. Comply with ASTM E985.

C. Allow for expansion and contraction of members and building movement without damage to connections or members.

D. Dimensions: See drawings for configurations and heights.

E. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

F. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 STEEL RAILING SYSTEM

A. Weathering Steel Pipe: ASTM 847 .

B. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.

C. Exposed Fasteners: No exposed bolts or screws.

2.03 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

D. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean and strip metals where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Anchor railings securely to structure.

3.03 FIELD FINISHING

A. For weathering steel railings, clean and prepare exposed surfaces as required to ensure uniform weathered finish.

END OF SECTION 055213

SECTION 060300 - CONSERVATION TREATMENT FOR PERIOD WOOD

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Repair of damaged wood components.

B. Replacement of damaged wood components.

C. Removal of existing wood finishes and refinishing.

1.02 RELATED REQUIREMENTS

A. Section 099113 - Exterior Painting.

B. Section 099123 - Interior Painting.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

C. SPIB (GR) - Standard Grading Rules; 2021.

PART 2 PRODUCTS

2.01 REPLACEMENT ROUGH CARPENTRY MATERIALS

A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Joist, Rafter, and Small Beam Framing, 2 by 6 through 4 by 16 (50 by 150 mm through 100 by 400 mm):
   1. Machine stress-rated as follows:
      a. Fb-single; minimum extreme fiber stress in bending: 1,350 psi (9300 kPa).
      b. E; minimum modulus of elasticity: 1,300,000 psi (8960 MPa).

E. Lumber and timbers salvaged from deconstruction of existing buildings or structures are permitted in lieu of sustainably harvested lumber, clean, without nails, and free of paint and finish materials and other contamination; identify source.

F. Lumber and timbers fabricated from recovered timber, timber previously abandoned in transit to riverbeds or lakes, are permitted in lieu of sustainably harvested lumber, unless indicated otherwise.

2.02 REPLACEMENT FINISH CARPENTRY MATERIALS

A. Quality Standard: Items fabricated in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 12, unless noted otherwise.

B. Exterior Finish Carpentry Items: Matching existing elements.
   1. Window Casings and Moldings: Prepare for opaque finish.
   2. Siding and Exterior Trim: Prepare for opaque finish.
   3. Stairs, Balustrades, and Handrails: Prepare for opaque finish.
   4. Brackets, Finials, and Pediments: Prepare for opaque finish.

C. Interior Finish Carpentry Items: Matching existing elements.
   1. Moldings, Bases, Casings, and Miscellaneous Trim: Prepare for opaque finish.
   2. Window Sills: Prepare for opaque finish.

2.03 PAINT REMOVERS

A. Solvent Based: Formulated without chlorinated solvents, acids, and caustics for removal of multiple coats of oil-based, water-based, acrylic-based, epoxy-based, urethane-based, elastomeric, and lead-based paints and lacquers and enamels.

2.04 WOOD REPAIR MATERIALS

A. Patching and Filling Compounds:
   1. Epoxy Based: Two-part, adhesive system designed to fill voids in wood and be painted, stained, sawed, nailed, planed, sanded carved, and machined like wood.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces to be cleaned and restored are ready for work of this section.

3.02 PREPARATION

A. Protect surrounding elements from damage that may result due to performance of restoration procedures.

B. Remove and store removable items located in areas to be restored including, but not limited to, fixtures, fittings, finish hardware, and accessories; reinstall upon completion.

C. Separate areas to be protected from restoration areas to prevent damage.

D. Mask or cover adjacent surfaces and permanent equipment. Secure coverings without nails or tapes that leave residue. Do not use impervious sheeting which produces condensation.
   1. Use materials that withstand cleaning and restoration procedures.

E. When using liquid cleaning methods, install drainage devices to prevent runoff over adjacent surfaces unless those surfaces are impervious to damage from runoff.

F. Do not allow cleaning runoff to drain into sanitary or storm sewers.

3.03 PAINT REMOVAL

A. Remove existing coatings to bare substrate or first sound paint layer as indicated.

B. Removal with Chemical Products: Use products in accordance with manufacturer's instructions.
   1. Allow product to dwell on existing surface for time period recommended by manufacturer or until existing coating dissolves. Periodically agitate remover paste with a stiff bristle brush to improve penetration into coating.
   2. Remove all traces of chemicals and coating residue from substrate.

C. Leave surfaces in a clean, residue-free condition, ready for subsequent restoration procedures.

D. Dispose of waste products and residue in accordance with applicable laws and regulations.

3.04 REPLACEMENT ELEMENT INSTALLATION

A. Match existing elements unless otherwise required for protection of wood materials from the weather and approved by Architect.

B. Maintain continuity of historic architectural fabric.

C. Rough Carpentry Elements:
   1. Set structural members level and plumb.
   2. Provide for erection loads, and temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
   3. Do not field cut or alter structural members without approval of Architect.

D. Finish Carpentry:
   1. Exterior Elements: Coordinate sequence of reinstallation with period treatment sequences of other exterior elements.
      a. General: Use corrosion-resistant fasteners.
      b. Set and secure materials and components in place, plumb, and level.
      c. Scribe to abutting components, with gaps of 1/32 inch (0.79 mm), maximum. Do not use overlay trim to conceal larger gaps.
      d. Siding and Exterior Trim: Install with gap widths between pieces matching adjacent, original construction.
      e. Stairs, Balustrades, and Handrails: Fit replacement pieces in with remaining elements.
      f. Brackets, Finials, and Pediments: Fit replacement pieces to remaining elements, with gap widths between pieces matching adjacent, original construction.
   2. Interior Elements:
      a. Do not begin installation until wood materials have been acclimated to interior conditions.
      b. Standing and Running Trim: Attach using finishing nails. Set finish nail heads just below the surface of trim.
         1) Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use overlay trim to conceal larger gaps.
         2) Attach using finishing nails. Set finish nail heads just below the surface of trim.
   3. Field Finishing: Prepare elements for field finishing.

a. Preparation: On exposed portions of woodwork remove handling marks or effects of exposure to moisture by sanding exposed surfaces with appropriate grit sandpaper.
b. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

3.05 REPAIR

A. General: Use corrosion-resistant or nonferrous fasteners. Isolate dissimilar metals from each other.

B. Consolidation: For wood elements indicated on drawings and identified via Contractor's field testing.

C. Patching: For wood elements indicated on drawings and identified via Contractor's field testing.
1. Mix patching compound components and colorants as recommended by manufacturer.
2. Mask off areas to be kept free of compound.
3. Apply with putty knife or similar implement into and over areas to be repaired.
4. Sand, plane, and shape repair area after patch has set for time period recommended by manufacturer.

END OF SECTION 060300

SECTION 061000 - ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Structural dimension lumber framing.

B. Nonstructural dimension lumber framing.

C. Rough opening framing for doors, windows, and roof openings.

D. Preservative treated wood materials.

E. Concealed wood blocking, nailers, and supports.

1.02 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing; 2019a.

C. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2024, with Errata.

D. AWPA U1 - Use Category System: User Specification for Treated Wood; 2025.

E. PS 1 - Structural Plywood; 2023.

F. PS 20 - American Softwood Lumber Standard; 2025.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
   2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Stud Framing (2 by 2 through 2 by 6 (50 by 50 mm through 50 by 150 mm)):
   1. Grade: No. 2.

D. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 (50 by 150 mm through 100 by 400 mm)):

E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

A. Roof Sheathing: Oriented strand board wood structural panel; PS 2.

B. Wall Sheathing: Plywood, PS 1, Grade C-D, Exposure I.

2.04 ACCESSORIES

A. Metal and Finish of Fasteners:
   1. Untreated Wood: Unfinished steel.

B. Subfloor Adhesives: Gap-filling construction adhesive for bonding wood structural panels to wood-based floor system framing; complying with ASTM D3498.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWC (WFCM) Wood Frame Construction Manual.

E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.03 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

E. Provide nonstructural framing and blocking to support the following:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.
   6. Wall-mounted door stops.
   7. Chalkboards and marker boards.
   8. Wall paneling and trim.
   9. Joints of rigid wall coverings that occur between studs.
   10. Other wall- or ceiling-mounted items indicated on drawings.

3.04 INSTALLATION OF CONSTRUCTION PANELS

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
   1. Nail panels to framing; staples are not permitted.

B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
   1. Install plywood wall sheathing in accordance with manufacturer's current ICC-ES evaluation report for specified sheathing product.

END OF SECTION 061000

SECTION 062000 - FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items.

1.02 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

1.03 SUBMITTALS

A. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Scale of Drawings: 1-1/2 inch to 1 foot (125 mm to 1 m), minimum.
   2. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Exterior Woodwork Items:
   1. Brackets, Finials, and Pediments: Prepare for paint finish.

C. Interior Woodwork Items:
   1. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine; prepare for paint finish.
   2. Door, Glazed Light, and Pocket Door Frames: White birch; prepare for paint finish.

2.02 FASTENINGS

A. Fasteners for Exterior Applications: Stainless steel; length required to penetrate wood substrate 1-1/2 inch (38 mm) minimum.

2.03 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION

3.01 INSTALLATION

A. Set and secure materials and components in place, plumb and level.

B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.

END OF SECTION 062000

SECTION 064100 - ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wood casework with transparent finish.

B. Shop finishing.

C. Cabinet and drawer hardware.

1.02 RELATED REQUIREMENTS

A. Section 123600 - Countertops.

1.03 REFERENCE STANDARDS

A. ANSI/AWI 0400 - Factory Finishing; 2022.

B. ANSI/AWI 0620 - Finish Carpentry/Installation; 2018.

C. ANSI/AWI 0641 - Architectural Wood Casework; 2019.

D. AWI 100 - Submittals; 2018.

E. AWI 200 - Care and Storage; 2018.

F. AWI 300 - Materials; 2018.

G. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

H. BHMA A156.9 - Cabinet Hardware; 2020.

I. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2024.

J. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

1.04 SUBMITTALS

A. AWI QCP Program Submittal Requirements: Comply with AWI 100.

B. Product Data for Wood Casework for Transparent Finish: Submit manufacturer's published, product descriptive data.
   1. Transparent Finish Systems: For each system, include manufacturer's name.
   2. Hardware: For each type of cabinet and drawer hardware.
   3. Locks: For each type of cabinet and drawer lock.

C. Shop Drawings:
   1. General: Each sheet sequentially numbered and dated.
   2. AWI QCP Program Shop Drawing Requirements:
      a. Comply with AWI 100 for shop drawing front matter documentation.
      b. Reference Plans: Casework locations in relative context of building floor plans.
      c. Plans and Elevations: Plan and elevation views of each assembly type.
      d. Detailed Sections: Dimensioned section views of each casework configuration.
      e. Details: Dimensioned casework assembly details with material thicknesses.
      f. Details of Wood Veneer Leaves: Include dimensions and grain direction for each leaf.

D. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.

1.05 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications: Firm specializing in fabricating and installing products specified in this section with minimum five years of documented experience; with qualifications indicating ability to comply with requirements of this section.

PART 2 PRODUCTS

2.01 ARCHITECTURAL WOOD CASEWORK

A. Casework Finish: Wood casework with transparent finish.

B. Provide casework and casework components in sizes and profiles as indicated on drawings.
   1. Interior Clearances: Comply with specified performance requirements.

C. Adjustable Shelves, Number of Shelves Per Cabinet Unit:
   1. Base Cabinets: One shelf for each cabinet unit.
   2. Wall Cabinets: Two shelves for each cabinet unit.

D. Scribed Fillers:

2.02 PERFORMANCE REQUIREMENTS

A. Architectural Woodwork Institute (AWI) Performance Requirements:
   1. Comply with AWI 300, ANSI/AWI 0641, ANSI/AWI 0400, and ANSI/AWI 0620 as applicable for specified casework finish, aesthetic grade, and performance duty level.
      a. Aesthetic Grade: Premium.
      b. Product Performance Duty Level: Duty Level 3.
   2. Panel and Material Thicknesses: Provide panels and materials as required to meet specified performance duty level, subject to minimum thickness requirements of AWI 300 and ANSI/AWI 0641 and flatness requirements indicated below.
   3. Panel Flatness: Provide panels with maximum variation from flat in 12 inches (300 mm) as measured diagonally across panel.
   4. Cabinet Door Flatness:

2.03 WOOD CASEWORK WITH TRANSPARENT FINISH

A. Finishing Method:
   1. Shop-applied transparent finish.

B. Casework Construction:
   1. Frameless Cabinet and Door Interface: Flush overlay.
   2. Door and Drawer Front Profile: Stile-and-rail.
   3. Stile-and-Rail Construction: Comply with specified performance requirements.

C. Wood Species for Exposed Exterior and Interior Surfaces:
   1. Softwood Species and Cut: White pine; sliced knotty veneer.

D. Premium Grade - Wood Casework with Transparent Finish:
   1. Exposed Exterior Surfaces, Panels to Receive Transparent Finish:
      a. Comply with specified performance requirements.
   2. Exposed Interior Surfaces, Panels to Receive Transparent Finish:
      a. Comply with specified performance requirements.
   3. Exposed Interior Surfaces, at Interior Faces of Doors and Drawer Fronts:
      a. Comply with specified performance requirements.
   4. Semi-Exposed Surfaces, Panels and Wood Face Veneers:
      a. Comply with specified performance requirements.

E. Exposed Exterior Surfaces, Matching of Veneer Leaves:
   1. Matching Between Doors, Drawers, and Adjacent Panels: Nonsequence matched.

F. Grain Direction of Exposed Surfaces:
   1. Fascia and Filler Panels: Vertical.
   2. Tops: Side to side.
   3. Soffits and Bottoms: Side to side.
   4. Doors: Vertical.
   5. Stile-and-Rail Doors, Stiles and Rails: Vertical on stiles; horizontal on rails.
   6. Drawer Fronts:
      a. Premium Grade: Comply with specified performance requirements.
   7. Knee Space Panels: Vertical.
   8. Aprons: Horizontal.
   9. End Panels: Horizontal.
   10. Edgebanding: Parallel to long direction of edge.

G. Edgebanding Applications for Wood Casework with Transparent Finish:
   1. Edgebanding: Provide edgebanding on exposed edges.

H. Edgebanding Materials for Wood Casework with Transparent Finish:
   1. Comply with specified performance requirements.

2.04 SOLID WOOD COMPONENTS

A. Description: Components fabricated from solid wood; types include profiled components and flat panels.

B. Comply with specified performance requirements.

C. Solid Wood Panels: Compatible in color with wood veneer.

D. Flat Panels for Drawer Boxes and Center Panels for Stile-and-Rail Doors:
   1. Thickness: 3/4 inch (19 mm), nominal.
   2. Minimum Thickness: 1/4 inch (6.4 mm).

E. Stile-and-Rail Moldings:
   1. Profile: Fabricator's option.
   2. Thickness: 3/4 inch (19 mm), nominal.

2.05 WOOD VENEER PANELS

A. Description: Panels consisting of wood face veneers applied to cores; panel layup with face ply, back ply, and core of either single layer or odd number of inner plies, to produce balanced construction panel; comply with HPVA HP-1.

B. Softwood Face Veneers Intended to Receive Transparent Finish:
   1. Species and Cut: As specified in this section with wood casework for transparent finish.

C. Back: Comply with backer requirements of AWI 300.

2.06 CONCEALED CABINET BASE COMPONENTS

A. Cabinet Base Toe-Kick Subfronts:
   1. Materials and Size: Fabricator's choice subject to requirements of ANSI/AWI 0641.

B. Cabinet Base Blocking and Stretchers:
   1. Materials and Size: Fabricator's choice subject to requirements of ANSI/AWI 0641.

C. Cabinet Base Sleepers:
   1. Materials and Size: Fabricator's choice subject to requirements of ANSI/AWI 0641.

2.07 WOOD AND WOOD-BASED MATERIALS

A. AWI 200 Wood Moisture Content Requirements:
   1. Climate Zone 2: Between 6 and 10 percent.

B. AWI 300 General Requirements for Wood.
   1. Provide wood in accordance with AWI 300.

2.08 CABINET AND DRAWER HARDWARE

A. Hinges, Number of Hinges for Each Cabinet Door:
   1. Comply with specified performance requirements.

B. Hinges, Self-Closing, Integrated Damper Hinges:
   1. Description: Self-closing hinges with integrated damper mechanisms.

C. Cabinet Door and Drawer Knobs:
   1. Description: Projecting metal shape used to operate door or drawer.
   2. Comply with specified performance requirements.
   3. Material and Finish: BHMA A156.18, 613 or 640 dark oxidized satin bronze.

D. Shelf Rests:
   1. Description: Metal shelf rests for installation into prepared holes in substrate.
   2. Comply with specified performance requirements.

E. Drawer Slides:
   1. Description: Hardware units that suspend drawers and provide controlled drawer sliding.
   2. Comply with specified performance requirements.
   3. Features: Self-closing.
   4. Travel: Full extension.

F. Cabinet Door and Drawer Silencers:
   1. Description: Self-adhesive rubber silencers.

2.09 FABRICATION

A. Fabricate to maximum extents plausible, including doors, drawers, and hardware; fabricate units in sizes transportable through building openings.

B. When necessary to cut and fit on site, provide materials with sufficient allowance for cutting.

C. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:

D. Provide cutouts for plumbing fixtures; verify locations of cutouts from on-site dimensions. Sand and seal cut edges.

2.10 SHOP FINISHING

A. Surface Preparation: Comply with:
   1. ANSI/AWI 0400 for specified aesthetic grade.

B. Shop Finishing: Shop finish architectural wood casework.
   1. Comply with ANSI/AWI 0400 for specified aesthetic grade.

C. Transparent Finish System:
   1. MPI (APSM) Gloss Level Measured at 60-Degree Angle:
      a. Gloss Level 5.
   2. ANSI/AWI 0400 Finish System: TR-1 - Lacquer, Nitrocellulose.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.

B. Install work of this section rigid, plumb, and level and in accordance with fabricator's documented instructions; secure casework as indicated on drawings.

C. Install cabinet hardware in accordance with hardware manufacturer's documented instructions using hardware manufacturer's furnished fasteners.

D. Install scribe fillers to close gaps between casework and adjacent walls.

3.02 TOLERANCES

A. Comply with specified performance requirements for tolerances.

3.03 ADJUSTING

A. Adjust hardware for smooth operation in accordance with hardware manufacturer's documented instructions.

END OF SECTION 064100

SECTION 064200 - WOOD PANELING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid wood paneling.

1.02 RELATED REQUIREMENTS

A. Section 099123 - Interior Painting: Field finishing.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

1.04 SUBMITTALS

A. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Scale of Drawings: 1-1/2 inch to 1 foot (125 mm to 1 m), minimum.
   2. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

B. Samples: Submit two samples of wood trim, 12 inch (305 mm) long.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 MOCK-UP

A. Construct mock-up, full height of wall and at least six panels wide illustrating finished paneling on inside corner, base trim, and crown trim.

B. Mock-up may remain as part of the Work.

PART 2 PRODUCTS

2.01 PANELING

A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS), unless otherwise indicated.

B. Solid Wood Paneling:
   1. Thickness: 3/4 inch (19 mm).
   2. Face Widths: 4 inch, 6 inch, and 8 inch exposure.
   3. Edges: 1/2 inch tongue and groove with 1/4 bevel on exposed edges.
   4. Length: As required to avoid joints.
   5. Species: Pine.
   6. Milling Options: As indicated on drawings.

2.02 WOOD-BASED MATERIALS - GENERAL

A. Lumber: Maximum moisture content of 6 percent; with vertical grain , of quality suitable for transparent finish.

2.03 ADHESIVES AND FASTENERS

A. Adhesives: Type suitable for intended purpose, complying with applicable air quality regulations.

B. Fasteners: Steel wire finish nails of size and type to suit application.

2.04 FABRICATION

A. Prepare panels for delivery to site, permitting passage through building openings.

B. Finish exposed edges of panels as specified by grade requirements.

2.05 ACCESSORIES

A. Wood Trim: Solid lumber 1x2 and 1x4 boards to match paneling.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing. Install blocking as required.

3.02 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Do not begin installation until wood materials have been fully acclimated to interior conditions.

C. Set and secure materials and components in place, plumb and level, using concealed fasteners wherever possible.

D. Where necessary to cut and fit on site, scribe work abutting other components. Do not use additional overlay trim to conceal gaps.

E. At tonge and groove paneling, fasten with finish nails at joint between beveled exposed faces. Avoid face nailing paneling wherever possible.

3.03 PREPARATION FOR FIELD FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Field Finishing: See Section 099123.

END OF SECTION 064200

SECTION 071616 - CRYSTALLINE WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Crystalline waterproofing.

1.02 REFERENCE STANDARDS

A. COE CRD-C 48 - Handbook for Concrete and Cement Standard Test Method for Water Permeability of Concrete; 1992.

B. NRCA (WM) - The NRCA Waterproofing Manual; 2021.

C. NSF 61 - Drinking Water System Components - Health Effects; 2024.

D. UL (DIR) - Online Certifications Directory; Current Edition.

1.03 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Test data showing hydraulic permeability.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Installation methods.
   5. Details for waterproofing at joints, intersections, and other special conditions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Crystalline Waterproofing:
   1. Penetron: www.penetron.com.
   2. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com.
   3. W. R. Meadows, Inc: www.wrmeadows.com.
   4. Xypex Chemical Corporation: www.xypex.com.

2.02 ASSEMBLIES

A. Crystalline Waterproofing for Concrete Building Surfaces:
   1. Interior side of footings and foundation walls.

2.03 MATERIALS

A. Crystalline Waterproofing: Portland cement, quartz or silica sand, and other active chemicals that when applied to surface of concrete forms insoluble crystals in capillary pores preventing passage of liquids, while having no adverse effect on normal properties of concrete.
   1. Water Permeability of Applied Concrete: No measurable leakage or water flow at pressure ranging from 175 psi (1.21 MPa) to 200 psi (1.38 MPa) when tested in accordance with COE CRD-C 48, using at least 2-inch (51 mm) thick sample, and with applied surface preparation and installation in accordance with NRCA (WM).
   2. Toxicity: Non-toxic.
      a. Potable Water and Drinking Water Safe: Provide UL (DIR) listed and labeled waterproofing; tested safe for use in potable drinking water applications in accordance with NSF 61.

B. Plugging Compound: Ready-mixed cementitious compound meeting requirements and approved by waterproofing manufacturer, resistant to water but vapor permeable for horizontal, vertical, and overhead surfaces not exposed to vehicular traffic and compatible with substrate.

C. Patching Compound: Ready-mixed cementitious mortar approved by waterproofing manufacturer for patching or filling tie holes, reveals, honeycombs, or other damaged cementitious surfaces and compatible with substrate.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under project conditions, and consider use of sandblasting, water blasting, or acid etching as recommended.

C. Plug water leaks.

D. Patch holes, construction joints, and cracks; remove defective concrete.

E. Obtain approval of manufacturer's field representative before beginning installation.

3.03 INSTALLATION

A. Install in accordance with manufacturer's written instructions, maintain environmental conditions required and recommended by manufacturer, and keep a copy of manufacturer's instructions on site.

B. Coordinate waterproofing installation with installation of products that must penetrate waterproofed surfaces.

C. Prevent excessive drying of surface.
   1. Cure waterproofing for at least three days, or length of time required by manufacturer, with water spray and adequate air circulation.
   2. Do not use chemical curing agents unless explicitly approved by waterproofing manufacturer.

D. Do not backfill, fill water or liquid holding structures, or apply finish coatings until time period recommended by manufacturer has passed.

END OF SECTION 071616

SECTION 072100 - THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.

B. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

A. Section 072119 - Foamed-In-Place Insulation.

1.03 REFERENCE STANDARDS

A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2024.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation in Wood Framed Walls: Batt insulation with separate vapor retarder.

B. Insulation in Wood Framed Ceiling Structure: Batt insulation with no vapor retarder.

2.02 MINERAL FIBER BLANKET INSULATION MATERIALS

A. Mineral Wool Blanket Thermal Insulation: Flexible or semi-rigid preformed insulation, complying with ASTM C665.
   1. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   2. Products:
      a. Johns Manville; Mineral Wool TempControl Batts: www.jm.com.
      b. ROCKWOOL; COMFORTBATT: www.rockwool.com.
      c. Thermafiber, Inc; SAFB: www.thermafiber.com.

2.03 ACCESSORIES

A. Interior Vapor Retarder: Modified polyethylene/polyacrylate (PE/PA) film reinforced with polyethylene terephthalate (PET) fibers, 12 mil, 0.012 inch (0.30 mm) thick.
   1. Width: 4.9 feet (1.5 m).

B. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
   1. Application: Sealing of interior circular penetrations, such as pipes or cables.

2. Width: Are required for application.

C. Eave Ventilation Baffles (Troughs): Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

PART 3 EXECUTION

3.01 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches (152 mm) on center. Lap and seal sheet retarder joints over face of member.

F. Tape seal tears or cuts in vapor retarder.

G. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane; tape seal in place.

H. Attics: Install eave ventilation baffles between roof framing members in insulated attic spaces at vented eaves.

END OF SECTION 072100

SECTION 072119 - FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Foamed-in-place insulation.
   1. In exterior wall crevices.
   2. In underside of roofs and ceilings.

B. Foamed-in-place intumescent insulation, two-layer hybrid system.

1.02 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

B. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016 (Reapproved 2023).

C. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2020.

D. ASTM D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics; 2017 (Reapproved 2023).

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026.

F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

G. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

H. FM 4880 - Examination Standard for Class 1 Fire Rating of Building Panels or Interior Finish Materials; 2022.

I. NFPA 275 - Standard Method of Fire Tests for the Evaluation of Thermal Barriers; 2022.

J. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2024.

K. UL 1040 - Standard for Safety Fire Test of Insulated Wall Construction; Current Edition, Including All Revisions.

L. UL 1715 - Standard for Safety Fire Test of Interior Finish Material; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. Product Data: Provide product description, insulation properties, and preparation requirements.

B. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified, with minimum three years experience, and approved by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Foamed-In-Place Insulation:
   1. BASF Corporation: www.spf.basf.com.
   2. Carlisle Spray Foam Insulation: www.carlislesfi.com.
   3. Gaco Western: www.gaco.com.
   4. Henry Company: www.henry.com.
   5. Huntsman Building Solutions: www.huntsmanbuildingsolutions.com.
   6. Johns Manville: www.jm.com.
   7. NCFI Polyurethanes: www.ncfi.com.
   8. Preferred Solutions, Inc: www.preferredsolutions.net.
   9. Xcelus Building Systems: www.xcelusbuildingsystems.com.

2.02 MATERIALS

A. Foamed-In-Place Intumescent Insulation (Two-Layer Hybrid System): Foamed on-site using blowing agent of non-ozone-depleting gas.
   1. Regulatory Requirements: Comply with applicable code for flame and smoke, concealment, and fire protection requirements.
      a. Fire Protection: Provide 15-minute thermal barrier of 1/2 inch (12.7 mm) gypsum board or equivalent material complying with NFPA 275 test method, or foamed-in-place insulation either exposed or with covering that complies with FM 4880, NFPA 286, UL 1040, or UL 1715.
   2. Base Layer: Medium-density, semi-rigid, closed cell, spray polyurethane foam.
      a. Thermal Resistance: R-value (RSI-value) of 7.0 (1.23), minimum, per 1 inch (25.4 mm) thickness at 140 degrees F (60 degrees C) mean temperature, at 90 days, when tested in accordance with ASTM C518.
      b. Water Vapor Permeance: 0.95 perms (54.34 ng/(Pa s sq m)), maximum, when tested at 1 inch (25.4 mm) thickness in accordance with ASTM E96/E96M.
      c. Closed Cell Content: At least 98 percent.
      d. Density: 2.0 lbs/cu ft (32 kg/cu m), nominal, in accordance with ASTM D1622.
      e. Tensile Strength: 62 psi (430 kPa), minimum, in accordance with ASTM D1623.
      f. Compressive Strength: 21 psi (145 kPa), minimum, in accordance with ASTM D1621.
      g. Surface Burning Characteristics: Flame spread/smoke developed index of 25/450, maximum, at 4 inch (102 mm) thick when tested in accordance with ASTM E84.
   3. Top Layer (Exposed Surface Layer): Medium-density, semi-rigid, two-part, closed cell, intumescent, spray polyurethane foam.
      a. Thermal Resistance: R-value (RSI-value) of 5.7 (1.0), minimum, per 1 inch (25.4 mm) thickness at 140 degrees F (60 degrees C) mean temperature, at 90 days, when tested in accordance with ASTM C518.

b. Water Vapor Permeance: 0.99 perms (56.64 ng/(Pa s sq m)), maximum, when tested at 3.5 inch (90 mm) thickness in accordance with ASTM E96/E96M.
c. Air Permeance: Less than 0.002 cfm per sq ft (0.011 L/(s/sq m)), when tested at 1 inch (25.4 mm) thickness in accordance with ASTM E2178 at 1.57 psf (75 Pa).
d. Closed Cell Content: At least 90 percent.
e. Density: 2.0 lbs/cu ft (32 kg/cu m), nominal, in accordance with ASTM D1622.
f. Tensile Strength: 55 psi (379 kPa), minimum, in accordance with ASTM D1623.
g. Compressive Strength: 22 psi (152 kPa), minimum, in accordance with ASTM D1621.
h. Surface Burning Characteristics: Flame spread/smoke developed index of 25/450, maximum, at 4 inch (102 mm) thick when tested in accordance with ASTM E84.

2.03 ACCESSORIES

A. Primer: As required by insulation manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify work within construction spaces or crevices is complete before insulation application.

B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation adhesion.

3.02 PREPARATION

A. Mask and protect adjacent surfaces from over spray or dusting.

B. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION

A. Apply insulation in accordance with manufacturer's instructions.

END OF SECTION 072119

SECTION 072500 - WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water-resistive barriers.

1.02 REFERENCE STANDARDS

A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2025.

B. ASTM D5590 - Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay; 2017 (Reapproved 2021).

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026.

D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

E. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

F. ICC-ES AC212 - Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing; 2015, with Editorial Revision (2020).

1.03 SUBMITTALS

A. Product Data: Provide data on material characteristics.

PART 2 PRODUCTS

2.01 WATER-RESISTIVE BARRIERS

A. Water-Resistive Barrier for Open-Joint Wall Cladding: Waterproof acrylate coating on tear-resistant polyester fleece with unlimited UV exposure limit.
   1. Width: 4.9 feet (1.5 m), minimum.
   2. Water Vapor Permeance: 107 perms (6,073 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F (23 degrees C).
   3. Ultraviolet (UV) Light Exposure Limit: Unlimited in open facings featuring joints up to 2 inches (51 mm) wide and that cover 40 percent or less of surface area.
   4. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A when tested in accordance with ASTM E84.
   5. Color: Black.
   6. Basis of Design Products

a. VaproShield; RevealShield SA Self-Adhered: www.vaproshield.com.

B. Water-Resistive Barrier Coating: Fluid-applied air and water-resistive coating for various exterior substrates.
   1. Air Permeance, Building Material Air Leakage Rate: 0.004 cfm/sq ft (0.02 L/sec sq m) maximum leakage when tested at 1.57 psf (75 Pa) pressure difference in accordance with ASTM E2178.
   2. Water-Resistive Barrier over Sheathing Compliance: Complying with ICC-ES AC212.
   3. Water Vapor Permeance: Tested in accordance with ASTM E96/E96M.
      a. Procedure A: Greater than 5 perms (287 ng/(Pa s sq m)).
      b. Procedure B: Greater than 14 perms (804 ng/(Pa s sq m)).
   4. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 120 days of weather exposure.
   5. Resistance to Fungal Growth: No growth when tested in accordance with ASTM D5590.
   6. Products:
      a. LATICRETE International, Inc: www.cdn.laticrete.com.
      b. Momentive Performance Materials, Inc/GE Silicones: www.siliconeforbuilding.com.
      c. PROSOCO, Inc: www.prosoco.com.
      d. Siplast: www.siplast.com.
      e. Substitutions: See Section 016000 - Product Requirements.

2.02 ACCESSORIES

A. Provide Wall Barrier Products, Rough Opening Flashing Products, Seal and Perimeter Tapes, and other required Accessories used on the same wall from the same manufacturer to the greatest extent possible

B. Flexible Flashing: Self-adhering sheet flashing complying with ASTM D1970/D1970M; waive slip resistance requirement if not installed on roof.
   1. Minimum Width: 9 inches (229 mm).
   2. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 30 days of weather exposure.
   3. Color: Black.
   4. Basis of Design Products:
      a. VaproShield; RevealFlashing SA Self-Adhered Roll: www.vaproshield.com
      b. Dorken Systems; Delta-Fassade-Flashing: www.dorken.com.
      c. Substitutions: See Section 016000 - Product Requirements.

C. Stainless Steel Flashing: Flexible flashing with 2 mil, 0.002 inch (0.051 mm) thick Type 304 stainless steel sheet, 8 mil, 0.008 inch (0.203 mm) of butyl adhesive and siliconized release liner.
   1. Roll Length: 50 feet (15.2 m) long.
   2. Width: 4 inches (102 mm) wide.

PART 3 EXECUTION

3.01 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

3.02 INSTALLATION

A. Install materials in accordance with manufacturer's installation instructions.

B. Install continuous water-resistive barriers where indicated on drawings, with sheets lapped to shed water.

C. Fluid-Applied Sheets:
   1. Prepare substrate in accordance with coating manufacturer's installation instructions; treat joints in substrate and between dissimilar materials as indicated.
   2. Apply flashing to seal with adjacent construction and to bridge joints in coating substrate.

D. Openings and Penetrations in Exterior Water-Resistive Barriers:
   1. Install flashing over sills, covering entire sill framing member, and extend at least 5 inches (127 mm) onto water-resistive barrier and at least 6 inches (152 mm) up jambs; mechanically fasten stretched edges.
   2. At openings filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches (100 mm) wide; do not seal sill flange.
   3. At openings filled with nonflanged frames, seal water-resistive barrier to each side of framing at opening using flashing at least 9 inches (230 mm) wide, and covering entire depth of framing.
   4. At head of openings, install flashing under water-resistive barrier extending at least 2 inches (50 mm) beyond face of jambs; seal water-resistive barrier to flashing.
   5. At interior face of openings, seal gaps between window and door frames and rough framing using appropriate joint sealant over backer rod.
   6. Service and Other Penetrations: Form flashing around penetrating items and seal to surface of water-resistive barrier.

END OF SECTION 072500

SECTION 073110 - SYNTHETIC SHINGLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Plastic shingles with shake appearance and texture.

B. Flexible sheet membranes for eave protection, underlayment, and valley protection.

C. Metal flashing.

1.02 RELATED REQUIREMENTS

A. Section 076200 - Sheet Metal Flashing and Trims.

1.03 REFERENCE STANDARDS

A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2025.

B. ASTM D4869/D4869M - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing; 2016a (Reapproved 2025).

C. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

D. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2025.

E. ASTM F1667/F1667M - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples; 2021a.

F. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments; 2023.

G. NRCA (RM) - The NRCA Roofing Manual; 2026.

H. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 SUBMITTALS

A. Product Data: Provide data indicating material characteristics, performance criteria, and limitations.

B. Shop Drawings: For metal flashings, indicate fastening methods and locations and installation details.

C. Selection Samples: Submit color chips representing manufacturer's full range of available shingle colors and finishes.

1.05 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: After underlayment installation and prior to installation of roofing shingles or membranes, conduct conference at Project site.

PART 2 PRODUCTS

2.01 SYNTHETIC SHINGLES

A. Synthetic Shingles, Shake Texture: Shingles manufactured from 100 percent virgin plastic and approximating appearance of traditional, natural wood shakes.
   1. Fire Resistance: ASTM E108, Class A.
   2. Profile: Upper surface mimics appearance of natural wood shakes, with integral rain gutter, nail holes, and interlocking edge; underside has integral reinforcing ribs, self alignment ledge, and leading edge tabs.
   3. Coursing: Straight.
   4. Color and Pattern: To be selected by Architect from manufacturer's full range.
   5. Products:
      a. DaVinci Roofscapes, LLC; Select Shake: www.davinciroofscapes.com.
      b. Brava Roof Tile; Cedar Shake: www.bravarooftile.com.
      c. Enviroshake; Enviroshake: www.enviroshake.com.

2.02 SHEET MATERIALS

A. Eave Protection Membrane: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil, 0.040-inch (1 mm) total thickness, with strippable treated release paper and polyethylene sheet top surface.

B. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 22 mil (0.55 mm) total thickness; with strippable release film and woven polypropylene sheet top surface.
   1. Minimum Requirements: Comply with ICC-ES AC188.
   2. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
   3. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
   4. Water Vapor Permeance: 0.067 perm (0.38 ng/(Pa s sq m)), when tested in accordance with ASTM E96/E96M, Procedure A (desiccant method).
   5. Liquid Water Transmission: Passes ASTM D4869/D4869M.
   6. Functional Temperature Range: From minus 70 degrees F (minus 56.7 degrees C) to 212 degrees F (100 degrees C).

2.03 METAL FLASHING

A. Metal Flashing: Provide sheet metal eave edge, gable edge, ridge, ridge vents, open valley flashing, chimney flashing, dormer flashing, and other flashing indicated.
   1. Form flashings to protect roofing materials from physical damage and to shed water.
   2. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
   3. Hem exposed edges of flashings minimum 1/4 inch (6 mm) on underside.
   4. Coat concealed surfaces of flashings with bituminous paint.

B. Aluminum Flashing: Prefinished aluminum, 26 gauge, 0.017 inch (0.43 mm) minimum thickness; PVC coating, color as selected.

2.04 ACCESSORIES

A. Roofing Nails: Standard round wire ring-shank shingle type, stainless steel, minimum 3/8-inch (9.5-mm) head diameter, 10 gauge, .134 inch (3.4 mm) nail shank diameter, 1-1/2 inches (38 mm) long and complying with ASTM F1667/F1667M.

B. Bituminous Paint: Acid and alkali resistant type; black color.

PART 3 EXECUTION

3.01 INSTALLATION

A. Eave Protection Membrane:
   1. Install eave protection membrane from eave edge to minimum 4 feet (1.2 m) up-slope beyond interior face of exterior wall.

B. Underlayment:
   1. Roof Slopes Up to 4:12: Install two layers of underlayment over area not protected by eave protection, with ends and edges weather lapped minimum 4 inches (102 mm); stagger end laps of each consecutive layer and nail in place.
   2. Items Projecting Through or Mounted on Roof: Weather lap and seal watertight with plastic cement.

C. Valley Protection:
   1. Install 18" wide valley protection membrane under sheet metal flashing, 5 inches from and parallel to valley centerline, both sides, typical.
   2. Install one layer of sheet metal flashing, minimum 24 inches (610 mm) wide, centered over open valley and crimped to guide water. Weather lap joints with at least 2-inch (5 mm) wide band of lap cement along each edge of first layer, press roll roofing into cement, and nail in place minimum 18 inches (457 mm) on center and 1 inch (25 mm) from edges.

D. Metal Flashing:
   1. Install flashings in accordance with SMACNA (ASMM) Architectural Sheet Metal Manual requirements.
   2. Weather lap joints minimum 2 inches (51 mm) and seal weathertight with plastic cement.
   3. Items Projecting Through or Mounted on Roofing: Flash and seal weathertight with plastic cement.

E. Shingles:
   1. Install shingles in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
   2. Project first course of shingles 3/4 inch (19 mm) beyond fascia boards.
   3. Extend shingles 1/2 inch (12.7 mm) beyond face of gable edge fascia boards.
   4. Coordinate installation of roof mounted components or work projecting through roof with weathertight placement of counterflashings.
   5. Provide weathertight installation.

END OF SECTION 073110

SECTION 073113 - ASPHALT SHINGLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Asphalt shingle roofing.

B. Flexible sheet membranes for eave protection, underlayment, and valley protection.

1.02 RELATED REQUIREMENTS

A. Section 076200 - Sheet Metal Flashing and Trim.

1.03 REFERENCE STANDARDS

A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2025.

B. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules; 2025.

C. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement; 2025.

D. ASTM D4869/D4869M - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing; 2016a (Reapproved 2025).

E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

F. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2025.

G. ASTM F1667/F1667M - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples; 2021a.

H. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments; 2023.

I. NRCA (RM) - The NRCA Roofing Manual; 2026.

1.04 SUBMITTALS

A. Product Data: Provide data indicating material characteristics, performance criteria, and limitations.

B. Shop Drawings: For metal flashings, indicate specially configured metal flashings, fastening methods and locations, and installation details.

C. Samples: Submit two samples of each shingle color indicating color range and finish texture/pattern ; for color selection.

1.05 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: After underlayment installation and prior to installation of roofing shingles or membranes, conduct conference at Project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Asphalt Shingles:
   1. Atlas Roofing Corporation: www.atlasroofing.com.
   2. Certainteed Roofing: www.certainteed.com.
   3. GAF: www.gaf.com.
   4. IKO Industries Inc: www.iko.come.
   5. Owens Corning Corp: www.owenscorning.com.

2.02 ASPHALT SHINGLES

A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462/D3462M.
   1. Fire Resistance: Class A, complying with ASTM E108.
   2. Warranted Wind Speed: Not greater than 150 mph (241 km/h).
   3. Self-sealing type.
   4. Style: Laminated overlay.

2.03 SHEET MATERIALS

A. Eave Protection Membrane:
   1. Eave Protection Membrane: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil (1 mm) total thickness; with strippable treated release paper and polyethylene sheet top surface.

B. Underlayment: Self-adhering butyl-rubber sheet complying with ASTM D1970/D1970M; strippable release film.
   1. Top Surface: Polyethylene film.
   2. Sheet Thickness: 19 mil (0.48 mm), minimum.
   3. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
   4. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
   5. Water Vapor Permeance: 0.05 perm (0.30 ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M, Procedure A (desiccant method).

2.04 ACCESSORIES

A. Roofing Nails: Standard round wire shingle type, galvanized steel, aluminum roofing nails, or copper roofing nails, minimum 3/8-inch (9.5 mm) head diameter, 12-gauge, 0.109-inch (2.77 mm) nail shank diameter, 1-1/2 inches (38 mm) long and complying with ASTM F1667/F1667M.

B. Asphalt Roof Cement: ASTM D4586/D4586M, asbestos-free.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions prior to starting this work.

B. Verify roof penetrations and plumbing stacks are in place and flashed to deck surface.

3.02 PREPARATION

A. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.

3.03 INSTALLATION

A. Eave Protection Membrane:
   1. Install eave protection membrane from eave edge to minimum 48 inches (1,220 mm) up-slope beyond interior face of exterior wall.

B. Underlayment:
   1. Roof Slopes Up to 4:12: Install two layers of underlayment over area not protected by eave protection, with ends and edges weather lapped minimum 4 inches (100 mm); stagger end laps of each consecutive layer and nail in place.
   2. Items Projecting Through or Mounted on Roof: Weather lap and seal watertight with plastic cement.

C. Valley Protection:
   1. Install 18" wide valley protection membrane under sheet metal flashing, 5 inches from and parallel to valley centerline, both sides, typical.
   2. Install one layer of sheet metal flashing, minimum 24 inches (600 mm) wide, centered over open valley and crimped to guide water flow. Weather lap joints minimum 2-inch (50 mm) wide band of lap cement along each edge of first layer, press roll roofing into cement, and nail in place minimum 18 inches (450 mm) on center and 1 inch (25 mm) from edges.

D. Shingles:
   1. Install shingles in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
      a. Fasten individual shingles using two nails per shingle, or as required by manufacturer and local building code, whichever is greater.
      b. Fasten strip shingles using four nails per strip, or as required by manufacturer and local building code, whichever is greater.
   2. Place shingles in straight coursing pattern with 5-inch (125 mm) weather exposure to produce double thickness over full roof area, and provide double course of shingles at eaves.
   3. Project first course of shingles 3/4 inch (19 mm) beyond fascia boards.
   4. Extend shingles 1/2 inch (13 mm) beyond face of gable edge fascia boards.
   5. Complete installation to provide weathertight service.

END OF SECTION 073113

SECTION 074623 - WOOD SIDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wood siding with boards for walls.

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Water-resistive barrier under siding.

B. Section 072500 - Weather Barriers: Water-resistive barrier under siding.

C. Section 099113 - Exterior Painting: Prime and finish painting.

1.03 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

1.04 MOCK-UPS

A. Construct mock-up on project site incorporating required materials and workmanship, with minimum size of 6 feet (2 m) long by 6 feet (2 m) wide. Include at least one exterior corner and head/jamb/sill condition.

B. Locate where directed by Architect.

C. Mock-up may remain as part of work.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with local wind load resistance requirements of ASCE 7.

2.02 WOOD SIDING MATERIALS

A. Log Siding: Convex profile solid wood shiplap siding.
   1. Products:
      a. Menard's; Meadow Valley 3 x 8 x 8' White Pine Loggers Choice Smooth Log Siding: https://www.menards.com/main/building-materials.

2.03 ACCESSORIES

A. Wood Sealer: Factory-applied, water-based polymer, water repellant sealer that reacts chemically with untreated, natural wood surfaces.

B. Nails and Screws: Hot dipped galvanized type; nonstaining, of size and strength to securely and rigidly retain the work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates are ready to receive work.

B. Verify that water-resistive barrier has been correctly and completely installed over substrate; see Section 061000.

C. Do not begin until unacceptable conditions have been corrected.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

A. Install siding, soffits, batten strips, and trim in accordance with manufacturer's instructions.

B. Fasten siding securely in place, level and plumb.
   1. Arrange for orderly nailing pattern, blind nail except over trim.
   2. Install siding for natural shed of water.
   3. Position cut ends over bearing surfaces, and sand cut edges smooth and clean.

C. Seal exposed wood substrates exposed to weather to prevent water accumulation and moisture intrusion.
   1. Seal penetrations.
   2. Seal exposed cuts of siding and trim; use of field-applied coatings is not permitted.

D. Sand work smooth and set exposed nails and screws.

END OF SECTION 074623

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts.

B. Sealants for joints within sheet metal fabrications.

C. Precast concrete splash pads.

1.02 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018 (Reapproved 2024).

D. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement; 2025.

E. CDA A4050 - Copper in Architecture - Handbook; Current Edition.

F. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 SUBMITTALS

A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

B. Samples: Submit two samples, 2 by 2 inches (50 by 50 mm) in size, illustrating metal finish color.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of experience.

PART 2 PRODUCTS

2.01 PREFINISHED ALUMINUM SHEETS

A. Aluminum Sheet Substrates: ASTM B209/B209M, alloy and temper as recommended by manufacturer for application.

B. Superior Performance Organic Coating System: Comply with AAMA 2605 for aluminum preparation, pretreatment, primer and finish coat system; provide thermally cured 70-percent PVDF fluoropolymer systems; tested for weathering for 10 years with 5 delta units color change maximum.

C. Application: Flashing, Counterflashing, Gutters, and Downspouts.
   1. Drawing Detail: As indicated on drawings.
   2. Coating System: High-performance organic coating system.
   3. Color: As selected by Architect from manufacturer's standard colors.

2.02 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18-inch (450 mm) long legs; seam for rigidity, seal with sealant.

2.03 GUTTERS AND DOWNSPOUTS

A. Gutters: SMACNA (ASMM) Semi-circular profile.

B. Downspouts: Round profile.

C. Gutters and Downspouts: Size indicated on drawings.

D. Accessories: Profiled to suit gutters and downspouts.
   1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
   2. Gutter Supports: Brackets, plumb
   3. Downspout Supports: Straps.

E. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3,000 psi (21 MPa) at 28 days, with minimum 5 percent air entrainment.

F. Downspout Extenders: Same material and finish as downspouts.

G. Seal metal joints.

2.04 ACCESSORIES

A. Fasteners: Aluminum, with soft neoprene washers.

B. Primer Type: Zinc chromate.

C. Concealed Sealants: Non-curing butyl sealant.

D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

E. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.

PART 3 EXECUTION

3.01 INSTALLATION

A. Insert flashings into reglets to form tight fit; secure in place with lead wedges; pack remaining spaces with lead wool; seal flashings into reglets with sealant.

B. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted.

C. Apply plastic cement compound between metal flashings and felt flashings.

D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

E. Seal metal joints watertight.

F. Secure gutters and downspouts in place with concealed fasteners.

G. Slope gutters 1/4 inch per 10 feet (2.1 mm per m), minimum.

H. Set splash pads under downspouts.

END OF SECTION 076200

SECTION 080300 - CONSERVATION TREATMENT FOR PERIOD OPENINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Restoration of existing elements.
   1. Doors.
   2. Door casings and frames.
   3. Windows and insect screens for gable vents.
   4. Window casings and frames.
   5. Hardware.

1.02 RELATED REQUIREMENTS

A. Section 060300 - Conservation Treatment for Period Wood for treatment of wood components of period openings.

B. Exhibit B - NPS Preservation Brief.

C. Section 099113 - Exterior Painting.

D. Section 099123 - Interior Painting.

1.03 SUBMITTALS

A. Product Data:
   1. Lumber Products: Species, cut, dimensions, physical and functional characteristics.

B. Replacement Component Samples: Two samples of each type of component.

C. Vision Glass Samples: Four samples of each type of replacement glass to show matching color, texture, and full color range.

D. Manufacturer's Instructions: For cleaning materials, indicate special procedures, conditions requiring special attention.

1.04 QUALITY ASSURANCE

A. Restorer Qualifications: Company specializing in period restoration with minimum five years of documented experience.

PART 2 PRODUCTS

2.01 WOOD MATERIALS

A. See Section 060300 - Conservation Treatment for Period Wood for wood restoration procedures, materials, and products.

B. Carpentry Methods: Match those exhibited in existing work.

2.02 GLASS MATERIALS

A. Glass: Match opacity, color, thickness, texture, pattern and other aesthetic characteristics of existing glass.

B. Glazing Compound for Glazed Window and Door Panes:
   1. Glazing Putty: Linseed-oil-based, knife grade consistency; gray color.

2.03 OPERATING HARDWARE

A. Replacement Hardware: For damaged or missing hardware; match existing to greatest extent technically and aesthetically possible. Duplicate operating functions of existing hardware. Match approved samples.

2.04 REPLACEMENT COMPONENTS

A. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable supports allowing screen removal without use of tools.
   1. Supports: Spring-loaded steel pins; four per screen unit.
   2. Screen Mesh: Aluminum insect mesh.
   3. Frame Finish: Baked enamel, color to match window exterior color.

PART 3 EXECUTION

3.01 PERIOD TREATMENT, GENERAL

A. See Section 013591 for special procedure requirements related to elements and features of historical significance and value.

3.02 PREPARATION - IN SITU RESTORATION

A. Protect surrounding elements from damage due to restoration procedures.

B. Remove or dismantle and store removable items located in areas to be restored including, but not limited to, fixtures, fittings, finish hardware, and accessories; reinstall upon completion of restoration work.

C. Separate areas to be protected from restoration areas to prevent damage.

D. When using liquid cleaning methods, install drainage devices to prevent runoff over adjacent surfaces, unless those surfaces are impervious to damage from runoff.

E. Do not allow cleaning runoff to drain into sanitary or storm sewers.

3.03 WOOD DOOR OPENING REPAIR

A. Provide repairs including, but not limited to, the following:

1. Wood Damage: Wood which is split, checked, or shows signs of rot:
    a. See Section 060300 for treatments involving consolidation, patching, and dutchman installation of wood components.
    b. Dry wood components.
    c. Treat decayed areas with a fungicide.
    d. Fill cracks and holes with patching putty.
2. Gaps and Loose Joints: Tighten moving joints in stile and rail doors. Inject adhesives into holes drilled into joints.
3. Replace deteriorated parts with new, matching pieces.
4. Splice new wood onto existing members.

3.04 WOOD WINDOW OPENING REPAIR

A. Provide repairs indicated.

B. Repair Class I:
1. Remove loose exterior and interior paint.
2. Remove and repair sashes.
    a. Gaps and Loose Joints: Tighten moving joints in sashes. Inject adhesives into holes drilled into joints.
3. Repair window frame.
4. Weatherstrip and reinstall sashes.
5. Reglaze sashes by replicating methods and final appearance used in similar existing windows.
6. Replace existing double-hung window counterweight pulley system with spring-loaded tape balances.
    a. Remove window sash and stop beads.
    b. Remove frame elements enclosing weight pockets to access existing mechanisms.
    c. Remove pulleys, cords or chains, and weights from weight pockets.
    d. Select spring-loaded balances based on weight of sash.
    e. Insulate the weight pocket void.
    f. Mortise jamb to accept balance assembly.
    g. Mortise sash for support angle/hook assembly.
    h. Fasten spring-loaded balance to each jamb and attach tape to hooks on sash.
    i. Set sash back in window and replace stop beads.
7. Paint.

C. Repair Class II: Perform Class I repairs and the following:
1. Wood Damage: Repair as indicated for wood which is split, checked, or shows signs of rot.
    a. See Section 060300 for treatments involving consolidation, patching, and dutchman installation of wood components.
    b. Dry affected wood components.
    c. Treat decayed areas with a fungicide.
    d. Waterproof with three applications of boiled linseed oil.
    e. Fill cracks and holes with patching putty.

D. Repair Class III: Perform Class I and Class II repairs and the following:
1. Replace deteriorated parts with new matching pieces.
2. Splice new wood onto existing members.

END OF SECTION 080300

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Thermally insulated hollow metal doors with frames.

1.02 RELATED REQUIREMENTS

A. Section 087100 - Door Hardware.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2024.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.

D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2025.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025a.

F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2025.

G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2025.

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026.

I. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames; 2016.

J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2024.

M. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.

N. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.

1.04 SUBMITTALS

A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.

B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
   1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
   2. Curries, an Assa Abloy Group company: www.assaabloydss.com.
   3. Dunbarton Corporation: www.dunbarton.com.
   4. Premier Steel Doors and Frames: www.trustpremier.com.
   5. Republic Doors, an Allegion brand: www.republicdoor.com.
   6. Steelcraft, an Allegion brand: www.allegion.com.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
   4. Door Edge Profile: Manufacturers standard for application indicated.
   5. Typical Door Face Sheets: Flush.
   6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
   7. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
      a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. Exterior Doors: Thermally insulated.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 1 - Standard-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 20 gauge, 0.032 inch (0.8 mm), minimum.
      e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
   2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
      a. Foam Plastic Insulation: Manufacturer's standard board insulation with maximum flame spread index (FSI) of 75, and maximum smoke developed index (SDI) of 450 in accordance with ASTM E84, and completely enclosed within interior of door.
   3. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
   4. Weatherstripping: Integral, recessed into door edge or frame.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Factory primed and field finished.

C. Exterior Door Frames: Knock-down type.
   1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
   2. Frame Metal Thickness: 18 gauge, 0.042 inch (1.0 mm), minimum.
   3. Weatherstripping: Integral, recessed into frame edge.

2.05 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Coordinate frame anchor placement with wall construction.

C. Install door hardware as specified in Section 087100.

3.02 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

3.03 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.04 SCHEDULE - SEE DRAWINGS

END OF SECTION 081113

SECTION 081433 - STILE AND RAIL WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wood doors, stile and rail design; non-fire rated.

B. Panels of wood.

1.02 RELATED REQUIREMENTS

A. Section 062000 - Finish Carpentry: Wood door frames.

B. Section 081113 - Hollow Metal Doors and Frames.

C. Section 087100 - Door Hardware.

D. Section 099123 - Interior Painting: Field finishing.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

1.04 SUBMITTALS

A. Product Data: Indicate stile and rail core materials and construction; veneer species, type and characteristics.

B. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, and factory finishing criteria.

C. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of experience.

1.06 WARRANTY

A. Include coverage for delamination of veneer, warping beyond specified installation tolerances, and defective materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Stile and Rail Wood Doors:
   1. Karona, Inc: www.karonadoor.com.
   2. Masonite Architectural: www.architectural.masonite.com.
   3. VT Industries, Inc: www.vtindustries.com.

2.02 DOORS

A. Quality Standard: Premium Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless otherwise indicated.

B. Exterior Doors: 1-3/4 inches (44.45 mm) thick unless otherwise indicated; solid lumber construction; mortise and tenon joints; water repellent treated. Opaque finish as indicated on drawings.

C. Wood veneer facing for field opaque finish as indicated on drawings.

2.03 DOOR FACINGS

A. Materials for Opaque Finishes: Material allowed by quality standard indicated.

B. Adhesive: Type I - Waterproof.

2.04 DOOR CONSTRUCTION

A. Vertical Exposed Edge of Stiles: Hardwood for paint finish.

B. Panels: Flat.

C. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.

D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

2.05 ACCESSORIES

A. Wood Door Frames: See Section 062000.

B. Hollow Metal Door Frames: See Section 081113.

C. Door Hardware: See Section 087100.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standards.

B. Field-Finished Doors: Trimming to fit is acceptable.

C. Machine cut for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

3.02 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

3.03 SCHEDULE - SEE DRAWINGS

END OF SECTION 081433

SECTION 085200 - WOOD WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Factory-fabricated wood windows.

B. Wood trim for exterior finishing.

1.02 RELATED REQUIREMENTS

A. Section 088000 - Glazing.

B. Section 099113 - Exterior Painting: Site finishing wood surfaces.

C. Section 099123 - Interior Painting: Site finishing wood surfaces.

1.03 SUBMITTALS

A. Product Data: Show component dimensions, anchorage and fasteners, glass, and internal drainage details.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.05 WARRANTY

A. Correct defective Work within a five year period after Date of Substantial Completion.

B. Manufacturer Warranty: Provide 5-year manufacturer warranty for insulated glass units against seal failure, interpane dusting or misting, and replacement of same. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 WOOD WINDOWS

A. Wood Windows: Wood frame and sash, factory fabricated and assembled.
   1. Exterior Finish: Primed.
   2. Interior Finish: Primed.
   3. Color: As indicated on drawings.

4. Configuration: As indicated on drawings.
5. Wood Species: Fir, preservative treated using treatment type suitable for required finish.
6. Frame and Sash Members: Mortise and tenon joints. Glue joints to hairline fit, weather tight.
7. Fasteners: Concealed from view.

2.02 COMPONENTS

A. Glass and Glazing Materials: See Section 088000.

B. Frames, Muntins/Grilles: Match existing.
   1. Pattern: Custom design, see drawings.

C. Fasteners: Stainless steel.

D. Sills, Stools, and Aprons: Match existing.

E. Wood for Casings and Trim: Clear fir, clear preservative treated, of type suitable for required finish.

F. Flashing: Provide related flashings, with necessary anchors and attachment devices.

G. Sealant for Setting Sills, Stools, Aprons, and Sill Flashing: Non-curing butyl type.

PART 3 EXECUTION

3.01 INSTALLATION

A. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

B. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

C. Install sills, stools, and aprons.

D. Set sill members and sill flashing in continuous bead of sealant.

E. Install glass; see Section 088000.

F. Finish exterior surfaces with opaque materials; see Section 099113.

G. Finish interior surfaces with opaque materials; see Section 099123.

END OF SECTION 085200

SECTION 087100 - DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for wood doors.

B. Lock cylinders for doors that hardware is specified in other sections.

C. Weatherstripping and gasketing.

1.02 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. BHMA A156.1 - Standard for Butts and Hinges; 2021.

C. BHMA A156.2 - Bored and Preassembled Locks and Latches; 2022.

D. BHMA A156.16 - Standard for Auxiliary Hardware; 2023.

E. BHMA A156.22 - Standard for Gasketing; 2021.

F. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames; 2006.

G. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

H. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.

1.03 SUBMITTALS

A. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.

B. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
   1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
   2. Provide complete description for each door listed.

1.04 WARRANTY

A. Manufacturer's Warranty: Provide warranty against defects in material and workmanship for period indicated. Complete forms in Owner's name and register with manufacturer.
   1. Locksets and Cylinders: Three years, minimum.
   2. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.

B. Provide individual items of single type, of same model, and by same manufacturer.

C. Provide door hardware products that comply with the following requirements:
   1. Applicable provisions of federal, state, and local codes.
   2. Accessibility: ADA Standards and ICC A117.1.
   3. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.

D. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's series. See Door Hardware Schedule.

E. Fasteners:
   1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
      a. Aluminum fasteners are not permitted.
      b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
   2. Fire-Rated Applications: Comply with NFPA 80.
      a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
      b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.

2.02 HINGES

A. Manufacturers:
   1. McKinney; an Assa Abloy Group company: www.assaabloydss.com.
   2. Hager Companies: www.hagerco.com.
   3. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com.

B. Hinges: Comply with BHMA A156.1, Grade 1.
   1. Provide hinges on every swinging door.
   2. Provide following quantity of butt hinges for each door:
      a. Doors up to 60 inches (1.5 m) High: Two hinges.
      b. Doors From 60 inches (1.5 m) High up to 90 inches (2.3 m) High: Three hinges.

2.03 LOCK CYLINDERS

A. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
   1. Provide cylinders from same manufacturer as locking device.
   2. Provide cams and/or tailpieces as required for locking devices.

2.04 CYLINDRICAL LOCKS

A. Cylindrical Locks (Bored): Comply with BHMA A156.2, Grade 1, 4000 Series.

1. Bored Hole: 2-1/8 inch (54 mm) diameter.
2. Latchbolt Throw: 1/2 inch (12.7 mm), minimum.
3. Backset: 2-3/4 inch (70 mm) unless otherwise indicated.
4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
   a. Finish: To match lock or latch.

2.05 WALL STOPS

A. Wall Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
   1. Type: Bumper, concave, wall stop.
   2. Material: Aluminum housing with rubber insert.

2.06 WEATHERSTRIPPING AND GASKETING

A. Weatherstripping and Gasketing: Comply with BHMA A156.22.
   1. Head and Jamb Type: Adjustable.
   2. Door Sweep Type: Encased in retainer.
   3. Material: Aluminum, with brush weatherstripping.

2.07 COAT HOOKS

A. Coat Hooks: Provide on room side of door, screw fastened.

B. Material: Brass.

2.08 SILENCERS

A. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
   1. Single Door: Provide three on strike jamb of frame.
   2. Pair of Doors: Provide two on head of frame, one for each door at latch side.
   3. Material: Rubber, gray color.

2.09 FINISHES

PART 3 EXECUTION

3.01 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Use templates provided by hardware item manufacturer.

C. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.

D. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glazing units.

B. Glazing compounds.

1.02 RELATED REQUIREMENTS

A. Section 080300 - Conservation Treatment for Period Openings.

B. Section 085200 - Wood Windows: Glazing provided by window manufacturer.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).

C. ASTM C1036 - Standard Specification for Flat Glass; 2025.

D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2025.

E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2025.

F. GANA (GM) - GANA Glazing Manual; 2022.

G. GANA (SM) - GANA Sealant Manual; 2008.

H. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (Reaffirmed 2016).

1.04 SUBMITTALS

A. Product Data on Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

C. Samples for Selection (pattern glass): Submit samples or full sized representations of available patterns for Architect's selection.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years experience.

1.06 WARRANTY

A. Heat Soaked Tempered Glass: Provide a five (5) year manufacturer warranty to include coverage for spontaneous breakage of fully tempered glass caused by nickel sulfide (NiS) inclusions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Float Glass Manufacturers:
   1. Cardinal Glass Industries: www.cardinalcorp.com.
   2. Guardian Glass, LLC: www.guardianglass.com.
   3. Pilkington North America Inc: www.pilkington.com/na.
   4. Saint Gobain North America: www.saint-gobain.com.
   5. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com.

B. Patterned Glass Manufacturers:
   1. Hollander Specialty Glass: www.hollanderglass.com.
   2. Warner Art Glass: www.warnerartglass.com.
   3. Paul Wissmach Glass Co.: www.wissmachglass.com.

2.02 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
   2. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
   3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
   4. Patterned Glass Type: ASTM C1036, Type II - Patterned Flat Glass, Quality - Q5, Form 3 - Patterned glass, with color and performance characteristics as indicated.

2.03 GLAZING UNITS

A. Monolithic Exterior Vision Glazing:
   1. Applications: Exterior glazing unless otherwise indicated.
   2. Glass Type: Annealed float glass.
   3. Tint: Clear.
   4. Thickness: 5/32 inch (4 mm), nominal.

B. Monolithic Safety Glazing: Non-fire-rated.
   1. Applications:
      a. Glazed lites in doors, except fire doors.
      b. Shower and bathtub enclosures and doors.

c. Glazed sidelights to doors, except in fire-rated walls and partitions.
d. Other locations required by applicable federal, state, and local codes and regulations.
e. Other locations indicated on drawings.

2. Glass Type: Fully tempered safety glass as specified.
3. Tint: Clear.
4. Thickness (window applications): 5/32 inch (4 mm), nominal.
5. Thickness (shower and bathtub enclosures and doors): 1/2 inch (13 mm), nominal.

C. Patterned Glazing: Textured or rolled glass; translucent, showing shadows but not form.
1. Applications: Locations as indicated on drawings.
2. Finish: F1 - Patterned one side; ASTM C1036.
3. Glass Patterns: Florentine, to match Architect's sample.
4. Tint: Clear.
5. Glass Type: Annealed.
6. Thickness: 5/32 inch (4 mm), nominal.

D. Back-Painted Spandrel Glass: Back-painted on one surface and highly opaque.
1. Applications: Locations as indicated on drawings.
2. Glazing Type: Monolithic; annealed glass; clear.
3. Thickness: 5/32 inch (4 mm), nominal.
4. Colors: Black.

2.04 GLAZING COMPOUNDS

A. Glazing Putty: Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; gray color.

2.05 ACCESSORIES

A. Glazing Clips and Points: Manufacturer's standard type.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

3.02 INSTALLATION - WET GLAZING METHOD (COMPOUND AND COMPOUND)

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building or window unit.

B. Locate and secure glazing pane using glazier's clips or points.

C. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.

END OF SECTION 088000

SECTION 092116 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Acoustic insulation.

B. Cementitious backing board.

C. Gypsum wallboard.

D. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Building framing and sheathing.

B. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

A. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2023.

B. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2023.

C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2024.

D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2025.

E. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.

F. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units; 2025.

G. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2024.

H. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

I. GA-216 - Application and Finishing of Gypsum Panel Products; 2024.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. American Gypsum Company: www.americangypsum.com.
   2. CertainTeed Corporation: www.certainteed.com.
   3. Georgia-Pacific Gypsum: www.gpgypsum.com.
   4. National Gypsum Services Company: www.nationalgypsum.com.
   5. PABCO Gypsum: www.pabcogypsum.com.
   6. USG Corporation: www.usg.com.

B. Abuse Resistant Wallboard:
   1. Application: High-traffic areas indicated.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. Type: Fire-resistance-rated Type X, UL or WH listed.
   4. Thickness: 5/8 inch (16 mm).
   5. Edges: Tapered.

C. Backing Board For Wet Areas: One of the following products:
   1. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
      a. Thickness: 5/8 inch (16 mm).

D. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Ceilings, unless otherwise indicated.
   2. Thickness: 5/8 inch (16 mm).
   3. Edges: Tapered.

2.03 GYPSUM BOARD ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed mineral-fiber, friction fit type, unfaced; thickness 3.5 inch (89 mm).

B. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, unless noted otherwise.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Suspended Ceilings and Soffits: Space framing and furring members at 16 inches on center (at 400 mm on center).
   1. Level ceiling system to a tolerance of 1/1200.

B. Studs: Space studs at 16 inches on center (at 406 mm on center).
   1. Extend partition framing to structure where indicated and to ceiling in other locations.

2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

C. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive gypsum board, not more than 4 inches (100 mm) from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches (600 mm) on center.

D. Acoustic Furring: Install resilient channels at maximum 24 inches (600 mm) on center. Locate joints over framing members.

E. Blocking: Install wood blocking for support of:
1. Framed openings.
2. Wall-mounted cabinets.
3. Plumbing fixtures.
4. Toilet accessories.
5. Wall-mounted door hardware.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.04 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Cementitious Backing Board: Install over wood framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

3.05 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
1. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.

B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).

END OF SECTION 092116

SECTION 093000 - TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Cementitious backer board as tile substrate.

D. Stone thresholds.

E. Ceramic accessories.

F. Non-ceramic trim.

1.02 REFERENCE STANDARDS

A. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2023.

B. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2020.

C. ANSI A108.20 - American National Standard Specifications for Exterior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs; 2020.

D. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2024.

E. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2019.

F. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2023.

G. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2023.

H. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014 (Reaffirmed 2024).

I. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2023.

J. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.

K. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018 (Reapproved 2023).

L. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2025.

1.03 SUBMITTALS

A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

B. Shop Drawings: Indicate perimeter conditions, junctions with dissimilar materials, thresholds, ceramic accessories, and setting details.

1.04 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Company specializing in performing tile installation, with minimum of five years of documented experience.

PART 2 PRODUCTS

2.01 TILE

A. Porcelain Tile: ANSI A137.1 standard grade.
   1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
   2. Size: 6 by 6 inch (152 by 152 mm), nominal and as otherwise indicated on drawings.
   3. Thickness: 3/8 inch (9.5 mm).
   4. Edges: Cushioned.
   5. Surface Finish: Unglazed.
   6. Color(s): To be selected by Owner from manufacturer's standard range.

B. Natural Stone Tile:
   1. Single Tiles:
      a. Size: 6 by 6 inch (152 by 152 mm), nominal.
      b. Thickness: 1 inch (25 mm).
   2. Face: Smooth.
   3. Surface Finish: Honed.
   4. Edges: Square.
   5. Color(s): To be selected by Owner from manufacturer's standard range.

2.02 TRIM AND ACCESSORIES

A. Ceramic Accessories: Unglazed finish, same color and finish as adjacent field tile; same manufacturer as tile.

B. Pre-Formed Accessories To Be Covered with Tile: High density expanded polystyrene with ANSI A118.10 waterproofing finish or membrane.
   1. Products:
      a. LATICRETE International, Inc; LATICRETE HYDRO BAN Pre-Sloped Shower Systems: www.laticrete.com.
      b. Noble Company; Pro Base II Preformed Shower Base: www.noblecompany.com.
      c. Schluter-Systems; KERDI-BOARD: www.schluter.com.

C. Non-Ceramic Trim: Brushed stainless steel, style and dimensions to suit application, for setting using tile mortar or adhesive.

D. Thresholds: 2 inches (51 mm) wide by full width of wall or frame opening; beveled edge on both long edges; without holes, cracks, or open seams.
   1. Thickness: 1/2 inch (12.7 mm).
   2. Material: Marble, honed finish.

2.03 SETTING MATERIALS

A. Provide setting and grout materials from same manufacturer.

B. Improved Latex-Portland Cement Mortar Bond Coat: ANSI A118.15.

2.04 GROUTS

A. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
   1. Applications: Use where indicated on drawings and where no other type of grout is indicated.
   2. Use sanded grout for joints 1/8 inch (3.2 mm) wide and larger; use unsanded grout for joints less than 1/8 inch (3.2 mm) wide.
   3. Color(s): As selected by Owner from manufacturer's full line.

2.05 ACCESSORY MATERIALS

A. Waterproofing Membrane at wet locations: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
   1. Crack Resistance: No failure at 1/16-inch (1.6 mm) gap, minimum; comply with ANSI A118.12.
   2. Fluid or Trowel Applied Type:
      a. Material: Synthetic rubber or Acrylic.
      b. Thickness: 25 mils (0.6 mm), minimum, dry film thickness.
   3. Bonded Sheet Membrane Type:
      a. Material: Polyethylene sheet membrane with nonwoven fabric laminated to both sides, 20 to 30 mils (0.5 to 0.8 mm) thick, nominal.
      b. Material: Polyethylene vinyl acetate (PEVA) core with nonwoven polypropylene laminated to both sides, 8 mils (0.2 mm) thick.
      c. Products:
         1) LATICRETE International, Inc; LATICRETE HYDRO BAN Sheet Membrane: www.laticrete.com.
         2) Noble Company; NobleSeal TS: www.noblecompany.com.
         3) Schluter-Systems; KERDI: www.schluter.com.

B. Reinforcing Underlayment: Specifically designed for bonding to thin-set setting mortar; not primarily waterproofing material and having the following characteristics:
   1. Crack Resistance: No failure at 1/16-inch (1.6 mm) gap, minimum; comply with ANSI A118.12.
   2. Type: Fluid or Trowel Applied.

C. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 7/16 inch (11 mm) thick; 2-inch (51 mm) wide coated glass fiber tape for joints and corners.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive tile.

B. Verify wall surfaces are smooth and flat within tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Cementitious Subfloor Surfaces: Verify that substrates are ready for tiling installation by testing for moisture and alkalinity (pH).
   1. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.

3.02 PREPARATION

A. Vacuum clean surfaces and damp clean.

B. Seal substrate surface cracks with filler.

C. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to feather edge.

3.03 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108/A118/A136, manufacturer's instructions, and TCNA (HB) or TCNA (HB-GP) recommendations, as applicable.

B. Lay tile to pattern indicated on drawings. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install ceramic accessories rigidly in prepared openings.

G. Install non-ceramic trim in accordance with manufacturer's instructions.

H. Install thresholds where indicated on drawings.

I. Sound tile after setting. Replace hollow sounding units.

J. Keep control and expansion joints free of mortar, grout, and adhesive.

K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

L. Grout tile joints unless otherwise indicated on drawings. Use standard grout unless otherwise indicated on drawings.

M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, on ground, with standard grout, unless otherwise indicated on drawings.
   1. Where waterproofing membrane is indicated on drawings, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout, on ground.

3.05 INSTALLATION - SHOWERS AND BATHTUB WALLS

A. Grout with standard grout.

3.06 INSTALLATION - WALL TILE

A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244C, using membrane at toilet rooms, and kitchens.

END OF SECTION 093000

SECTION 099113 - EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:

D. Do Not Paint or Finish the Following Items:
1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
2. Items indicated to receive other finishes.
3. Items indicated to remain unfinished.
4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
5. Stainless steel, weathering steel, anodized aluminum, bronze, terne-coated stainless steel, zinc, and lead.
6. Floors, unless specifically indicated.
7. Glass.
8. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

1.03 SUBMITTALS

A. Product Data: Provide complete list of products to be used, with the following information for each:
1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
2. MPI product number (e.g. MPI #47).
3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

B. Samples: Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on sample of actual finish material or otherwise on hardboard, 8x8 inch (203x203 mm) in size.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.

B. Paints:
   1. Behr Process Corporation: www.behr.com.
   2. Diamond Vogel Paints: www.diamondvogel.com.
   3. PPG Paints; aka Pittsburgh Paints: www.pitsburghpaintsco.com.
   4. Sherwin-Williams Company: www.sherwin-williams.com.

C. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each paint material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.

2.03 PAINT SYSTEMS - EXTERIOR

A. Wood, Opaque, Alkyd, 3 Coat:
   1. One coat of alkyd primer sealer.
   2. Semi-gloss: Two coats of alkyd enamel.

B. Ferrous Metals, Unprimed, Alkyd, 3 Coat:
   1. One coat of alkyd primer.
   2. Semi-gloss: Two coats of alkyd enamel.

C. Aluminum, Unprimed, Alkyd, 3 Coat:
   1. One coat etching primer.
   2. Semi-gloss: Two coats of alkyd enamel.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Fiber Cement Siding: Remove dirt, dust and other foreign matter with a stiff fiber brush. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

G. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

3.02 APPLICATION

A. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.

D. Do Not Paint or Finish the Following Items:
1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
2. Items indicated to receive other finishes.
3. Items indicated to remain unfinished.
4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
5. Floors, unless specifically indicated.
6. Glass.
7. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

1.03 SUBMITTALS

A. Product Data: Provide complete list of products to be used, with the following information for each:
1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
2. MPI product number (e.g., MPI #47).
3. Cross-reference to specified paint system products to be used in project; include description of each system.

B. Samples: Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on sample of actual finish material or otherwise on hardboard, 8x8 inch (203x203 mm) in size.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.

B. Paints:
   1. Behr Process Corporation: www.behr.com.
   2. Diamond Vogel Paints: www.diamondvogel.com.
   3. PPG Paints: www.ppgpaints.com.
   4. Sherwin-Williams Company: www.sherwin-williams.com.

C. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each paint material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

2.03 PAINT SYSTEMS - INTERIOR

A. Wood, Opaque, Alkyd, 3 Coat:
   1. One coat alkyd primer sealer.
   2. Semi-gloss: Two coats of alkyd enamel.

B. Concrete/Masonry, Alkyd Floor Enamel, 3 Coat:
   1. One coat of alkali-resistant primer.
   2. Gloss: Two coats of alkyd floor enamel.

C. Gypsum Board/Plaster, Latex-Acrylic, 3 Coat:
   1. One coat of alkyd primer sealer.
   2. Eggshell: Two coats of latex-acrylic enamel.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

3.02 APPLICATION

A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

END OF SECTION 099123

SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid surface toilet compartments.

1.02 RELATED REQUIREMENTS

A. Section 102800 - Toilet, Bath, and Laundry Accessories.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2026.

C. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

D. ASTM A743/A743M - Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application; 2021.

E. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 SUBMITTALS

A. Product Data: Provide data on panel construction, hardware, and accessories.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall, floor, and ceiling supports, and door swings.

C. Samples: Two sample blocks, 6 by 6 inches (152 by 152 mm) in size, illustrating partition panel finish, color, and sheen.

1.05 WARRANTY

A. Manufacturer Warranty: Provide 10-year manufacturer warranty for material against breakage, corrosion, and delamination. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Solid Surface Toilet Compartments:
   1. DuPont Corian; Privacy Plus Partitions: www.privacypluspartitions.com.

2. Inpro: www.inprocorp.com.

2.02 DESIGN CRITERIA

A. Accessibility: Comply with ICC A117.1 and ADA Standards.

2.03 SOLID SURFACE TOILET COMPARTMENTS

A. General Description: Factory-fabricated doors, pilasters, and divider panels made of acrylic polymer resin, mineral filler, and pigment; floor-mounted, headrail-braced.

B. Color: As selected by Architect.

C. Doors:
1. Thickness: 1 inch (25 mm).
2. Width: 24 inches (610 mm).
3. Width for Handicapped Use: 36 inches (915 mm), outswinging.
4. Height: 55 inches (1397 mm).

D. Panels:
1. Thickness: 1/2 inch (13 mm).
2. Height: 55 inches (1397 mm).

E. Pilasters:
1. Thickness: 1 inch (25 mm).
2. Width: As required to fit space; minimum 3 inches (76 mm).

F. Urinal Screens: Without doors; to match compartments; mounted to wall with two panel brackets.

2.04 FABRICATION

A. Fabricate toilet compartment components to sizes indicated in shop drawings.

B. Coordinate requirements and provide cutouts for through-partition toilet accessories.

C. Provide shoes and caps at pilasters and posts to conceal anchorage, supports, and leveling mechanisms.

D. Provide manufacturer's standard corrosion-resistant supports, leveling mechanisms, anchors, and anchoring assemblies for pilasters and posts.

E. Floor-Anchored, Overhead-Braced Units: Provide supports, leveling mechanisms, and anchors at pilasters to suit floor conditions.

2.05 MATERIALS

A. Stainless Steel Sheet, Plate, and Bar: ASTM A240/A240M or ASTM A666/A666M, Type 304, stretcher-leveled standard of flatness.

B. Stainless Steel Castings: ASTM A743/A743M.

2.06 ACCESSORIES

A. Pilaster Shoes: Stainless steel, satin finish, 3 inches (76 mm) high; concealing floor fastenings.

B. Headrails: Extruded aluminum, anti-grip profile.
   1. Size: Manufacturer's standard size.

C. Wall and Pilaster Brackets: Stainless steel; manufacturer's standard type for conditions indicated on drawings.

D. Attachments, Screws, and Bolts: Stainless steel, tamper-proof type.

E. Hinges: Stainless steel, manufacturer's standard finish.
   1. Continuous-type hinge, self-closing.

F. Door Hardware: Stainless steel, manufacturer's standard finish.
   1. Door Latch: Slide type with exterior emergency access feature.

G. Coat Hook: One per compartment, mounted on door.

H. Toilet Accessories: See Section 102800.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and interfaces with other work.

B. Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

C. Verify spacing of and between plumbing fixtures.

D. Verify location of built-in framing, anchorage, and bracing.

E. Verify substrate and site conditions for product installation are installed in accordance with manufacturer's written instructions.

F. Notify Architect in writing of conditions detrimental to completion of work. Do not proceed with installation until detrimental conditions are corrected.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's written instructions.

B. Maintain 3/8-to-1/2-inch (10 to 12 mm) space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate headrail joints at pilaster center lines.

3.03 TOLERANCES

A. Maximum Variation from True Position: 1/4 inch (6 mm).

B. Maximum Variation from Plumb: 1/8 inch (3 mm).

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch (5 mm).

B. Adjust hinges to position doors in partially open position when unlatched. Return outswinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

END OF SECTION 102113.19

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories.

B. Residential toilet, shower, and bath accessories.

C. Under-lavatory pipe supply covers.

D. Electric hand/hair dryers.

E. Diaper changing stations.

F. Utility room accessories.

1.02 REFERENCE STANDARDS

A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2025.

B. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

C. ASTM C1036 - Standard Specification for Flat Glass; 2025.

D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2025.

E. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2022.

1.03 SUBMITTALS

A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

B. Available Finishes for Selection: Complete finish selction charts representing manufacturer's full range of available metal, glass, and cast polymer materials and finishes.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Commercial Toilet, Shower, and Bath Accessories:

B. Residential Toilet, Shower, and Bath Accessories:
   1. American Specialties, Inc: www.americanspecialties.com.

2. Ginger by Brasstech Inc: www.gingerco.com.
3. Pamex Inc: www.pamexinc.com.
4. Seachrome Corporation: www.seachrome.com.

C. Provide products of each category type by single manufacturer.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

B. Stainless Steel Sheet: ASTM A666/A666M, Type 304.

C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

D. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.

2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

2.04 COMMERCIAL TOILET ACCESSORIES

A. Toilet Paper Dispenser: Double roll, surface mounted, for cored or coreless type rolls.

B. Grab Bars: Stainless steel, smooth surface.
1. Heavy Duty Grab Bars: Floor supports are not acceptable.
   a. Push/Pull Point Load: Minimum 1000 pound-force (4448.2 N), minimum.
   b. Dimensions: 1-1/2 inch (38 mm) outside diameter, minimum 0.125 inch (3.17 mm) wall thickness, exposed flange mounting, 1-1/2 inch (38 mm) clearance between wall and inside of grab bar.
   c. Length and Configuration: As indicated on drawings.

C. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.

2.05 RESIDENTIAL TOILET, SHOWER, AND BATH ACCESSORIES

A. Decorative Stainless-Steel Grab Bars: Smooth surface.
1. Push/Pull Point Load: 250 pound-force (1112 N), minimum.
2. Dimensions: 1-1/4 inch (32 mm) outside diameter, minimum 0.080 inch (2 mm) wall thickness, bracket, 1-1/2 inch (38 mm) clearance between wall and inside of grab bar.
3. Length and Configuration: As indicated on drawings.

B. Toilet Paper Holder: Surface mounted, double roll, concealed attachment.
1. Material: Stainless steel; satin finish.

C. Towel Shelf with Bar: Round tubular frame with round bars.
1. Bracket/Frame Material: Stainless steel; bright polished finish.
2. Bar Material: To match bracket material.

3. Length: 18 inches (460 mm) minimum.
4. Shelves: Two.
5. Towel Bar: One.
6. Basis of Design Products:
   a. DEWVIE; Bathroom Towel Rack with Tower Bars - SUS 304 Stainless Steel Lavatory Bath Towel Shelf Wall Mount Towel Holder Polished Surface Finish, 22 Inch, 3-Tier; amazon.com..
      1) Link: https://www.amazon.com/dp/B094R378MD/ref=sspa_dk_detail_4?pd_rd_i=B094R378MD&pd_rd_w=Jugxk&content-id=amzn1.sym.d81b167d-1f9e-48b6-87d8-8aa5e473ea8c&pf_rd_p=d81b167d-1f9e-48b6-87d8-8aa5e473ea8c&pf_rd_r=H49WWZH9CZYB1J630323&pd_rd_wg=LQuvj&pd_rd_r=3392a01e-6f63-4434-b6d7-75408976ec6b&s=office-products&sp_csd=d2lkZ2V0TmFtZT1zcF9kZXRhaWxfdGhlbWF0aWM&th=1.

D. Shower Curtain Rod: Straight tube, 1 inch (25 mm) diameter, with mounting flanges for concealed attachment.

E. Shower Curtain: Mildew resistant fabric with plastic grommets.

F. Robe Hook: Double-prong, concealed attachment.

2.06 UNDER-LAVATORY PIPE AND SUPPLY COVERS

A. Specified in 224000 - Plumbing Fixtures.

2.07 ELECTRIC HAND/HAIR DRYERS

A. Electric Hand Dryers:
   1. Operation: Automatic, sensor-operated on and off.
   2. Mounting: Wall-mounted - surface.
   3. Cover: Stainless steel with brushed finish.
      a. Tamper-resistant screw attachment of cover to mounting plate.
   4. Air Velocity: 15,000 linear feet per minute (76 m/s), minimum.
   5. Fan Control: Field adjustable down to approximately half-speed.
   6. Total Wattage: 500 W, maximum; no heater.
   7. Runtime: Field adjustable or automatic, up to 35 seconds.

2.08 DIAPER CHANGING STATIONS

A. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
   1. Material: Polyethylene.
   2. Mounting: Surface.
   3. Color: As selected.
   4. Minimum Rated Load: 250 pounds (113.4 kg).

2.09 UTILITY ROOM ACCESSORIES

A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch (1.3 mm) thick stainless steel, Type 304, with 1/2 inch (12 mm) returned edges, 0.06 inch (1.6 mm) steel wall brackets.
   1. Drying rod: Stainless steel, 1/4 inch (6 mm) diameter.
   2. Hooks: Two, 0.06 inch (1.6 mm) stainless steel rag hooks at shelf front.
   3. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
   4. Length: Manufacturer's standard length for number of holders/hooks.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.

D. Verify that field measurements are as indicated on drawings.

3.02 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

END OF SECTION 102800

SECTION 123600 - COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertops for architectural cabinet work.

B. Window stools.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

B. ISFA 3-01 - Classification and Standards for Quartz Surfacing Material; 2013.

C. NSI (DSDM) - Dimensional Stone Design Manual, Version VIII; 2016.

D. PS 1 - Structural Plywood; 2023.

1.04 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

B. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.

C. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

D. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of experience.

PART 2 PRODUCTS

2.01 COUNTERTOPS & WINDOW STOOL

A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.

B. Natural Stone (Alternate): Stone slabs bonded to substrate; use as large pieces as possible with inconspicuous adhesive joints.
   1. Stone: Granite without cracks, voids, or pin holes ; filling with matching epoxy resin is acceptable.
   2. Color: As selected by Architect.
   3. Stone Thickness: 1/2 inch (12 mm), minimum.
   4. Surface Finish: Polished.
   5. Surface Sealer: High gloss water-based acrylic, transparent.
   6. Back and End Splashes: Same material, same thickness; for field attachment.

C. Natural Quartz and Resin Composite (Base Bid): Sheet or slab of natural quartz and plastic resin over continuous substrate.
   1. Flat Sheet Thickness: 1-1/4 inch (32 mm), minimum.
   2. Natural Quartz and Resin Composite Sheets, Slabs and Castings: Complying with ISFA 3-01 and NEMA LD 3; orthophthalic polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard stone fabrication tools; no surface coating; color and pattern consistent throughout thickness.
      a. Manufacturers:
         1) Cambria Company LLC: www.cambriausa.com.
         2) Cosentino North America: www.cosentino.com.
         3) Dal-Tile Corporation: www.daltile.com.
         4) LG Hausys America, Inc; Viatera 3cm: www.lghausysusa.com.
         5) Wilsonart: www.wilsonart.com.
      b. Factory fabricate components to the greatest extent practical in sizes and shapes indicated; comply with NSI (DSDM).
      c. Finish on Exposed Surfaces: Polished.
      d. Color and Pattern: As selected by Architect from manufacturer's standard line.
   3. Other Components Thickness: 3/4 inch (19 mm), minimum.
   4. Back and End Splashes: Same sheet material, square top; minimum 4 inches (102 mm) high.

2.02 MATERIALS

A. Wood-Based Components:
   1. Wood fabricated from old growth timber is not permitted.

B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch (19 mm) thick; join lengths using metal splines.

C. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

2.03 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch (25 mm) except where top butts against cabinet or wall.

3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
2. Height: 4 inches (102 mm), unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Apply sealer products in accordance with manufacturer's written instructions.

C. Seal joint between back/end splashes and vertical surfaces.

3.02 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet (3 mm in 3 m), maximum.

B. Offset From Wall, Countertops: 1/8 inch (3 mm) maximum; 1/16 inch (1.5 mm) minimum.

C. Field Joints: 1/8 inch (3 mm) wide, maximum.

END OF SECTION 123600

SECTION 200000 - FACILITY SERVICES GENERAL CONDITIONS

PART 1 - GENERAL

1.01 GENERAL

A. The "Architectural General Conditions" and "Supplementary General Conditions" govern work under this section.

B. Before submitting a proposal, this contractor shall visit the site of the work and shall carefully examine the drawings specifications. It is expressly understood that this proposal is based on the above requirements and that it covers everything necessary to do and complete the work.

1.02 INSPECTION AND COOPERATION

A. No deviation from the drawings and / or specifications will be allowed without prior written approval of the Owner's representative. This contractor shall cooperate with the other contractors to allow for the installation of their work as well as his own.

B. This contractor shall be responsible for his work fitting in place without conflict with the other trades, where proper planning could avoid interference.

1.03 CODES AND PERMITS

A. Nothing in the drawings and / or specifications shall be interpreted to conflict with any City or State law, regulation, code, ordinance, ruling, or Fire Underwriter's requirement applicable to this class of work.

B. Should the drawings and / or specifications conflict with such laws or ordinances, the conflicting portion of the work shall be installed strictly in accordance with such laws and ordinances without extra cost to the Owner.

C. This contractor shall secure and pay for all necessary permits and inspections required from this installation of his work.

1.04 ACCURACY OF DATA

A. The information given herein and on the drawings is as exact as could be secured, but its extreme accuracy is not guaranteed. This contractor shall examine the locations and verify all measurements, distances, elevations and existing pipe sizes before starting the work.

B. This contractor shall provide all necessary offsets, raised and drops in piping and ductwork as required by building conditions at no additional cost to the Owner.

C. Mechanical drawings shall not be used for general construction dimensions or for type of material used. For exact building layout, dimensions and building material used, this contractor shall refer to the Architectural Drawings.

1.05 SHOP DRAWINGS

A. All shop or installation drawings, foundation plans, equipment or apparatus drawings shall be furnished by this contractor. These drawings shall be clearly marked indicating which items are to be supplied and shall state capacities, sizes and general description of all equipment. Any changes from the specified items shall be noted on the submittals.

B. Shop drawings of special apparatus or equipment, which is to be fabricated individually for this project and is not described by standard manufacturer's drawings or bulletins shall be submitted for processing before fabrication.

C. These drawings shall be submitted in a timely manner.

D. It shall be this contractor's responsibility to maintain liaison with all parties concerned with the material submitted. This contractor shall not pr4uchase any equipment until shop drawings have been processed

E. This contractor shall submit no drawings without notation of each copy indicating date of contractor's review and signature of check for contractor together with contractor's name and project identification.

F. Engineer's processing will not constitute a complete check but will indicate only that general method of construction and detailing is satisfactory.

G. Engineer's processing will not relieve the contractor of responsibility for errors since this contractor is solely responsible for dimensions and designs of adequate connections, details and satisfactory construction of all work, as well as furnishing materials and workmanship required by drawings and specifications which may not be indicated on the submittals when approved.

PART 2 - PRODUCTS & EXECUTION

2.01 SUBSTITUTIONS OF EQUIPMENT OR MATERIAL

A. The brand names of equipment or materials specified herein shall establish quality, capacity, type and dimensions to be included in the base bid.

B. This contractor may propose substitutions. However, substitutions of materials must be submitted as an alternate to the base bid. A complete set of cut sheets, labeled items, break out cost savings and a clarification letter must be presented to the engineer fourteen (14) days prior to bid presentation for review. Failure to provide material substitutions and receive approval as described will indicated that the specified items will be provided and installed as intended.

C. Except as stated herein, the bidder shall make no presumptions with regard to any substitution.

D. This contractor shall be held responsible for all physical changes resulting from such substitutions of equipment and/or material and shall bare all increased cost to other trades due to making said substitutions. Approval of equipment and/or materials other than that specified does not relieve this contractor of that responsibility.

2.02 ERECTION OF APPARATUS

A. All work shall be done under the personal supervision of this contractor who shall provide a competent foreman to lay out all work. All work shall be laid out with due regard for the space requirements of the other contractors. This contractor shall report any conflicts or difficulties in regard to the installation immediately.

B. Where crowded locations exist or where there is a possibility of conflict between trades, this contractor shall make composite drawings showing the exact locations of pipes, duct, conduit and equipment. Drawings shall be based on field measurements and after consultation and agreement between the trades, shall be approved by the Owner's representative before installation of the work.

C. Equipment of a type to require replacement, servicing, adjusting or maintenance shall be located to allow easy access and space for removal of internal assemblies, it required.

2.03 EXCAVATION AND BACKFILL

A. This contractor shall do all excavation required to install pipes and equipment shown on the plans or required for proper operation. Excess excavation below the required level shall be backfilled with earth and thoroughly tamped. Utilities services, sewer and drain lines shall be inspected and approved by the proper inspection authority before backfilling.

B. The bottom of trenches shall be tamped hard and graded to secure the required fall. Rock, where encountered shall be excavated to a depth of six inches (6") below the bottom of the pipe, and before the pipe is laid, the space between bottom pipe and rock surface shall be filled with gravel. If trenches are deeper than bottom of flooring or closer than three feet (3'-0") to footing they must be filled with cohesive soil and compacted to 95% of maximum density, standard proctor, ASTM D-698. All other excavations under floor slabs compacted to 95% standard proctor.

C. When excess dirt has been removed, the trench shall be brought to the required level with sand and gravel firmly compacted.

D. Trenches and excavation shall be backfilled in 6" layers of earth, free of clods, and stones thoroughly tamped to a depth of 12" above the pipe. After that depth has been reached, backfilling shall be done in 12" layers, thoroughly tamped.

2.04 EQUIPMENT SUPPORTS

A. Any structural steel members required to adapt the equipment and piping as furnished by this contractor, to the building steel or structure, shall be included in the bid of the contractor furnishing the equipment or piping. Hanging of all equipment and required supporting steel and bracing shall be furnished by the contractor who supplies the equipment.

2.05 ROOF MOUNTED EQUIPMENT

A. This contractor shall furnish and install curbs for all roof mounted equipment and roof penetrations. Curbs shall be a minimum of 8" above roof surface and shall be set so that roofing contractor can mop units into the roofing system.

2.06 CUTTING AND PATCHING

A. This contractor shall include all cutting, patching and painting of patched areas required for and resulting from the installation of all of this contractor's work, except where noted otherwise.

B. All openings around duct or pipe penetrations through smoke or fire-rated floors, ceilings or walls shall be sealed airtight with material having a rating equal to the material of the wall, ceiling and/or floor penetrated.

C. All patching shall be neatly finished to the satisfaction of the Architect.

2.07 ACCESS PANELS

A. This contractor shall locate and furnish for installation by the General Contractor, all access panels as required for access to values, dampers and the proper servicing of equipment and lines installed under the contract.

B. All panels shall be Milcor, Style "M" for masonry, "A" for acoustical tile and "K" for plaster; except for fire-rated UL 1 ½ hour and "B" label access panels shall be furnished in fire-rated walls and ceilings as indicated on the drawings.

C. Access doors shall be 12" x 12" minimum size for valves and shall be 24" x 36" for access to equipment and filters.

2.08 DIELECTRIC UNIONS

A. For the prevention of electrolytic corrosion at connections between pipe of dissimilar metals or between pipe and equipment connections of dissimilar metals, provide dielectric unions or flanges.

2.09 MOTORS, STARTERS AND DISCONNECTS

A. Unless specified to be furnished with equipment, all motor starters and disconnect switches shall be furnished and installed by the electrical contractor.

2.10 JOINTS AND FITTINGS

A. Treads on screwed pipe shall be standard, clean but and tapered. Pipe shall be reamed of burrs and kept clean of scale, dirt and shavings. Treads shall be made with flaked graphite and lubricating oil or approved pipe compound on the male thread only.

B. Copper-to-steel and copper-to-brass joists shall be made with silver solder. All other copper-to-copper joints above ground shall be made with lead free solder. Copper pipe shall be cut square, burrs removed and care shall be given to keep the lines free of dirt and moisture. All tubing and fittings shall be thoroughly cleaned.

C. Welded pipe shall have butt-welded single "V" type joints for which pipe has been beveled to 45 degrees. Weld shall be one-fourth greater thickness than the pipe. Connections to equipment, accessories, etc. shall be made by means of flanges and / or adaptors.

D. Unions shall be provided at each screwed valve and unions or flanges at each equipment connection.

2.11 EXPANSION JOINTS

A. Furnish and install Flexonics expansion joints in piping system where shown or necessary for expansion and contraction.

B. Expansion joints in pipe 4" and greater shall be the packless type with stainless steel bellows and have welded or flanged end. Joints shall have traverse as indicated on the plans. Expansion joints shall be of the controlled flexing type.

C. Expansion joints in copper pipe under 4" in size shall be of the compensator type constructed of two-ply stainless steel bellows and carbon steel shrouds and end fittings, internal guides and anti-torque devices.

D. Expansion joints in steel pipe under 4" in size shall be of the compensator type constructed of two-ply stainless steel bellows and carbon steel shrouds and end fittings, internal guides and anti-torque devices.

E. Provide guides on each side of expansion joint, at 4 pipe diameters, 14 pipe diameters, and a third guide as recommended by the manufacturer.

2.12 PIPE FLEXIBLE CONNECTIONS

A. Flexible pipe connections shall be Resistoflex #R6904 or approved equal flexible connections made from Teflon.

B. Provide for movement in piping by use of swing joints at connection of all branches to mains and risers. All branches from mains and risers shall have ¼" clearance between pipe insulation and sleeve to permit pipe movement.

2.13 VALVES

A. This contractor shall furnish and install all valves of one manufacturer, figure number and type throughout the entire installation of the work, unless otherwise specified. The following numbers are from the Crane Catalog. Equal valves of reputable manufactures, such as Hammond, Nibco-Scott and/or Jensins will be considered equal.

B. All valves shall be built for a minimum of 125 PSIG working pressure.

C. Gate valves 2 ½" and smaller shall be #438 (screwed ends) or #1320 (solder-joint ends) with bronze body, bronze trim and rising stem.

D. Gate valves 3" and larger shall be #461 (flanged ends) with iron body, bronze trim and non-rising stem.

E. Check valves 2 ½" and smaller shall be #36 (screwed ends) or #1342 (solder-joint ends) swing-type with bronze body and bronze trim.

F. Check valves 3" and larger shall be #73 (flanged ends) swing check with iron body and bronze trim.

G. Butterfly valves 2" and larger shall be #12F, iron body, cast-iron wafer w/locker lever.

H. Ball valve up to 3" in size shall be Appollo series #70 bronze valve with chrome-plated ball and Teflon seat. Balancing ball valves over 3" in size shall be Dezurik.

I. Gas line cocks up to 4" shall be #320. Larger than 4" gas shutoffs to be butterfly valve #12F.

J. Hose end valves shall be #438 gate valves with hose end nipples.

2.14 PIPE SLEEVES AND COLLARS

A. This contractor shall layout all his work and set sleeves in new construction as concrete forms and wall are erected so as to be able to install his work without cutting or breaking of floors or walls. All sleeves for insulated piping shall be larger enough to allow insulation to pass through sleeve.

B. All sleeves passing through floors which are waterproofed shall be copper tubing sleeves extending 1" above finished floor. All other sleeves shall be 24 gauge-galvanized pipes and sleeves to be thoroughly packed with oakum and the remaining space filled with mastic and must be watertight.

C. All sleeves passing through inner walls shall be standard pipe thimbles equal to the thickness of the wall.

D. Spaces between pipes and sleeves through outside walls, above grade, shall be caulked with caulking compound; those below grade shall be caulked with oakum and lead and made watertight.

E. Sleeves through equipment room floors above lower floor shall be steel pipe sleeves and shall extend 4" above finished slab and shall be caulked watertight.

F. Sleeves through poured concrete floors shall be ½" less than the floor thickness

G. Space arou8nd all piping through fire or smoke rated partitions or floors shall be sealed airtight with material as specified under firestopping.

H. All pipe penetrations of slabs on grade shall be wrapped with #15 building felts or foam wrap.

2.15 HANGERS

A. All hangers shall be Grinnell Fig. 108 malleable iron split ring or Grinnell Fig. 260 black steel adjustable clevis type hangers. Riser clamps on each vertical pipe at each floor line shall be Grinnell Fig. 261. All hangers for copper lines shall be copper-plated. Strap hangers will not be permitted. Similar and equal supports as manufactured by Fee & Mason and Elcen will be acceptable for approval.

B. All horizontal downspouts, soil, waste and vent lines shall be supported at the hub with Grinnell Fig. 260 black steel adjustable clevis hangers.

C. All horizontal water lines 4" and smaller shall be hung with Grinnell Fig. 97 hangers. All hangers for copper lines shall be copper-plated or felt lined. At fixture groups, horizontal pipes shall be hung from long arm riser clamps attached to vent lines.

2.16 TEMPORARY WATER SERVICE, TOILET FACILITIES, AND HEATERS

A. See special conditions for responsibility under this contract.

2.17 DAMAGE BY LEAKS

A. This contractor shall be responsible for damages to the grounds, walks, roads, all building components and finishes, piping systems, electrical systems and their equipment and content, caused leaks in the piping systems being installed or having been installed herein. All repairs will be made at this contractor's expense.

2.18 PIPE MARKERS

A. Furnish and install Brady #B-350 thin film or approved equal pipe markers. Markers shall be 1 1/8" high for pipes 3" and under and 2 ¼ high for pipes over 3". Markers shall indicate type of service and direction of flow.

B. Pipe markers shall be located:

1. At equipment connections
2. At access doors
3. At branch mains
4. On all accessible pipe a maximum of 75' between markers.

2.19 FLOOR, WALL AND CEILING PLATES

A. Pipes passing through floors and finished ceilings, fitted with chrome-plated plates or escutcheons large enough to completely close opening around pipe or pipe covering and floor support in the case or vertical piping, securely held in place; caulk watertight around pipe in unfinished rooms.

2.20 FIRE STOPPING

A. The penetrations of fire and/or smoke rated walls or floors shall be protected by a UL approved material to retain the integrity of the time-rated construction by maintaining as effective barrier against the spread of flame, smoke and gasses. It shall be used in all duct cable, conduct and piping penetrations through floor slabs and time-rated walls, and/or floors. The rating of the firestopping shall equal the rating of the time-rated assembly.

B. Firestopping material shall be 3M Fire Barrier Sealing system of approved equal. Firestopping material shall constitute one more of the following products:
   1. Caulk: CP-25
   2. Putty: #303
   3. Wrap/strip: FS195
   4. Composite Sheet: CS195
   5. Penetrating Sealing Systems: 7900 series

C. Installation of firestopping shall be installed in accordance with and in strict conformity with manufacturer's printed instructions as to surface preparation, installation and quality control. Areas of work shall remain accessible until inspection and approval by the applicable code authorities.

D. On insulated pipes, the fire-rating classification shall not require removal of the insulation.

E. Quality Assurance:
   1. Submit manufacturer's product data, certification or certified laboratory test report that the material or combination of materials meet the requirements specified in ASTM E814 and are so classified in UL's Building Materials Directory.
   2. Materials shall meet and be acceptable for use by all three model building codes; Basic Code, Uniform Building Code and Standard Building Code.
   3. Materials shall meet the requirements of NFPA101- Life Safety Code and NFPA 70-National Electrical Code.

F. Submittals:
   1. Submit shop drawings, product data, certificates and manufacturer's installation instructions.
   2. Submit manufacturer's product data for all materials and prefabricated devices, providing descriptions sufficient for identification at the job site. Include manufacturer's instructions for installation.
   3. Submit shop drawings showing proposed material, reinforcement, anchorage, fastenings, and met6hod of installation. Construction details shall accurately reflect actual job conditions.

2.21 CLEANUP AND ADJUSTMENT

A. All parts work left clean: equipment, fixtures, valves, pipes and fittings cleaned of grease and metal cuttings. Any discoloration or other damage to portions of building, its finish or furnishing due to this contractor's failure to properly clean interior of piping, repaired at this contractor's expense. All automatic control devises adjusted for proper operation. All surplus materials and any rubbish removed as it accumulates. All equipment left in safe, proper operating condition.

B. All parts of heating and cooling units and all other items of equipment including registers, grilles, coils, cabinets, controls, shall be carefully protected by this contractor form the normal work of other trades. Damage to any portions must be repaired of the part replaced by this contractor and all parts left without dents, scratches, through the finish paint, loose plaster, stains or other blemishes. Interior of all ducts and all coils and filters are to be thoroughly cleaned at the completion of all work in the building.

2.22 AS BUILT DRAWINGS

A. Two copies of drawings prepared by this contractor, detailing revisions or "As-Built" construction shall be furnished to the Architect.

B. These drawings shall consist of two sets of black or blue line prints which shall be furnished to this contractor by the Architect. This contractor shall during the progress of the job, record any and all changes or deviations from the original drawings and at the completion of the project, deliver to the Architect these two sets of marked-up "As-Built" drawings.

2.23 PIPE TESTING AND START-UP

A. All piping to be tested in accordance with the following:
   1. Compress Air – one and one-half times the maximum operating pressure
   2. Water – 100 psi water pressure
   3. Refrigerant – 250 psi with anhydrous carbon dioxide
   4. Gas – 50 psi air pressure

B. All testing must hold for at lease 24 hours without loss of pressure of vacuum. All concealed piping shall be tested in the presence of the Engineer prior to covering.

C. Before starting any system, all mechanical and electrical equipment shall be lubricated by this contractor. Test entire plant for heating, ventilating, and air conditioning under full load conditions for a period of not less than one (1) week during which time the Owner's operating personnel shall be fully instructed in the operation and maintenance of the plant. After the plant is in full operation, this contractor is to furnish whatever additional service is required to recalibrate and reset controls, valves, balancing cocks, etc. to ensure proper operation of this system.

2.24 TESTING AND BALANCING

(This portion of work is to be provided by an independent T&B contractor included in the general contract)

A. This contractor shall at the time of installation ensure that all devices to complete Testing and Balancing as directed herein are furnished and installed during fabrication and installation of work.

B. Balance, adjust and test air handing equipment, air distribution devices and water systems as described below. All instruments used are to be recently calibrated and maintained. Upon request this contractor shall furnish proof of calibration and conduct tests in the presence of the Engineer. The system is to be completely installed and operating before any testing starts. Test data shall be compiled by this contractor on legible forms and shall be complete. This contractor shall, at no additional cost, make fine adjustments to individual areas as required within ninety (90) days after turnover.

C. Air systems to be adjusted and checked that all dampers are in the proper position and free to operate. Adjust equipment and on the submittal sheets record the following data:
   1. RPM and Amperage
   2. Rotation
   3. Static pressure suction and discharge
   4. Traverse of main ducts
   5. Temperatures – outside air wet and dry bulb, mixed air wet and dry bulb, discharge air wet and dry bulb.
   6. Return air quantity
   7. Fresh air quantity
   8. Set individual rooms to within 10% of design criteria. Identify each supply and return device within room and the air quantity and velocity of the air passing through it.
   9. The manufacturer and AK value of each device within the room.
   10. Readjust fans to obtain room design conditions and re-record amperage and RPM.
   11. Report in writing all discrepancies between design and installation criteria.

D. Submit to the Architect for approval, a complete bound report of air balance, water balance, and control set points certified correct. After approval by Architect, three (3) copies shall be furnished to the Owner.

E. Submit to the Architect for approval, a complete bound set of manufacturer's operating and maintenance instructions, and spare parts lists. After approval by the Architect, three (3) copies shall be furnished to the Owner.

F. Entire balance of systems shall be provided by an independent test and balance company with NEBB Certification. Submit data on balancing company which is proposed for approval by the Engineer after contract is accepted and signed.

2.25 SEISMIC RESTRAINTS ON EQUIPMENT

A. All mechanical equipment shall be provided with seismic restraining services as required by local building Codes. Contractor shall have local building office review each piece of equipment when installed and the Contractor shall install all required tie down, anchors, straps or other devices required.

2.26 GUARANTEE

A. This Contractor shall guarantee all equipment, materials, and labor furnished under this Contract to be free from defects for a period of one (1) year from the date of substantial completion and shall repair or replace any equipment or material which is defective or improperly installed. In addition, this Contractor shall assume full responsibility for any damage to the buildings and its contents or other equipment, caused by defects or improper installation of equipment or materials installed under this Section of the Specifications.

B. All HVAC units shall have a five (5) year compressor warranty.

2.27 MAINTENANCE OF SERVICE

A. Continuity of all building services and utilities serving facilities in existing building shall be maintained without interruption, except for such period of time that the Owner may designate.

B. This contractor shall so arrange and execute his work that any connections, either temporary or permanent, or rearrangement of present equipment and piping shall be in such a manner as to assure full resumption of service at the time designated by the Owner.

C. If temporary valves, cross connections and piping are necessary to assure this continuity of service, they shall be furnished under this section of these specifications without additional charges to the Owner or his agents and shall be removed when no longer necessary.

2.28 INTERFERENCE WITH OPERATION

A. This contractor shall confine his activities to the area set aside for him to do his work and shall not interfere with any of the Owner's activities.

B. This contractor shall not be permitted to store material except within the areas as directed by the Owner.

C. Should any disturbance of existing installation be necessary this contractor shall so inform the Owner well in advance of the time comtemplated for the disturbance. After a plan acceptable to the owner has been formulated, the general contractor's superintendent shall keep in close personal contact with the work to see that it is executed in accordance with the agreed procedure.

2.29 MECHANICAL SMOKE DETECTION DEVICES

A. The mechanical contractor is to furnish detection devices as required by code. Signaling devices are to be furnished by the mechanical contractor for installation by the electrical contractor. Verify placement requirements with local inspection agency prior to installation.

2.30 PROTECTION OF EQUIPMENT

A. All mechanical, plumbing and electrical equipment located in an area where possible damage can occur from carts, trucks, cars, etc. are to be protected by an approved bollard, post, or guard rail type system. This would include meters, condensing units, generators, fuel tanks, etc.

B. This system is to be furnished and installed by the individual contractor whose equipment is being protection with all required hardware for a complete and approved system.

END OF SECTION 200000

SECTION 220000 - PLUMBING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The work under this section of specification shall include all material, equipment and labor required to install a complete plumbing installation as shown on the drawings and herein. Work shall begin at a point shown on the drawings. Final connections to site utilities shall be this contractor.

B. Provisions of Section 200000 Facility Services General Conditions apply to work under this section.

1.02 TEMPORARY WATER

A. As soon as practical after the start of construction, the water service shall be available for use within the building.

1.03 CLEANING, PROTECTING AND ADJUSTMENTS

A. This contractor shall provide protective coverings on all fixtures and equipment furnished. He shall thoroughly clean all fixtures, equipment and piping furnished.

B. Open bends of piping system shall be kept covered during construction.

C. This contractor shall adjust all valves for the satisfactory operation of the plumbing system.

1.04 SUBMITTALS - PLUMBING FIXTURES

A. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

B. Manufacturer's Instructions: Indicate installation methods and procedures.

C. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

PART 2 - PRODUCTS & EXECUTION

2.01 DOMESTIC WATER SERVICE

A. This contractor shall continue water service as indicated on the drawings. Water service shall be type “L” water tubing above ground and type “K” underground.

B. Provide Watts model #909s-AG backflow preventers in service lines where required by building department or water company.

2.02 SANITARY SEWERS

A. This contractor shall connect sanitary sewer as indicated on the drawings. Verify direction of flow prior to any rough-in work.

B. Each pipe shall be laid to the line and grade indicated on the plans and such a manner as to form a close concentric joint with the adjoining pipe and to prevent offsets in flow line. All pipe shall be laid with the bells uphill.

C. The sub-grades shall be kept free from water while pipes are being laid. All pipe shall be laid with ends abutting and true to line and grade. They shall be fitted and matched so that they will form a sewer with a smooth and uniform invert.

D. Each joint shall be cleaned as it is laid and all bells shall be cleaned before pipes are joined.

E. Vitrified clay pipe shall be joined using compression gasket joints in accordance with A.S.T.M. C-425

2.03 INSIDE WATER PIPING

A. Runouts to fixtures shall have ample provisions for expansion and contraction, both horizontally and vertically.

B. All unions in copper lines shall be Mueller "streamline" ground joints or equal. Provide dielectric unions where copper lines are connected to steel. Provide unions at each equipment connection.

C. This contractor shall furnish all valves of one manufacturer figure number and type throughout the entire installation of work, unless otherwise specified. Install gate valves at each equipment connection.

D. Gate valves 2" and smaller shall be brass body, brass trim, nonrising stem, built for 125# working pressure: Crane #1320 (Solder-Joint) or #438 (screwed).

E. Check valves 2" and smaller shall be brass body, swing type, built for 125# working pressure: Crane #1342 (Solder-Joint) or #372 (screwed).

F. Similar valves of reputable manufacturer, such as Hammond, Nibco, Scott &^ Jenkins will be acceptable.

G. At each fixture, provide air chambers not less than 18" long, same size as supply pipe. This applies to all hot and cold-water supplies.

H. Upon completion of his work, this contractor shall adjust the temperature setting to 140 degrees F. Adjust the thermostatic mixing valve to 110 degrees F.

I. All joints below ground to be silver-soldered. All joints above ground to be made with 95-5 solder.

J. Domestic supplies can be a "PEX" system. Provide supports 18"oc and only in concealed spaces. All fittings are to be tool compressed as recommended by the manufacturer.

2.04 STERILIZATION OF DOMESTIC WATER SYSTEM

A. The entire domestic water distribution system shall be thoroughly sterilized with a solution containing not less than 100 parts per million of available chlorine. The solution shall remain in the system for two (2) hours during which time all valves and faucets shall be opened and closed several times. After sterilization, the solution shall be flushed from the system with clean water until the residue chlorine content is no greater than the chlorine level of the available water supply

2.05 WASTE, SOIL, DRAIN AND VENT PIPING

A. The house drains, soil waste and vent pipe and fittings including extensions to sewers shall be of cast iron piping. All cast pipe shall be sand spun service cast iron of the sizes indicated on the drawings. Pipe and fittings to be coated on the inside and outside with coal tar pitch, cylindrical and free from cracks or other defects.

B. All trenches to be dug with gradual fall, the piping to be straight. Cast iron piping shall be no-hub above grade and spigot with push-on joints below grade.

C. The arrangement of the system shall be as shown on the drawings and as direct as possible, avoiding all unnecessary offsets. The stacks shall be firmly secured in position with steel clamps at each floor.

D. All changes in direction of soil or waste pipe shall be made by means of "Y" branches and 1/8 bends. Ninety-degree short turn fittings will not be permitted except to individual fixture connections or where the flow is from the horizontal to the vertical.

E. Handholes with cast iron ferrules and heavy brass screws for cleanouts shall be placed at ends and all changes in direction of soil and waste pipe where not otherwise shown or where required and brought up to the floor line where piping is concealed by means of "Y"s or suitable bends.

F. All 3" and smaller waste piping shall be sloped at 1/4" per foot.

G. All 4" and larger waste piping shall be sloped at 1/8" per foot.

H. All cleanouts shall be of full size of pipe up to 4" and 4" for all over this size. Connections between outlets of fixtures and soil or waste pipe shall be made with "Y" branches to "TY" branches wherever possible. All horizontal soil waste and vent pipe shall be graded toward outlets and pipe not buried shall be installed above the ceiling or close as possible to the construction above where there is no ceiling.

I. The stacks shall be extended through roof of building to points not less than 12" above roof. Extensions through roof shall be made water-tight by means of a lead flashing of four points sheet lead spread over a distance of not less than twelve inches (12) around pipe. Thimble to be soldered to base and extended over and turned down into end of pipe in an approved manner.

J. All cleanouts in floors to be adjustable cleanout with cast iron body, cast brass scoriated cover with letters C.O. cast in top and concealed brass plug.

K. Cleanouts shall be installed in base of each stack. Concealed cleanouts shall have cast iron tee, brass plug, round stainless steel access cover.

L. All joints of cast iron pipe shall be made with neoprene push-on gaskets below grade and no-hub fittings above grade.

M. If approved by the local codes, service weight polyvinyl chloride schedule 40 (PVC) pipe with DWV fittings may be used for the waste and vent system. PVC pipe and fittings shall be installed in strict accordance with all Codes. Encasement of PVC pipes within rated shafts shall be the cost of this contractor. Foam core or cellular core will be accepted.

N. Any and all cast iron piping shall comply with the latest issues of CISPI Standard 301, ASTM A888 and/or ASTM A74. Pipe and fittings shall be marked with the trademark of the "Cast Iron Soil Pipe Institute" and foundry. Only domestic cast iron pipe will be accepted. Approved foundries: AB&I, Charlotte or Tyler.

O. The following literature will be required upon request:
1. Radiation Screening w/records
2. Mechanical Testing w/records
3. Chemical Testing w/records
4. Dimensional verification w/records
5. Certification letter by the manufacturer and legal domestic address of one of the approved foundries listed.

2.06 VENT FLASHING

A. Each vent flashing shall be made water-tight with the roof by proper lead flashing. Flashing shall be lead four (4) pounds per square foot.

2.07 WASTE, VENT AND WATER CONNECTIONS

A. The minimum size of waste, vent, and water connection to the individual fixtures shall be as follows:

FIXTURE WASTE VENT C.W. H.W.

1. Water Closets (valve) 4" 2" ¾" -
2. Urinals 2" 2" ¾" -
3. Lavatories 1 ¼" 1 ¼" ½" ½"
4. Sinks 1 ¼" 1 ¼" ½" ½"
5. Service Sinks 3" 1 ¼" ½" ½"
6. Water Coolers 1 ¼" 1 ¼" ½" -
7. Wall Hydrants - - ¾" -

B. Where fixtures are grouped pipes shall be per the drawings. In all cases the size arrangements and connections of waste, water and vent piping shall not be less than that shown on the drawings. No water pipe less than ½" shall be installed in concealed places such as in partitions or walls etc. NO waste or vent piping below floor shall be smaller than 2".

C. Installation: This contractor shall be responsible for protection of the plumbing fixtures and accessories during construction. He shall replace at his expense any material that is marred, scratched, defaced and/or broken. Fixtures shall be covered with building paper and wooden crates during construction.

D. Contractor shall provide rough-in and shall connect all fixtures to the plumbing system. All fixtures to be installed to dimensions with chrome-plated brass supplies with stops.

E. All fixtures installed to dimensions shown on the Architectural drawings.

F. All water closets shall have wax ring seals between the floor and underside of the water closet.

G. Contractor shall provide rough-in and shall connect all fixtures and equipment to the plumbing system. This includes items furnished and set in place by others. Stop valves are required for each individual water connection.

2.08 PLUMBING FIXTURES AND TRIM

A. Plumbing fixtures shall be furnished and installed in a neat and workmanlike manner with proper connections to supply and drainage piping. All fixtures shall be free of flaws and defects of any sort in material and workman-ship and shall operate perfectly when installed in accordance with manufacturer's direction.

B. Approved Manufacturers:
1. Fixtures: American Standard, Kohler, Toto
2. Faucets: Delta, Moen, Symmons
3. Drains/Cleanouts: JR Smith, Sioux Chief, Wade
4. Water Heater: AO Smith, Bradford-White, Rheem
5. Hose Bibs: Prier, Wade, Zurn
6. Sink: Kindred, Kohler, Elkay

2.09 INSULATION

A. All insulation shall have composite (insulation, jacket or facings and adhesive used to adhere the facing or jacket to the insulation) fire and smoke hazard ratings as tested by procedure ASTM E-84, NFPA 225 UL 723 not exceeding:
1. Flame spread 25
2. Smoke Developed 50
3. Fuel Distribution 50

B. All accessories such as adhesives, mastics, cements, tapes and cloth for fittings shall have the same components ratings as listed above.

C. Insulation shall be applied on clean, dry surfaces and after inspection and release for insulation application. All insulation shall be continuous through wall and ceiling openings and sleeves. Insulation on all cold surfaces where vapor barrier jackets are used will be applied with a continuous, unbroken vapor seal, including all fittings and valves. All insulation to be installed in accordance with manufacturer's recommendation. Fittings shall be finished with ¼" coat of insulating cement and canvas.

D. Insulation schedule:
1. Domestic cold water piping – ½" thick Armaflex pipe covering
2. Domestic hot water piping – ½" thick Armaflex pipe covering
3. Under Handicapped Lavatory/Sink piping – Provide complete True-Bro molded Handi-Lav Guard insulation kit (White)
4. Note that all outdoor wrap is to be provided with UV protection.
5. At each pipe hanger and/or support is to be protected using Armaflex "Pipe Hanger" insulation covering. This protective product is to have polyurethane inserts for support.
6. All protective components are to be secured with Armaflex #520 BLV black-low "VOC" adhesive.

E. Product as manufactured by Nomaco Inc. of Zebulon, North Carolina identified as "Imcoa" is approved for insulation. All components such as glue, adhesive, joint tape, etc. is to be followed by manufacturer's recommendation and practice.

2.10 SUBSTITUTIONS

A. All bids shall be based on equipment as specified.

B. This contractor may propose substitutions. However, substitutions of materials must be submitted as an alternate to the base bid. A complete set of cut sheets, labeled items, breakout cost savings and a clarification letter must be presented to the engineer 14 days prior to bid presentation for engineer's review.

C. Except as stated above, the bidder shall make no presumptions with regard to substitutions.

D. This contractor shall be held responsible for all physical changes resulting from such substitution of equipment and shall bear all increased costs to other trades in making said substitutions. Approval of equipment other than specified does not relieve the contractor of that responsibility.

END OF SECTION 220000

SECTION 230000 - HEATING, VENTILATION, AND AIR-CONDITIONING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The work under this section shall include all material, equipment and labor required to install a complete heating, ventilating and air conditioning installation as shown on the drawings and specified herein.

B. Provisions of Section 200000 Facility Services General Conditions apply to work under this section.

1.02 SUBMITTALS - HVAC UNITS

A. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

B. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.

C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

D. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.03 SUBMITTALS - AIR OUTLETS AND INLETS

A. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

B. Samples: Submit two of each required air outlet and inlet type.

1.04 SUBMITTALS - AIR COOLED REFRIGERANT CONDENSERS

A. Product Data: Provide rated capacities, weights, accessories, electrical requirements, and wiring diagrams.

B. Shop Drawings: Indicate components, assembly, dimensions, weights and loading, required clearances, and location and size of field connections. Include schematic layouts showing condenser, refrigeration compressors, cooling coils, refrigerant piping and accessories required for complete system.

C. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.

D. Operation and Maintenance Data: Include start-up instructions, maintenance instructions, parts lists, controls, and accessories.

E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 SUBMITTALS - AIR COILS

A. Product Data: Provide coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.

B. Shop Drawings: Indicate coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.

C. Certificates: Certify that coil capacities, pressure drops, and selection procedures meet or exceed specified requirements.

D. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

PART 2 - PRODUCTS & EXECUTION

2.01 CONDENSATE DRAIN PIPING

A. Provide condensate drain piping for all cooling coil drains as noted on the drawings. Condensate drain piping shall be type “M” copper or PVC if approved by local codes. Secure to floor with approve cleats.

B. Drains shall be pitched in the direction of flow with a pitch of not less than 1” in 10 feet or horizontal run.

C. Provide traps at coil drain connections and terminate condensate drain as indicated on the drawings.

2.02 SHEET METAL WORK

A. Fabricate and install ductwork for velocities less than 2000 feet per minute and static pressure less than two inches water gauge in accordance with the latest edition of the Low Velocity Duct Construction Standards published by the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)

B. Except where noted or specified otherwise, all ductwork shall be constructed of galvanized sheet metal.

C. Duct sizes shown have allowed for 1” ductliner and therefore duct sizes need not be increased.

D. All supply and return ductwork shall be lined with 1” ductliner glued, clipped and edges treated all has recommended by the manufacturer and per the latest SMACNA manual.

E. Provide turning vanes, splitter dampers and volume dampers all as shown by symbols on drawings.

F. Round ductwork shall be spiral duct of gauges specified for size by SMACNA. Approved Manufacturer is Lindfab, Inc.

G. The product as manufactured by Kingspan "Koolduct" can be used in lieu of the metal duct if approved by the local agency having authority. All criteria must be followed as designed, ie; sizing and flow requirements. The "Koolduct" system is to be fabricated and installed by an approved and licensed company for such work. All fittings, hangers, angles, components are to be provided and installed for this application.

2.03 FLEXIBLE DUCTS

A. Furnish and install 1" installed flexible ductwork where indicated on the drawings.

B. Maximum length of each run to be 10'-0"

2.04 REGISTERS, GRILLES AND DIFFUSERS

A. Furnish and install air distribution outlets where shown on the drawings. Outlets shall be of type indicated in the schedules.

B. Approved Manufacturers:
1. Krueger.
2. Price.
3. Titus.

2.05 EXHAUST FANS

A. Furnish and install fans as shown in the schedule on the drawings.

B. Fans shall be complete with fan motor, backdraft damper and factory-mounted built-in disconnect switch.

C. Approved Manufacturers:
1. Broan.
2. Cook.
3. Penn.

2.06 FILTERS

A. Furnish and install filters and filter racks in all air handling equipment, except exhaust fans. Unless otherwise indicated in equipment specification, filters shall be 1" thick, throw away type. This contractor is to install new filters in all units when project is ready for acceptance by the Owner.

2.07 TEMPERATURE CONTROLS

A. Furnish and install all controls for HVAC equipment and provide complete wiring diagrams to the electrical contractor so that he can properly wire all remote controls.

B. Controls shall include all firestats and smoke detectors as required by code.

C. Provide locking type plastic guards for all thermostats.

2.08 REFRIGERATION PIPING

A. Refrigerant lines shall be type "L" hard drawn copper tubing, cleaned and capped for refrigerant service with wrought copper fittings.

B. All joints shall be made with silver solder equal to silvaloy 15.

C. Sine of liquid and suction lines shall be as recommended by the manufacturer for the run distance, etc.

D. Furnish and install liquid line sight glass and dryer-strainer as manufactured by Sporlan of sizes required on all split systems.

E. Upon completion of piping, the system shall be triple evacuated, recharged and put into operation.

F. Replace all freon gas lost through defective piping during the first year of operation.

2.09 PIPE INSULATION

A. Furnish and install 1/2" Armaflex or equal installation with flue as recommended by the manufacturer on all refrigeration suction lines.

B. If PVC pipe is used on condensate drains, no additional insulation will be required. However, if type "M" copper is used these lines shall be insulated with 3/8" Armaflex of equal wrap.

C. All exterior insulation is to be provided with ultra-violet protection.

2.10 EXTERNAL INSULATION

A. External insulation at all round duct run outs shall have 2" foil backed fiberglass external duct wrap with joints sealed and taped as per the manufacturer's recommendations.

2.11 INTERIOR MINI SPLIT A/C UNIT

A. Furnish and install a split package as indicated on the drawings.

B. Unit shall have insulated cabinet, cooling coil, heating element, fan, insulated steel condensate pan with drain connection, filters and fan resiliently mounted. Recessed housing and accessibility for maintenance.

C. Approved Manufacturers:
   1. Carrier.
   2. Lennox.
   3. Trane.

2.12 EXTERIOR MINI SPLIT A/C UNIT

A. Furnish and install a split package as indicated on the drawings.

B. Unit shall be rated for exterior use. Fan, coil, compressor all to be incorporated within the package and comply with manufacturing standards for the application.

C. Refrigerant lines to be installed per manufacturers recommendations and insulated.

D. Approved Manufacturers:

1. Carrier.
2. Lennox.
3. Trane.

2.13 WALL HEATER

A. Recessed cabinet heater as indicated on the drawings.

B. Approved Manufacturers:
   1. Berkel.
   2. Dayton.
   3. Q'Mark.

2.14 SUBSTITUTIONS

A. All bids shall be based on equipment as specified.

B. This contractor may propose substitutions. However, substitutions of materials must be submitted as an alternate to the base bid. A complete set of cut sheets, labeled items, breakout cost savings and a clarification letter must be presented to the engineer 14 days prior to bid presentation for engineer's review.

C. Except as stated above, the bidder shall make no presumptions with regard to substitutions.

D. This contractor shall be held responsible for all physical changes resulting from such substitution of equipment and shall bear all increased costs to other trades in making said substitutions. Approval of equipment other than specified does not relieve the contractor of that responsibility.

END OF SECTION 230000

SECTION 260000 - ELECTRICAL

PART 1 - GENERAL

2.01 GENERAL CONDITIONS

A. The "General Conditions" and "Supplementary General Conditions" govern work under this section. Refer to Electrical General Specification on the drawings.

B. Provisions of Section 200000 Facility Services General Conditions apply to work under this section.

2.02 WORK INCLUDED

A. The work covered by this section of the specification consists of providing all the materials, labor, equipment, and services necessary for a complete electrical installation as specified herein. Work in this section includes, but is not necessarily limited to the following items:
   1. Service and main panelboard
   2. Feeders and subpanelboards
   3. Grounding system
   4. Temporary service
   5. All conduits, wire, and outlet boxes
   6. Raceways, outlets, and cabinets for telephone service
   7. Lighting fixtures, receptacles, and toggle switches
   8. Nameplates
   9. Excavating and backfilling for electrical work
   10. Cutting and patching for electrical work
   11. Connect heating, ventilating, and air conditioning equipment including control wiring
   12. Motor starters for all equipment where they are not furnished as part of control panels for condensing units etc.
   13. Underground service shall be verified by the Utility Company for their part of the work.
   14. Connection of equipment supplied by others

2.03 WORK NOT INCLUDED

A. The following work is not included under this section of the specification:
   1. Electrical service shall be installed by the Utility Company per their standard service requirements.
   2. Telephone service shall be brought to, and installed in the building by the Utility.
   3. All heating, ventilating, and air-conditioning motors and associated controls not including motor starters shall be furnished by Mechanical Contractor.
   4. Temperature controls shall be furnished by the Mechanical Contractor installed by this contractor
   5. Finished painting shall be by the General Contractor.

2.04 SUBMITTALS - INTERIOR LIGHTING

A. Shop Drawings:

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
   1. LED Luminaires:
      a. Include estimated useful life, calculated based on IES LM-80 test data.
   2. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.

C. Certificates for Dimming Ballasts: Manufacturer's documentation of compatibility with dimming controls to be installed.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

2.05 SUBMITTALS - WIRING DEVICES

A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

B. Certificates for Surge Protection Receptacles: Manufacturer's documentation of listing for compliance with UL 1449.

2.06 SUBMITTALS - ELECTRICITY METERING

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for electricity metering systems and associated components and accessories. Include ratings, configurations, standard wiring diagrams, dimensions, service condition requirements, and installed features.

B. Shop Drawings: Include system interconnection schematic diagrams showing all factory and field connections. Include requirements for interface with other systems.

2.07 SUBMITTALS - PANELBOARDS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

B. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

2.08 SUBMITTALS - LIGHTING CONTROL DEVICES

A. Product Data: Include ratings, operating modes or sequence of functions, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.

B. Shop Drawings:
   1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
   2. Daylighting Controls: Provide lighting plan indicating location, model number, and orientation of each photo sensor and associated system component.

C. Operation and Maintenance Data: Include detailed information on device programming and setup.

2.09 CODES

A. All electrical work shall be done in strict accordance with the latest edition of the National Electrical Code and all regulations, laws, and ordinances which may be applicable. Electrical Contractor shall obtain and pay for all permits and inspection fees required for his work.

2.10 ELECTRICAL SERVICE

A. Electrical service shall be supplied underground at 120/240 volt, single phase, three wire.

B. This contractor shall obtain from the Utility Company and pay all charges for the proper size meter cabinet to hold the required meters. They shall mount the cabinet and/or meters and make necessary wiring connections as directed by Utility.

C. This contractor shall include in his bid all charges of the Utility Company for their service connection. Provide a lineal foot cost for trenching and 4"pvc conduit for primary service installation.

2.11 GROUNDING SYSTEM

A. Furnish and install a grounding system including all fittings, clamps, conduit, and wire of the proper size to make ground connections between all apparatus, neutral bus, conduits, etc. and the incoming water service as required by the latest edition of the National Electrical Code, and according to the requirement of the local Utility Company.

2.12 CLEAN UP

A. This contractor shall have all electrical rubbish and debris removed to a location on the premises as directed by the General Contractor. The General Contractor shall remove all rubbish and debris from the premises.

B. All electrical equipment and materials installed by this contractor shall be thoroughly cleaned and ready for use upon completion of the work.

2.13 FIELD CONDITIONS AND MEASUREMENTS

A. The Electrical Contractor shall visit the site of the work and familiarize himself with all available information concerning the nature of the structural excavations, and the location conditions bearing on transportation, handling, and storage of materials. The Electrical Contractor shall make his own estimate of the facilities needed and difficulties attending the execution of the contract including local conditions, availability of labor, uncertainties of weather, transportation, and other contingencies. In no event will the Architect assume any responsibility whatsoever for any interpretation, deduction, or conclusion drawn from the examination of the site. Failure of the contractor to acquaint himself with all available information concerning these conditions will not relieve him of responsibility for estimating the difficulties and costs or successfully performing his work.

B. The Electrical Contractor shall verify in the field, all measurements necessary for his work and shall assume responsibility for their accuracy.

2.14 TESTING

A. The entire system shall be tested, demonstrated, and explained to such persons as the Owner, Architect, and Engineer shall designate.

B. This contractor will be required to make the following checks, and tests with his instruments as required:
   1. Test to make sure that accidental grounds do not exist on any portion of the system before energizing the circuits.
   2. The correctness of lighting circuits to be in conformity with the branch circuitry shown on the drawings.
   3. Motors shall be checked for proper direction of rotation and corrected if necessary.
   4. Grounds shall be checked and the resistance to ground shall not be more than outlined in the National Electrical Code.

2.15 GUARANTEE

A. Contractor guarantees by his acceptance of the contract, that all work installed will be free from any and all defects in workmanship and/or materials and that all apparatus will develop capacities and characteristics specified, and that if, during the period of one year from date of certificate of completion and acceptance of work, any such defects in workmanship, materials, or performance appear, he will, without cost to the Owner, remedy such defects within a reasonable time to be specified in the notice from the Architect. In default thereof, Owner may have such work done and charge cost to this contractor.

PART 2 - PRODUCTS & EXECUTION

3.01 CONDUIT

A. In general, unless noted otherwise, conduit shall be “Thinwall” electrical metallic tubing “EMT”. Tubing shall be welded cold rolled steel, galvanized with coated interior.

B. "Heavywall" rigid conduit shall be used in all locations exposed to the weather, and in the earth, or below vapor barrier of concrete slabs on grade. Heavywall conduit shall be steel, hot dipped galvanized with coated interior. All the above-mentioned conduits shall have all joints red leaded, and all conduits in the earth shall be coated with two coats of bituminous paint. PVC conduit may be used in lieu of Heavywall conduit, except where exposed to the weather. Where conduits leave slab or earth, they shall be Heavywall conduit. Install ground wire in all PVC conduits as required by Code.

3.02 WIRE AND CABLE

A. Building wire and cable with 600-volt insulation shall be 98% conductivity copper unless noted otherwise. The minimum size conductor for lighting and power shall be no. 12 AWG.

B. Conductors sized no. 10 AWG and smaller shall be type "TW" solid or stranded as required, unless noted otherwise; sized no. 8 AWG and larger shall be type "THW" stranded, unless noted otherwise.

C. Type "AC", "BX:, and non-metallic sheathed cable shall not be used on this project. "MC" cable can be used for light fixture whips or concealed within walls ONLY. "MC" cable is to have a labeled independent green ground wire included and must be approved by the AHJ for this application.

D. All branch circuit wiring shall be minimum of #12 AWG/THWN(THHN) unless otherwise noted. For runs exceeding 50 feet, wiring shall be minimum #10 AWG/THWN(THHN). This contractor shall size wiring in accordance with the latest edition of the National Electrical Code: NEC Article 210-19, 215-2, 310-15 and 410 for voltage drop and table B310-11 for derating factors. This contractor is to increase conduit sizes as required for compliance with NEC criteria.

E. All conduit is to have an independent green ground wire included within the feeders shown on the drawings sized per NEC.

3.03 INSTALLATION OF CONDUIT AND WIRE

A. Conduits shall be continuous from outlet to outlet and from outlet to cabinets, junction or pull boxes, and shall enter and be secured to all boxes in such a manner that each system shall be electrically continuous from services to all outlets. Terminals of Heavywall conduits shall be furnished with double lock nuts and bushings. Thinwall box connectors and couplings shall be raintight. Pressure indent type of thinwall box connectors and couplings shall not be acceptable. Bushings on Heavywall conduits larger than 1 1/4" shall be plastic reinforced with metal.

B. In general, all conduit shall be run concealed, unless indicated otherwise to be run exposed. Exposed conduit shall be installed perpendicular or parallel to building walls. Where more than one exposed conduit in a conduit bank changes direction, all bends shall be concentric. Conduits concealed inside floors, walls, or ceilings shall be run to clear depressions in floors, walls, ducts, plumbing, or heating pipes. This contractor shall consult all other trades' drawings to ascertain where conflicts will occur.

C. Conduit shall be supported on approved types of galvanized brackets, ceiling trapeze or pipe straps of hangers secured by means of toggle bolts on hollow masonry, expansion bolts in concrete or bricks, machine screws on metal surfaces, or wood screws on wood construction. Nails shall be used as a means of fastening boxes or conduits. Perforated flat steel straps shall not be used for supporting conduits.

D. The final 12" of conduit feeding motors, air-conditioning equipment, exhaust fans, etc. shall be "Seal-Tite" flexible conduit with proper connectors and ground wires.

E. Taps and splices will not be permitted in either feeders or branch circuits except at outlets or accessible junction boxes. Splices and taps in wire size no. 8 AWG and smaller shall be made with "Wire Nuts". Installing covers of equivalent conductor shall install be applied so that no bare wire or cable will be exposed.

F. Taps and splices in wire and cable size no. 6 AWG and larger shall be of the bolted pressure or hydraulic pressure type. Connectors shall be a non-ferrous material applied to the conductor by clamping with a minimum of two bolts for bolted pressure type, and provided with a phenolic insulating cover.

3.04 OUTLET BOXES

A. Outlet boxes for concealment in the ceiling or walls inside the building shall be galvanized stamped steel. Outlet boxes for work exposed to weather, in floors, and other exposed locations shall be of the cast type. Boxes shall be designed for metallic conduit. Conduit fittings may be used in lieu of outlet boxes where applicable. PVC boxes are acceptable with "NM" wiring if approved by the AHJ.

B. Outlet boxes shall be of the size and type to accommodate the structural conduit, size and number of raceways, conductors or cables entering, and device or fixture for which box is required. Install blank plates on all outlet boxes where apparatus is installed which does not in itself provide a cover for the box. Plaster rings shall be provided as required.

C. Special care shall be taken to set all boxes square and true with the building finish. The edge of the cover shall come flush with the building or wall finish. When possible, all wall outlets shall be secured to the building structure or steel by adjustable supports which shall be buried in.

D. The exact location of all outlets and switches in finished rooms shall be obtained from the Architect or Engineer and/or from scale drawings of interior details and finishes. Generally, switches are to be grouped with a gang cover plate and installed at the strike side of the door opposite the hinge side. Final correct readjustment shall be to outlets, if necessary to give proper centering. In centering of outlets and location of outlet boxes, allow for overhead pipes, ducts, and other mechanical equipment, and for variations in arrangement and thickness of walls, fireproofing, plastering, window trim, paneling, hung ceiling, and the like. Any inaccuracy resulting from failure to take the above into consideration shall be corrected by this contractor without expense to the owner.

3.05 TOGGLE SWITCHES

A. Toggle switches shall be quiet type rated 15 amperes, 120/277 volt, AC type with ivory handles, unless noted otherwise, as follows:
   1. Single Pole Hubbell #1201-I
   2. Two Pole Hubbell #1202-I
   3. Three way Hubbell #1203-I
   4. Four way Hubbell #1204-I

B. Toggle switches shall be mounted 48" above finished floor to the center of the mounting plate, unless noted otherwise.

C. Toggle switches shall be installed so that they shall bear evenly and truly and be secured on the axis of the supporting member. No wooden wedges, shims, or blocks shall be used to true up toggle switches. Should the outlet box in any case come too far back of the finished surface, box extenders, and screws of the proper length to reach the box shall be used to form a shoulder to retain the switch in its proper position.

D. Contractor shall review drawings and check with the Architect for rooms that are to have switches of different color, and/or type.

E. The following are approved manufacturers"
   1. Hubbell
   2. Leviton
   3. Pass & Seymour

3.06 CONVENIENCE OUTLETS

A. Duplex outlets shall be grounding type, flush mounted rated 20 ampere, 125 volt with ivory molded face, unless noted otherwise. Hubbell #5362-I

B. Waterproof outlets shall be duplex, GFI, grounding type rated 20 ampere, 125 volt receptacles mounted in a cast box with waterproof gasketed spring door. Hubbell #CWP8H

C. Duplex outlets isolated ground/surge suppression type, flush mounted rated 20 ampere, 125 volt with ivory coverplate unless noted otherwise. Hubbell #IG-5352-S.

D. Duplex receptacle GCFI type, flush mounted rated 20 amperes, 125 volt with ivory face, unless noted otherwise. Hubbell #GF5352-I

E. Receptacles shall be mounted 18" above finished floor to centerline, unless noted otherwise.

F. Contractor shall review drawings and check with Architect for rooms that are to have receptacles of different color and/or type.

G. The following are approved manufacturers:
   1. Hubbell
   2. Leviton
   3. Pass & Seymour

3.07 DEVICE PLATES

A. Device plates shall be impact nylon with ivory finish and/or heavy-duty stainless steel unless noted otherwise.

B. This contractor shall examine the plaster, block, brick, wood, drywall, painting, and other finishes before making his installation to insure that his accessories, when installed, will fit and leave no open or unfinished surfaces exposed. Deficiencies shall be promptly reported top the Architect so that corrections can be made prior to proceeding with the installation of the device plates.

C. Contractor shall review drawings and check with Architect for rooms that are to have device plates of different color and/or type.

3.08 LIGHTING FIXTURES

A. Furnish and install lighting fixtures selected in accordance with the Lighting Fixture Schedule on the drawings.

B. Fixtures shall be completely wired and constructed to comply with the National Electrical Code and Underwriters Laboratories Standard for Electric Lighting Fixtures. Fixtures shall bear the factory inspection label of the Underwriters' Laboratory.

C. Ferrous metal used in fixture manufacture shall be bonderized, galvanized, or treated with an approved rust inhibiting coating to provide a rustproof base application of finish. Rust proofing must be applied after all forming or punching operations. Painted light reflection surfaces shall be finished in a porcelain or baked with enamel having a reflection factor of not less than 85%. All parts of the reflector shall be completely covered by finish and free from irregularities. Non-reflecting surfaces shall be finished in a baked enamel finish, unless noted otherwise. All post-painted units.

D. Fixtures with visible frames shall have concealed hinges and catches. A safety arrangement shall be incorporated in the design of fixtures to prevent frame from becoming disengaged when relamping or cleaning. Pendant fixtures and lamp holders shall be provided with ball type aligners.

E. LED fixtures shall be equipped with drivers compatible with unit. Recessed lighting fixtures are to meet the requirements as stated in the latest edition of the National Electrical Code section 410-64.

F. All fixtures shall be provided with white lamp holders. Industrial type fluorescent fixtures shall have turret type lamp holders. All fluorescent fixtures with exposed lamps shall have spring lock sockets.

G. The following are approved manufacturers:
   1. Acuity Corporation
   2. Cooper Corporation
   3. Current Corporation

3.09 INSTALLATION OF LIGHTING FIXTURES

A. Fixtures shall be installed at the mounting heights shown and as detailed on the drawings or as directed. Pendant fixtures with in the same room or area shall be installed plumb and at a uniform height above finished floor unless noted otherwise. Adjustment of height shall be made during installation.

B. Recessed lighting fixtures shall be equipped with plaster frames as required and shall be installed so as to completely eliminate light leakage between the frame and the finished surface. It shall be this contractor's responsibility to review architectural drawings and to provide and install plaster frames as required.

C. Fixtures and/or fixture outlet boxes shall be provided with hangers to adequately support the complete weight of the fixture. Fixtures mounted on outlet boxes shall be rigidly secured to a fixture stud in the outlet box. Hickies or extension pieces shall be installed where required to facilitate proper installation. This contractor shall have installed additional hanger wires from the grid tee system to bar joists, or building structure, where lighting fixtures are connected and/or supported to the ceiling system grid tees.

D. Fixture housing, frame, or canopy shall provide a suitable cover for the fixture outlet box or fixture opening.

E. Fixtures located outside the building shall be installed with stainless steel or non-ferrous metal screws finished to match fixture trim.

F. This contractor shall confer with the General Contractor to locate recessed ceiling fixtures and install supports for ceiling fixtures of such weight or construction as to require special provisions for their support.

G. All lighting fixtures shall be installed by experienced mechanics. Fixtures shall be installed after finished coat of paint has been applied to walls and ceiling, and when paint is dry.

H. Upon completion of the installation of the lighting fixtures and other lighting equipment, they must be clean and in first-class operating order and in perfect condition as to finish, hardware, glassware, etc. At the time of final inspection, all fixtures shall be properly lamped and directed to give desired illumination. Any fixture reflector, glassware, etc. which is broken or lamp burnouts, which occur prior to the turning over of the installation to the Owner, shall be replaced without cost to the Owner.

3.10 PANELBOARDS

A. Panelboards shall be dead front and consist of cabinets, interiors, bus, main and branch circuit protective devices, main lugs, and all necessary equipment for a complete panelboard. Detailed characteristics such as number of branches, frame of ampere rating, trip or fuse size, bus size, type mounting or voltage ratings, shall be shown on the drawings.

B. Cabinet shall be fabricated of code gauge, hot galvanized steel with adequate gutters. Joints shall be welded and reinforced where required. The outside of surface mounted cabinets shall be finished with one coat of zinc chromate primer and at least one coat of gray enamel. Load center type panelboards are not acceptable.

C. Trim and panelboard front shall be made of cold-rolled steel of code gauge steel. Trim shall have doors with concealed hinges and have a flush type combination lock and catch or a multiple point contact catch. Each lock shall be provided with two keys. All panelboards shall be keyed alike. Furnish and install a typed index identifying the panelboard and indicating the circuit number with the description or function of the associated branch circuit. Index shall be mounted under a clear glass or plastic protective cover. Trim shall be cleaned, and given a prime coat of paint and at least one finished coat of gray enamel.

D. Circuit breakers shall be plug-in or bolt-in type, ambient compensated thermal magnetic trip and quick-make and quick-break. Toggle mechanism shall be over-center type with trip free positive operation. All multipole circuit breakers shall be common trip type. Handle lock-ons shall be furnished and installed on all circuits as indicated on the drawings. Circuit breakers used to control lighting fixtures shall be UL rated for this duty and marked "SWD" as required by National Electrical Code Article 240, paragraph 83(d).

E. Fused switches shall be "Heavy-duty" quick-make, quick-break with external operating handle. Handle shall be clearly marked to indicate position of switch. Switch shall be able to be locked in the "ON" or the "OFF" position. The switch cover shall have a cover interlock complete with provision for momentarily voiding the interlock.

F. All lugs shall be of the solderless type

G. All panelboards shall have engraved nameplates identifying panelboards as indicated on the drawings. Main and power panelboards shall have engraved nameplates for each circuit with circuit name engraved, see drawing for nameplate data.

H. The following are approved manufacturers:
1. Eaton

2. General Electric
3. Siemens
4. Square D

3.11 POWER AND CONTROL WIRING

A. The contractor shall consult the heating, ventilation, air conditioning, plumbing, and electrical drawings, and specifications for the number and type of all motors, controls, and starting equipment which will be furnished under these headings. This contractor shall connect all motors and controls, and ALL temperature controls, complete and ready for operation.

3.12 TEMPORARY POWER

A. This contractor shall arrange with the local Utility Company and the General Contractor for temporary service necessary for construction purposes. Furnish, install and maintain the temporary power system on a pole furnished by General Contractor, and consisting of service, panelboard, grounding system and receptacle outlets required on pole. General Contractor shall pay for all metered charges by the Utility. Service shall be 100 ampere, 120/240 volt, single phase, three wire. The Electrical Contractor shall provide and maintain throughout the construction period temporary lighting to meet all OSHA requirements.

3.13 EXCAVATION AND BACKFILL

A. This contractor shall provide all excavation and backfilling required for his work. Backfill shall be with clean earth and shall be done in layers of 6" or less with each layer tampered. It shall be this contractor's responsibility to maintain all of his areas of backfill and to rebackfill all areas of settlement. He shall remove all of his excess excavation materials of the site as required by the General Contractor. In general all electrical cable and conduits shall be buried 3'-)' below grade. Backfill around cables shall be with at least 6" of sand above and below the elevation of the cable. A treated wood plank shall be placed on top of the sand for the entire length of run before earth backfill starts. If conduit Is used, the treated wood plank can be eliminated.

3.14 INCIDENTAL OVERTIME

A. The cost of incidental overtime work for changeover of service shall be included in this contractor's price. Any other overtime must be authorized by the General Contractor, and the premium only to be reimbursed to this contractor.

3.15 SUBSTITUTIONS

A. All bids shall be based on equipment as specified.

B. This contractor may propose substitutions. However, substitutions of materials must be submitted as an alternate to the base bid. A complete set of cut sheets, labeled items, breakout cost savings and a clarification letter must be presented to the engineer 14 days prior to bid presentation for engineer's review.

C. Except as stated above, the bidder shall make no presumptions with regard to substitutions.

D. This contractor shall be held responsible for all physical changes resulting from such substitution of equipment and shall bear all increased costs to other trades in making said substitutions. Approval of equipment other than specified does not relieve the contractor of that responsibility.

3.16 AS-BUILT DRAWINGS

A. This contractor shall provide as-built drawings at the completion of the job, before final payment with be approved. This contractor shall maintain a set of drawings at the job site for his employees to record all as-built changes to the drawings. At the completion of the project he shall record all changes on a set of as-built mylars and submit them to the Architect for review. If all changes have not been recorded properly they shall be returned to contractor for revisions. No final payments will be made without completed and approved as-built drawings.

3.17 SEISMIC RESTRAINTS ON ELECTRICAL EQUIPMENT

A. All electrical equipment shall be provided with seismic restraining services as required by local building Codes. Contractor shall have local building office review each piece of equipment when installed and the Contractor shall install all required tie down, anchors, straps or other devices required.

3.18 CONNECTION OF TRADE EQUIPMENT

A. When equipment arrives on-site this contractor shall help unload, uncrate, assemble, set in place, install and electrically connect all equipment complete and ready for operations as required by all local area work rules and regulations.

B. This contractor is to pull feeders indicated for equipment but is to wait for arrival of appliance to install device. Once appliances arrive, then a device can be installed that matches cord/cap requirements.

END OF SECTION 260000

SECTION 311000 - SITE CLEARING

PART 1 GENERAL

1.01 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.

1.02 SUMMARY

A. This section includes the following:
   1. Temporary erosion and sediment control measures.
   2. Clearing and grubbing.
   3. Pavement removals.
      a. Related sections include the following:
   4. Section 31 21 00 Excavation and Fill for soil materials, excavating, backfilling, and site grading.

1.03 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, weeds, roots, toxic materials, or other non-soil materials.

B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

C. Tree Protection Fencing: Orange plastic safety fencing (4 foot tall) with rebar stakes placed and zip-tied to the fencing at a minimum of every 10 feet. Place orange plastic caps at the top of every rebar stake.

1.04 MATERIALS OWNERSHIP

A. Except for stripped topsoil and any other materials indicated to be stockpiled or to remain Owner's property, all demolished and/or cleared materials shall become the property of the Contractor and shall be removed from the site.

1.05 SUBMITTALS

A. Existing conditions photographs or videotape: Sufficiently document all existing site conditions. This includes the condition of trees and plants to remain, adjoining buildings, site features, etc., and any other site conditions that might be misconstrued as damage caused by construction. Submit to the Owner's Representative for verification and agreement prior to the start of any construction operations.

B. Missouri One-Call contact confirmation letter: Submit a letter, on Contractor's company letterhead, stating that Missouri One-Call (DIGRITE) has been contacted, and that, to the best of the Contractor's knowledge, all public utilities have been marked. Submit to the Owner's Representative for verification prior to the start of any construction operations.

C. Dump site license: Where soils or construction materials will be removed from the site, these waste materials must be dumped in an approved dump site. Dump site must be permitted for waste disposal by the local authority that has jurisdiction. Contractor to submit a copy of this dump site license to the Owner's Representative.

D. Product Data: Erosion Control Measures (Siltation Fencing).

1.06 PROJECT CONDITIONS

A. Contractor shall contact Missouri One-Call System (DIGRITE) to have all public utilities within the project area located before starting any construction operations.

B. It is the responsibility of the Contractor to provide any and all necessary surveying for this project.

C. Private site utilities are shown, to the best of the Owner's knowledge, on the topographic survey and plan drawings. It is the Contractor's responsibility to verify that all public and private utilities are field located before starting any construction operations.

D. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during construction operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Owner's Representative.
   2. When closures and/or obstructions must occur, and are approved by the Owner's Representative, provide alternate routes around all closed or obstructed traffic ways and pedestrian paths.

E. Do not commence site clearing operations until project erosion and sedimentation control measures are in place.

F. Contractor shall coordinate the location and size of the project construction staging area with the Owner's Representative.

PART 2 PRODUCTS

2.01 EROSION CONTROL MEASURES

A. Contractor shall follow the construction drawings and site details for proper materials and installation of erosion control measures. This includes, but is not limited to, the following:
   1. Siltation Control Fencing.

B. When local and/or state land disturbance codes and ordinances require more stringent erosion control methods, products, or installation, the more stringent codes shall be followed.

PART 3 EXECUTION

3.01 PREPARATION

A. Contractor is responsible for placing all site improvements in correct locations, as outlined on the construction drawings. Protect and maintain survey benchmarks and survey control points from disturbance during construction.

B. Install erosion and sedimentation control measures as outlined on the construction drawings.

C. Locate and clearly flag all trees scheduled for removal as shown on the construction drawings. For all trees within 50 feet of any construction or land disturbance area, install tree protection fencing at the drip line of all trees marked to remain.

D. Protect all existing site features to remain from damage during construction. If damage occurs to any existing site features scheduled to remain, the Contractor shall immediately contact the Owner's Representative. Restore damaged features to their original condition, as acceptable to the Owner's Representative, and at no additional cost.

E. Carefully remove all items indicated to be salvaged on the plan drawings and store within construction staging area.

F. Clear and grub and remove all surface site features scheduled to be removed prior to starting any rough grading and/or mass excavation.

3.02 CLEARING AND GRUBBING

A. Strip and clear all ground cover, grass, trees, shrubs, roots, obstructions, waste materials in planned disturbance areas as shown on the construction drawings. All cleared items shall not be reused or incorporated into fill materials. All cleared materials shall be hauled off-site and disposed of in a legal manner.
   1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
   2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
   3. Completely remove all below grade stumps and roots of trees scheduled to be removed.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material in fill areas only.

3.03 PAVEMENT REMOVALS

A. Sawcut pavements in locations shown on the Construction Drawings. If no locations are shown, Contractor shall locate nearest existing pavement joint and remove at that joint, or joint to joint. Consult Owner's Representative for further instructions of locations, if needed.

B. Within pavement removal areas, remove pavement and all rock base down to existing soil. Pavement and base rock shall be considered waste materials and shall be removed from the site and disposed of in a lawful manner.

C. Prepare subgrades per Specification Section 31 21 00 Excavation and Fill.

D. Protect newly prepared subgrades from storm water, construction traffic etc. Prepared subgrades that remain open for long periods of time shall be retested to meet the standards for compaction.

3.04 SITE IMPROVEMENTS

A. Remove all existing above and below grade site improvements as indicated on the construction drawings and as necessary to facilitate new construction.

3.05 UTILITIES

A. Do not interrupt existing utilities serving facilities occupied by adjacent property Owners. If services must be temporarily disconnected, Contractor shall obtain a letter of written permission from the utility owner to interrupt service prior to starting any utility work, and Contractor shall submit letter to the Owner's Representative.

B. Identify, locate, disconnect and cap off utilities indicated to be removed and/or abandoned.

C. Remove all existing above and below grade utilities as indicated on the plan drawings and as necessary to facilitate new construction.

3.06 DISPOSAL

A. Disposal: Remove surplus soil materials, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off the Owner's property. Legal disposal shall be at a permitted disposal site licensed for the appropriate disposal material.

END OF SECTION 311000

SECTION 312100 - EXCAVATION AND FILL

PART 1 GENERAL

1.01 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.

1.02 SUMMARY

A. This section includes the following:
   1. Excavating and backfilling for new surface improvements
   2. Excavating and backfilling for new utility improvements.
   3. Earthwork/grading.

B. Related sections include the following:
   1. Section 31 10 00 Site Clearing for all site clearing operations.

1.03 DEFINITIONS

A. Aggregate Base: Layer of rock placed above prepared subgrade for slabs-on-grade and pavements.

B. Backfill: Soil materials used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

C. Bedding: Layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow: Satisfactory soils imported from off-site for use as fill or backfill.

E. Deleterious material: Glass, fabric, wood, organics, rubble larger than 6 inches in any dimension, or any other compressible material.

F. Drainage Backfill: Rock placed in areas to specifically drain water.

G. Drainage Fabric: Nonwoven geotextile specifically designed for subsurface drainage and soil separation.

H. Excavation: Removal of material encountered above planned subgrade elevations.
   1. Additional Excavation: Excavation below planned subgrade elevations due to encountered unsuitable materials. Additional excavation and replacement material will be paid for according to the Contract provisions for changes in the Work. Unsuitable materials can only be classified by the Geotechnical Engineer. The owner will not pay for additional excavation that has not been approved in writing by the Geotechnical Engineer.
   2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by the Geotechnical Engineer. Unauthorized excavation shall be without additional compensation.

I. Fill: Soil materials used to raise existing grades.

J. Geotechnical Testing Agency: Individual or company who will be providing geotechnical testing responsibilities for this project.

K. Overexcavation: Excavation below planned subgrade elevations.

L. Prepared Subgrade: Subgrade that has been proof-rolled according to this specification, compacted according to this specification, and approved by the Geotechnical Testing Agency.

M. Rock: Material defined as and including all solid rock in ledges, embedded deposits, in unstratified masses, in conglomerate deposits or boulders so firmly cemented as to present all the characteristics of solid rock, stratified in layers greater than 4" thick between seams of ledge rock, and any material where each piece is greater than one cubic yard in volume such as boulders, detached pieces of limestone, hard sandstone, most shales, soft sandstone or rubble, and which require the use of drilling, blasting, or continued use of pneumatic jackhammers, 3/4 cubic yards or more in volume. All material which can be removed and loaded with normal power operating excavation equipment, including bulldozers and front end loaders, shall not be classified as rock.
   1. Class I: Field Rock
   2. Class II: Trench Rock

N. Satisfactory soils: Materials consisting of low plasticity, cohesive soils or well graded granular materials. Satisfactory soils shall include non-organic materials designated in soil classification groups CL, ML, CL-ML, SW, GW, and GM by ASTM D 2487. Satisfactory soils shall not contain debris/waste of any kind, frozen materials, vegetation, and other deleterious matter.

O. Structures: 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. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill.

Q. Unclassified Excavation: Excavation beyond subgrade that has been determined by the Geotechnical Testing Agency as unsatisfactory soils, and that has been authorized to be removed by the Owner's Representative

R. Unsatisfactory soils: All soils not defined as Satisfactory Soils using the definition above.

S. Utilities: above or below ground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.04 QUALITY ASSURANCE

A. Installation by a Contractor specializing in the work, and with a minimum of ten (10) years of documented experience for successful, high quality installations of excavation and fill specified herein.

B. Geotechnical Testing Agency Qualifications: The Contractor will engage an independent testing agency qualified according to ASTM E 329 to conduct soil materials, rock-definition testing and compaction testing as documented according to ASTM D 3740 and ASTM E 548. The Contractor is responsible for coordinating all testing as required in this specification with the Geotechnical Testing Agency.

1.05 SUBMITTALS

A. Samples:
   1. 60-lb soil samples, sealed in airtight containers, of each proposed fill soil material from on-site or borrow sources. Submit samples to the Geotechnical Testing Agency for testing.

B. Material Test Reports: From the Geotechnical Testing Agency, indicating and interpreting test results for compliance with the following requirements indicated: (submit test reports to the Owner's Representative and Civil Engineer.)
   1. Classification according to ASTM D 2487 of each on-site soil material and, if needed, each off-site borrow soil material proposed for use as fill and/or backfill.
   2. Laboratory compaction curves according to ASTM D 1557 (Modified Proctor) for each on-site soil material or borrow site soil material proposed for use as fill and/or backfill. This test may require 3 to 4 business days to complete. This test must be completed prior to commencing earthwork.

C. Test Reports: From the Geotechnical Testing Agency, indicating and interpreting test results for compliance with the following requirements indicated: (The Geotechnical Testing Agency shall submit test reports to the Owner's Representative, Civil Engineer and Contractor no more than 24 hours after the test results are known.)
   1. Test Reports as indicated in "Field Quality Control" section of this specification.

1.06 PROJECT CONDITIONS

A. Do not interrupt existing utilities serving facilities occupied by the Owner or others unless permitted by the Owner's representative or the utility owner. Contractor shall obtain written permission from the utility owner to interrupt service prior to starting any utility work.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

A. General: Provide off-site borrow soil materials when sufficient satisfactory soil materials are not available from on-site project areas.

B. Satisfactory Soils: Existing excavated satisfactory soil materials can be reused provided that any compressible or other deleterious materials (debris, waste, frozen materials, vegetation, wood, metals, etc.) have been removed.

C. Unsatisfactory Soils: Soils not meeting the definition of Satisfactory Soil Materials as mentioned above. When unsatisfactory soil materials are encountered, they shall be treated as waste materials. Soil materials classified as unsatisfactory soil materials may only be reused after a soil remediation plan has been specifically authorized and/or approved by the Geotechnical Testing Agency.

D. Backfill and Fill: Satisfactory soil materials, or remediated Unsatisfactory Soils as directed by the Geotechnical Testing Agency.

E. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2- inch sieve and 0 to 5 percent passing a No. 8 sieve.

G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand with 100 percent passing the 1-inch sieve.

H. Impervious Fill: Silty clay or clay soil capable of compaction to a dense state.

PART 3 EXECUTION

3.01 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared sub-grades, and from flooding project site and surrounding area.

C. Protect and maintain benchmarks and survey control points from disturbance during construction.

D. Verify that all erosion control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust has been installed properly, and in the locations and methods shown on the construction drawings.

E. Protect sub-grades from softening, undermining, washout, and damage by rain or water.

F. Stockpile borrow materials and satisfactory soil materials, without intermixing, in shaped, graded, drained, and covered stockpiles. Stockpile soil materials away from edge of excavations and outside drip line of remaining trees.

G. Fill and backfill: Place backfill and fill materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

H. Prepared Subgrades: Uniformly moisten or aerate subgrade before compaction to within 2 percent of optimum moisture content. Remove and replace, or scarify and air-dry, soil materials that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight. Compact subgrade as indicated in 3.1.H. Once subgrade has been compacted, proof roll subgrades with heavy pneumatic-tired equipment under supervision of the Owner's Representative to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities.

I. Compaction: Compact fill, backfill, and prepare subgrades to not less than the following percentages of maximum dry density as determined by the standard Proctor test, according to ASTM D 698:
   1. Under structures, building slabs, steps, pavements, and sidewalks compact and prepare subgrade and each layer of backfill or fill material to 95 percent of the maximum dry density.
   2. Under lawn or unpaved areas, compact and prepare subgrade and each layer of backfill or fill material to 85 percent of the standard Proctor maximum dry density.

J. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled or where they lose compaction.

K. Grading tolerances: Uniformly grade areas to smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Grade lawns, walks, and unpaved subgrades to tolerances of plus or minus 1 inch (25 mm) and pavements and areas within building lines to plus or minus 1/2 inch (13 mm). Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled or where they lose compaction.

L. Where settling occurs, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

M. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

N. Protect all structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations. If damage occurs, the contractor shall restore damaged features to their original condition, as acceptable to the Owner's representative, and at no additional cost.

3.02 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust. Place erosion control measures at the base of all soil stockpile areas.

B. Stockpile soil materials away from edges of construction. Do not store stockpile materials within the drip line of trees to remain.

3.03 DEWATERING

A. Prevent surface water and ground water from entering excavations, ponding on prepared subgrades, and flooding Project site and surrounding area by rerouting surface water away from excavated areas. Do not use excavated trenches as temporary drainage ditches.

B. Do not allow water to accumulate in excavations or on prepared subgrades. Install pumps or dewatering systems to keep excavations and subgrades dry. Convey water away from project area, and filter discharge water to prevent soil-bearing water runoff. Maintain dewatering methods until no longer needed.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

3.04 EXPLOSIVES

A. Explosives: Explosives are not permitted on the jobsite. Do not use explosives.

3.05 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
   1. Lawn or Unpaved Areas: Plus or minus 1 inch (25 mm).
   2. Walks: Plus or minus 1/2 inch (13 mm).
   3. Pavements: Plus or minus 1/2 inch (13 mm).

3.06 EXCAVATION

A. It is the Contractor's responsibility to follow all local, state, federal and OSHA regulations with regards to excavation and trench safety. Brace and/or shore all excavations and utility trenches as required by all local, state, federal and OSHA regulations. Excavations and/or utility trenches left open for any amount of time shall be barricaded. Do not leave open excavations or utility trenches unattended.

B. Excavate to final elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.

C. If excavated materials are intended for fill and backfill, have the Geotechnical Testing Agency classify and approve excavated materials for reuse. Discard any deleterious materials or unsatisfactory soil materials and/or waste off-site. Deleterious materials include glass, fabric, wood, cinders, organics, rubble larger than 6 inches in any dimension, or any other compressible material.

D. Excavation for Pavements and Walks: Excavate to indicated elevations and dimensions for subgrade preparation. Extend excavations a sufficient distance from structures for placing and removing formwork, for installing services and other construction, and for inspections.

E. Excavation for Utility Trenches: Excavate trenches to 4 inches (100 mm) deeper, or as shown on the project plans, than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
   1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

F. Excavation for Lawn and Landscaped areas: Excavate areas under lawn and landscape areas to indicated final grades minus 6 inches. Place 4 inches of topsoil on the top of excavated lawn and landscape areas to accept 2 inch thick sod lawns.

3.07 FILL AND BACKFILL

A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills. Once materials have been removed to expose in-situ soils, the surface shall be considered subgrade, and shall be prepared as dictated by this specification (Refer to "SUBGRADE PREPARATION" section of this specification).

B. For placing fills on existing areas sloped steeper than 1 vertical to 3 horizontal, contact Geotechnical Testing Agency and obtain instructions on how to place fill.

C. Once subgrade has been prepared, place and compact fill materials to required elevations as follows: (Refer to "COMPACTION" section of this specification for proper compaction requirements.)
   1. Under lawn and landscape areas, use satisfactory soil material.
   2. Under walks and pavements, use satisfactory soil material.
   3. Under steps and ramps, use engineered fill material.

3.08 SUBGRADE PREPARATION

A. Notify Geotechnical Testing Agency when excavations for footings, foundations, slabs-on-grade and pavements have reached required subgrade.

B. If Geotechnical Testing Agency visually determines that satisfactory soils are present, proof roll subgrade with a fully loaded tandem axle dump truck in order for Geotechnical Testing Agency to observe. If proof roll is satisfactory according to the Geotechnical Testing Agency, proceed with compaction as specified in "COMPACTION" section of this specification. In some cases, due to the nature of the soil materials, the Geotechnical Testing Agency may waive the need for proof rolling and compaction of the subgrade (only from approval by the Owner's Representative), in which case, Contractor shall proceed with placing fill as specified in the "FILL AND BACKFILL" section of this specification.

C. If Geotechnical Testing Agency determines that unsatisfactory soils are present, overexcavate to depths recommended by the Geotechnical Testing Agency. Continue this procedure until Geotechnical Testing Agency has approved that overexcavated grade is suitable. Proof roll excavated subgrades with a fully loaded tandem axle dump truck in order for Geotechnical Testing Agency to observe. If proof roll is satisfactory according to the Geotechnical Testing Agency, proceed with compaction as specified in "COMPACTION" section of this specification. In some cases, due to the nature of the soil materials, the Geotechnical Testing Agency may waive the need for proof rolling and compaction of the subgrade, in which case, Contractor shall proceed with placing fill as specified in the "FILL AND BACKFILL" section of this specification.
   1. Additional excavation and replacement material will be paid for according to the Contract Unit Prices.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, as directed by the Geotechnical Testing Agency. Contractor shall be responsible for rebuilding damaged subgrades at no additional cost to the Owner.

E. The Contractor is responsible for limiting the amount of heavy vehicle construction traffic on planned subgrades. Contractor shall be responsible for rebuilding damaged subgrades as a result of excessive construction traffic at no additional cost to the Owner.

3.09 BACKFILL FOR UTILITY TRENCHES

A. Place and compact bedding course on trench bottoms where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Coordinate backfilling with utilities testing. Test utilities and confirm positive test results prior to backfilling utility trenches.

C. Initial backfill: Place and compact backfill materials, as specified in the utility trench details on the plan drawings. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system. Compact initial backfill as specified in "COMPACTION" section of this specification.

D. Final backfill: Place and compact final backfill materials under both lawn/landscape area and pavement area as shown in the utility trench details on the plan drawings. Compact final backfill as specified in "COMPACTION" section of this specification.

E. Install utility warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements.

3.10 COMPACTION

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 4 percent of optimum moisture content.
   1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

B. Place backfill and fill materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

C. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

D. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557 (Modified Proctor Test):
   1. Building and pavement subgrades: compact to 95 percent.
   2. Fill and backfill under areas of building pads and pavements: compact each 8 inch layer to 95 percent.
   3. Fill and backfill under areas of lawn and landscaping: compact each 8 inch layer to 85 percent.

3.11 FIELD QUALITY CONTROL

A. Fill and Backfill courses: Geotechnical Testing Agency shall inspect and test each fill or backfill layer with the frequency of at least one test for every 10,000 sq. ft. Proceed with placing next earthwork fill or backfill layer only after test results for previously completed work complies with requirements.

B. Pavement Subgrades: The Geotechnical Testing Agency shall test compaction of soils in place, according to ASTM D 698 (Standard Proctor Test). Tests will be performed at the following locations and frequencies:
   1. Building Slab and Pavement Areas: At least one test for every 3,000 sq. ft. of paved area.

C. When the Geotechnical Testing Agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained. The Owner is not responsible for any costs associated with retesting previously failed areas.

3.12 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   1. Scarify or remove and replace soil material to depth as directed by Geotechnical Engineer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.13 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal:
   1. Remove waste material, unsatisfactory soils, trash, debris, satisfactory soils that are not needed for construction, and legally dispose of these materials off Owner's property.

END OF SECTION 312100

SECTION 321123 - AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 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.

1.02 SUMMARY

A. This section includes the following:
   1. Aggregate material requirements for base courses and utility trench backfill.

B. Related sections include the following:
   1. Section 31 21 00 Excavation and Fill for soil materials, excavating, backfilling, and site grading.

1.03 DEFINITIONS

A. Aggregate Base Course: Layer placed between the subgrade and paving materials.

B. Drainage Fabric: Geotextile fabric used to encapsulate soils to prevent intermingling with surrounding aggregates, and/or used to prevent soil loss in perforated piping.

C. Geotechnical Testing Agency: Individual or company who will be providing geotechnical testing responsibilities for this project.

D. MODOT: Missouri Department of Transportation.

E. Prepared Subgrade: Excavated soil surface which has been proof-rolled and/or compacted to the satisfaction of the Geotechnical Testing Agency, or the top surface of a properly compacted fill or backfill.

F. Separation Fabric: Geotextile fabric used as a horizontal barrier under pavement aggregate base to prevent intermingling of prepared subgrades and aggregate bases.

1.04 SUBMITTALS

A. Products: Separation Fabric.

B. Material Test Certifications: Written documentation from the manufacturing source certifying that each specified aggregate meets MODOT requirements.

C. Test Reports: From the Geotechnical Testing Agency, indicating and interpreting test results for compliance with the following requirements indicated: (Geotechnical Testing Agency shall submit test reports to the Owner's Representative, Civil Engineer and Contractor no more than 24 hours after the test results are known.)
   1. Test Reports as indicated in "FIELD QUALITY CONTROL" section of this specification.

1.05 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: The Contractor shall engage an independent testing agency qualified according to ASTM E 329 to conduct soil materials, rock-definition testing and compaction testing as documented according to ASTM D 3740 and ASTM E 548.

PART 2 PRODUCTS

2.01 2.01 MATERIALS

A. Aggregate Base Courses: MODOT Type 5 Aggregate: Type 5 aggregate for base shall consist of crushed stone and gravel. The aggregate shall not contain more than 15 percent deleterious rock and shale. The fraction passing the No. 40 sieve shall have a plasticity not to exceed six. Any sand, silt, clay, deleterious rock and shale shall be uniformly distributed throughout the material. The aggregate shall be in accordance with the following gradation requirements:
   1. Sieve Percent by Weight
   2. Passing 1 inch 100
   3. Passing ½ inch 60-90
   4. Passing No. 4 35-60
   5. Passing No. 30 10-35
   6. Passing No. 200 0-10

B. Separation Fabric: 8 oz. nonwoven geotextile – to meet or exceed AASHTO M288.
   1. Drainage Fabric: 8 oz. nonwoven geotextile – to meet or exceed AASHTO M288.

PART 3- GENERAL

3.01 RELATED DOCUMENTS

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

3.02 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials, as necessary.

C. Verify that all erosion control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust has been installed properly. Refer to plan drawings and erosion control details in the construction drawings for specifics on location and placement of erosion control measures.

3.03 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
   2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.04 EXCAVATION

A. Excavation for pavement and aggregate roadway areas: Excavate areas under pavement and aggregate roadway areas to indicated subgrade elevations as shown on the plan drawings and detail sheet of the construction drawings.

3.05 STORAGE OF SOIL MATERIALS

A. Aggregates shall be produced, handled, and stockpiled to minimize segregation, degradation, and contamination. Regardless of the method of storage and handling, all aggregate that is segregated, degraded, or contaminated to the extent that the aggregate does not meet specifications, will be considered unacceptable.

B. Stockpile aggregate materials away from edges of construction. Do not store within drip line of remaining trees.

3.06 COMPACTION

A. Only place aggregate bases on prepared subgrades.

B. Place aggregate base 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. Compact each layer of aggregate base material to not less than the following percentages of maximum dry density as determined by the standard Proctor test, according to ASTM D 698.
   1. Compact each layer of aggregate material by compacting to 95 percent of the maximum dry unit weight according to ASTM D 698 (standard Proctor Test).

3.07 FIELD QUALITY CONTROL

A. Aggregate Base: The Geotechnical Testing Agency shall test compaction of the aggregate base in place, according to ASTM D 698 (standard Proctor Test). Tests will be performed at the following locations and frequencies:
   1. Building Slabs and Pavement Areas: At least one test for every 2000 sq. ft. but in no case fewer than 3 tests.

B. When the Geotechnical Testing Agency reports that aggregate bases have not achieved degree of compaction specified, remove, and replace aggregates, as required. Recompact and retest until specified compaction is obtained. The Owner is not responsible for any costs associated with retesting previously failed areas.

C. The Contractor is responsible for limiting the amount of heavy vehicle construction traffic on aggregate bases. Contractor shall be responsible for rebuilding damaged aggregate bases as a result of excessive construction traffic at no additional cost to the Owner.

3.08 PROTECTION

A. Protect newly placed aggregate bases from freezing and erosion. Keep free of trash and debris.

3.09 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal:
   1. Dispose of waste materials and debris legally off Owner's property.

END OF SECTION 321123

SECTION 321216 - ASPHALT PAVING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
   1. Hot-mix asphalt paving.
   2. Pavement-marking paint.

1.03 DEFINITIONS

A. Asphalt Base Course: Layer of asphalt placed above the aggregate base and below the asphalt surface course.

B. Asphalt Surface Course: Layer of asphalt placed above the asphalt base course.

C. Compacted aggregate base: Aggregate base placed and compacted according to the project plan drawings and project specifications.

D. Hot-Mix Asphalt Paving Terminology: Refer to the Asphalt Institute.

E. MODOT: Missouri Department of Transportation.

F. QUALITY ASSURANCE

G. Asphalt Material Qualifications: Manufacturer of asphalt shall be registered with and approved by the Missouri Department of Transportation (MODOT).

H. Contractor Qualifications: Contractor shall be a current asphalt paving contractor registered with, and approved by, the Missouri Department of Transportation.

I. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

J. Installation by a Contractor with a minimum of ten (10) years of documented experience for successful, high quality installations of asphalt work specified herein.

K. Provide hot-mix asphalt paving according to materials, workmanship, these specifications, and other applicable requirements of the Asphalt Institute.

L. Testing Agency Qualifications: Contractor shall engage an independent testing agency to perform testing services as described in the "FIELD QUALITY CONTROL" portion of this specification, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

1.04 SUBMITTALS

A. General: Conform to general project submittal requirements established in the Division 01 Section and/or General Conditions.

B. Surface course asphalt mix design.

C. Base course asphalt mix design.

D. Pavement marking paint.

E. Test Reports: Asphalt testing as stated in this specification.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:
   1. Prime and Tack Coats: Minimum surface temperature of 50 deg F.
   2. Asphalt Base Course: Minimum surface temperature of 50 deg F and rising at time of placement.
   3. Asphalt Surface Course: Minimum surface temperature of 50 deg F at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 PRODUCTS

2.01 ASPHALT AGGREGATES

A. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or properly cured, crushed blast-furnace slag.

B. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, properly cured blast-furnace slag, or combinations thereof.
   1. ASPHALTIC MATERIALS

C. Asphalt Binder: AASHTO MP 1.

D. Asphalt Prime Coat: Type RC or MC, liquid asphalt.

E. Asphalt Tack Coat: SS-1, emulsified asphalt.
   1. AUXILIARY MATERIALS

F. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wetted powder form.

G. Sand: ASTM D 1073, Grade Nos. 2 or 3.

H. Joint Sealant: ASTM D 3405, hot-applied, single-component, polymer-modified bituminous sealant.

I. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with FS TT-P-115, Type I or AASHTO M 248, Type N. Apply two coats, minimum.
   1. Color: White (Parking Stripes - Asphalt).
   2. Color: Color: Yellow (Traffic Control and Crosswalks – Asphalt and Concrete, Parking Stripes - Concrete).
   3. Color: ADA Light Blue (ADA parking stripes, accessible parking symbols, crosswalks at ADA parking areas).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that aggregate subbase has been compacted as outlined in Section 32 11 23 Aggregate Base Courses. Verify that aggregate subbase is dry and in suitable condition to support paving and imposed loads.

B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.02 PRIME AND TACK COATS

A. Prime Coat: Follow MODOT Standards.
   1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
   2. Protect primed substrate from damage until ready to receive paving.

B. Tack Coat: Follow MODOT Standards.
   1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
   2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.03 HOT-MIX ASPHALT PLACEMENT

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from milled and/or compacted aggregate base surfaces. Ensure that aggregate base is ready to receive paving.
   1. Sweep loose granular particles from surface of aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
   1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

C. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
   1. Apply Prime Coat (as specified in Section 3.4/A of this specification).
   2. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
   3. Spread mix at minimum temperature of 250 deg F.
   4. Begin applying mix along high side of one-way slopes, unless otherwise indicated.
   5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
   6. Compact each asphalt base course lift as specified in Section 3.50 of this specification.
   7. Place tack coat if asphalt base course has become dirty or if set for 5 days.
   8. Place hot-mix asphalt surface course in number of lifts and thicknesses indicated.
   9. Compact each asphalt surface course lift as specified in Section 3.50 of this specification.

D. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
   1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

E. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

F. Compact each base course hot-mix asphalt paving lift as indicated in "Compaction" of this specification.

G. Apply Tack Coat (as specified in Section 3.4/B) prior to beginning placement of surface course asphalt.

H. Machine place surface course hot-mix asphalt on base course hot-mix asphalt surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix.
   1. Spread mix at minimum temperature of 250 deg F.
   2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

I. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

J. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

K. Compact each surface course hot-mix asphalt paving lift as indicated in "Compaction" of this specification.

3.04 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.
   1. Clean contact surfaces and apply tack coat to joints.
   2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.

3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
5. Compact asphalt at joints to a density within 2 percent of specified course density.

3.05 COMPACTION OF ASPHALT

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.
   1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
   1. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

I. INSTALLATION TOLERANCES

J. Thickness: Compact each course to produce the thickness indicated within the following tolerances:
   1. Base Course: Plus or minus 1/2 inch.
   2. Surface Course: Plus 1/4 inch, no minus.

K. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
   1. Base Course: 1/4 inch.
   2. Surface Course: 1/8 inch.
   3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.06 PAVEMENT MARKING

A. Allow paving to age for 30 days before starting pavement marking.

B. Sweep and clean surface to eliminate loose material and dust.

C. Apply paint with mechanical equipment or hand apply to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.07 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
   1. Testing agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from specified requirements.

B. Testing agency shall test base course and surface course asphalt temperature for each asphalt truck load, and in-place asphalt temperature immediately after placement.

C. Nuclear density test according to ASTM D 2922 of base course and surface course asphalt at the rate of one (1) per 2,000 square feet.

D. Written verification from an independent testing agency that the compaction of the base course asphalt meets or exceeds the standards of this specification.

E. Written verification from an independent geotechnical testing agency that the compaction of the surface course asphalt meets or exceeds the standards of this specification.

F. Remove and replace hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements. Additional testing and inspections, at Contractor’s expense, will be performed in order to determine compliance of replaced or additional work.

G. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

H. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

I. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

J. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.08 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them offsite.
   1. Do not allow excavated materials to accumulate on-site.

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:
   1. Curbs.
   2. Sidewalks.
   3. Pavement marking paint.

1.03 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.04 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

D. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
   1. Cementitious materials and aggregates.
   2. Steel reinforcement and reinforcement accessories.
   3. Admixtures.
   4. Curing compounds.
   5. Joint fillers.
   6. Pavement marking paint.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced concrete installer with more than 10 years of satisfactory service, and who has completed concrete pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
   1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.

C. Testing Agency Qualifications: Contractor shall engage an independent testing agency to perform testing services as described in the "FIELD QUALITY CONTROL" portion of this specification, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

F. Pre-installation Conference: Conduct conference at Project site to review construction drawings, specifications, and project schedule.
   1. Before submitting design mixes, review concrete pavement mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with concrete pavement to attend, including the following:
      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixes.
      c. Ready-mix concrete producer.
      d. Concrete subcontractor.

1.06 PROJECT CONDITIONS

A. Traffic Control: Maintain access around project site for vehicular and pedestrian traffic routes, where applicable. Close placed concrete areas to traffic during and after installation for a time period such that concrete can cure and harden.

B. Environmental limitations: Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting installation performance.

C. Plant-Mixed Concrete: Schedule delivery of concrete to provide consistent mix times, from batching until discharge.

D. Concrete Placement: Schedule placement of concrete to minimize exposure to wind and hot sun before curing materials have been applied. Do not place concrete in rain, snow, or if frost is forecast within 24 hours. Protect fresh concrete from moisture loss and freezing.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing the manufacturer's labels. For colored concrete products, manufacturer's label shall indicate brand name, directions for storage, mixing components, and application instructions.

B. Store products and materials in manufacturer's unopened packaging until ready for installation. Storage of materials shall comply with manufacturer's written instructions in order to prevent deterioration from moisture or other detrimental effects.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

PART 2 PRODUCTS

2.01 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
   1. Use flexible or curved forms for curves of a radius 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.02 STEEL REINFORCEMENT

A. Reinforcement bars: As specified on the Construction Drawings.

2.03 CONCRETE MATERIALS

A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.

B. Portland Cement: ASTM C 150, Type I or II.
   1. Fly Ash: ASTM C 618, Class F or C, maximum 15%.

C. Course Aggregate: standard cast-in-place concrete applications: ASTM C 33, uniformly graded, limestone, from a single source as follows:
   1. Maximum Aggregate Size: 3/4 inch nominal.
   2. Do not use coarse aggregates containing substances that cause spalling.

D. Fine Aggregate: ASTM C 33, size 67, uniformly graded, from a single local source, with fine aggregate as follows:
   1. Concrete Sand.
   2. Do not use fine aggregate containing substances that cause spalling.
   3. Lignite free.

E. Water: ASTM C 94.

2.04 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures. Use of calcium chloride as an admixture is prohibited.

B. Air-Entraining Admixture: ASTM C 260.

C. The following may be used under various site conditions. Contractor must get permission from the Engineer to use these admixtures:
   1. Water-Reducing Admixture: ASTM C 494, Type A.
   2. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
   3. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
   4. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.05 CURING MATERIALS

A. Water: Potable.

B. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

C. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.06 RELATED MATERIALS

A. Expansion Joint Filler Strips: ASTM D 1752, cellulosic fiber with preinstalled bond breaker and removable top strip for joint sealant application.

B. Joint Sealant: ASTM C 920, pourable, chemically curing elastomeric formulation.

C. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with FS TT-P-115, Type I or AASHTO M 248, Type N, with drying time of less than 1 hour.
   1. Color: White (Parking stall stripes in Asphalt).
   2. Color: Yellow (Safety striping, traffic control striping, parking stall stripes in crosswalks, traffic control, and parking stall striping in concrete).
   3. Color: ADA Light Blue (ADA parking space stripes, crosswalks from ADA parking spaces and accessible parking symbols. Verify state and local standards for color, size, hatching and symbol size for ADA parking spaces).

2.07 CONCRETE MIXES

A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.

C. Proportion mixes to provide concrete with the following properties:
   1. Compressive Strength (28 Days): 4000 psi.
   2. Maximum Water-Cementitious Materials Ratio: 0.45.
   3. Slump Limit: 4 inches.

D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
   1. Cementitious Material by weight: 25% max total
   2. Fly Ash: Max 15 percent.
   3. Ground Granulated Blast-Furnace Slag: 50 percent.
   4. Flint and chert: 1 percent by weight of the course aggregate.
   5. Lignite: Certified lignite free.

E. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus or minus 1.5 percent:
   1. Air Content: 6.0 percent for 3/4-inch maximum aggregate.

2.08 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.
   1. When air temperature is below 85 deg F, concrete delivery time and placement time shall be no more than 90 minutes.
   2. When air temperature is between 85 deg F and 90 deg F, concrete delivery time and placement time shall be no more than 75 minutes.
   3. When air temperature is above 90 deg F , concrete delivery and placement time shall be no more than 60 minutes.

B. Project-Site Mixing: Comply with requirements and measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
   1. For mixers of 1 cu. yd. or smaller capacity, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
   2. For mixers of capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
   3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added.

PART 3 EXECUTION

3.01 PREPARATION

A. Proceed with pavement placement only after proper compaction of aggregate bases has been confirmed. Remove loose material from aggregate surface immediately before placing concrete.

3.02 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.03 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.
   1. Apply epoxy repair coating to uncoated or damaged surfaces of epoxy-coated reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install fabricated bar mats, if applicable, in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.04 JOINTS

A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
   1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.
   1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
   2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
   3. Provide tie bars at sides of pavement strips where indicated.
   4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-third of the concrete thickness, as follows:
   1. Sawed Joints: Saw joints as soon as concrete has hardened sufficiently to permit sawing without raveling: usually 4 to 12 hours after placement. All joints shall be sawed before uncontrolled shrinkage cracking takes place. If necessary, the sawing operations shall be carried on both during the day and night, regardless of weather conditions.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

F. All joints (contraction and expansion) shall be sealed with elastomeric sealant.

3.05 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

F. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.
   1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

G. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.

H. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
   2. Do not use frozen materials or materials containing ice or snow.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

I. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:
   1. Concrete whose internal temperature exceeds 90 deg F at discharge shall be rejected.
   2. If temperature is approaching 90 deg F, cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F. Chilled mixing water or crushed ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is at the Contractor's option, and shall be approved in advance by the Geotechnical Testing Agency.
   3. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
   4. Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.
   5. As soon as concrete is placed and formed employ moisture retention measures to prevent shrinkage cracking.

3.06 CONCRETE FINISHING

A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots, and fill low spots. Re-float surface immediately to uniform granular texture.
   1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.07 PAVEMENT MARKING

A. Do not apply pavement-marking paint until colors for pavement striping have been verified and approved by the Owner's Representative.

B. Allow paving to age for 7 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.

E. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply two coats of paint, at manufacturer's recommended rates, in order to provide a minimum wet film thickness of 15 mils.

3.08 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing. Curing materials shall not discolor or alter the appearance of the concrete in any way, and shall not affect or fade the appearance of any coloring agents in the concrete.

B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by wet/moisture curing, curing compound, or a combination of these as follows:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Water.
      b. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
   2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.09 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:
   1. Elevation: 1/4 inch.
   2. Thickness: Plus 3/8 inch, minus 1/4 inch.
   3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
   4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
   5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
   6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
   7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
   8. Joint Spacing: Minimum=0.8 times width of walk, Maximum=1.2 times width of walk.
   9. Contraction Joint Depth: Plus 1/4 inch, no minus.
   10. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: The Contractor shall engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Testing Services: Testing shall be performed according to the following requirements:
   1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
   2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
   3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
   4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive-strength specimens.
   5. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd.. One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
   6. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
   7. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi.

C. Test results shall be reported in writing to Owner's Representative, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

D. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by the Owner's Representative. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.11 REPAIRS AND PROTECTION

A. Remove and replace any concrete pavement that does meet testing, is broken, damaged, or defective, or does not meet requirements in this Section, at no additional expense to the Owner.

B. Concrete shall be allowed to cure for a minimum of 7 days before any light vehicular loads are applied, 14 days until any heavy vehicular loads are applied. When vehicular traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 323223 - MODULAR BLOCK RETAINING WALLS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes segmental retaining walls with soil reinforcement and structural backfill.

B. Related Sections include the following:
   1. Section 312100 Excavation and Fill for excavation and backfill of segmental retaining walls.
   2. 2Section 321123 Aggregate Base Courses for block unit bases.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated:
   1. Block units.
   2. Cap units.
   3. Geogrid.
   4. Drainage Fabric.
   5. Drainage Pipe.
   6. Drainage Aggregate.
   7. Block Setting Aggregate.

B. Geotechnical Calculations and Certification Letter (global stability): Contractor shall contract with an independent geotechnical professional engineer, licensed in the State of Missouri, to review the project geotechnical report, and provide a global stability analysis for the wall. It may be necessary to obtain extra soil information in the area of the wall base, the cost for obtaining this additional information, if deemed necessary by the geotechnical engineer is the responsibility of the Contractor. Contractor shall also provide, from said geotechnical engineer, a certification letter, on the engineer's letterhead, stating the owner's project number and project title, with results of analysis and recommendations, if applicable. The letter shall be sealed, signed, and dated.

C. Structural Calculations and Certification Letter (local stability): Contractor shall contract with an independent structural professional engineer, licensed in the State of Missouri, to provide structural calculations that review the present wall layout, and provides a design of the wall system. This needs to include wall face profiles, length and vertical frequency of geogrid, any attachment details, etc. Contractor shall also provide, from said structural engineer, a certification letter, on the engineer's letterhead, stating the owner's project number and project title, with results of analysis and recommendations, if applicable. The letter shall be sealed, signed, and dated.

D. Block unit color catalog: Contractor shall submit a block catalog, clearly depicting the type of block planned for use, as well as the block manufacturer's standard colors for the type of block planned for use.

E. Qualification Data: Contractor shall submit information from the planned block wall installer that certifies that the block wall installer has a history of successful modular block wall installations that match the project scope of work.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store and handle concrete units and accessories to prevent deterioration or damage due to moisture, temperature changes, contaminants, breaking, chipping, or other causes.

B. Store geogrid and drainage fabric in manufacturer's original packaging with labels intact. Store on elevated platforms, protected from moisture, sunlight, chemicals, flames, temperatures above 160 deg F or below 32 deg F, and other conditions that might damage them. Verify identification of geogrid and drainage fabrics before using and examine them for defects as material is placed.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Retaining Wall Units:
      a. Licensees of MagnumStone Retaining Walls
   2. Licensees of Redi-Rock Retaining Walls
   3. Licensees of Versa-Lok Retaining Wall Systems.
   4. Geogrid Soil Reinforcement:
      a. Civil Engineering Fabrics; a division of BP Amoco Chemicals.
      b. TC Mirafi.
      c. TENAX Corporation.
      d. Tensar Earth Technologies, Inc.

2.02 RETAINING WALL UNITS

A. Face Pattern: To be selected by the Owner’s Representative from the manufacturer’s standard range.

B. Colors: To be selected by the Owner’s Representative from the manufacturer’s standard range.

C. Reinforcement: Either gravity, geogrid, etc. as determined by the Contractors structural engineer.

2.03 INSTALLATION MATERIALS

A. Cap Adhesive: Product recommended by segmental retaining wall unit manufacturer for adhering cap units to block units below.

B. Aggregate Base: Compacted MoDOT Type 5 Aggregate Base.

C. Drainage Fill: 1” clean aggregate, or as recommended by segmental retaining wall unit manufacturer.

D. Structural Fill: 4,000 psi concrete, or as recommended by segmental retaining wall unit manufacturer.

E. Soil Fill: Comply with requirements in Division 2 Section "Earthwork" for satisfactory soils.

F. Drainage Pipe: 4" SDR35 PVC with drainage holes and geotextile sock.

G. Geogrid Soil Reinforcement: Product recommended by segmental retaining wall unit manufacturer for transferring load from block units into drainage fill.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for excavation tolerances, condition of subgrades, and other conditions affecting performance of segmental retaining walls.

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

3.02 RETAINING WALL INSTALLATION

A. General: Place units according to NCMA's "Segmental Retaining Wall Installation Guide" and segmental retaining wall unit manufacturer's written instructions. Lay units in running bond.

B. Compacted Aggregate Base: Place and compact base material to thickness indicated and with not less than 90 percent maximum dry unit weight according to ASTM D 1557.

C. First Course: Place first course of segmental retaining wall units on leveling base/course for full length of wall. Place units in firm contact with each other, properly aligned and level.
   1. Tamp units into leveling base as necessary to bring tops of units into a level plane.
   2. Place and compact fill, either drainage or soil fill as indicated, to top of first course. Place fill on both sides of wall at same time without disturbing alignment of units. Fill voids between and within units with drainage fill.

D. Subsequent Courses: Remove excess fill and debris from tops of units in course below. Place units in firm contact, properly aligned, and directly on course below.
   1. For units with lugs designed to fit into holes in adjacent units, lay units so lugs are accurately aligned with holes, and bedding surfaces are firmly seated on beds of units below.
   2. For units with lips at front of units, slide units as far forward as possible for firm contact with lips of units below.
   3. For units with pins, install pins and align units according to manufacturer's written instructions.

E. For units with clips, install clips and align units according to manufacturer's written instructions.

F. Cap Units: Place cap units and secure with cap adhesive according to manufacturer's written instructions.

3.03 FILL PLACEMENT

A. General: Comply with requirements in Division 2 Section "Earthwork," NCMA's "Segmental Retaining Wall Installation Guide," and segmental retaining wall unit manufacturer's written instructions.
   1. Place, spread, and compact fill in uniform lifts for full width and length of embankment as wall is laid. Begin at back of wall and place and spread fill toward embankment.

3.04 CONSTRUCTION TOLERANCES

A. Variation from Level: For bed-joint lines along walls, do not exceed 1-1/4 inches in 10 feet, 3 inches maximum.

B. Variation from Indicated Batter and/or straight: For slope of wall face, do not vary from indicated slope by more than 1-1/4 inches in 10 feet.

3.05 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing on the prepared subgrade and aggregate base as indicated in Section "Excavation and Fill" and Section "Aggregate Base Courses" respectively.

3.06 ADJUSTING AND CLEANING

A. Remove and replace segmental retaining wall construction of the following descriptions:
   1. Broken, chipped, stained, or otherwise damaged units. Units may be repaired if methods and results are approved by the Architect.

END OF SECTION 323223

SECTION 333100 - SANITARY UTILITY SEWERAGE PIPING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes sanitary sewerage outside the building.

1.03 DEFINITIONS

A. PVC: Polyvinyl chloride plastic.

1.04 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.

B. Follow all City of Columbia standards for sanitary sewerage products and work.

1.05 SUBMITTALS

A. Product Data: For the following:
   1. Pipe.
   2. Manholes.

B. Shop Drawings: Include plans, elevations, details, and attachments for the following:
   1. Precast concrete manholes and all other structures, including frames and covers.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic structures, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle precast concrete manholes and all other structures according to manufacturer's written rigging instructions.

1.07 PROJECT CONDITIONS

A. Site Information: Verify all existing utility locations.

B. Locate existing storm sewer piping and structures that has been closed or abandoned.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to the Owner's Representative.
   1. Do not proceed with utility interruptions without Owner's Representative written permission.

PART 2 PRODUCTS

2.01 PIPES AND FITTINGS

A. PVC Sewer Pipe and Fittings: According to the following.
   1. PVC Sewer Pipe and Fittings: ASTM D 3034, SDR 26, for solvent-cemented or gasketed joints.
      a. Gaskets: ASTM F 477, elastomeric seals.

2.02 MANHOLES

A. Normal-Traffic Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.
   1. 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 minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
   4. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
   5. Top Section: Eccentric-cone type. Top of cone of size that matches grade rings.
   6. Gaskets: ASTM C 443, rubber.
   7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match frame and cover indicated.
   8. Steps: ASTM C 478, individual steps or ladder. Omit steps for manholes less than 60 inches deep.
   9. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include indented top design with lettering "SANITARY SEWER" cast into cover. Refer to construction drawing utility details for specific manhole and covers for manholes.

PART 3 EXECUTION

3.01 GENERAL

A. Follow all City of Columbia standards for sanitary sewer materials and construction, unless directed otherwise by the project documents. Contractor is responsible for all sewer installation, testing, permit fees, deposits, and as-built drawings required for this project.

3.02 EARTHWORK

A. Refer to Section 31 2100 "Excavation and Fill" for soil materials, excavating, backfilling, and site grading.

3.03 IDENTIFICATION

A. Install warning tape above piping and structures during backfilling. Locate below finished grade, directly over piping. See Section 31 2100 "Excavation and Fill" for underground warning tapes.

3.04 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawing plans and sewer profiles indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout takes 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 use of lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.

C. 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.

3.05 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. General: Join and install pipe and fittings according to installations indicated.

B. PVC Sewer Pipe and Fittings: As follows:
   1. Install according to ASTM D 2321.

C. 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.

3.06 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 manhole frames and covers flush with finished surface of surrounding pavements. Set tops 1 inches above finished grade of lawn areas, unless otherwise indicated.

D. Install precast concrete manhole sections with gaskets according to ASTM C 891.

3.07 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. Make branch connections to underground structures by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated.
   1. Use concrete that will attain minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

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.

3.08 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
   1. Testing agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from specified requirements.

B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

C. 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. In large, accessible piping, brushes and brooms may be used for cleaning.
   2. Place plug in end of incomplete piping at end of day and when work stops.
   3. Flush piping between manholes and other structures to remove collected debris.

D. 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 at completion of Project.
   1. Perform separate tests 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 92.5 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. Re-inspect and repeat testing procedure until results are satisfactory.

E. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
   1. Perform separate tests for each system inspection.
   2. Do not enclose, cover, or put into service before inspection and approval.
   3. Test completed piping systems according to authorities having jurisdiction.
   4. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
   5. Leaks and loss in test pressure constitute defects that must be repaired.
   6. Replace leaking piping using new materials, and repeat testing procedure until leakage is within allowances specified.

F. Submit all test reports within 24 hours of the testing to the authority having jurisdiction, Owner’s Representative and Architect.

G. Surveyed as-builts: The Contractor is responsible for providing a surveyed as-built if required by the City of Columbia permit. The Contractor is responsible for coordinating this effort with the Contractor's project surveyor, drainlayer and City of Columbia in order to provide all the required information necessary to gain an approved survey as-built, as required.

END OF SECTION 333100

SECTION 334100 - STORM UTILITY DRAINAGE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes storm drainage outside the building.

1.03 DEFINITIONS

A. AHJ: Authorities Having Jurisdiction

B. HDPE: High Density Polyethylene

C. PVC: Polyvinyl chloride plastic

1.04 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.

B. The Contractor shall follow all current AHJ standards for sewer construction.

1.05 SUBMITTALS

A. Product Data: For the following:
   1. Piping (any and all varieties used on the project).
   2. Plastic inlets.
   3. Inlet frames and covers.

B. Shop Drawings: Include plans, elevations, details, and attachments for the following:
   1. Inlet drainage structures, including frames, covers, and grates.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic structures, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle precast concrete manholes and all other structures according to manufacturer's written rigging instructions.

1.07 PROJECT CONDITIONS

A. Site Information: Verify all existing utility locations.

B. Locate existing storm sewer piping and structures that has been closed or abandoned.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to the Owner's Representative.
   1. Do not proceed with utility interruptions without Owner's Representative written permission.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Products and Manufacturers: Subject to compliance with Owner's requirements, and product submittal review and approval by the Engineer.

2.02 PIPES AND FITTINGS

A. PVC Sewer Pipe and Fittings: Piping for all storm sewers less than 12 inches in diameter.
   1. PVC Sewer Pipe and Fittings, ASTM D 3034, SDR 26, for solvent-cemented or gasketed joints.
      a. Gaskets: ASTM F 477, elastomeric seals.

B. For piping on all storm sewers 12 inches in diameter or larger, use either of the following:
   1. RCP Sewer Pipe and Fittings, ASTM C 76.
      a. Bell and spigot ends.
      b. Wall B, Class III minimum, asbestos free.
      c. Rubber gasketed, uniformly compressed to provide a watertight seal.
   2. HDPE Sewer Pipe and Fittings: According to the following.
      a. HDPE Sewer Pipe and Fittings, ASTM F 2648, with couplings.
      b. Couplings: Soil tight, ASTM F 2487, matching pipe and fittings.

PART 3 EXECUTION

3.01 GENERAL

A. Follow all local AHJ standards for storm sewer materials and construction, unless directed otherwise by the project documents.

3.02 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section "Excavation and Fill"

3.03 IDENTIFICATION

A. Install warning tape directly above piping and structures during backfilling. Plastic underground warning tapes: Nonmagnetic, polyethylene plastic tape, 4 inches wide by 4 mils thick, solid green in color with continuously printed caption in black letters "CAUTION – SEWER LINE BURIED BELOW" for each sewer line.

3.04 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawing plans and sewer profiles indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout takes 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 use of lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.

C. 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 storm drains, of sizes and in locations indicated. Terminate piping as indicated.
   1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
   2. Install piping with 36-inch minimum cover unless otherwise indicated.

3.05 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. General: Join and install pipe and fittings according to installations indicated.

B. PVC Sewer Pipe and Fittings: As follows:
   1. Install according to pipe manufacturers written specifications or AHJ specifications, whichever is more stringent.

C. RCP Sewer Pipe and Fittings: As follows:
   1. Install according to pipe manufacturers written specifications or AHJ specifications, whichever is more stringent.

D. HDPE Sewer Pipe and Fittings: As follows:
   1. Install according to pipe manufacturers written specifications or AHJ specifications, whichever is more stringent.

E. 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.

3.06 MANHOLE AND INLET 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, cover and grates flush with finished surface for manholes and inlets that occur in pavements, and 2 inches above finished grade surface for lawns, unless otherwise indicated.

3.07 TAP CONNECTIONS

A. Make connections to existing piping and underground structures.

B. Make branch connections to underground structures by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated.
   1. Use concrete that will attain minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.
   2. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

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.

3.08 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
   1. Testing agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from specified requirements.

B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

C. 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. In large, accessible piping, brushes and brooms may be used for cleaning.
   2. Place plug in end of incomplete piping at end of day and when work stops.
   3. Flush piping between manholes and other structures to remove collected debris.

D. 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 at completion of Project.
   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 92.5 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.

E. 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.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate reports for each test.
5. Leaks and loss in test pressure constitute defects that must be repaired.
6. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 334100

APPENDIX A

EXHIBIT A

R&R ENVIRONMENTAL
PARTNERS, LLC

167 Lamp & Lantern Village, Ste #268 ▪ Chesterfield, MO 63017 ▪ 314-297-8215 ▪ www.rrenvpartners.com

June 7, 2024

Michael Byrd
Core10 Architecture
4501 Lindell Boulevard, Suite 1a
St. Louis, Missouri 63108

RE: Limited Asbestos and Lead-Based Paint Survey
Update CCC Restroom & Renovate CCC Restroom into Cabin, 2CCC, Washington State Park
State of Missouri Project No.: X2337-01

Dear Mr. Byrd:

R&R Environmental Partners LLC (R&R) was contracted to complete a limited asbestos and lead-based paint survey of two (2) Civilian Conservation Corps (CCC) restroom buildings located at Washington State Park, for future renovation purposes. R&R's Missouri State licensed asbestos inspector and a subcontracted lead-based paint inspector using an X-Ray Florescence meter (XRF) performed the inspections and collected samples.

SCOPE OF WORK

The scope of work for this project consisted of a limited asbestos survey on materials to be removed or repaired and does not include the stonework, concrete floors, and wood shake roofing shingles. Although wood shake shingles would not contain asbestos, any roofing felts underneath the shingles and flashing adhesives could potentially still contain asbestos on the roof. Only the restroom known as "The Bug House" contained roofing felt. The Thunderbird restroom did not contain roofing felt under the shake shingles. Due to the condition of the roofs, it was not safe for the inspectors to climb up to get a sample of the flashing adhesive around the chimney at each building.

SCOPE OF WORK (cont.)

A total of fifteen (15) asbestos samples were collected from potential asbestos containing building materials. See attached Missouri asbestos inspector's license.

Lead-based paint was evaluated by use of an X-Ray Florescence meter (XRF), and building material samples were collected and analyzed by Polarized Light Microscopy (PLM) for the presence of asbestos. See attached Missouri lead-based paint inspector's license.

LEAD-BASED PAINT SURVEY

On May 21, 2024, a lead-based paint survey was conducted on two (2) CCC restroom buildings located at Washington State Park near De Soto, Missouri. The two (2) buildings known as "The Bug House" and the Thunderbird restrooms were constructed during the 1930s of wood and local stone. Most of the wood surfaces have been painted over the years with evidence of several layers of paint in the buildings.

Bug House Restroom

XRF samples were collected from the walls, ceilings, roof decking, roof trusses, windows, window frames, headers, and mulleins; doors and door frames; exterior doors, windows, and associated framing. Samples were also collected from ceramic flooring and brick as these items can also contain lead.

Based on the XRF testing data collected on May 21, 2024, several items within the Bug House contain lead-based paint; including the interior foyer roof deck, trusses, and window header; the men's room walls, window, frame and header, and the roof deck and trusses. A positive result for lead-based paint on the exterior window frame on the north side of the building was also found. See the attached XRF Testing data tables.

Although the women's side of the restroom showed no lead-based paint on the samples collected; the men's side of the restroom walls did contain lead-based paint. However, it was noted from the samples collected that there were many small pockets of thicker layered paint found on the men's side of the restroom due to older layers of paint still present. These older paint layers are the layers that contain lead and although the samples collected on the women's side did not contain lead, these pockets of thicker paint could still be present and were just missed by XRF. The XRF only measures a small area that is located directly under the monitoring tip.

LEAD-BASED PAINT SURVEY (cont.)

Bug House Restroom (cont.)

Since both sides of the restrooms were painted with the same paint it would be prudent to assume that all of the walls in the Bug House restroom contain some amount of lead-based paint from previous layers of paint.

Thunderbird Restroom

XRF samples were collected from the walls, ceilings, roof decking, roof trusses, windows, window frames, headers and mullions; doors and door frames; exterior doors, windows and associated framing. Samples were also collected from ceramic flooring and wall covering; as these items can also contain lead.

Based on the XRF testing data collect on May 21, 2024, only a few items on the exterior of the Thunderbird restroom contain lead-based paint; including the door frame on the south side of the building; the door/window framing on the east side of the building; and the exterior door frame on the north side of the building.

See the attached XRF Testing data tables.

ASBESTOS SURVEY

On May 21, 2024, a limited asbestos survey was conducted on two (2) CCC restroom buildings located at Washington State Park near De Soto, Missouri. The two buildings known as "The Bug House" and the Thunderbird restrooms were constructed during the 1930s of wood and local stone.

Bug House Restroom

Bulk samples were collected of the mortar, the roofing felt, and the window glazing.

Based on the May 21, 2024 sample results, the window glazing (BH-WSP-GLZ) was found to contain 3% Chrysotile asbestos. In addition, it should be noted that the roof flashing/caulking was ASSUMMED to be asbestos-containing. If these materials have a likelihood of being disturbed, they should be removed by a State of Missouri licensed asbestos abatement contractor.

Asbestos was NOT detected in the mortar or roofing felt.

ASBESTOS SURVEY (cont.)

Thunderbird Restroom

Bulk samples were collected of the window/door caulk, the firebrick, and the window glazing.

Based on the May 21, 2024 sample results, the window glazing (TB-WSP-GLZ) was found to contain 5% Chrysotile asbestos. In addition, the window/door caulk was found to contain <1% Chrysotile asbestos. A material is considered by the EPA and/or State of Missouri to be asbestos containing if at least one (1) sample collected from the homogenous area contains asbestos in an amount greater than 1%. Based on EPA's NESHAP regulations, any material containing <1% asbestos must be assumed as asbestos containing unless the material is analyzed via the Point Count Method. We have assumed this material to be asbestos containing so no further testing is warranted. Keep in mind, if we point count this material and it is found to be <1%, the EPA and the State of Missouri do not consider this to be a regulated material. However, OSHA requires that any material, such as the window/door caulk, which contains any amount of asbestos be removed under certain conditions. While a State of Missouri licensed asbestos abatement contractor is not required; OSHA regulations may still apply (with special work practice requirements – see attached document). Asbestos was NOT detected in the firebrick found in the mechanical room/closet.

See attached Asbestos analytical reports from EMSL Analytical laboratory including their NAVLAP accreditation for analyzing asbestos samples.

SUMMARY

Asbestos

Based on the results of the limited asbestos at the Bug House and Thunderbird restroom buildings, a limited amount of asbestos was found primarily in the window glazing at both facilities. The caulk at the Thunderbird restroom contained <1% asbestos and is not considered asbestos containing by EPA and the Missouri Department of Natural Resources (MDNR). OSHA asbestos work standards may still apply to these materials, including the caulk at Thunderbird. Any adhesives or caulking associated with the roof flashing observed around the chimneys at both facilities are assumed to be asbestos containing and any work required to remove or repair them must be completed using asbestos protocols. The roofing felts at the Bug House were not asbestos containing, and no roofing felts were found at Thunderbird.

SUMMARY (cont.)

Lead-Based Paint

Based on the results of the lead-based paint survey, there are several areas of lead-based paint at the Bug House restroom; however, it is only on the exterior door and window/door framing at the Thunderbird restroom. No interior lead-based paint samples were found at Thunderbird.

Thunderbird Lead-Based Paint Positive Samples:

Thunderbird

Exterior	S	Door Frame	Wood	Brown	I	4.9	Pos
Exterior	E	Door/Window Frame	Wood	Brown	I	6.0	Pos
Exterior	N	Exterior Door Frame	Wood	Brown	I	4.0	Pos

Lead-based paint samples found to be positive at the Bug House:

Bug House

Room #	Wall	Component	Substrate	Paint Color	Paint Condition	XRF Reading	Result
Foyer	E	Roof Deck	Wood	Brown	I	1.0	Pos
Foyer	E	Roof Truss	Wood	Brown	I	1.3	Pos
Men's	W	Header	Wood	Brown	I	1.3	Pos
Men's	N	Wall	Brick	White	CR	1.5	Pos
Men's	N	Wall	Brick	White	CR	0.9	Pos
Men's	S	Window Header	Wood	White	A	2.2	Pos
Men's	S	Window Frame	Wood	White	CR	1.9	Pos
Men's	S	Window	Wood	White	CR	1.5	Pos
Men's	S	Rood Deck	Wood	White	A	3.3	Pos
Men's	S	Roof Truss	Wood	White	A	1.2	Pos
Exterior	N	Window Frame	Wood	Brown	I	1.3	Pos

SUMMARY (cont.)

Lead-Based Paint (cont.)

During the inspection, several samples were taken of the men's room walls because both positive and negative samples were taken from the same material. A visual inspection of the wall showed that several layers of thick paint were observed in different patchwork areas around the room and it was those areas that were positive for lead. Although the women's side test results show negative results for lead, it could be that the areas tested did not contain the older layers of paint, but that those older layers could still exist in the room and were missed by the XRF since they could be scattered around the room in small patches. It would be prudent to treat both the men's and women's walls as lead-containing due to the potential for small areas of older layers of paint potentially still present on the women's side.

If you have any technical questions about this report, please contact Juliette Travous at 314-229-7185. For any other questions, please contact Jackie Robb at 314-297-8215.

Sincerely,
R&R ENVIRONMENTAL PARTNERS LLC

Juliette Travous

Juliette Travous CIH, CSP, CHMM
Director Industrial Hygiene and Safety

Jackie Robb

Jackie Robb, CHMM
Partner/Co-Owner

JT/jr

CORE10

Washington Park - Asbestos/Lead Survey Photos

Bug House – Sample locations

Window Glazing



Stone Mortar



Wood Shake Shingles – not sampled



Wood Shake Shingles – not sampled



Roofing felts near stack pipe opening at Bug House



The Bug House Roof with chimney flashing

Adhesives/caulking assumed to be asbestos containing



The Bug House Women’s Entry Door and

Exterior windows



Side of Bug House with window framing



The Bug House Men’s Entry Door



Stone walls on interior of Bug House



Stone walls, window frame and header in

Bug House



Door frame stone end caps and brick wall

Inside Bug House



Women’s Sink - insulating paint on underside

Is assumed to be asbestos containing



Thunderbird – Sample Locations

Thunderbird exterior window caulking



Thunderbird front exterior showing

Window and door framing and headers

And wood window cover



Thunderbird showing window/door Header, window frames and chimney flashing



Thunderbird Window framing and glazing



Thunderbird Entry Doorway and bank of windows.



Thunderbird exterior stone mortar



PSI Project #:

Building: "The Bug House"

XRF Device #: 2303

Type of XRF: Viken PB200e

Operator's Name: Kevin Roberts

Date of Survey: 05/21/24

XRF Testing Data Table

Shot No.	Interior / Exterior	Room #	Wall	Component	Substrate	Paint Color	Paint Condition	XRF Reading	Result
1	Calibration							0.9	Pass
2								0.9	
3								1.0	
4	Int	Womens	N	wall	Wood	White	I	0.1	Neg
5			N	Window Beam	Wood	White	A	0.7	Neg
6			N	Window Beam	Wood	White	A	0.6	Neg
7			N	Window Frame	Wood	White	P	0.6	Neg
8			N	Window	Wood	White	P	0.2	Neg
9			N	Window Mullens	Wood	White	I	0.0	Neg
10			S	Wall	Brick	White	CR	0.6	Neg
11			S	Wall	Brick	White	CR	0.7	Neg
12			S	Stall Walls	Metal	White	I	0.0	Neg
13			S	Stall Frame	Metal	White	CR	0.0	Neg
14			S	Stall Doors	Metal	White	I	0.0	Neg
15			N	Roof Deck	Wood	White	I	0.1	Neg
16			N	Roof Truss	Wood	White	CR	0.3	Neg
17			E	Window	Wood	Brown	I	0.2	Neg
18			S	Door Frame	Wood	White	I	0.0	Neg
19		Foyer	E	Door Header	Wood	Brown	I	0.4	Neg
20			E	Door	Metal	Brown	I	0.2	Neg
21			E	Roof Deck	Wood	Brown	I	0.8	Neg
22			E	Roof Deck	Wood	Brown	I	1.0	Pos
23			E	Roof Truss	Wood	Brown	I	1.3	Pos

XRF Testing Data Table

Shot No.	Interior / Exterior	Room #	Wall	Component	Substrate	Paint Color	Paint Condition	XRF Reading	Result
24		Mens	W	Header	Wood	Brown	I	0.8	Neg
25			W	Header	Wood	Brown	I	1.3	Pos
26			W	Roof Deck	Wood	Brown	I	0.5	Neg
27			W	Roof Deck	Wood	Brown	I	0.5	Neg
28			W	Roof Truss	Wood	Brown	I	0.8	Neg
29			W	Roof Truss	Wood	Brown	I	0.7	Neg
30			W	Door	Metal	Brown	I	0.0	Neg
31			W	Door Frame	Wood	White	I	0.1	Neg
32			N	Wall	Brick	White	CR	1.5	Pos
33			N	Wall	Brick	White	CR	0.7	Neg
34			N	Wall	Brick	White	CR	0.9	Pos
35			N	Stall Walls	Metal	While	I	0.1	Neg
36			N	Stall Frame	Metal	White	CR	0.0	Neg
37			N	Stall Doors	Metal	White	U	0.0	Neg
38			S	Window Header	Wood	White	A	2.2	Pos
39			S	Window Frame	Wood	White	CR	1.9	Pos
40			S	Window	Wood	White	CR	1.5	Pos
41			S	Windown Mullens	Wood	White	I	0.0	Neg
42			S	Wall	Wood	White	I	0.2	Neg
43			S	Rood Deck	Wood	White	A	3.3	Pos
44			S	Roof Truss	Wood	White	A	1.2	Pos
45	Exterior		W	Roof Deck	Wood	Brown	I	0.7	Neg
46			W	Roof Deck	Wood	Brown	I	0.9	Neg

XRF Testing Data Table

Shot No.	Interior / Exterior	Room #	Wall	Component	Substrate	Paint Color	Paint Condition	XRF Reading	Result
47			NW	Roof Truss	Wood	Brown	CR	0.4	Neg
48			SW	Roof Deck	Wood	Brown	I	0.8	Neg
49			SW	Roof Truss	Wood	Brown	CR	0.6	Neg
50			SW	Roof Truss	Wood	Brown	CR	0.4	Neg
51			W	Window Frame	Wood	Brown	I	0.5	Neg
52			W	Window Header	Wood	Brown	I	0.5	Neg
53			W	Window Cover	Wood	Brown	CR	0.0	Neg
54			S	Window Frame	Wood	Brown	I	0.7	Neg
55			S	Window	Wood	Brown	i	0,1	Neg
56			S	Roof Deck	Wood	Brown	I	0.2	Neg
57			S	Roof Truss	Wood	Brown	I	0.3	Neg
58			E	Window Frame	Wood	Brown	I	0.8	Neg
59			E	Window	Wood	Brown	I	0.0	Neg
60			E	Window Header	Wood	Brown	I	0.8	Neg
61			E	Rood Deck	Wood	Brown	I	-0.5	Neg
62			E	Roof Truss	Wood	Brown	I	0.6	Neg
63			N	Window Frame	Wood	Brown	I	1,3	Pos
64			N	Window	Wood	Brown	I	0.2	Neg
65			N	Roof Deck	Wood	Brown	I	0.6	Neg

XRF Testing Data Table

Shot No.	Interior / Exterior	Room #	Wall	Component	Substrate	Paint Color	Paint Condition	XRF Reading	Result
66			N	Roof Truss	Wood	Brown	I	0.7	Neg
67									
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81	Calibration							1.0	Pass
82								1.0	
83								1.0	

PSI Project #: _____ XRF Device #: 2303 Date of Survey: 05/21/24

Building: Thunderbird Type of XRF: Viken PB200e

_____ Operator's Name: Kevin Roberts

XRF Testing Data Table

Shot No.	Interior / Exterior	Room #	Wall	Component	Substrate	Paint Color	Paint Condition	XRF Reading	Result
1	Calibration								Pass
2									
3									
4	Interior	Mens	N	Door	Metal	Cream	P	0.0	Neg
5			N	Door Frame	Metal	Cream	I	0,0	Neg
6			W	Window Header	Wood	Cream	I	0.2	Neg
7			W	Window Frame	Wood	Cream	I	0.2	Neg
8			W	Window Board	Wood	Cream	I	0.0	Neg
9			W	Block Wall	Ceramic	NA	NA	0.0	Neg
10			W	Stall Door	Metal	Cream	P	0.0	Neg
11			W	Stall Wall	Metal	Cream	P	0.0	Neg
12			W	Stall Frame	Metal	Cream	P	0.1	Neg
13			S	Block Wall	Ceramic	NA	NA	0.0	Neg
14			N	Window Frame	Wood	Cream	CR	0.3	Neg
15			N	Window Header	Wood	Cream	CR	0.1	Neg
16			N	Window	Wood	Cream	I	0.1	Neg
17			N	Window Mullens	Wood	Cream	I	0.1	Neg
18			N	Ceiling	Wood	Cream	CR	0.2	Neg
19			N	Floor	Ceramic	NA	NA	0.1	Neg
20	Interior	closet	E	Door	Wood	Brown	I	0.0	Neg

21			E	Droor Frame	Wood	Silver	I	0.0	Neg
22			E	Window	Wood	Silver	I	0.0	Neg
23			E	Ceiling	Wood	Silver	I	0.2	Neg
24	Interior	Womans	S	Interior Door	Metal	Cream	P	0.1	Neg
25			S	Door Frame	Wood	Cream	P	0.1	Neg
26			W	Window Frame	Wood	Cream	I	0.1	Neg
27			W	Windown Header	Wood	Cream	P	0,2	Neg
28			W	Wall	Ceramic	NA	NA	0.0	Neg
29			W	Stall Door	Metal	Cream	P	0.0	Neg
30			W	Stall Wall	Metal	Cream	P	0.1	Neg
31			W	Stall Frame	Metal	Cream	P	0.0	Neg
32			N	Wall	Ceramic	NA	NA	0.0	Neg
33			SW	Window	Wood	Cream	P	0.1	Neg
34			SW	Window Frame	Wood	Cream	P	0.2	Neg
35			SW	Window Header	Wood	Cream	P	0.1	Neg
36			SW	Ceiling	Wood	Cream	P	0.2	Neg
37			SW	Floor	Ceramic	NA	NA	0.1	Neg
38	Exterior		S	Roof Deck	Wood	Brown	I	0.0	Neg
39			S	Roof Truss	Wood	Brown	I	0.0	Neg
40			S	Exterior Door	Metal	Brown	I	0.0	Neg
41			S	Door Frame	Wood	Brown	I	4.9	Pos
42			S	Window Frame	Wood	Brown	I	0.0	Neg
43			S	Window	Wood	Brown	I	0.0	Neg

44			S	Window Mullens	Wood	Brown	I	0.0	Neg
45			S	Window Wood Covers	Wood	Brown	P	0.0	Neg
46			E	Door/Window Frame	Wood	Brown	I	6.0	Pos
47			E	Window Cover	Wood	Brown	I	0.0	Neg
48			E	Window Frame	Wood	Brown	I	0.1	Neg
49			W	Roof Deck	Wood	Brown	i	0.0	Neg
50			W	Roof Truss	Wood	Brown	I	0.1	Neg
51			W	Window Frame	Wood	Brown	I	0.0	Neg
52			W	Window	Wood	Brown	I	0.0	Neg
53			W	Window Mullens	Wood	Brown	I	0.0	Neg
54			N	Exterior Door Frame	Wood	Brown	I	4.0	Pos
55			N	Door	Metal	Brown	I	0.0	Neg
56			N	Spindels	Wood	Brown	I	0.2	Neg
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77									
78									
79									

80									
81	Calibration							1.0	Pass
82								1.0	
83								1.0	

EMSL Analytical, Inc.

100 Green Park Industrial Court Saint Louis, MO 63123

Tel/Fax: (314) 577-0150 / (314) 776-3313

http://www.EMSL.com / saintlouislab@emsl.com

EMSL Order:	392402684
Customer ID:	PSI54
Customer PO:	0029-6297
Project ID:	

Attention:	Chuck Dowling	**Phone:**	(618) 806-0693
	PSI - Professional Service Industries	**Fax:**	(314) 432-5119
	11826 Borman Drive	**Received Date:**	05/21/2024 3:38 PM
	Saint Louis, MO 63146	**Analysis Date:**	05/23/2024
		Collected Date:	

Project: 0029-6297-2 R & R Washington State Park

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
BH-WSP-MOR-001 *392402684-0001*		Various Non-Fibrous Homogeneous		17% Quartz 83% Non-fibrous (Other)	None Detected
BH-WSP-MOR-002 *392402684-0002*		Various Non-Fibrous Homogeneous		18% Quartz 82% Non-fibrous (Other)	None Detected
BH-WSP-MOR-003 *392402684-0003*		Gray Non-Fibrous Homogeneous		12% Quartz 88% Non-fibrous (Other)	None Detected
BH-WSP-RFL-001 *392402684-0004*		Brown Non-Fibrous Homogeneous	37% Cellulose 2% Synthetic	61% Non-fibrous (Other)	None Detected
BH-WSP-RFL-002 *392402684-0005*		Brown Non-Fibrous Homogeneous	34% Cellulose 2% Synthetic	64% Non-fibrous (Other)	None Detected
BH-WSP-RFL-003 *392402684-0006*		Brown Non-Fibrous Homogeneous	42% Cellulose 5% Synthetic	53% Non-fibrous (Other)	None Detected
BH-WSP-GLZ-001 *392402684-0007*		Gray Non-Fibrous Homogeneous		97% Non-fibrous (Other)	**3% Chrysotile**
BH-WSP-GLZ-002 *392402684-0008*					**Positive Stop (Not Analyzed)**
BH-WSP-GLZ-003 *392402684-0009*					**Positive Stop (Not Analyzed)**
TB-WSP-CLK-001 *392402684-0010*		Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	**<1% Chrysotile**
TB-WSP-CLK-002 *392402684-0011*		Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	**<1% Chrysotile**
TB-WSP-CLK-003 *392402684-0012*		Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	**<1% Chrysotile**
TB-WSP-FB-001 *392402684-0013*		Various Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
TB-WSP-FB-002 *392402684-0014*		Various Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
TB-WSP-FB-003 *392402684-0015*		Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
TB-WSP-GLZ-001 *392402684-0016*		Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 05/23/2024 17:10:49

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100 Green Park Industrial Court Saint Louis, MO 63123
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EMSL Order:	392402684
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Project ID:	

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
TB-WSP-GLZ-002 *392402684-0017*		White Non-Fibrous Homogeneous		95% Non-fibrous (Other)	**5% Chrysotile**
TB-WSP-GLZ-003 *392402684-0018*					**Positive Stop (Not Analyzed)**

Analyst(s)
Sue Ferrario (11)
Sarah Kuper (4)

Jeff Siria, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 “Interim Method”) but augmented with procedures outlined in the 1993 (”final”) version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Saint Louis, MO NVLAP Lab Code 200742-0, CA 2668, OR 4194-001

Initial report from: 05/23/2024 17:10:49

APPENDIX B

EXHIBIT B

2 PRESERVATION BRIEFS



Repointing Mortar Joints in Historic Masonry Buildings

Robert C. Mack, FAIA
John P. Speweik

U.S. Department of the Interior
National Park Service
Cultural Resources
Heritage Preservation Services



Figure 1. After removing deteriorated mortar, an experienced mason repoints a portion of this early-20th century limestone building. Photo: Robert C. Mack, FAIA.

Masonry — brick, stone, terra-cotta, and concrete block — is found on nearly every historic building. Structures with all-masonry exteriors come to mind immediately, but most other buildings at least have masonry foundations or chimneys. Although generally considered "permanent," masonry is subject to deterioration, especially at the mortar joints. Repointing, also known simply as "pointing"or—somewhat inaccurately—"tuck pointing"*, is the process of removing deteriorated mortar from the joints of a masonry wall and replacing it with new mortar (Fig. 1). Properly done, repointing restores the visual and physical integrity of the masonry. Improperly done, repointing not only detracts from the appearance of the building, but may also cause physical damage to the masonry units themselves.

The purpose of this Brief is to provide general guidance on appropriate materials and methods for repointing historic masonry buildings and it is intended to benefit building owners, architects, and contractors. The Brief should serve as a guide to prepare specifications for repointing historic masonry buildings. It should also help develop sensitivity to the particular needs of historic masonry, and to assist historic building owners in working cooperatively with architects, architectural conservators and historic preservation consultants, and contractors. Although specifically intended for historic buildings, the guidance is appropriate for other masonry buildings as well. This publication updates *Preservation Briefs 2: Repointing Mortar Joints in Historic Brick Buildings* to include all types of historic unit masonry. The scope of the earlier Brief has also been expanded to acknowledge that the many buildings constructed in the first half of the 20th century are now historic and eligible for listing in the National Register of Historic Places, and that they may have been originally constructed with portland cement mortar.

*Tuckpointing technically describes a primarily decorative application of a raised mortar joint or lime putty joint on top of flush mortar joints.

Historical Background

Mortar consisting primarily of lime and sand has been used as an integral part of masonry structures for thousands of years. Up until about the mid-19th century, lime or quicklime (sometimes called lump lime) was delivered to construction sites, where it had to be slaked, or combined with water. Mixing with water caused it to boil and resulted in a wet lime putty that was left to mature in a pit or wooden box for several weeks, up to a year. Traditional mortar was made from lime putty, or slaked lime, combined with local sand, generally in a ratio of 1 part lime putty to 3 parts sand by volume. Often other ingredients, such as crushed marine shells (another source of lime), brick dust, clay, natural cements, pigments, and even animal hair were also added to mortar, but the basic formulation for lime putty and sand mortar remained unchanged for centuries until the advent of portland cement or its forerunner, Roman cement, a natural, hydraulic cement.

Portland cement was patented in Great Britain in 1824. It was named after the stone from Portland in Dorset which it resembled when hard. This is a fast-curing, hydraulic cement which hardens under water. Portland cement was first manufactured in the United States in 1872, although it was imported before this date. But it was not in common use throughout the country until the early 20th century. Up until the turn of the century portland cement was considered primarily an additive, or "minor ingredient" to help accelerate mortar set time. By the 1930s, however, most masons used a mix of equal parts portland cement and lime putty. Thus, the mortar found in masonry structures built between 1873 and 1930 can range from pure lime and sand mixes to a wide variety of lime, portland cement, and sand combinations.

In the 1930s more new mortar products intended to hasten and simplify masons' work were introduced in the U.S. These included **masonry cement**, a premixed, bagged mortar which is a combination of portland cement and ground limestone, and **hydrated lime**, machine-slaked lime that eliminated the necessity of slaking quicklime into putty at the site.

Identifying the Problem Before Repointing

The decision to repoint is most often related to some obvious sign of deterioration, such as disintegrating mortar, cracks in mortar joints, loose bricks or stones, damp walls, or damaged plasterwork. It is, however, erroneous to assume that repointing alone will solve deficiencies that result from other problems (Fig. 2). The root cause of the deterioration—leaking roofs or gutters, differential settlement of the building, capillary action causing rising damp, or extreme weather exposure—should always be dealt with prior to beginning work. Without appropriate repairs to eliminate the source of the problem, mortar deterioration will continue and any repointing will have been a waste of time and money.

Use of Consultants. Because there are so many possible causes for deterioration in historic buildings, it may be desirable to retain a consultant, such as a historic architect or architectural conservator, to analyze the building. In addition to determining the most appropriate solutions to the problems, a consultant can prepare specifications which reflect the particular requirements of each job and can provide oversight of the work in progress. Referrals to preservation consultants frequently can be obtained from State Historic Preservation Offices, the American Institute for Conservation of Historic and Artistic Works (AIC), the Association for Preservation Technology (APT), and local chapters of the American Institute of Architects (AIA).



Figure 2. Much of the mortar on this building has been leached away by water from a leaking downspout. The downspout must be replaced and any other drainage problems repaired before repointing. Photo: Robert C. Mack, FAIA.

Finding an Appropriate Mortar Match

Preliminary research is necessary to ensure that the proposed repointing work is both physically and visually appropriate to the building. Analysis of unweathered portions of the historic mortar to which the new mortar will be matched can suggest appropriate mixes for the repointing mortar so that it will not damage the building because it is excessively strong or vapor impermeable. Examination and analysis of the masonry units—brick, stone or terra cotta—and the techniques used in the original construction will assist in maintaining the building's historic appearance (Figs. 3-4). A simple, non-technical, evaluation of the masonry units and mortar can provide information concerning the relative strength and permeability of each–critical factors in selecting the repointing mortar—while a visual analysis of the historic mortar can provide the information necessary for developing the new mortar mix and application techniques.

Although not crucial to a successful repointing project, for projects involving properties of special historic significance, a mortar analysis by a qualified laboratory can be useful by providing information on the original ingredients. However, there are limitations with such an analysis, and replacement mortar specifications should not be based solely on laboratory analysis. Analysis requires interpretation, and there are important factors which affect the condition and performance of the mortar that cannot be established through laboratory analysis. These may include: the original water content, rate of curing, weather conditions during original construction, the method of mixing and placing the mortar, and the cleanliness and condition of the sand. *The most useful information that can come out of laboratory analysis is the identification of sand by*



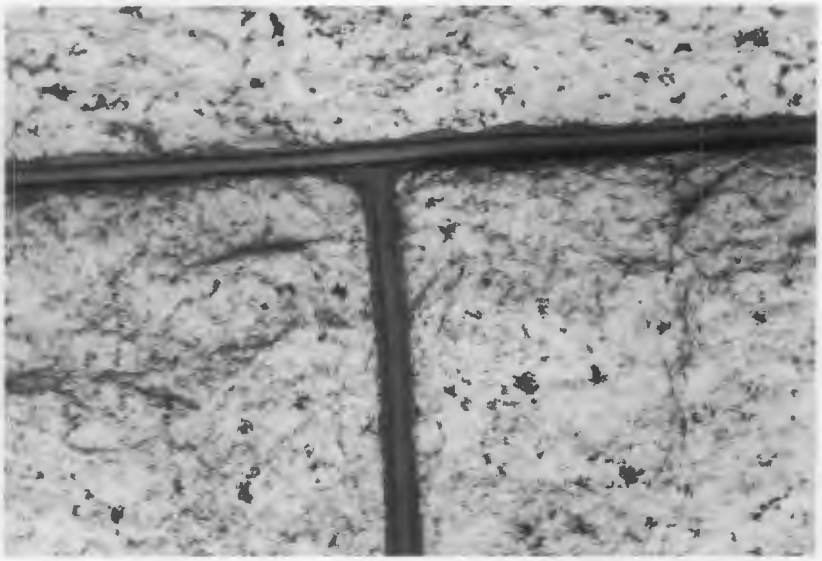


Figure 3. Good-quality repointing closely replicates the original in composition, texture, joint type and profile on this 19th century brick building (left), and on this late-19th century granite on H.H. Richardson's Glessner House in Chicago (right). Photos: Charles E. Fisher: Sharon C. Park, FAIA.

gradation and color. This allows the color and the texture of the mortar to be matched with some accuracy because sand is the largest ingredient by volume.

In creating a repointing mortar that is compatible with the masonry units, the objective is to achieve one that matches the historic mortar as closely as possible, so that the new material can coexist with the old in a sympathetic, supportive and, if necessary, sacrificial capacity. The exact physical and chemical properties of the historic mortar are not of major significance as long as the new mortar conforms to the following criteria:

- The new mortar must match the historic mortar in color, texture and tooling. (If a laboratory analysis is undertaken, it may be possible to match the binder components and their proportions with the historic mortar, if those materials are available.)
- The sand must match the sand in the historic mortar. (The color and texture of the new mortar will usually fall into place if the sand is matched successfully.)
- The new mortar must have **greater vapor permeability** and be **softer** (measured in compressive strength) than the masonry units.
- The new mortar must be **as vapor permeable** and **as soft or softer** (measured in compressive strength) than the historic mortar. (Softness or hardness is not necessarily an indication of permeability; old, hard lime mortars can still retain high permeability.)

Properties of Mortar

Mortars for repointing should be softer or more permeable than the masonry units and no harder or more impermeable than the historic mortar to prevent damage to the masonry units. It is a common error to assume that hardness or high strength is a measure of appropriateness, particularly for lime-based historic mortars. Stresses within a wall caused by expansion, contraction, moisture migration, or settlement must be accommodated in some manner; in a masonry wall these





Figure 4. (left) The poor quality of this repointing–it appears to have been "tooled" with the mason's finger–does not match the delicacy of the original beaded joint on this 19th-century brick wall. (right) It is obvious that the repointing on this "test patch" is not an appropriate replacement mortar joint for this early-19th century stone foundation. Photos: Lee H. Nelson, FAIA.

stresses should be relieved by the mortar rather than by the masonry units. A mortar that is stronger in compressive strength than the masonry units, will not "give," thus causing the stresses to be relieved through the masonry units—resulting in permanent damage to the masonry, such as cracking and spalling, that cannot be repaired easily (Fig. 5). While stresses can also break the bond between the mortar and the masonry units, permitting water to penetrate the resulting hairline cracks, this is easier to correct in the joint through repointing than if the break occurs in the masonry units.

Permeability, or rate of vapor transmission, is also critical. High lime mortars are more permeable than denser cement mortars. Historically, mortar acted as a bedding material–not unlike an expansion joint–rather than a "glue" for the masonry units, and moisture was able to migrate through the mortar joints rather than the masonry units. When moisture evaporates from the masonry it deposits any soluble salts either on the surface as *efflorescence* or below the surface as *subflorescence*. While salts deposited on the surface of masonry units are usually relatively harmless, salt crystallization within a masonry unit creates pressure that can cause parts of the outer surface to spall off or delaminate. If the mortar does not permit moisture or moisture vapor to migrate out of the wall and evaporate, the result will be damage to the masonry units.

Components of Mortar

Sand. Sand is the largest component of mortar and the material that gives mortar its distinctive color, texture and cohesiveness. Sand must be free of impurities, such as salts or clay. The three key characteristics of sand are: particle shape, gradation and void ratios.



Figure 5. The use of hard, portland-cement mortar that is less permeable than the soft bricks has resulted in severe damage to this brick wall. Moisture trapped in the wall was unable to evaporate through the mortar which is intended to be sacrificial, and thus protect the bricks. As a result the moisture remained in the walls until water pressure eventually popped the surface off the bricks. Photo: National Park Service Files.

When viewed under a magnifying glass or low-power microscope, particles of sand generally have either rounded edges, such as found in beach and river sand, or sharp, angular edges, found in crushed or manufactured sand. For repointing mortar, rounded or natural sand is preferred for two reasons. It is usually similar to the sand in the historic mortar and provides a better visual match. It also has better working qualities or plasticity and can thus be forced into the joint more easily, forming a good contact with the remaining historic mortar and the surface of the adjacent masonry units. Although manufactured sand is frequently more readily available, it is usually possible to locate a supply of rounded sand.

The gradation of the sand (particle size distribution) plays a very important role in the durability and cohesive properties of a mortar. Mortar must have a certain percentage of large to small particle sizes in order to deliver the optimum performance. Acceptable guidelines on particle size distribution may be found in ASTM C 144 (American Society for Testing and Materials). However, in actuality, since neither historic nor modern sands are always in compliance with ASTM C 144, matching the same particle appearance and gradation usually requires sieving the sand.

A scoop of sand contains many small voids between the individual grains. A mortar that performs well fills all these small voids with binder (cement/lime combination or mix) in a balanced manner. Well-graded sand generally has a 30 per cent void ratio by volume. Thus, 30 per cent binder by volume generally should be used, unless the historic mortar had a different binder: aggregate ratio. This represents the 1:3 binder to sand ratios often seen in mortar specifications.

For repointing, sand generally should conform to ASTM C 144 to assure proper gradation and freedom from impurities; some variation may be necessary to match the original size and gradation. Sand color and texture also should match the original as closely as possible to provide the proper color match without other additives.

Lime. Mortar formulations prior to the late-19th century used lime as the primary binding material. Lime is derived from heating limestone at high temperatures which burns off the carbon dioxide, and turns the limestone into quicklime. There are three types of limestone—calcium, magnesium, and dolomitic—differentiated by the different levels of magnesium carbonate they contain which impart specific qualities to mortar. Historically, calcium lime was used for mortar rather than the dolomitic lime (calcium magnesium carbonate) most often used today. But it is also important to keep in mind the fact that the historic limes, and other components of mortar, varied a great deal because they were natural, as opposed to modern lime which is manufactured and, therefore, standardized. Because some of the kinds of lime, as well as other components of mortar, that were used historically are no longer readily available, even when a conscious effort is made to replicate a "historic" mix, this may not be achievable due to the differences between modern and historic materials.

Lime, itself, when mixed with water into a paste is very plastic and creamy. It will remain workable and soft indefinitely, if stored in a sealed container. Lime (calcium hydroxide) hardens by carbonation absorbing carbon dioxide primarily from the air, converting itself to calcium carbonate. Once a lime and sand mortar is mixed and placed in a wall, it begins the process of carbonation. If lime mortar is left to dry too rapidly, carbonation of the mortar will be reduced, resulting in poor adhesion and poor durability. In addition, lime mortar is slightly water soluble and thus is able to re-seal any hairline cracks that may develop during the life of the mortar. Lime mortar is soft, porous, and changes little in volume during temperature fluctuations, thus making it a good choice for historic buildings. *Because of these qualities, high calcium lime mortar may be considered for many repointing projects, not just those involving historic buildings.*

For repointing, lime should conform to ASTM C 207, Type S, or Type SA, Hydrated Lime for Masonry Purposes. This machine-slaked lime is designed to assure high plasticity and water retention. The use of quicklime which must be slaked and soaked by hand may have advantages over hydrated lime in some restoration projects if time and money allow.

Lime putty. Lime putty is slaked lime that has a putty or paste-like consistency. It should conform to ASTM C 5. Mortar can be mixed using lime putty according to ASTM C 270 property or proportion specification.

Portland cement. More recent, 20th-century mortar has used portland cement as a primary binding material. A straight portland cement and sand mortar is extremely hard, resists the movement of water, shrinks upon setting, and undergoes relatively large thermal movements. When mixed with water, portland cement forms a harsh, stiff paste that is quite unworkable, becoming hard very quickly. (Unlike lime, portland cement will harden regardless of weather conditions and does not require wetting and drying cycles.) Some portland cement assists the workability and plasticity of the mortar without adversely affecting the finished project; it also provides early strength to the mortar and speeds setting. Thus, it may be appropriate to add some portland cement to an essentially lime-based mortar even when repointing relatively soft 18th or 19th century brick under some circumstances when a slightly harder mortar is required. The more portland cement that is added to a mortar formulation the harder it becomes—and the faster the initial set.

For repointing, portland cement should conform to ASTM C 150. White, non-staining portland cement may provide a better color match for some historic mortars than the more commonly available grey portland cement. But, it should not be assumed, however, that white portland cement is always appropriate for all historic buildings, since the original mortar may have been mixed with grey cement. The cement should not have more than 0.60 per cent alkali to help avoid efflorescence.

Masonry cement. Masonry cement is a preblended mortar mix commonly found at hardware and home repair stores. It is designed to produce mortars with a compressive strength of 750 psi or higher when mixed

MORTAR ANALYSIS

Methods for analyzing mortars can be divided into two broad categories: **wet chemical** and **instrumental**. Many laboratories that analyze historic mortars use a simple **wet-chemical** method called *acid digestion*, whereby a sample of the mortar is crushed and then mixed with a dilute acid. The acid dissolves all the carbonate-containing minerals not only in the binder, but also in the aggregate (such as oyster shells, coral sands, or other carbonate-based materials), as well as any other acid-soluble materials. The sand and fine-grained acid-insoluble material is left behind. There are several variations on the simple acid digestion test. One involves collecting the carbon dioxide gas given off as the carbonate is digested by the acid; based on the gas volume the carbonate content of the mortar can be accurately determined (Jedrzejewska, 1960). Simple acid digestion methods are rapid, inexpensive, and easy to perform, but the information they provide about the original composition of a mortar is limited to the color and texture of the sand. The gas collection method provides more information about the binder than a simple acid digestion test.

Instrumental analysis methods that have been used to evaluate mortars include polarized light or thin-section microscopy, scanning electron microscopy, atomic absorption spectroscopy, X-ray diffraction, and differential thermal analysis. All instrumental methods require not only expensive, specialized equipment, but also highly-trained experienced analysts. However, instrumental methods can provide much more information about a mortar. Thin-section microscopy is probably the most commonly used instrumental method. Examination of thin slices of a mortar in transmitted light is often used to supplement acid digestion methods, particularly to look for carbonate-based aggregate. For example, the new ASTM test method, ASTM C 1324-96 "Test Method for Examination and Analysis of Hardened Mortars" which was designed specifically for the analysis of modern lime-cement and masonry cement mortars, combines a complex series of wet chemical analyses with thin-section microscopy.

The drawback of most mortar analysis methods is that mortar samples of known composition have not been analyzed in order to evaluate the method. Historic mortars were not prepared to narrowly defined specifications from materials of uniform quality; they contain a wide array of locally derived materials combined at the discretion of the mason. While a particular method might be able to accurately determine the original proportions of a lime-cement-sand mortar prepared from modern materials, the usefulness of that method for evaluating historic mortars is questionable unless it has been tested against mortars prepared from materials more commonly used in the past.

Lorraine Schnabel.

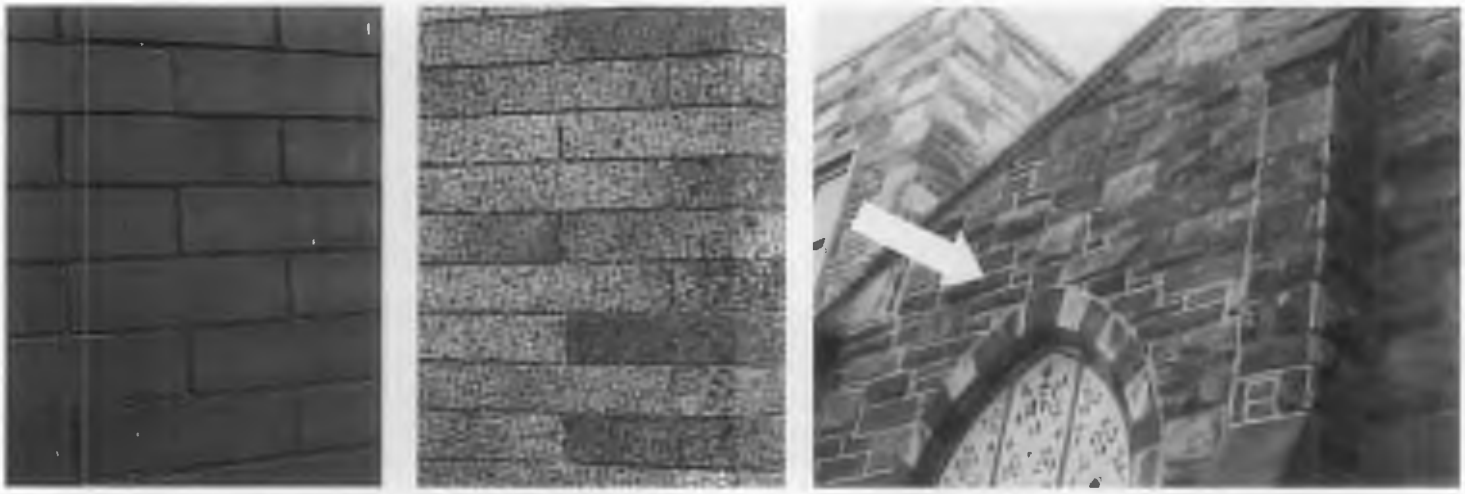


Figure 6. Tinted mortar. (left)Black mortar with a beaded joint was used here on this late-19th century hard pressed red brick and, (center) a dark brown tinted mortar with an almost flush joint was used on this early-20th century Roman brick. (right) When constructed at the turn-of-the-century, this building was pointed with a dark gray mortar to blend with the color of the stone, but the light-colored mortar used in spot repointing has destroyed this harmony and adversely impacts the building's historic character. Photos: Anne Grimmer.

with sand and water at the job site. It may contain hydrated lime, but it always contains a large amount of portland cement, as well as ground limestone and other workability agents, including air-entraining agents. Because masonry cements are not required to contain hydrated lime, and generally do not contain lime, they produce high strength mortars that can damage historic masonry. *For this reason, they generally are not recommended for use on historic masonry buildings.*

Lime mortar (pre-blended). Hydrated lime mortars, and pre-blended lime putty mortars with or without a matched sand are commercially available. Custom mortars are also available with color. In most instances, pre-blended lime mortars containing sand may not provide an exact match; however, if the project calls for total repointing, a pre-blended lime mortar may be worth considering as long as the mortar is compatible in strength with the masonry. If the project involves only selected, "spot" repointing, then it may be better to carry out a mortar analysis which can provide a custom pre-blended lime mortar with a matching sand. In either case, if a preblended lime mortar is to be used, it should contain Type S or SA hydrated lime conforming to ASTM C 207.

Water. Water should be potable—clean and free from acids, alkalis, or other dissolved organic materials.

Other Components

Historic components. In addition to the color of the sand, the texture of the mortar is of critical importance in duplicating historic mortar. Most mortars dating from the mid-19th century on—with some exceptions—have a fairly homogeneous texture and color. Some earlier mortars are not as uniformly textured and may contain lumps of partially burned lime or "dirty lime", shell (which often provided a source of lime, particularly in coastal areas), natural cements, pieces of clay, lampblack or other pigments, or even animal hair. The visual characteristics of these mortars can be duplicated through the use of similar materials in the repointing mortar.

Replicating such unique or individual mortars will require writing new specifications for each project. If possible, suggested sources for special materials should be included. For example, crushed oyster shells can be obtained in a variety of sizes from poultry supply dealers.

Pigments. Some historic mortars, particularly in the late 19th century, were tinted to match or contrast with the brick or stone (Fig. 6). Red pigments, sometimes in the form of brick dust, as well as brown, and black pigments were commonly used. Modern pigments are available which can be added to the mortar at the job site, but they should not exceed 10 per cent by weight of the portland cement in the mix, and carbon black should be limited to 2 per cent. Only synthetic mineral oxides, which are alkali-proof and sun-fast, should be used to prevent bleaching and fading.

Modern components. Admixtures are used to create specific characteristics in mortar, and whether they should be used will depend upon the individual project. *Air-entraining agents*, for example, help the mortar to resist freeze-thaw damage in northern climates. *Accelerators* are used to reduce mortar freezing prior to setting while *retarders* help to extend the mortar life in hot climates. Selection of admixtures should be made by the architect or architectural conservator as part of the specifications, not something routinely added by the masons.

Generally, modern chemical additives are unnecessary and may, in fact, have detrimental effects in historic masonry projects. The use of antifreeze compounds is not recommended. They are not very effective with high lime mortars and may introduce salts, which may cause efflorescence later. A better practice is to warm the sand and water, and to protect the completed work from freezing. No definitive study has determined whether air-entraining additives should be used to resist frost action and enhance plasticity, but in areas of extreme exposure requiring high-strength mortars with lower permeability, air-entrainment of 10-16 percent may be desirable (see formula for "severe weather exposure" in **Mortar Type and Mix**). Bonding agents are not a substitute for proper joint preparation, and they should generally be avoided. If the joint is properly prepared, there will be a good bond between the new mortar and the adjacent surfaces. In addition, a bonding agent is difficult to remove if smeared on a masonry surface (Fig. 7).

Mortar Type and Mix

Mortars for repointing projects, especially those involving historic buildings, typically are custom mixed in order to ensure the proper physical and visual qualities. These materials can be combined in varying proportions to create a mortar with the desired performance and durability. The actual specification of a particular mortar type should take into consideration all of the factors affecting the life of the building including: current site conditions, present condition of the masonry, function of the new mortar, degree of weather exposure, and skill of the mason. Thus, no two repointing projects are exactly the same. Modern materials specified for use in repointing mortar should conform to specifications of the American Society for Testing and Materials (ASTM) or comparable federal specifications, and the resulting mortar should conform to ASTM C 270, Mortar for Unit Masonry.

Specifying the proportions for the repointing mortar for a specific job is not as difficult as it might seem. Five mortar types, each with a corresponding recommended mix, have been established by ASTM to distinguish high strength mortar from soft flexible mortars. The ASTM designated them in decreasing order of approximate general strength as Type M (2,500 psi), Type S (1,800 psi), Type N (750 psi), Type O (350 psi) and Type K (75 psi). (The letters identifying the types are from the words MASON WORK using every other letter.) Type K has the highest lime content of the mixes that contain portland cement, although it is seldom used today, except for some historic preservation projects. The designation "L" in the accompanying chart identifies a straight lime and sand mix. Specifying the appropriate ASTM mortar by proportion of ingredients, will ensure the desired physical properties. Unless specified otherwise, measurements or proportions for mortar mixes are always given in the following order: cement-lime-sand. Thus, a Type K mix, for example, would be referred to as 1-3-10, or 1 part cement to 3 parts lime to 10 parts sand. Other requirements to create the desired visual qualities should be included in the specifications.



Figure 7. The dark stain on either side of the vertical joint on this sandstone watertable probably resulted from the use of a bonding agent that was not properly cleaned off the masonry after repointing. Photo: Anne Grimmer.



Figure 8. Due to inadequate joint preparation, the repointing mortar has not adhered properly and is falling out of the joint. Photo: Robert C. Mack, FAIA.

The strength of a mortar can vary. If mixed with higher amounts of portland cement, a harder mortar is obtained. The more lime that is added, the softer and more plastic the mortar becomes, increasing its workability. A mortar strong in compressive strength might be desirable for a hard stone (such as granite) pier holding up a bridge deck, whereas a softer, more permeable lime mortar would be preferable for a historic wall of soft brick. Masonry deterioration caused by salt deposition results when the mortar is less permeable that the masonry unit. A strong mortar is still more permeable than hard dense stone. However, in a wall constructed of soft bricks where the masonry unit itself has a relatively high permeability or vapor transmission rate, a soft, high lime mortar is necessary to retain sufficient permeability.

Budgeting and Scheduling

Repointing is both expensive and time consuming due to the extent of handwork and special materials required. It is preferable to repoint only those areas that require work rather than an entire wall, as is often specified. But, if 25 to 50 per cent or more of a wall needs to be repointed, repointing the entire wall may be more cost effective than spot repointing. Total repointing may also be more sensible when access is difficult, requiring the erection of expensive scaffolding (unless the majority of the mortar is sound and unlikely to require replacement in the foreseeable future). Each project requires judgement based on a variety of factors. Recognizing this at the outset will help to prevent many jobs from becoming prohibitively expensive.

In scheduling, seasonal aspects need to be considered first. Generally speaking, wall temperatures between 40 and 95 degrees F (8 and 38 degrees C) will prevent freezing or excessive evaporation of the water in the mortar. Ideally, repointing should be done in shade, away from strong sunlight in order to slow the drying process, especially during hot weather. If necessary, shade can be provided for large-scale projects with appropriate modifications to scaffolding.

The relationship of repointing to other work proposed on the building must also be recognized. For example, if paint removal or cleaning is anticipated, and if the mortar joints are basically sound and need only selective repointing, it is generally better to postpone repointing

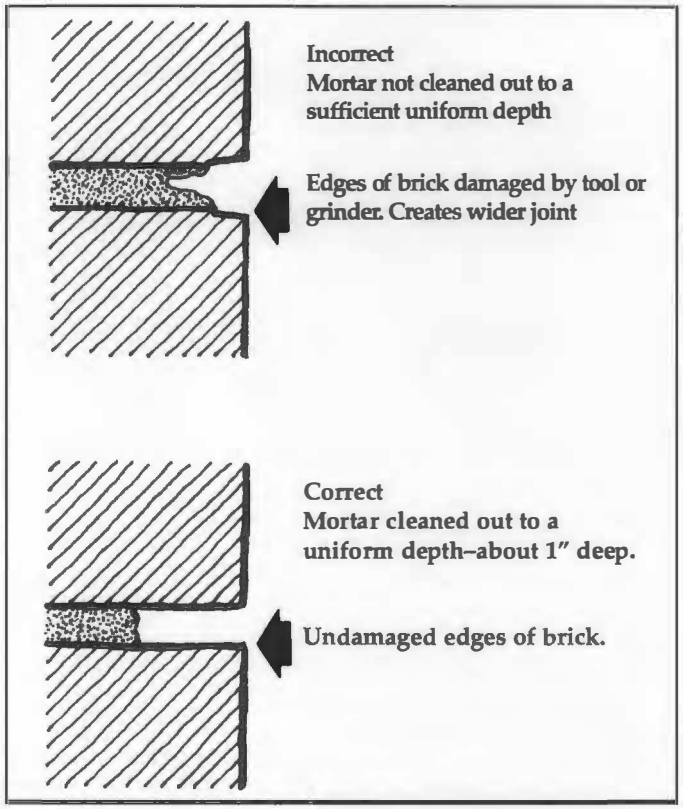


Figure 9. Comparison of incorrect and correct preparation of mortar joints for repointing. Drawing: Robert C. Mack, FAIA, and David W. Look, AIA.

until after completion of these activities. However, if the mortar has eroded badly, allowing moisture to penetrate deeply into the wall, repointing should be accomplished before cleaning. Related work, such as structural or roof repairs, should be scheduled so that they do not interfere with repointing and so that all work can take maximum advantage of erected scaffolding.

Building managers also must recognize the difficulties that a repointing project can create. The process is time consuming, and scaffolding may need to remain in place for an extended period of time. The joint preparation process can be quite noisy and can generate large quantities of dust which must be controlled, especially at air intakes to protect human health, and also where it might damage operating machinery. Entrances may be blocked from time to time making access difficult for both building tenants and visitors. Clearly, building managers will need to coordinate the repointing work with other events at the site.

Contractor Selection

The ideal way to select a contractor is to ask knowledgeable owners of recently repointed historic buildings for recommendations. Qualified contractors then can provide lists of other repointing projects for inspection. More commonly, however, the contractor for a repointing project is selected through a competitive bidding process over which the client or consultant has only limited control. In this situation it is important to ensure that the specifications stipulate that masons must have a minimum of five years' experience with repointing historic masonry buildings to be eligible to bid on the project. Contracts are awarded to the lowest *responsible* bidder, and bidders who have performed poorly on other projects usually can be eliminated from consideration on this basis, even if they have the lowest prices.

The contract documents should call for unit prices as well as a base bid. Unit pricing forces the contractor to determine in advance what the cost addition or reduction will be for work which varies from the scope of the base bid. If, for example, the contractor has fifty linear feet less of stone repointing than indicated on the contract documents but thirty linear feet more of brick repointing, it will be easy to determine the final price for the work. Note that each type of work—brick repointing, stone repointing, or similar items—will have its own unit price. The unit price also should reflect quantities; one linear foot of pointing in five different spots will be more expensive than five contiguous linear feet.

Execution of the Work

Test Panels. These panels are prepared by the contractor using the same techniques that will be used on the remainder of the project. Several panel locations—preferably not on the front or other highly visible location of the building—may be necessary to include all types of masonry, joint styles, mortar colors, and other problems likely to be encountered on the job. If cleaning tests, for



Figure 10. Using a hammer and masonry chisel is the least damaging and, thus, generally the preferred method of removing old mortar in preparation for repointing historic masonry. Photo: John P. Speweik.



Figure 11. The damage to the edges and corners of these historic bricks was caused by using a mechanical grinder to rake out the joints. Note the overcutting of the head joint and the damage to the arises (corners) of the bricks. Photo: Lee H. Nelson, FAIA.

example, are also to be undertaken, they should be carried out in the same location. Usually a 3 foot by 3 foot area is sufficient for brickwork, while a somewhat larger area may be required for stonework. These panels establish an acceptable standard of work and serve as a benchmark for evaluating and accepting subsequent work on the building.

Joint Preparation. Old mortar should be removed to a minimum depth of 2 to 2- $^1/_2$ times the width of the joint to ensure an adequate bond and to prevent mortar "popouts" (Fig. 8). For most brick joints, this will require removal of the mortar to a depth of approximately $^1/_2$ to 1 inch; for stone masonry with wide joints, mortar may need to be removed to a depth of several inches. Any loose or disintegrated mortar beyond this minimum depth also should be removed (Fig. 9).

Although some damage may be inevitable, careful joint preparation can help limit damage to masonry units. The traditional manner of removing old mortar is through the use of hand chisels and mash hammers (Fig. 10). Though labor-intensive, in most instances this method poses the least threat for damage to historic masonry units and produces the best final product.

The most common method of removing mortar, however, is through the use of power saws or grinders. The use of power tools by unskilled masons can be disastrous for historic masonry, particularly soft brick. Using power saws on walls with thin joints, such as most brick walls, almost always will result in damage to the masonry units by breaking the edges and by overcutting on the head, or vertical joints (Fig. 11).

However, small pneumatically-powered chisels generally can be used safely and effectively to remove mortar on historic buildings as long as the masons maintain appropriate control over the equipment.



Figure 12.. A power grinder, operated correctly by a skilled mason may be used in preparation for repointing to cut wide, horizontal mortar joints, typical of many early-20th century brick structures without causing damage to the brick. Note the use of protective safety equipment. Photo: Robert C. Mack, FAIA.

Under certain circumstances, thin diamond-bladed grinders may be used to cut out *horizontal* joints only on hard portland cement mortar common to most early-20th century masonry buildings (Fig. 12). Usually, automatic tools most successfully remove old mortar without damaging the masonry units when they are used in combination with hand tools in preparation for repointing. Where horizontal joints are uniform and fairly wide, it may be possible to use a power masonry saw to assist the removal of mortar, such as by cutting along the middle of the joint; final mortar removal from the sides of the joints still should be done with a hand chisel and hammer. Caulking cutters with diamond blades can sometimes be used successfully to cut out joints without damaging the masonry. Caulking cutters are slow; they do not rotate, but vibrate at very high speeds, thus minimizing the possibility of damage to masonry units (Fig. 13). Although mechanical tools may be used safely in limited circumstances to cut out horizontal joints in preparation for repointing, they should never be used on vertical joints because of the danger of slipping and cutting into the brick above or below the vertical joint. Using power tools to remove mortar without damaging the surrounding masonry units also necessitates highly skilled masons experienced in working on historic masonry buildings. Contractors



Figure 13. (left) In preparation for repointing, the mortar joints on these granite steps are first cut out mechanically (note the vacuum attached to the cutting tool in foreground to cut down on dust). (right) Final removal of the old mortar is done by hand to avoid damage to the edges of the joints. Mechanical preparation of horizontal joints by an experienced mason may sometimes be acceptable, especially where the joints are quite wide and the masonry is a very hard stone. Photos: Anne Grimmer.

should demonstrate proficiency with power tools before their use is approved.

Using any of these power tools may also be more acceptable on hard stone, such as quartzite or granite, than on terra cotta with its glass-like glaze, or on soft brick or stone. The test panel should determine the acceptability of power tools. If power tools are to be permitted, the contractor should establish a quality control program to account for worker fatigue and similar variables.

Mortar should be removed cleanly from the masonry units, leaving square corners at the back of the cut. Before filling, the joints should be rinsed with a jet of water to remove all loose particles and dust. At the time of filling, the joints should be damp, but with no standing water present. For masonry walls—limestone, sandstone and common brick—that are extremely absorbent, it is recommended that a continual mist of water be applied for a few hours before repointing begins.

Mortar Preparation. Mortar components should be measured and mixed carefully to assure the uniformity of visual and physical characteristics. Dry ingredients are measured by volume and thoroughly mixed before the addition of any water. Sand must be added in a damp, loose condition to avoid over sanding. Repointing mortar is typically pre-hydrated by adding water so it will just hold together, thus allowing it to stand for a period of time before the final water is added. Half the water should be added, followed by mixing for approximately 5 minutes. The remaining water should then be added in small portions until a mortar of the desired consistency is reached. The total volume of water necessary may vary from batch to batch, depending on weather conditions. It is important to keep the water to a minimum for two reasons: first, a drier mortar is cleaner to work with, and it can be compacted tightly into the joints; second, with no excess water to evaporate, the mortar cures without shrinkage cracks. Mortar should be used within approximately 30 minutes of final mixing, and "retempering," or adding more water, should not be permitted.

Using Lime Putty to Make Mortar. Mortar made with lime putty and sand, sometimes referred to as roughage or course stuff, should be measured by volume, and may require slightly different proportions from those used with hydrated lime (Fig. 14). No additional water is usually needed to achieve a workable consistency because enough water is already contained in the putty. Sand is proportioned first, followed by the lime putty, then mixed for five minutes or until all the sand is thoroughly coated with the lime putty. But mixing, in the familiar sense of turning over with a hoe, sometimes may not be sufficient if the best possible performance is to be obtained from a lime putty mortar. Although the old practice of chopping, beating and ramming the mortar has largely been forgotten, recent field work has confirmed that lime putty and sand rammed and beaten with a wooden mallet or ax handle, interspersed by chopping with a hoe, can significantly improve workability and performance. The intensity of this action increases the overall lime/sand contact and removes any surplus water by compacting the other ingredients. It may also be advantageous for larger projects to use a mortar pan mill for mixing. Mortar pan mills which have a long tradition in Europe produce a superior lime putty mortar not attainable with today's modern paddle and drum type mixers.

For larger repointing projects the lime putty and sand can be mixed together ahead of time and stored indefinitely, on or off site, which eliminates the need for piles of sand on the job site. This mixture, which resembles damp brown sugar, must be protected from the air in sealed containers with a wet piece of burlap over the top or sealed in a large plastic bag to prevent evaporation and premature carbonation. The lime putty and sand mixture can be recombined into a workable plastic state months later with no additional water.

If portland cement is specified in a lime putty and sand mortar—Type O (1:2:9) or Type K (1:3:11)—the portland cement should first be mixed into a slurry paste before adding it to the lime putty and sand. Not only will this ensure that the portland cement is evenly distributed throughout the mixture, but if dry portland cement is added to wet ingredients it tends to "ball up," jeopardizing dispersion. (Usually water must be added to the lime putty and sand anyway once the portland cement is introduced.) Any color pigments should be added at this stage and mixed for a full five minutes. The mortar should be used within 30 minutes to 1 ½ hours and it should not be retempered. Once portland cement has been added the mortar can no longer be stored.

Filling the Joint. Where existing mortar has been removed to a depth of greater than 1 inch, these deeper areas should be filled first, compacting the new mortar in several layers. The back of the entire joint should be filled successively by applying approximately ¼ inch of mortar, packing it well into the back corners. This



Figure 14. Mixing mortar using lime putty: (a) proportioning sand; (b) proportioning lime putty; (c) placing lime putty on top of sand; (d) mixing sand over lime putty; (e) hand mixing mortar; and, (f) sample of mortar after mixing. Photos: John P. Speweik.

application may extend along the wall for several feet. As soon as the mortar has reached thumb-print hardness, another ¼ inch layer of mortar—approximately the same thickness—may be applied. Several layers will be needed to fill the joint flush with the outer surface of the masonry. It is important to allow each layer time to harden before the next layer is applied; most of the mortar shrinkage occurs during the hardening process and layering thus minimizes overall shrinkage.

When the final layer of mortar is thumb-print hard, the joint should be tooled to match the historic joint (Fig. 15). Proper timing of the tooling is important for uniform color and appearance. If tooled when too soft, the color will be lighter than expected, and hairline cracks may occur; if tooled when too hard, there may be dark streaks called "tool burning," and good closure of the mortar against the masonry units will not be achieved.

If the old bricks or stones have worn, rounded edges, it is best to recess the final mortar slightly from the face of the masonry. This treatment will help avoid a joint which is visually wider than the actual joint; it also will avoid creation of a large, thin featheredge which is easily damaged, thus admitting water (Fig. 16). After tooling, excess mortar can be removed from the edge of the joint by brushing with a natural bristle or nylon brush. Metal bristle brushes should never be used on historic masonry.

Curing Conditions. The preliminary hardening of high-lime content mortars—those mortars that contain more lime by volume than portland cement, i.e., Type O (1:2:9), Type K (1:3:11), and straight lime/sand, Type "L"(0:1:3) —takes place fairly rapidly as water in the mix is lost to the porous surface of the masonry and through evaporation. A high lime mortar (especially Type "L") left to dry out too rapidly can result in chalking, poor adhesion, and poor durability. Periodic wetting of the repointed area after the mortar joints are thumb-print hard and have been finish tooled may significantly accelerate the carbonation process. When feasible, misting using a hand sprayer with a fine nozzle can be simple to do for a day or two after repointing. Local conditions will dictate the frequency of wetting, but initially it may be as often as every hour and gradually reduced to every three or four hours. Walls should be covered with burlap for the first three days after repointing. (Plastic may be used, but it should be tented out and not placed directly against the wall.) This helps keep the walls damp and protects them from direct sunlight. Once carbonation of the lime has begun, it will continue for many years and the lime will gain strength as it reverts back to calcium carbonate within the wall.

***Aging* the Mortar.** Even with the best efforts at matching the existing mortar color, texture, and materials, there will usually be a visible difference between the old and



Figure 15. The profile of the repointed joints on the left replicate the historic joints around the corner to the right on the front of this stone building in Leesburg, VA. The contractor's pride in the repointing work is evident by the signature in the vertical joint. Photo: Anne Grimmer.

new work, partly because the new mortar has been matched to the unweathered portions of the historic mortar. Another reason for a slight mismatch may be that the sand is more exposed in old mortar due to the slight erosion of the lime or cement. Although spot repointing is generally preferable and some color difference should be acceptable, if the difference between old and new mortar is too extreme, it may be advisable in some instances to repoint an entire area of a wall, or an entire feature such as a bay, to minimize the difference between the old and the new mortar. If the mortars have been properly matched, usually the best way to deal with surface color differences is to let the mortars age naturally. Other treatments to overcome these differences, including cleaning the non-repointed areas or staining the new mortar, should be carefully tested prior to implementation.

Staining the new mortar to achieve a better color match is generally not recommended, but it may be appropriate in some instances. Although staining may provide an initial match, the old and new mortars may weather at different rates, leading to visual differences after a few seasons. In addition, the mixtures used to stain the mortar may be harmful to the masonry; for example, they may introduce salts into the masonry which can lead to efflorescence.

Cleaning the Repointed Masonry. If repointing work is carefully executed, there will be little need for cleaning other than to remove the small amount of mortar from the edge of the joint following tooling. This can be done with a stiff natural bristle or nylon brush after the mortar has dried, but before it is initially set (1-2 hours). Mortar that has hardened can usually be removed with a wooden paddle or, if necessary, a chisel.

Further cleaning is best accomplished with plain water and natural bristle or nylon brushes. If chemicals must

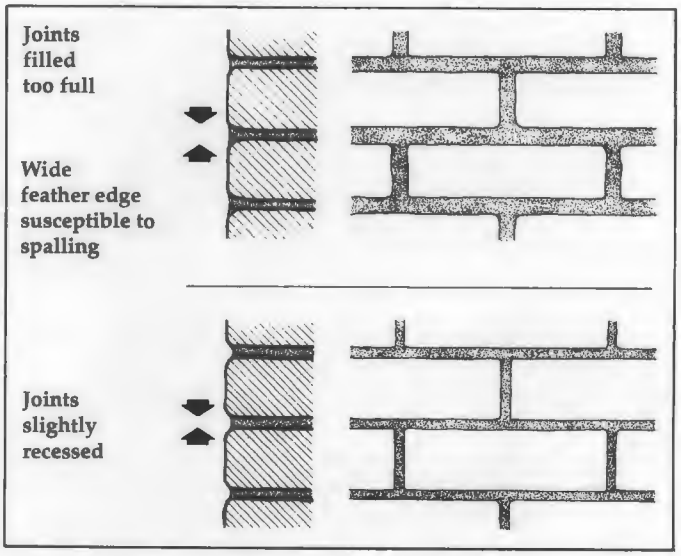


Figure 16. Comparison of visual effect of full mortar joints vs. slightly recessed joints. Filling joints too full hides the actual joint thickness and changes the character of the original brickwork. Drawing: Robert C. Mack, FAIA.

be used, they should be selected with extreme caution. Improper cleaning can lead to deterioration of the masonry units, deterioration of the mortar, mortar smear, and efflorescence. New mortar joints are especially susceptible to damage because they do not become fully cured for several months. Chemical cleaners, particularly acids, should never be used on dry masonry. The masonry should always be completely soaked once with water before chemicals are applied. After cleaning, the walls should be flushed again with plain water to remove all traces of the chemicals.

Several precautions should be taken if a freshly repointed masonry wall is to be cleaned. First, the mortar should be fully hardened before cleaning. Thirty days is usually sufficient, depending on weather and exposure; as mentioned previously, the mortar will continue to cure even after it has hardened. Test panels should be prepared to evaluate the effects of different cleaning



Figure 17. This photograph shows the significant visual change to the character of this historic brick building that has resulted from improper repointing procedures and a noticeably increased thickness of the mortar joints. Photo: Lee H. Nelson, FAIA.

Mortar Types			
(Measured by volume)			
Designation	Cement	Hydrated Lime or Lime Putty	Sand
M	1	1/4	3 - 3 3/4
S	1	1/2	4 - 4 1/2
N	1	1	5 - 6
O	1	2	8 - 9
K	1	3	10 - 12
"L"	0	1	2 1/4 - 3

Suggested Mortar Types for Different Exposures			
	Exposure		
Masonry Material	Sheltered	Moderate	Severe
Very Durable: granite, hard-cored brick, etc.	O	N	S
Moderately Durable: limestone, durable stone, molded brick	K	O	N
Minimally Durable: soft hand-made brick	"L"	K	O

methods. Generally, on newly repointed masonry walls, only very low pressure (100 psi) water washing supplemented by stiff natural bristle or nylon brushes should be used, except on glazed or polished surfaces, where only soft cloths should be used.**

New construction "bloom" or efflorescence occasionally appears within the first few months of repointing and usually disappears through the normal process of weathering. If the efflorescence is not removed by natural processes, the safest way to remove it is by dry brushing with stiff natural or nylon bristle brushes followed by wet brushing. Hydrochloric (muriatic) acid, is generally ineffective, and it should not be used to remove efflorescence. It may liberate additional salts, which, in turn, can lead to more efflorescence.

Surface Grouting is sometimes suggested as an alternative to repointing brick buildings, in particular. This process involves the application of a thin coat of cement-based grout to the mortar joints and the mortar/brick interface. To be effective the grout must extend slightly onto the face of the masonry units, thus widening the joint visually. The change in the joint appearance can alter the historic character of the structure to an unacceptable degree. In addition, although masking of the bricks is intended to keep the grout off the remainder of the face of the bricks, some level of residue, called "veiling," will inevitably remain. Surface grouting cannot substitute for the more extensive work of repointing, and it is not a recommended treatment for historic masonry.

**Additional information on masonry cleaning is presented in *Preservation Briefs 1: The Cleaning and Waterproof Coating of Masonry Buildings*, Robert C. Mack, AIA, Washington, D.C.: Technical Preservation Services, National Park Service, U.S. Department of the Interior, 1975; and *Keeping it Clean: Removing Exterior Dirt, Paint, Stains & Graffiti from Historic Masonry Buildings*, Anne E. Grimmer, Washington, D.C.: Technical Preservation Services, National Park Service, U.S. Department of the Interior, 1988.

Summary

For the Owner/Administrator. The owner or administrator of a historic building should remember that repointing is likely to be a lengthy and expensive process. First, there must be adequate time for evaluation of the building and investigation into the cause of problems. Then, there will be time needed for preparation of the contract documents. The work itself is precise, time-consuming and noisy, and scaffolding may cover the face of the building for some time. Therefore, the owner must carefully plan the work to avoid problems. Schedules for both repointing and other activities will thus require careful coordination to avoid unanticipated conflicts. The owner must avoid the tendency to rush the work or cut corners if the historic building is to retain its visual integrity and the job is to be durable.

For the Architect/Consultant. Because the primary role of the consultant is to ensure the life of the building, a knowledge of historic construction techniques and the special problems found in older buildings is essential. The consultant must assist the owner in planning for logistical problems relating to research and construction. It is the consultant's responsibility to determine the *cause* of the mortar deterioration and ensure that it is corrected before the masonry is repointed. The consultant must also be prepared to spend more time in project inspections than is customary in modern construction.

For the Masons. Successful repointing depends on the masons themselves. Experienced masons understand the special requirements for work on historic buildings and the added time and expense they require. The entire masonry crew must be willing and able to perform the work in conformance with the specifications, even when the specifications may not be in conformance with standard practice. At the same time, the masons should not hesitate to question the specifications if it appears that the work specified would damage the building.

Visually Examining the Mortar and the Masonry Units

A simple in-situ comparison will help determine the hardness and condition of the mortar and the masonry units. Begin by scraping the mortar with a screwdriver, and gradually tapping harder with a cold chisel and mason's hammer. Masonry units can be tested in the same way beginning, even more gently, by scraping with a fingernail. This relative analysis which is derived from the 10-point hardness scale used to describe minerals, provides a good starting point for selection of an appropriate mortar. It is described more fully in "The Russack System for Brick & Mortar Description" referenced in **Selected Reading** at the end of this Brief.

Mortar samples should be chosen carefully, and picked from a variety of locations on the building to find unweathered mortar, if possible. Portions of the building may have been repointed in the past while other areas may be subject to conditions causing unusual deterioration. There may be several colors of mortar dating from different construction periods or sand used from different sources during the initial construction. Any of these situations can give false readings to the visual or physical characteristics required for the new mortar. Variations should be noted which may require developing more than one mix.

1) Remove with a chisel and hammer three or four unweathered samples of the mortar to be matched from several locations on the building. (Set the largest sample aside—this will be used later for comparison with the repointing mortar). Removing a full representation of samples will allow selection of a "mean" or average mortar sample.

2) Mash the remaining samples with a wooden mallet, or hammer if necessary, until they are separated into their constituent parts. There should be a good handful of the material.

3) Examine the powdered portion—the lime and/or cement matrix of the mortar. Most particularly, note the color. There is a tendency to think of historic mortars as having white binders, but grey portland cement was available by the last quarter of the 19th century, and traditional limes were also sometimes grey. Thus, in some instances, the natural color of the historic binder may be grey, rather than white. The mortar may also have been tinted to create a colored mortar, and this color should be identified at this point.

4) Carefully blow away the powdery material (the lime and/or cement matrix which bound the mortar together).

5) With a low power (10 power) magnifying glass, examine the remaining sand and other materials such as lumps of lime or shell.

6) Note and record the wide range of color as well as the varying sizes of the individual grains of sand, impurities, or other materials.

Other Factors to Consider

Color. Regardless of the color of the binder or colored additives, the sand is the primary material that gives mortar its color. A surprising variety of colors of sand may be found in a single sample of historic mortar, and the different sizes of the grains of sand or other materials, such as incompletely ground lime or cement, play an important role in the texture of the repointing mortar. Therefore, when specifying sand for repointing mortar, it may be necessary to obtain sand from several sources and to combine or screen them in order to approximate the range of sand colors and grain sizes in the historic mortar sample.

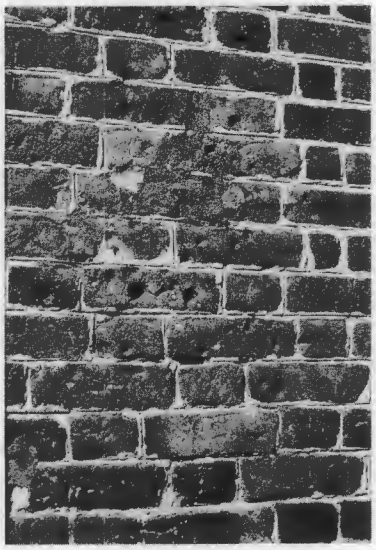


Figure 19. Mortar joints of 18th century brick buildings were often as much as 1/2 inch wide, cut flush and struck with a grapevine joint, but for window and door surrounds where a finer quality rubbed brick was used, mortar joints were very thin. Photo: National Park Service Files.

Pointing Style. Close examination of the historic masonry wall and the techniques used in the original construction will assist in maintaining the visual qualities of the building (Fig. 18). Pointing styles and the methods of producing them should be examined. It is important to look at both the horizontal and the vertical joints to determine the order in which they were tooled and whether they were the same style. Some late-19th and early-20th century buildings, for example, have horizontal joints that were raked back while the vertical joints were finished flush and stained to match the bricks, thus creating the illusion of horizontal bands. Pointing styles may also differ from one facade to another; front walls often received greater attention to mortar detailing than side and rear walls (Fig. 19). **Tuckpointing** is not true repointing but the



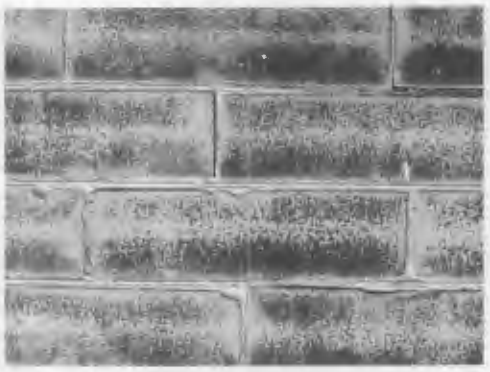
Figure 20. This stone garden wall was tuckpointed to match the tuckpointing on the c. 1920s house on the property. Photo: Anne Grimmer.



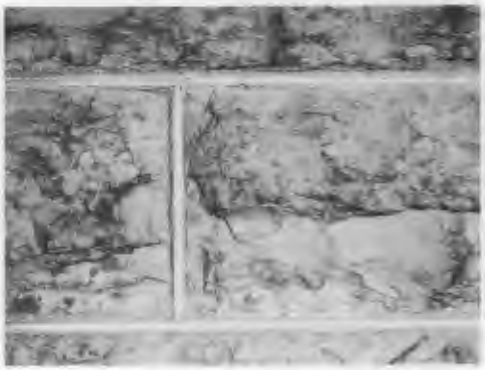
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Figure 18. A cross-section of mortar joint types. (a) Grapevine joints on a mid-18th century brick building; (b) flush joints on a mid-to-late 19th century brick building; (c) beaded joints on a late-19th century brick building; (d) early-20th century beaded joints on rough-cut limestone where the vertical joints were struck prior to the horizontal joints; (e) raked joints on 1920s wire brick; (f) horizontal joints on a 1934 building designed by Frank Lloyd Wright were raked back from the face of the bricks, and the vertical joints were filled with a red-tinted mortar to emphasize the horizontality of the narrow bricks, and struck flush with the face of the bricks; (g) the joints on this 20th century glazed terra-cotta tile building are raked slightly, emphasizing the glazed block face. Photos: National Park Service Files (a,b,e); Robert C. Mack, FAIA (c,d,f,g).

application of a raised joint or lime putty joint on top of flush mortar joints (Fig. 20). **Penciling** is a purely decorative, painted surface treatment over a mortar joint, often in a contrasting color.

Masonry Units. The masonry units should also be examined so that any replacement units will match the historic masonry. Within a wall there may be a wide range of colors, textures, and sizes, particularly with hand-made brick or rough-cut, locally-quarried stone. Replacement units should blend in with the full range of masonry units rather than a single brick or stone.

Matching Color and Texture of the Repointing Mortar

New mortar should match the unweathered interior portions of the historic mortar. The simplest way to check the match is to make a small sample of the proposed mix and allow it to cure at a temperature of approximately 70 degrees F for about a week, or it can be baked in an oven to speed up the curing; this sample is then broken open and the surface is compared with the surface of the largest "saved" sample of historic mortar.

If a proper color match cannot be achieved through the use of natural sand or colored aggregates like crushed marble or brick dust, it may be necessary to use a modern mortar pigment.

During the early stages of the project, it should be determined how closely the new mortar should match the historic mortar. Will "quite close" be sufficient, or is "exactly" expected? The specifications should state this clearly so that the contractor has a reasonable idea how much time and expense will be required to develop an acceptable match.

The same judgment will be necessary in matching replacement terra cotta, stone or brick. If there is a known source for replacements, this should be included in the specifications. If a source cannot be determined prior to the bidding process, the specifications should include an estimated price for the replacement materials with the final price based on the actual cost to the contractor.

Conclusion

A good repointing job is meant to last, at least 30 years, and preferably 50-100 years. Shortcuts and poor craftsmanship result not only in diminishing the historic character of a building, but also in a job that looks bad, and will require future repointing sooner than if the work had been done correctly (Fig. 17). The mortar joint in a historic masonry building has often been called a wall's "first line of defense." Good repointing practices guarantee the long life of the mortar joint, the wall, and the historic structure. Although careful maintenance will help preserve the freshly repointed mortar joints, it is important to remember that mortar joints are intended to be sacrificial and will probably require repointing some time in the future. Nevertheless, if the historic mortar joints proved durable for many years, then careful repointing should have an equally long life, ultimately contributing to the preservation of the entire building.

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Useful Addresses

Brick Institute of America
11490 Commerce Park Drive
Reston, VA 22091

Portland Cement Association
5420 Old Orchard Road
Skokie, IL 60077

National Lime Association
200 N. Glebe Road, Suite 800
Arlington, VA 22203

Acknowledgments

Robert C. Mack, FAIA, is a principal in the firm of MacDonald & Mack, Architects, Ltd., an architectural firm that specializes in historic buildings in Minneapolis, Minnesota. **John P. Speweik, CSI**, Toledo, Ohio, is a 5th-generation stonemason, and principal in U.S. Heritage Group, Inc., Chicago, Illinois, which does custom historic mortar matching. **Anne Grimmer**, Senior Architectural Historian, Heritage Preservation Services Program, National Park Service, was responsible for developing and coordinating the revision of this Preservation Brief, incorporating professional comments, and the technical editing.

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Front Cover: Repointing a historic brick building using a lime-based mortar. Traditional lime mortars have a consistency that enables the mortar to cling to a repointing tool while in a vertical position. Photo: John P. Speweik.

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