PROJECT MANUAL

Replace Water Distribution System

Algoa Correctional Center

Jefferson City, Missouri

Designed By: McClure Engineering Company
2001 W. Broadway
Columbia, MO 65203

Date Issued: October 25, 2024

Project No.: C2403-01

STATE *of* MISSOURI

OFFICE *of* ADMINISTRATION

Facilities Management, Design and Construction

SECTION 000107 - PROFESSIONAL SEALS AND CERTIFICATIONS

PROJECT NUMBER: C2403-01

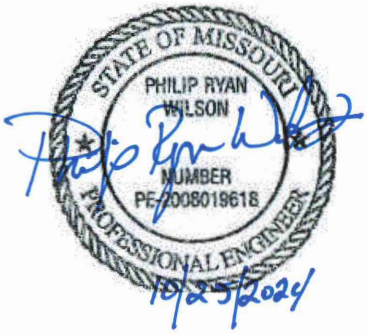
THE FOLLOWING DESIGN PROFESSIONALS HAVE SIGNED AND SEALED THE ORIGINAL PLANS AND SPECIFICATIONS FOR THIS PROJECT, WHICH ARE ON FILE WITH THE DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION:

ALL:

McClure Engineering Company

Certificate of Authority No.: E-2006023253

Exp. 12/31/2024



Philip Ryan Wilson, PE

Exp. 12/31/2024

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SECTION 000115 – LIST OF DRAWINGS

PART 1 - GENERAL

1.1 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.

1.2 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

3.1 LIST OF DRAWINGS

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

	TITLE	SHEET NO.	DATE	CAD NO.
1.	Cover Sheet	Sheet G-001	10-25-24	C2403-01-AL-G-GNL-01
2.	Location Map Legend & General Notes	Sheet G-002	10-25-24	C2403-01-AL-G-GNL-02
3.	Construction Staging & Access Control	Sheet G-003	10-25-24	C2403-01-AL-G-GNL-03
4.	SWPPP Notes	Sheet G-004	10-25-24	C2403-01-AL-G-GNL-04
5.	New Water Main Site Plan	Sheet C-001	10-25-24	C2403-01-AL-C-SITE-01
6.	Softener Building Existing Conditions	Sheet C-002	10-25-24	C2403-01-AL-C-EXC-02
7.	Softener Building Existing Conditions	Sheet C-003	10-25-24	C2403-01-AL-C-EXC-03
8.	Softener Building Demolition Plan	Sheet C-004	10-25-24	C2403-01-AL-C-DEM-04
9.	Softener Building Demolition Plan	Sheet C-005	10-25-24	C2403-01-AL-C-DEM-05
10.	Softener Building Proposed Conditions	Sheet C-006	10-25-24	C2403-01-AL-C-SBPC-06
11.	Softener Building Proposed Conditions	Sheet C-007	10-25-24	C2403-01-AL-C-SBPC-07
12.	Trench Details	Sheet D-001	10-25-24	C2403-01-AL-D-DTL-01
13.	Piping Details	Sheet D-002	10-25-24	C2403-01-AL-D-DTL-02

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. Replace Water Distribution System
Algoa Correctional Center
Jefferson City, Missouri
Project No.: C2403-01

3.0 BIDS WILL BE RECEIVED:

A. Until: 1:30 PM, March 13, 2025

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 construction of potable water infrastructure replacements including piping, valves, and water softening equipment and all items incidental to total construction.

B. MBE/WBE/SDVE Goals: MBE 10%, WBE 10%, and SDVE 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) meeting the requirements of Section 34.074, RSMo and 1 CSR 30-5.010, can be used to satisfy the MBE/WBE/SDVE participation goals for this project.**

5.0 PRE-BID MEETING:

A. Place/Time**:** 10:00 a.m. March 3, 2025, at 8501 No More Victims Road, Jefferson City, Missouri 65101 (park next to water tower and meet at the Administration Building which is down the hill on the left).

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 $30.00** 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. Designer: McClure Engineering Company, Philip Wilson, 660-349-0105, email: PWilson@mcclurevision.com

B. Project Manager: Scott Zeller, 573-680-8138, email: Scott.Zeller@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 Designer and 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 Designer and 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 Compliance Evaluation Form
004338	MBE/WBE/SDVE Eligibility Determination for Joint Ventures
004339	MBE/WBE/SDVE GFE Determination
004340	SDVE 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 or 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 with your bid to FMDCBids@oa.mo.gov.

D. All bids shall be submitted without additional terms and conditions, modifications, or reservations. The completed forms should 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 should 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 should 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 and bids received by the Owner 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. All revised bids must be submitted to FMDCBids@oa.mo.gov, revised bids sent any other way 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 a E-Verify is located at https://www.uscis.gov/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 - LIST OF SUBCONTRACTORS

A. If required by "Section 004113 – Bid Form," each Bidder must submit as part of their bid a list of subcontractors to be used in performing the work (Section 004336). The list must specify the name of the single designated subcontractor, manufacturer, or suppliers for each category of work listed in "Section 004336 - Proposed Subcontractors Form." If work within a category will be performed by more than one subcontractor, the bidder must provide the name of each subcontractor and specify the exact portion of the work to be done by each. If the Bidder intends to perform any of the designated subcontract work with the use of his own employees, the Bidder shall make that fact clear, by listing his own firm for the subject category. **If any category of work is left vacant or if more than one subcontractor is listed for any category without designating the portion of work to be performed by each, the bid shall be rejected.**

12.0 - 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.

13.0 - 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.

14.0 – 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.

15.0 - MBE/WBE/SDVE INSTRUCTIONS

A. Definitions:

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

2. **"MINORITY"** has the same meaning as set forth in 1 C.S.R. 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.

B. MBE/WBE/SDVE General Requirements:

1. For all bids greater than $100,000, the Bidder shall obtain MBE, WBE and SDVE 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 and SDVE 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 Compliance Evaluation Form for every MBE, WBE, or SDVE subcontractor or material supplier the Bidder intends to use for the contract work. The Bidder is required to submit all MBE/WBE/SDVE 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, and/or SDVE 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 34.074, RSMo, a Prime Bidder that qualifies as an SDVE 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 by three percent of the apparent low responsive Bidder's bid. Based on this calculation, if the eligible SDVE's evaluation is less than the apparent low responsive Bidder's bid, the eligible SDVE'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 preference, the Bidder must complete and submit with its bid the Missouri Service-Disabled Veteran Business Form, and any information required by the form.

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

1. A Bidder who is a MBE, WBE, or SDVE may count 100% of the contract towards the MBE, WBE or SDVE goal, less any amounts awarded to another MBE, WBE or SDVE. (NOTE: a MBE firm that bids as general contractor must obtain WBE and SDVE participation; a WBE firm that bids as a general contractor must obtain MBE and SDVE participation; and a SDVE 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 Compliance Evaluation Form (Section 004337) identifying itself as an MBE, WBE or SDVE.

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

3. Expenditures for materials and supplies obtained from a certified MBE, WBE, or SDVE supplier or manufacturer may be counted towards the MBE, WBE and SDVE goals, if the MBE, WBE, or SDVE 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 and SDVE goals, if the MBE, WBE, or SDVE 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, or SDVE partner in the joint venture may be counted towards the MBE/WBE/SDVE goals.

6. Only expenditures to a MBE, WBE, or SDVE that performs a commercially useful function in the work may be counted towards the MBE, WBE and SDVE goals. A MBE, WBE, or SDVE 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 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 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 subcontractor or supplier by referring to the Office of Equal Opportunity online SDVE 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 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 Participation:

1. If a Bidder has made a good faith effort to secure the required MBE, WBE and/or SDVE participation and has failed, the Bidder shall submit with its bid the information requested in MBE/WBE/SDVE 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, and/or SDVE 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 and/or SDVE 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, and SDVE 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 firms contacted for specific categories of work;

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

e. Whether the Bidder made any attempts to follow-up with MBE, WBE or SDVE 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 Obligations

1. If awarded a contract, the Bidder will be contractually required to subcontract with or obtain materials from the MBE, WBE, and SDVE 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, or SDVE during the course of the contract, the Contractor shall replace it with another MBE, WBE, or SDVE or make a good faith effort to do so. All MBE, WBE and SDVE 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 obligations. At a minimum, the Contractor shall report the dollar-value of work completed by each MBE, WBE, or SDVE during the preceding month and the cumulative total of work completed by each MBE, WBE or SDVE 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, and SDVE 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: **Replace Water Distribution System**
Algoa Correctional Center
Jefferson City, Missouri

Project Number: **C2403-01**

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 **190 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 $700** 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.

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)

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.

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

The Contractor has been granted a waiver of the 10% MBE and 10% WBE and 3% SDVE participation goals. The Contractor agrees to secure the MBE/WBE/SDVE participation amounts for this project as follows: (OR)

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

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

Total $

MBE/WBE/SDVE 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 firms listed above when such disputes impact the subcontract amounts shown above.

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. Proposed Contractors Form (Section 004336)
        iii. MBE, WBE, SDVE Compliance Evaluation Form(s) (Section 004337)
        iv. MBE, WBE, SDVE Eligibility Determination Form for Joint Ventures (Section 004338)
        v. MBE, WBE, SDVE Good Faith Effort (GFE) Determination Form (Section 004339)
        vi. Missouri Service Disabled Veteran Business Form (Section 004340)
        vii. Affidavit of Work Authorization (Section 004541)
        viii. Affidavit for Affirmative Action (Section 005414), if applicable

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:

_____
Brian Yansen, 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

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 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 PARTICIPATION DOLLAR AMOUNT OF THIS PROJECT AS INDICATED IN THE ORIGINAL CONTRACT: **$**

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

Revised 06/2023

INSTRUCTIONS FOR MBE/WBE/SDVE PROGRESS REPORT

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

The MBE/WBE/SDVE 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, or SDVE 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, or SDVE 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

INDEX

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, 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 0, BIDDING AND CONTRACTING REQUIREMENTS.

2.0 CONTACTS:

Designer:
Philip Wilson
McClure Engineering Company
2001 W. Broadway
Columbia, MO 65203
Telephone: 660-349-0105
Email: PWilson@mcclurevision.com

Construction Representative:
Josh Siebeneck
Division of Facilities Management, Design and Construction
301 W High Street, Room 730
Jefferson City, MO 65101
Telephone: 573-751-2697
Email: Joshua.Siebeneck@oa.mo.gov

Project Manager:
Scott Zeller
Division of Facilities Management, Design and Construction
135 N. Chestnut Street
Jefferson City, MO 65101
Telephone: 573-680-8138
Email: Scott.Zeller@oa.mo.gov

Contract Specialist:
Mandy Roberson
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, MO 65101
Telephone: 573-522-0074
Email: Mandy.Roberson@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 5 complete sets of drawings and specifications at no charge.

B. The Owner will furnish the Contractor with approximately 5 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

MICHAEL L. PARSON, Governor

Annual Wage Order No. 31

Section 026
COLE 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
Todd Smith, Director
Division of Labor Standards

Filed With Secretary of State: **March 8, 2024**

Last Date Objections May Be Filed: **April 8, 2024**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$62.47
Boilermaker	$30.53*
Bricklayer-Stone Mason	$54.17
Carpenter	$50.84
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	$43.74
Plasterer	
Communication Technician	$57.89
Electrician (Inside Wireman)	$58.31
Electrician Outside Lineman	$30.53*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	$30.53*
Glazier	$56.48
Ironworker	$68.93
Laborer	$43.22
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	$30.53*
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	$67.64
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	$42.11
Plumber	$70.54
Pipe Fitter	
Roofer	$54.75
Sheet Metal Worker	$57.54
Sprinkler Fitter	$52.79
Truck Driver	$30.53*
Truck Control Service Driver	
Group I	
Group II	
Group III	
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.

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	$55.19
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$80.11
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	$48.42
General Laborer	
Skilled Laborer	
Operating Engineer	$63.82
Group I	
Group II	
Group III	
Group IV	
Truck Driver	$48.68
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance with 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 as 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

1.1 RELATED DOCUMENTS

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

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The Project consists of construction of potable water infrastructure replacements including piping, valves, and water softening equipment and all items incidental to total construction.

1. Project Location: Algoa Correctional Center, 8501 No More Victims Road, Jefferson City, Missouri 65101.

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 **October 25, 2024** were prepared for the Project by **McClure Engineering Company, 2001 W. Broadway, Columbia, Missouri 65202, Phone: 573.814.1568, Email: pwilson@mcclurevision.com**.

C. The Work consists of construction of potable water infrastructure replacements including piping, valves, and water softening equipment and all items incidental to total construction.

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

1.3 CONTRACTOR USE OF PREMISES

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

B. 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. Owner Occupancy: PUBLIC WILL NOT BE ALLOWED ACCESS TO THE SITE DURING CONSTRUCTION.

2. 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.

1.4 OCCUPANCY REQUIREMENTS

A. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install material and store equipment on the site in a manner that will not impede the contractor's work. This does not constitute acceptance of the total Work.

1. Upon final completion, the Owner will assume responsibility for maintenance of the project.

1.5 MISCELLANEOUS PROVISIONS

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 011000

SECTION 012100 – ALLOWANCES

PART 1 - GENERAL

1.1 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.

1.2 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. 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.

1.3 WEATHER ALLOWANCE

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

B. 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.

PART 2 - EXECUTION

2.1 SCHEDULE OF ALLOWANCES

A. Weather Allowance: Included within the completion period for this Project is TEN (10) "bad weather" days.

END OF SECTION 012100

SECTION 012600 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY

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

B. Related Sections include the following:

1. Division 0, Section 007213, Article 3.1 "Acceptable Substitutions" for administrative procedures for handling Requests for Substitutions made after Contract award.
2. Division 0, Section 007213, Article 4.0 "Changes in the Work" for Change Order requirements.
3. Division 1, Section 012100 "Allowances" for procedural requirements for handling and processing Allowances.
4. Division 1, Section 013115 “Project Management Communications” for administrative requirements for communications.

1.3 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.

1.4 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).

1.5 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.

1.6 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 012600

SECTION 013100 – COORDINATION

PART 1 - GENERAL

1.1 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.

1.2 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.
2. Articles 1.8.B and 1.8.C of Section 007213 "General Conditions" for coordinating meetings onsite.
3. Article 5.4.H of Section 007213 "General Conditions" for coordinating Closeout of the Contract.

1.3 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. Coordination: Each Contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each Contractor shall coordinate its operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other Contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required

maintenance, service, and repair of all components including mechanical and electrical.

C. 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.

D. 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.

E. 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.

1.4 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.

1.5 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 & number

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 013100

SECTION 013115 - PROJECT MANAGEMENT COMMUNICATIONS

PART 1 - GENERAL

1.1 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

1.2 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 location[1] with high-speed Internet access, i.e. DSL, local cable company's Internet connection, or T1 connection.
   2. Each of the above referenced computer systems shall have the following minimum system[2] and software requirements:
      a. Desktop configuration (Laptop configurations are similar and should be equal to or exceed desktop system.)
         1) Operating System: Windows XP or newer
         2) Internet Browser: Internet Explorer 6.01SP2+ (Recommend IE7.0+)
         3) Minimum Recommend Connection Speed: 256K or above
         4) Processor Speed: 1 Gigahertz and above
         5) RAM: 512 mb
         6) Operating system and software shall be properly licensed.
         7) Internet Explorer version 7 (current version is a free distribution for download). This specification is not intended to restrict the host server or client computers provided that industry standard HTTP clients may access the published content.
         8) Adobe Acrobat Reader (current version is a free distribution for download).
         9) Users should have the standard Microsoft Office Suite (current version must be purchased) or the equivalent.

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[1] The normal work location is the place where the user is assigned for more than one-half of his time working on this project.

[2] The minimum system herein will <u>not be sufficient</u> for many tasks and may not be able to process all documents and files stored in the E-Builder® Documents area.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable.)

END OF SECTION 013115

SECTION 013200 – SCHEDULE – BAR CHART

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY

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

B. Suggested Sequence: Construct Work in phases in order to accommodate Owner's occupancy requirements and to keep water infrastructure operational during construction period. A suggested sequence of construction is included for information only.
1. Six-inch water main.
2. Water softener building – piping and softening system.

PART 2 - PRODUCTS – (Not Applicable)

PART 3 - EXECUTION

3.1 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. 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

b. 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.

3.2 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.

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. 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. Fabrication
5. Deliveries
6. Installation
7. Testing
8. Adjusting
9. Curing

10. Placement into final use and operation

3.3 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.

3.4 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 013200

SECTION 013300 – SUBMITTALS

PART 1 - GENERAL

1.1 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.

1.2 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. Quality Assurance Submittals
4. Construction Photographs
5. Operating and Maintenance Manuals
6. 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.

1.3 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

1.4 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 24"x36".

1.5 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.

1.6 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.

1.7 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.

1.8 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

3.1 REQUIRED SUBMITTALS

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

SPEC SECTION	TITLE	CATEGORY
011000	Schedule of Values	Schedule of Values
013100	Coordination Drawings	Shop Drawings
013100	Key Personnel Names	Shop Drawings
013200	Schedules - Bar Chart	Construction Schedule
014000	Soil Field Density	Certification
014000	Concrete Testing	Certification
014000	Manufacturer's Field Services	Certification
017900	Demonstration and Training	Product Data
017900	Demonstration and Training	Construction Schedule
024113	Demolition and Removal Sequence and Location of Salvageable Items	Shop Drawings
024113	Location and Construction of Barricades, Fences, and Temporary Work	Shop Drawings
031000	Concrete Forming & Accessories	Shop Drawings
031000	Form Coatings, Ties, Accessories, Form system	Product Data
032000	Concrete Reinforcing	Shop Drawings
032000	AWS Certification	Certification
032000	Manufacturer's Certificate	Certification
033000	Concrete Mix Design	Product Data
033000	Concrete Mix Design	Certification
033000	Admixtures, Joint Devices, Attachment Accessories	Product Data
033500	Concrete Hardener, Sealer, Curing Compounds, Curing Papers, Slip Resistant Treatment	Product Data
055000	Metal Fabricated Items detailing materials, sections, connections, anchors, and paint	Shop Drawings
099600	Materials List	Product Data
099600	Items to be Painted	Shop Drawings
099600	Color Selection	Shop Drawings
099600	Samples	Shop Drawings
223116	Water Softening System	Product Data
223116	Water Softening System	Shop Drawings
223116	Water Softening System	Operation/Maintenance Manual
312323	Fill	Test Report
321500	Aggregates for Surfacing	Product Data
321500	Aggregates for Surfacing	Certification
329219	Seed	Product Data
331400	Water Utility Systems	Product Data
400500	Process Piping	Product Data
400507	Pipe Hangers, Supports, and Anchors	Product Data
400523	Process Valves	Product Data

B. Schedule of access must be provided in advance to the designated Department of Corrections point of contact. Variations in schedule must be provided in advance.

END OF SECTION 013300

SECTION 013513.16 - SITE SECURITY AND HEALTH REQUIREMENTS

PART 1 - GENERAL

1.1 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.

1.2 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. Revise list to include all required submittals.
   4. 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.
   5. Tuberculin skin test results for all employees required to be tested as set forth below.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 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. The Contractor shall provide Facility Representatives notice twenty-four (24) hours prior to any possible vehicle entry and/or required escort. The Contractor shall maintain a time log of any delays in gaining entrance to the Facility due to lack of an escort, which is to be submitted monthly with the Contractor's pay request materials. The purpose of this log is to establish a basis for a contract change, if required. The log shall contain the date and time of delay, date and time of request of entry, workers delayed (name and occupation), and name of the Facility Representative to whom the request was made, if possible. Any delay in entry must be validated by sallyport and pass office personnel at the Facility. Only delays greater than thirty (30) minutes will be considered for a contract change. A 30-minute delay upon arrival with a vehicle to enter

the sallyport should be expected.

3.2 RULES OF THE FACILITY

A. The Contractor and its workers shall observe the following rules:
   1. There shall be no fraternization with inmates.
   2. No intoxicating beverages or illegal drugs shall be brought onto Facility grounds.
   3. No firearms, other weapons, or explosives shall be carried onto Facility grounds.
   4. No prescription drugs above one day's dosage shall be carried on Facility grounds.
   5. Any vehicle or individual is subject to search at any time while on Facility grounds.
   6. The vehicles of the Contractor and its workers shall be locked whenever unattended.
   7. All tools and equipment shall be tightly secured during non-working hours in the Contractor's storage trailer or assigned area.
   8. The Facility will not be responsible for the Contractor's tools, equipment, or materials. The Contractor shall keep and maintain a current tool inventory. The tool inventory shall be made available to Facility Representatives and the Owner upon request.
   9. The Contractor shall report any missing tools to Facility Representatives immediately.
   10. Smoking shall be permitted only in accordance with the regulations of the Facility.
   11. Possession or use of smokeless tobacco or smokeless non-tobacco alternatives is strictly prohibited.

B. All workers shall be required to sign an acknowledgement of receipt of these rules.

3.3 SECURITY CLEARANCES AND RESTRICTIONS

A. DOC SECURITY CLEARANCE REQUIREMENTS

   1. Prior to the commencement of any onsite work, the Contractor shall submit a list containing the name, date of birth, and Missouri driver's license number or social security number of all construction personnel to the Missouri Department of Corrections for the purpose of obtaining security clearances. The required information shall be submitted at the pre-construction meeting, or as otherwise directed by Department of Corrections' personnel. Any construction personnel with pending warrants or felony convictions within the last five (5) years or other offenses deemed to create a security risk by Department of Corrections shall not be allowed onsite. The Department of Corrections reserves the right to refuse admission to any individual they feel may be detrimental to the security of the Facility.

3.4 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. The Contractor's workers shall not be under the influence of any intoxicating substances while on the Facility premises.

3.5 TUBERCULOSIS TESTING REQUIREMENTS

A. All workers who will be in the confines of the Facility for more than ten (10) consecutive working days must provide proof of a negative tuberculin skin test. The test results must be no more than six (6) months old at the commencement of construction. The Contractor or the worker, not the Owner, shall pay the cost of the test.

B. The Contractor shall submit to Facility Representatives current tuberculin skin test results for all workers who are required to have such a test in accordance with paragraph A above. If the contract period extends for more than twelve (12) months, the Contractor must provide new test results for all workers prior to the anniversary of the contract commencement date.

C. Any worker required to have a tuberculin skin test under paragraph A above who fails or refuses to do so will be denied admission to the facility until such time as proof of the test results are provided.

D. If any worker has a tuberculin skin test with positive results, the worker shall be denied access to the facility until the worker produces a certification from a physician licensed to practice in the State of Missouri that the worker does not have infectious tuberculosis.

E. The Contractor shall not be entitled to any additional time or compensation if any of its workers are denied access to the facility because of failure to produce negative tuberculin skin test results.

F. Failure or refusal of the Contractor to maintain and produce the required tuberculin skin test

records shall be a material breach of this contract, which shall subject the Contractor to a declaration of default.

3.6 PREA FOR CONTRACTORS AND EMPLOYEES

A. The contractor and all of the contractor's employees and agents providing services in any Department of Corrections institution must be at least 18 years of age. A Missouri Uniform Law Enforcement System (MULES) check or other background investigation may be required on the contractor, the contractor's employees and agents before they are allowed entry into the institution. The contractor, its employees and agents understand and agree that the Department may complete criminal background records checks annually for the contractor and the contractor's employees and agents that have the potential to have contact with inmates.

B. The institution shall have the right to deny access into the institution for the contractor and any of the contractor's employees and agents for any reason, at the discretion of the institution.

C. The contractor, its employees and agents under active federal or state felony or misdemeanor supervision must receive written division director approval prior to providing services pursuant to a Department contract. Similarly, contractors/employees/agents with prior felony convictions and not under active supervision must receive written division director approval in advance.

D. The contractor, its employees and agents shall at all times observe and comply with all applicable state statutes, Department rules, regulations, guidelines, internal management policies and procedures, and general orders of the Department that are applicable, regarding operations and activities in and about all Department property. Furthermore, the contractor, its employees and agents, shall not obstruct the Department or any of its designated officials from performing their duties in response to court orders or in the maintenance of a secure and safe correctional environment. The contractor shall comply with the Department's policies and procedures relating to employee conduct.
   1. The Department has a zero tolerance policy for any form of sexual misconduct to include staff/contractor/volunteer on offender, or offender on offender, sexual harassment, sexual assault, sexual abuse and consensual sex.
      a. Any contractor or contractor's employee or agent who witnesses any form of sexual misconduct must immediately report it to the warden of the institution. If a contractor or contractor's employee or agent fails to report or knowingly condones sexual harassment or sexual contact with or between offenders, the Department may cancel the contract, or at the Department's sole discretion, require the contractor to remove the employee/agent from providing services under the contract.
      b. Any contractor or contractor's employee or agent who engages in sexual abuse shall be prohibited from entering the institution and shall be reported to law enforcement agencies and licensing bodies, as appropriate.

E. The contractor, its employees and agents shall not interact with the offenders except as is necessary to perform the requirements of the contract. The contractor, its employees and agents shall not give anything to nor accept anything from the offenders except in the normal performance of the contract.

F. If any contractor or contractor's employee or agent is denied access into the institution for any reason or is denied approval to provide service to the Department for any reason stated herein, it shall not relieve the contractor of any requirements of the contract. If the contractor is unable to

perform the requirements of the contract for any reason, the contractor shall be considered in breach.

3.7 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

3.8 CELL PHONES AND ELECTRONIC DEVICES

A. Cell Phones, pagers, smart watches (that can send/receive messages), fitness wrist bands (that can send/receive messages) or other electronic devices are not permitted.
   1. Contractors, repairpersons, or information technology services department staff may be permitted to bring in a cell phone and portable wireless router (Wi-Fi, MiFi, etc.) if approved by the Chief Administrative Officer (CAO) when the phone is necessary to complete job duties relating to repairs on a case by case basis.
   2. Tables (IPad, etc.) are not allowed with the exception of for re-entry purposes approved via the division of adult institutions (DAI) director and the re-entry manager.
   3. Laptop computers may be permitted by the CAO on a case by case basis.

3.9 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 013513.16

SECTION 014000 – QUALITY REQUIREMENTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Quality control.

B. Tolerances.

C. References.

D. Labeling.

E. Testing and inspection services.

F. Manufacturers' field services.

G. Testing by Engineer.

1.2 QUALITY CONTROL

A. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.

B. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

C. Perform Work using persons qualified to produce required and specified quality.

D. Products, materials, and equipment may be subject to inspection by Engineer and Owner at place of manufacture or fabrication. Such inspections shall not relieve Contractor of complying with requirements of Contract Documents.

E. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

1.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current as of date of Contract Documents except where specific date is established by code.

C. Obtain copies of standards and maintain on Site when required by product Specification Sections.

D. When requirements of indicated reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

E. Neither contractual relationships, duties, or responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference in reference documents.

1.5 LABELING

A. Attach label from agency approved by authorities having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.

B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label:
1. Model number.
2. Serial number.
3. Performance characteristics.

C. Manufacturer's Nameplates, Trademarks, Logos, and Other Identifying Marks on Products: Not allowed on surfaces exposed to view in public areas, interior or exterior.

1.6 TESTING AND INSPECTION SERVICES

A. Contractor shall retain Engineer for the following tests and inspections:
1. Field density (soil)
2. Concrete (slump, air, compressive strength, etc).

B. Contractor/supplier shall be responsible for all shop inspections and certifications including, but not limited to welding.

1.7 MANUFACTURER'S FIELD SERVICES

A. When specified in individual Specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe Site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, testing, adjusting, and balancing of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer is subject to approval of Engineer.

C. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.

D. Refer to Section 013300 - Submittals.

1.8 MATERIAL TESTS

A. Includes all materials tests or tests specified hereinafter.

B. Employ approved testing laboratory to show that construction materials comply with specifications.

C. Contractor shall provide samples of materials required for laboratory tests pay cost of all tests including transportation charges on samples.

D. Incorporate no materials in work until laboratory tests have been furnished which show materials comply with specifications.

E. All materials shall be subject to sampling, testing, inspection and rejection at site by Engineer.

F. Laboratory tests for materials:
   1. Structural Steel: Certified copies of mill tests; ASTM A36.
   2. Cement: Bin sample for entire replacement, ASTM C150.
   3. Concrete Aggregates: One sample of each, ASTM C33.
   5. Two concrete compression cylinders from trial batch for each proposed mix, ASTM C39; test one at 7 days, one at 28 days; test random cylinders during construction.
   6. Reinforcing Steel: Certify that reinforcing steel conforms to ASTM A615 for grade specified.

PART 2 – PRODUCTS – Not Used

PART 3 – EXECUTION

3.1 SCHEDULE OF TESTING

A. Coordinate with Engineer to allow the performance of tests, inspections, and other services specified in individual Specification Sections, as required by Engineer, and as shown in the following Schedule:
   1. Provide Standard Proctor in accordance with ANSI/ASTM D698 for each type of material requiring density tests.
   2. In-place density tests according to requirements of Section 312323 Fill.
   3. Section 033000 – Cast-In-Place Concrete according to the requirements of Field Quality Control.

END OF SECTION 014000

SECTION 015000 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 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.

1.2 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. Storm sewer
2. Sanitary sewer

C. Support facilities include, but are not limited to, the following:

1. Dewatering facilities and drains
2. Temporary project identification signs and bulletin boards
3. Waste disposal services
4. Construction aids and miscellaneous services and facilities

D. Security and protection facilities include, but are not limited to, to following:

1. Barricades, warning signs, and lights
2. Environmental protection

1.3 SUBMITTALS

A. Not applicable. Contained in other sections.

1.4 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

1.5 PROJECT CONDITIONS

A. 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

2.1 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.

2.2 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. 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. Locate units at a location approved by Correctional Center Administration.

PART 3 - EXECUTION

3.1 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.

3.2 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 Toilets: Install self-contained toilet units. Use of pit-type privies will not be permitted. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project’s needs.

1. Shield toilets to ensure privacy.

2. Provide separate facilities for male and female personnel.

3. Provide toilet tissue materials for each facility.

C. 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.

D. 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.

3.3 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. Storage Facilities: Limited areas for storage of building materials are available onsite. Available storage areas are shown on the drawings. The Contractor shall provide his own security. Specific locations for storage will be discussed at the Pre-Bid Meeting and the Pre-Construction Meeting.

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 Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered “tools and equipment” and not temporary facilities.

F. Project Identification and Temporary Signs: Prepare project identification and other signs of size indicated in Drawings. 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. 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.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. 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.

B. 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.

C. 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.

3.5 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.

END OF SECTION 015000

SECTION 017400 – CLEANING

PART 1 - GENERAL

1.1 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.

1.2 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

2.1 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

3.1 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 daily, 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.

3.2 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. Leave the Project clean and ready for occupancy.

6. Site shall be restored to condition prior to commencement of construction activities.

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

D. 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 017400

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

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

1.3 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.

1.4 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 Engineer.
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.

1.5 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative experienced in operation and maintenance procedures and training.

B. Pre-Instruction 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.

1.6 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 Engineer.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

a. System, subsystem, and equipment descriptions.
b. Performance and design criteria if Contractor is delegated design responsibility.
c. Operating standards.
d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2. 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

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 007213 "General Conditions".

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Include the Engineer and Owner as appropriate for instruction in basis of design and operational philosophy.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
1. Owner will furnish Contractor with names and positions of participants.
2. 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.

3.3 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 640 x 480 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 DVD 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 017900

SECTION 024113 – SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Demolishing designated structures.
   2. Removing demolished materials.

1.2 SUBMITTALS

A. Section 013300 – Submittals: requirements for submittals.

B. Shop Drawings: Indicate demolition and removal sequence and location of salvageable items; location and construction of barricades, fences, and temporary work.

1.3 QUALITY ASSURANCE

A. Conform to applicable code for demolition of structures, safety of adjacent structures, dust control, runoff control, and disposal.

B. Conform to applicable code for procedures when hazardous or contaminated materials are discovered.

C. Obtain required permits from authorities having jurisdiction.

1.4 SEQUENCING

A. Section 011000 – Summary of Work and Drawings for requirements for sequencing.

1.5 SCHEDULING

A. Section 013200 - Schedules: Requirements for scheduling.

B. Schedule:
   1. Perform demolition and removal work so as not to interfere with Owner's operations.
   2. Coordinate demolition and removal work so new construction can proceed without undue delay.

1.6 PROJECT CONDITIONS

A. Protection
   1. Do not close or obstruct streets, walks and other public facilities occupied and used by Owner and public without prior written permission from Owner and other authorities having jurisdiction.
   2. Maintain in service and protect from damage existing facilities, utilities, and equipment indicated to remain or adjacent to work areas.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine existing structures indicated to be demolished before demolition.

B. Determine where removals may result in structural deficiency or unplanned collapse during demolition. Coordinate demolition sequence and procedures to prevent structures from becoming unstable.

C. Determine where demolition may affect structural integrity or weather resistance of adjacent buildings indicated to remain.

D. Identify measures required to protect structures from damage.

3.2 PREPARATION

A. Provide, erect, and maintain temporary barriers and security devices.

B. Protect existing landscaping materials, appurtenances, structures and utilities which are not to be demolished.

C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.

D. Mark location of utilities.

3.3 DEMOLITION REQUIREMENTS

A. Conduct demolition to minimize interference with adjacent structures and utilities.

B. Cease operations immediately if adjacent structures appear to be in danger. Notify Engineer. Do not resume operations until directed.

C. Conduct operations with minimum interference to public or private accesses.

D. Remove existing concrete, steel and masonry to extent indicated on drawings. Provide smooth, straight joint or cut line. Make cuts parallel with walls and/or floors.

E. Concrete structures to be removed to limits shown on drawings.

F. Provide temporary shoring and bracing to transfer loads of existing construction to remain from construction being removed.

G. Remove materials to be salvaged, re-installed or retained in manner to prevent damage. Store and protect.

H. Do not burn or bury materials on site. Leave site in clean condition.

I. Do not use blasting method for demolition.

J. Fill below grade abandoned structures with compacted fill material.

3.4 ABANDONMENT

A. Abandon disconnected utilities and underground piping within influence zone of proposed underground piping and proposed structures.

3.5 DISPOSAL

A. Separate all non-concrete materials from concrete rubble and stone rubble.

B. Concrete and brick shall be disposed of as follows:
   1. Cut exposed rebar from all concrete rubble.
   2. Haul above listed materials to contractor obtained site. Contractor to pay all disposal costs.
   3. Legally dispose of materials at a location off site.

C. All disposals shall be in accordance with Federal, State and local laws, ordinances and rules.

END OF SECTION 024113

SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast in place concrete; shoring bracing and anchorage; from stripping; form accessories

B. Related Sections:
1. Division 01 – General Requirements
2. Section 032000 – Concrete Reinforcing.
3. Section 033000 – Cast-In-Place Concrete.
4. Section 033500 – Concrete Finishing

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301 - Specifications for Structural Concrete for Buildings.
3. ACI 318 - Building Code Requirements for Structural Concrete.
4. ACI 347 - Guide to Formwork for Concrete.
5. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures

B. American Forest and Paper Association:
1. AF&PA - National Design Specifications for Wood Construction.

C. The Engineered Wood Association:
1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.

D. American Society of Mechanical Engineers:
1. ASME A17.1 - Safety Code for Elevators and Escalators.

E. ASTM International:
1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types), Current Edition.
2. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials, Current Edition.

F. West Coast Lumber Inspection Bureau:
1. WCLIB R17 - Standard Grading Rules for West Coast Lumber.

1.3 DESIGN REQUIREMENTS

A. Design, erect, support, brace, and maintain formwork so it will safely support vertical and lateral loads applied, until such loads can be supported by the concrete structure.

B. Carry vertical and lateral loads to ground by formwork system and in-place construction which has attained adequate strength.

C. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position.

D. Design forms and falsework to include assumed values of live load, dead load, weight of moving equipment operated of formwork, concrete mix, and height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.

E. Provide shore and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof.

F. Provide trussed supports when adequate foundations for shores and struts cannot be secured.

G. Support form facing materials by structural members spaced sufficiently close to prevent objectionable deflection.

H. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities, and within allowable tolerances.

I. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads.

J. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

1.4 SUBMITTALS

A. Section 013300 – Submittals.

B. Shop Drawings:
   1. Submit formwork, shoring, and reshoring shop drawings.
   2. Indicate the following:
      a. Pertinent dimensions, openings, methods of construction, types of connections, materials, joint arrangement and details, ties and shores, location of framing, studding and bracing, and temporary supports.
      b. Means of leakage prevention for concrete exposed to view in finished construction.
      c. Sequence and timing of erection and stripping assumed compressive strength at time of stripping, height of lift and height of drop during placement.
      d. Vertical, horizontal and special loads in accordance with ACI 347, Section 2.2 and camber diagrams, when applicable.
      e. Notes to formwork erector showing size and location of conduits and piping embedded in concrete in accordance with ACI 318, Section 6.3.
      f. Procedure and schedule for removal of shores and installation and removal of reshores.

C. Within 30-calendar days after Award of the Contract, submit manufacturer’s data and installation instruction for proprietary materials including form coatings, ties and accessories, and manufacturer’s form system (if used).

D. Product Data: Submit data on void form materials and installation requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 318.

B. For wood products furnished for work of this Section, comply with AF&PA.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver void forms and installation instructions in manufacturer's packaging.

B. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.7 COORDINATION

A. Section 013100 - Coordination

B. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

C. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request instructions from Engineer before proceeding.

PART 2 – PRODUCTS

2.1 WOOD FORM MATERIALS

A. Plywood: Douglas Fir species; exterior grade; sound undamaged sheets with clean, true edges.

B. Lumber forms:
   1. Application: Use for edge forms and unexposed finish concrete.
   2. Boards: 6-inches or 8-inches in width, ship lapped or tongue and groove, “Standard” Grade Douglas Fir, conforming to WCLIB Standard Grading Rules for West Coast Lumber. Surface boards on four sides.

2.2 PRE–FABRICATED FORMS

A. Preformed steel forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

B. Glass fiber fabric reinforced plastic forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

C. Pan Type: Steel or Glass fiber of size and profile required.

D. Tubular column type: Round, spirally wound laminated fiber, wood or glass fiber material, surface treated with release agent, non-reusable.

E. Steel forms: Sheet steel, suitably reinforced, and designed for particular use indicated on Drawings.

F. Form liners: Smooth, durable, grain less and non-staining hardboard, unless otherwise indicated on Drawings.

G. Framing, studding and bracing: Stud or No. 3 structural light framing grade.

2.3 FORMWORK ACCESSORIES

A. Form ties: Removable or Snap-off type, steel, adjustable length, cone type, with waterproofing washer, free of defects capable of leaving holes larger than 1 inch in concrete surface.
   1. For locations exposed to sewage or fluids: Use snap type plastic cone with water seal. Minimum 1-1/2-inch break back and maximum 1-inch cone diameter.
   2. Do not use wire ties where surface on either side will be exposed to moisture or chemical attack.

B. Spreaders: Standard, non-corrosive metal form clamp assembly, of type acting as spreaders and leaving no metal within 1-inch of concrete face. Wire ties, wood spreaders or through bolts are not permitted.

C. Form anchors and hangers:
   1. Do not use anchors and hangers exposed concrete leaving exposed metal at concrete surface.
   2. Symmetrically arrange hangers supporting forms from structural steel members to minimize twisting or rotation of member.
   3. Penetration of structural steel members is not permitted.

D. Form release agent: Colorless mineral oil that will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

E. Corners: Chamfer, rigid plastic or wood strip, ¾-inch by ¾-inch or as shown on drawings.

F. Vapor retarder: Where indicated on Drawings, 8 mil thick polyethylene sheet.

G. Bituminous joint filler: ASTM D1751.

H. Nails, spikes, lag bolts, through bolts, anchorages: Size, strength and character to maintain formwork in place while placing concrete.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Section 013100 - Coordination.

B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.

C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Engineer.

3.2 INSTALLATION

A. Earth forms:
   1. Earth forms are not permitted.

B. Formwork - General:
   1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
   2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
   3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.
   4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
   5. Complete wedging and bracing before placing concrete.

C. Forms for smooth finish concrete:
   1. Use steel, plywood or lined board forms.
   2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
   3. Install form lining with close-fitting square joints between separate sheets without springing into place.
   4. Use full size sheets of form lines and plywood wherever possible.
   5. Tape joints to prevent protrusions in concrete.
   6. Use care in forming and stripping wood forms to protect corners and edges.
   7. Level and continue horizontal joints.
   8. Keep wood forms wet until stripped.

D. Architectural form liners:
   1. Erect architectural side of formwork first.
   2. Attach form liner to forms before installing form ties.
   3. Install form liner squares, with joints and pattern aligned.
   4. Seal form liner joints to prevent grout leaks.
   5. Dress joints and edges to match form liner pattern and texture.

E. Forms for surfaces to receive membrane waterproofing: Use plywood or steel forms. After erection of forms, tape form joints to prevent protrusions in concrete.

F. Framing, studding and bracing:
   1. Space studs at 16-inches on center maximum for boards and 12-inches on center maximum for plywood.
   2. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations.
   3. Construct beam soffits of material minimum of 2-inches thick.
   4. Distribute bracing loads over base area on which bracing is erected.
   5. When placed on ground, protect against undermining, settlement or accidental impact.

G. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301.

H. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

I. Obtain Engineer's approval before framing openings in structural members not indicated on Drawings.

J. Install chamfer strips on external corners of beams, joists, and columns.

K. Install void forms in accordance with manufacturer's recommendations.

L. Do not reuse wood formwork. Do not patch formwork.

M. Forms for exposed concrete:
1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes.
2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
3. Use extra studs, whalers, and bracing to prevent objectionable bowing of forms strips of form material that will produce bow.
4. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.

N. Corner treatment: Unless shown otherwise, form chambers with ¾-inch by ¾-inch strips, accurately formed and surfaced to produce uniformly straight lines and tight edge joints on exposed concrete. Extend terminal edges to required limit and miter chamfer strips at changes in direction.

O. Control joints: Locate as directed by Engineer or as indicated on the Drawings.

3.3 APPLICATION – FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces are indicated to receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

D. Reuse and coating of forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.

3.4 INSTALLATION – INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Install formed openings for items to be embedded in or passing through concrete work.

B. Locate and set in place items required to be cast directly into concrete.

C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.

D. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.

E. Install water stops continuous without displacing reinforcement. Heat seal joints watertight.

F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

H. Form ties:
1. Use sufficient strength and sufficient quantity to prevent spreading of forms.
2. Place ties at least 1-inch away from finished surface of concrete.
3. Leave inner rods in concrete when forms are stripped.
4. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.

I. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.

J. Construction joints:
1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.
2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.
4. Arrange joints in continuous line straight, true and sharp.

K. Embedded Items:
1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
2. Do not embed wood or uncoated aluminum in concrete.
3. Obtain installation and setting information for embedded items furnished under other Specification sections.
4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.

L. Openings for items passing through concrete:
1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
2. Coordinate work to avoid cutting and patching of concrete after placement.
3. Perform cutting and repairing of concrete required as result of failure to provide required openings.

M. Screeds:
1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.

2. Slope slabs to drain where required or as shown on Drawings.
3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.

N. Screed supports:
1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membrane.
2. Staking through membrane is not permitted.

O. Cleanouts and access panels:
1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.
2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.

3.5 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.6 FORM REMOVAL

A. Formwork not supporting the weight of concrete and construction live loads, such as sides of beams, walls, columns, and similar parts of the work, shall remain in place until concrete has reached 75 percent of its specified 28-day strength.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements may not be removed until concrete has attained design minimum 28-day compressive strength. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of the concrete location or members, as specified in other sections.

C. Form-facing material may be removed four days after placement, only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

D. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated or otherwise damaged form-facing material will not be acceptable. Apply new form-coating compound material to concrete contact surfaces as specified for new formwork. When forms are reused for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets.

3.7 ERECTION TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301.

3.8 FIELD QUALITY CONTROL

A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

B. Notify Engineer after placement of reinforcing steel in forms, but prior to placing concrete.

C. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION 031000

SECTION 032000 – CONCRETE REINFORCING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
1. Reinforcing bars.
2. Welded wire fabric.
3. Reinforcement accessories.

B. Related Sections:
1. Division 01 – General Requirements
2. Section 031000 - Concrete Forming and Accessories.
3. Section 033000 - Cast-In-Place Concrete.
4. Section 033500 – Concrete Finishing

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete for Buildings.
2. ACI 318 - Building Code Requirements for Structural Concrete.
3. ACI 530.1 - Specifications for Masonry Structures.
4. ACI SP-66 - ACI Detailing Manual.

B. ASTM International:
1. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
3. A185/A185M-07 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
4. ASTM A496/A496M - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
5. ASTM A1064 / A1064M - 18a Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
6. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
7. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement, Current Edition.
8. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement, Current Edition.
9. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement, Current Edition.
10 ASTM A775/A775M- Standard Specification for Epoxy-Coated Steel Reinforcing Bars , Current Edition.
11. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement, Current Edition.
12. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars, Current Edition.
13. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel

Deformed Bars for Concrete Reinforcement, Current Edition.

C. American Welding Society:
   1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

D. Concrete Reinforcing Steel Institute:
   1. CRSI - Manual of Standard Practice.
   2. CRSI - Placing Reinforcing Bars.

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, and supporting and spacing devices.

C. Certificates: Submit AWS qualification certificate for welders employed on the Work.

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 318.

B. Prepare shop drawings in accordance with ACI SP-66.

1.5 QUALIFICATIONS

A. Welders: AWS qualified within the previous 12 months.

1.6 COORDINATION

A. Section 013100 – Coordination.

B. Coordinate with placement of formwork, formed openings and other Work.

PART 2 – PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing steel: ASTM A615 60 ksi yield grade, deformed billet bars.

2.2 ACCESSORY MATERIALS

A. Tie wire: Minimum 16 gage annealed iron wire.

B. Chairs, bolsters, bar supports, spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder puncture.

C. Special chairs, bolsters, bar supports, spacers adjacent to weather exposed concrete

surfaces: Stainless steel type; size and shape to meet Project specifications.

2.3 FABRICATION

A. Fabricate concrete reinforcement in accordance with ACI 318.

B. Form standard hooks for 180-degree bends, 90 degree bend, stirrup and tie hooks, and seismic hooks as indicated on Drawings.

C. Form reinforcement bends with minimum diameters in accordance with ACI 318.

D. Fabricate column reinforcement with offset bends at reinforcement splices.

E. Form ties and stirrups from the following:
   1. For bars No. 10 and Smaller: No. 3 deformed bars.
   2. For bars No. 11 and Larger: No. 4 deformed bars.

F. Under no circumstances will welding of any reinforcing be allowed.

G. Locate reinforcement splices not indicated on Drawings, at point of minimum stress.

H. Hooks: Conform to requirements of Paragraph 7.1, ACI 318-77.

I. Where column bars are offset or dowels used for column splices, provide ½-inch clearance between bars or dowels and vertical bars of next lift.

J. Locate reinforcing splices not indicated on Drawings at point of minimum stress. Review location of splices with Engineer.

K. Lap splices on #14 and larger bar or dowels are not permitted.

PART 3 – EXECUTION

3.1 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance:
   1. Do not weld crossing bars for assembly unless permitted by Engineer.

B. Do not displace or damage vapor retarder.

C. Accommodate placement of formed openings.

D. Space reinforcement bars with minimum clear spacing in accordance with ACI 318:
   1. Where bars are indicated in multiple layers, place upper bars directly above lower bars.

E. Maintain concrete cover around reinforcement in accordance with ACI 318, as indicated on the drawings or as follows:

Reinforcement Location		Minimum Concrete Cover
Footings and Concrete Formed Against Earth		3-inches
Concrete exposed to earth or weather	No. 6 bars and larger	2-inches
	No. 5 bars and smaller	1-1/2-inches
Supported Slabs, Walls, and Joists	No. 14 bars and larger	1-1/2-inches
	No. 11 bars and smaller	¾-inches
Beams and Columns		1-1/2-inches
Shell and Folded Plate Members	No. 6 bars and larger	¾-inches
	No. 5 bars and smaller	½-inches

F. Bars:

1. Reinforce footings as shown on Drawings. Where reinforcing is not shown, minimum reinforcing shall be as follows for each wall thickness:

   6" wall - #4@18-inches, one layer
   8" wall - #4@18-inches, one layer
   10" wall - #4@18-inches, each face
   12" wall - #5@18-inches, each face
   24" wall - #7@16-inches, each face
   30" wall - #7@12-inches, each face

2. Reinforce top of stem wall under door and other openings with two #5 bars, minimum; 4-feet longer than opening.
3. Reinforce curbs as shown on Drawings. Where reinforcing is not shown, place one #5 bar top and bottom.
4. At wall or floor openings, if reinforcing is not shown, include two #5 bars, each face, on all sides, 4-feet longer than opening dimension. Also add two #5 bars, each face, diagonally at each corner.

G. Lap splices shall be in accordance with Chapter 12 of ACI 318-89. All reinforcing shall be lap spliced or doweled as shown on Drawings.

H. Reinforcing embedded lengths shall be in accordance with ACI.

I. Drilled dowel placement and depth shall be as indicated on the Drawings. Engineer of Record must be contacted for drilled dowel placement and depth if not shown on the drawings.

J. Other:

1. Clean reinforcement to remove loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.
2. Position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
3. Place reinforcement to obtain the minimum coverage for concrete protection.

Arrange, space, and securely tie bars and bar supports together with 16-gauge wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.

4. Bars are to be tied at all intersections except where spacing is less than 1-foot in each direction, in which case alternate intersections are to be tied.
5. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least 1 full mesh.
6. Provide sufficient numbers of supports and of strengths to carry reinforcement. Do not place reinforcing bars more than 2-inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
7. Splices: Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wrapped tie wire around bars.

3.2 ERECTION TOLERANCES

A. Install reinforcement within the following tolerances for flexural members, walls, and compression members:

Reinforcement Depth	Depth Tolerance	Concrete Cover Tolerance
Greater than 8 inches	plus or minus 3/8-inch	minus 3/8-inch
Less than 8 inches	plus or minus 1/2-inch	minus 1/2-inch

B. Install reinforcement within the tolerances specified in ACI 530.1 for foundation walls.

END OF SECTION 032000

SECTION 033000 – CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete for the following:
   1. Exterior concrete work.

B. Related Sections:
   1. Division 01 – General Requirements
   2. Section 031000 - Concrete Forming and Accessories.
   3. Section 032000 - Concrete Reinforcing.
   4. Section 033500 - Concrete Finishing.

C. Control, expansion, and contraction joint devices associated with concrete work including joint sealants.

D. Work shall not be performed directly upon newly constructed concrete floor slabs:
   1. All newly poured and cured floor slabs shall be covered with heavy cloth or canvas or plastic coated tarpaulins for the duration of the construction period.
   2. Remove for periodic cleaning and replace before continuing construction Work.
   3. Remove and dispose of just prior to final inspection.
   4. No vehicles of any type shall be operated directly upon newly poured and cured floor slabs.
   5. No materials placed upon or stored directly on newly poured and cured floor slabs.

E. Utilize all efforts necessary to protect surface of newly poured floor systems during the remainder of the construction period.

1.2 REFERENCES

A. American Concrete Institute:
   1. ACI 211.1 – Recommended Practices for Selecting Proportions for Normal and Heavyweight Concrete, Current Edition.
   2. ACI 301 - Specifications for Structural Concrete for Buildings.
   3. ACI 302.1R – Guide for Concrete Floor and Slab Construction, Current Edition.
   4. ACI 304 – Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete, Current Edition.
   5. ACI 305 - Hot Weather Concreting.
   6. ACI 306.1 - Standard Specification for Cold Weather Concreting.
   7. ACI 308.1 - Standard Specification for Curing Concrete.
   8. ACI 318 - Building Code Requirements for Structural Concrete.
   9. ACI 350 – Environmental Engineering Concrete Structures.

B. ASTM International:
   1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   2. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
   3. ASTM C33 - Standard Specification for Concrete Aggregates.
   4. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

5. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
6. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
7. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
8. ASTM C150 - Standard Specification for Portland Cement.
9. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
10. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
12. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
13. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
14. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
15. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
16. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
17. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing.
18. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
19. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars.
20. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
21. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
22. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
23. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete.
24. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
25. ASTM C1218/C1218M - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
26. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
27. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
28. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
29. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
30. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
31. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
32. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
33. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
34. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on joint devices, attachment accessories, and admixtures.

C. Concrete mix design:
   1. Submit separate mix designs when admixtures are required for the following:
      a. Hot and cold weather concrete work.
      b. Air entrained concrete work.
   2. Identify mix ingredients and proportions, including admixtures.

D. Manufacturer's installation instructions: Submit installation procedures and interface required with adjacent Work

1.4 CLOSEOUT SUBMITTALS

A. Not required.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 318.

B. Conform to ACI 305 when concreting during hot weather.

C. Conform to ACI 306.1 when concreting during cold weather.

D. Acquire cement and aggregate from one source for Work.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Maintain concrete temperature after installation at minimum 50 degrees F for minimum 7 days.

1.7 COORDINATION

A. Section 013100 – Coordination.

B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

C. Coordinate Work building concrete tankage for water processes with ACI-350, Code Requirements for Environmental Engineering Structures.

PART 2 – PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I - Normal except as otherwise noted on Drawings or approved by Engineer. Type III and Type V Cement may be used as specified.

B. Fine aggregate:
   1. Meet requirements of ASTM C33-71a, except where more rigid requirements are included.
   2. Gradation within requirements of ASTM C33, Sections 4, 5, 6 and 7. Sieve analysis of aggregate must accompany mix design when submitted to Engineer for review.
   3. Natural sand:
      a. Clean, hard, strong, durable, uncoated grains.
      b. Coal and lignite: 0.25 percent maximum.
      c. Prove acceptability of aggregate by laboratory test conducted and certified by laboratory acceptable to Engineer on sample taken in accordance with ASTM C75.

C. Course aggregate:
   1. Meet requirements of ASTM C33-71a, Sections 8, 9 and 10, except where more rigid requirements are included.
   2. Clean, hard, strong, durable, uncoated grains.
   3. Gradation within requirements of ASTM C33, Table II:
      #57, 1" to No. 4; for footings and plain concrete.
      #57, 1" to No. 4; for slabs on grade and reinforced walls.
      #57, 1" to No. 4; for slabs, beams, fillet and fill concrete.
   4. Limitation of deleterious substances:
      a. Clay lumps and friable particles: Maximum 1.0 percent.
      b. Soft particles: Maximum 2.0 percent.
      c. Coal and Lignite: Maximum 0.25 percent.

D. Water: ACI 318; potable, without deleterious amounts of oil, acid, alkali, chlorides and sulfates, other common salts, organic matter or other deleterious substances.

2.2 ADMIXTURES

A. Air entrainment: ASTM C260.
   1. All concrete exposed to weather and freeze-thaw cycles shall be air-entrained, unless otherwise specified.

B. Fly Ash: ASTM C618 Class C.
   1. A singular source of fly ash shall be used for all work.

C. Plasticizing: ASTM C1017/C1017M Type I, plasticizing.

2.3 ACCESSORIES

A. Bonding agent: Two component modified epoxy resin.

B. Expansion Joints:
   1. Expansion joint filler shall be flexible, lightweight, non-staining, polyethylene, and closed cell. It shall be a chemical-resistant, ultraviolet stable, non-absorbent, low density, compressible foam and have the following requirements.
      a. Density, ASTM D1751: 2.0 Ibs/cu.ft. (32.04 kg/cu. m)
      b. Compression, ASTM D3575
         i. 10% Deflection: 10 psi (69 KPa) maximum.
         ii. 80% Deflection: 125 psi (862.49 KPa) max.
      c. Tensile Strength, ASTM D3575: 55 psi (379.50 KPa)
      d. Water Absorption, ASTM D3575: 0.5% vol. maximum.

e. Temperature Stability: -40ºC to 71ºC (-40ºF to 160ºF).

2.4 CONCRETE MIX

A. Select proportions for normal weight concrete in accordance with ACI 301 Method 1.

B. Provide concrete to the following criteria for construction of exterior concrete stairs:

Material and Property	Measurement
Compressive Strength (7-day)	4,000-psi
Compressive Strength (28-day)	5,000-psi
Cement Type	ASTM C150
Aggregate Type	Normal weight
Water-Cement Ratio (maximum)	0.45 by weight
Air Content	6.0 percent plus or minus 1.0 percent
Slump	3-inches plus or minus 1-inch

C. Admixtures: Include admixture types and quantities indicated in concrete mix designs only when approved by Engineer.
1. Use accelerating admixtures in cold weather. Use of admixtures will not relax cold weather placement requirements.
2. Do not use calcium chloride nor admixtures containing calcium chloride.
3. Use set retarding admixtures during hot weather, only with Engineer's authorization.
4. Add air entrainment admixture to concrete mix for work exposed to freezing and thawing or deicing chemicals.
5. For concrete exposed to deicing chemicals, limit fly ash, pozzolans, silica fume, and slag.

D. Average compressive strength reduction: Not permitted

E. Ready mixed concrete: Mix and deliver concrete in accordance with ASTM C94/C94M.

F. Site mixed concrete: Mix concrete in accordance with ACI 318.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Section 013100 – Coordination.

B. Verify requirements for concrete cover over reinforcement.

C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.

B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout or epoxy in accordance with Drawings or manufacturer's recommendations.

C. Remove debris and ice from formwork, reinforcement, and concrete substrates.

D. Remove water from areas receiving concrete before concrete is placed.
   1. Bottom of excavations shall be undisturbed earth free of frost or debris, level and compacted.
   2. Do not place any concrete until the Engineer has inspected and authorization forms and soil conditions, and until reinforcing, sleeves, and embedded items have been placed.
   3. Clean all dirt and debris from transporting equipment.
   4. Clean reinforcement of all foreign matter.
   5. Clean forms and oil or wet (except in freezing conditions) surfaces.

E. Transport concrete to prevent separation of materials in accordance with ACI practices:
   1. Do not add water to concrete during transporting.
   2. Handle from miser to point of placement with carts, buggies, or conveyors.
   3. Do not dump concrete from mixer or from transporting equipment with a free fall of more than 3-feet.
   4. Deposit concrete as nearly to its final position as possible.
   5. Clean transporting equipment at frequent intervals during placement.
   6. Do not use partially hardened or contaminated concrete.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 301.

B. Notify testing laboratory, Owner and Engineer minimum 48-hours prior to commencement of operations.

C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, and accessories are not disturbed during concrete placement.

D. Separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler.

E. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface.

F. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.

G. Install joint covers in longest practical length, when adjacent construction activity is complete.

H. Deposit concrete at final position. Prevent segregation of mix. Deposit concrete continuously or in layers of such thickness so no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

I. Place concrete in continuous operation for each panel or section determined by predetermined joints.

J. Consolidate concrete.

K. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

L. Place concrete continuously between predetermined expansion, control, and construction joints.

M. Do not interrupt successive placement; do not permit cold joints to occur.

N. Saw cut joints within 24-hours after placing. Use 3/16-inch thick blade, cut into 1/4 depth of slab thickness.

O. Placing concrete forms:
   1. Deposit concrete in forms in horizontal layers not deeper than 24-inches and in a manner to avoid inclined construction joints.
   2. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
   3. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.
   4. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6-inches into preceding layer. Do not insert vibrators into lower layers of concrete which have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

P. Cold weather placing:
   1. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306, “Cold Weather Concreting”, and as herein specified.
   2. When air temperature has fallen to or is expected to fall below 40°F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 40°F and not more than 80°F at point of placement, and maintain minimum temperature over the entire work for no less than 72 hours.
   3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
   4. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical acceleration unless otherwise accepted in mix designs.

Q. Hot weather placing:
   1. When hot weather conditions exist which could seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 “Hot Weather Concreting” and as herein specified.
   2. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F. Mixing water may be chilled or chopped ice may be used to control temperature provided water equivalent of ice is calculated in total amount of mixing water.

3. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
4. Wet forms thoroughly before placing concrete.
5. Use water-reducing retarding admixture (Type A) when required by high temperatures, low humidity, or other adverse placing conditions.

R. Construction joints: Contractor to submit placement and type of construction joints to Engineer for review prior to placement of any concrete on the project.

S. Expansion joints:
1. Install expansion joint filler where interior slabs abut exterior walls, interior bearing walls and columns, at perimeter of concrete equipment pads, and other necessary locations as determined by Engineer.
2. Omit expansion joint filler and install 15-pound felt, centered below doors, to break bond at exterior doors with concrete platforms, unless otherwise shown on the Drawings.

3.4 CONCRETE FINISHING

A. Finish concrete surfaces to requirements of Section 033500.

3.5 CURING AND PROTECTION

A. Cure and protect concrete surfaces to requirements of Section 033500.

3.6 FIELD QUALITY CONTROL

A. Perform field testing in accordance with these Documents.

B. Provide free access to Work and cooperate with appointed firm performing testing.

C. Concrete inspections:
1. Continuous placement inspection: Inspect for proper installation procedures.
2. Periodic curing inspection: Inspect for specified curing temperature and procedures.

D. Slump tests:
1. Make test in accordance with ASTM C143 on sample taken in accordance with ASTM C172.
2. Tests required:
   a. First load each day.
   b. Every 50-cy or fraction thereof.
   c. Whenever other tests are being made.
   d. After any change in mix.
   e. When directed by Engineer.

E. Temperature tests:
1. Required whenever outside temperature is within 10°F of limiting temperature.
2. Make tests at same time slump tests are taken.
3. Use armored thermometer accurate to plus or minus 2°F.

4. Place thermometer in freshly discharged concrete and leave it in place until reading

becomes stable.

F. Air content tests:
1. By pressure method ASTM C231 or volumetric method ASTM C173 on samples taken in accordance with ASTM C172.
2. Test first load of air entrained concrete and spot check by additional test on each day when air entrained concrete is placed.

G. Unit weight of concrete – in pounds per cubic foot.

H. Compression tests:
1. Prepare cylinders in accordance with ASTM C31.
2. Set of 3 cylinders required for every run of 50-cy or fraction thereof.
3. Cure cylinders under laboratory conditions and test by procedure in ASTM C39.
4. Prepare additional cylinders and cure under job conditions if air temperature is likely to fall below 40°F.
5. Break cylinders at 7 and 28-days, or as directed by Engineer.
6. If over 1 in 10 tests of laboratory specimens fall below specified design compressive strength, check design of mix and make necessary corrections before additional concrete is placed.
7. When test specimens break below strength specified, Contractor may be required to test concrete affected by procedure in ASTM C42 core tests or load test portion of structure affected.
8. Remove concrete not in accordance with specifications and replace without cost to Owner.

I. Record results of all tests immediately in Log of Tests which must be maintained at job site. Log must contain following information:
1. Date and time tests are made.
2. Test results, if immediately available.
3. Exact location where tested concrete was placed in structure.
4. Weather conditions, including air temperature at time tests were made.
5. Plant and number of mixer truck which delivered concrete.
6. Name of person who made test.
7. Mix design number.

3.7 PATCHING

A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms. Repair defects in accordance with Chapter 9 of ACI 301 and with ACI 309.2R.

B. Tie holes:
1. After being thoroughly cleaned and dampened, tie holes shall be grouted solid with a nonmetallic, non-shrinking grout.
2. Tie holes shall be filled from the large end of the cone-shaped hole and packed solid by rodding.
3. Rubber plugs shall be placed deep in the wall prior to filling with grout.
4. Holes shall be grouted on both sides of the walls.
5. Grout material shall fill the entire tie hole filling process shall be reviewed with and authorized by the Engineer prior to starting the Work.

C. Patching minor defects:
1. Surfaces to be patched or repaired after removal of forms shall be by methods

reviewed by the Engineer.

2. Plastering over the defects is not allowed.
3. Patching shall be performed as soon as the forms are removed and before any curing compound is applied.
4. Non-shrink, non-staining grout should be used. Provide well-bonded patch to adjacent concrete.
5. Patch imperfections in accordance with ACI 301.

D. Honeycombing:

1. Excessive honeycomb or embedded debris in concrete is not acceptable.
2. Honeycombing may be a result of improper concrete placement or inadequate vibration.
3. Patching of honeycombing areas may be permissible, depending on the extent and depth of defective concrete and its location.
4. If patching is allowed, all unsound material shall be chipped out back to sound, solid concrete.
5. Patch per Paragraph C above.
6. If patching is not allowed, concrete shall be removed and replaced.

3.8 JOINT FILLERS

A. Joint cleaning, priming and sealing to be in accordance with sealing manufacturer's recommendations. All joints to be sealed continuously full height in accordance with all product recommendations, under specified environmental conditions.

3.9 PROTECTION OF CONCRETE CONSTRUCTION

A. All surfaces shall be protected against injury. During the first 72-hours after placing the concrete, any wheeling, working or walking on the concrete shall not be permitted. This does not alter the requirements for proper curing.

B. Work shall not be performed directly upon newly constructed concrete floor slabs:

1. All newly poured and cured floor slabs shall be covered with heavy cloth or canvas or plastic-coated tarpaulins for the duration of the construction period.
2. Remove for periodic cleaning and replace before continuing construction Work.
3. Remove and dispose of just prior to final inspection.
4. No vehicles of any type shall be operated directly upon newly poured and cured floor slabs.
5. No materials placed upon or stored directly on newly poured and cured floor slabs.

C. Utilize all efforts necessary to protect surface of newly poured floor systems during the remainder of the construction period.

D. Do not place concrete slabs or top surfaces of walls during rain unless acceptable protective shelter is provided; and during such weather, all concrete placed within the preceding 12-hours shall be protected with waterproof canvas or other suitable coverings. These shall be provided and kept ready at hand.

E. All concrete construction shall be protected from excessive loading. Installation of mechanical and electrical equipment shall be accomplished by employing shores, bearing plates, frames, cranes and temporary beams.

3.10 DEFECTIVE CONCRETE

A. Defective concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by Engineer.

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

END OF SECTION 033000

SECTION 033500 – CONCRETE FINISHING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Finishing Concrete.

B. Related Sections:
   1. Division 01 – General Requirements
   2. Section 031000 – Concrete Forming and Accessories
   3. Section 032000 – Concrete Reinforcing
   4. Section 033000 - Cast-In-Place Concrete

1.2 REFERENCES

A. American Concrete Institute:
   1. ACI 301 - Specifications for Structural Concrete.
   2. ACI 302.1 - Guide for Concrete Floor and Slab Construction.

B. ASTM International:
   1. ASTM E1155 - Standard Test Method for Determining Floor Flatness and Levelness Using the F-number System.

1.3 SUBMITTALS

A. Section 013300 - Submittals.

B. Product Data: Submit data on concrete hardener, sealer, curing compounds curing papers, and slip resistant treatment, compatibilities, and limitations.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three (3) years documented experience.

B. Finisher: Company specializing in performing work of this section with minimum three (3) year documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's packaging including application instructions.

1.6 COORDINATION

A. Section 013100 - Coordination.

B. Coordinate the Work with concrete placement and concrete curing.

PART 2 – PRODUCTS

2.1 CURING COMPOUNDS

A. Exterior applications: “Kure-N-Harden” water-soluble, inorganic, silicate-based curing, hardening, sealing and dustproofing compound:
   1. Clear color.
   2. Apply at rate of 150 to 200-square feet per gallon.
   3. Prepare surface and apply per manufacturer’s recommendations.
   4. BASF, SIKA, Sonneborn; or equivalent.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Section 013100 - Coordination.

3.2 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
   1. Protect concrete footings from freezing for minimum 7 days.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Cure concrete floors in accordance with the following:
   1. Cover with fabric mats and keep wet during curing period.
   2. Cover with waterproof paper which meets requirements of ASTM C171.
   3. Cover with clear or white polyethylene sheets, 0.004-inch thick. Lap edges minimum 4-inch and seal with tape.
   4. Seal with liquid applied curing and sealing compound applied in accordance with manufacturer's directions. Do not apply compound on construction joints or floors to receive other finishes such as ceramic tile.
   5. Do not use Methods 1 and 4 in unheated areas during cold weather operations if exposed concrete is protected with blanket insulation.

D. Vertical surfaces:
   1. Wood forms, kept wet, and metal forms provide satisfactory curing. Cure exposed top surfaces as specified above.
   2. When forms are removed before end of curing period, exposed concrete must be cured by one of first three authorization methods included under Item C.

3.3 CONCRETE SLAB FINISHING

A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1 using a broom finish.

B. Complete screeding and darbying slabs before excess moisture or bleeding of water is present on surface.

C. Do not begin subsequent finishing operations until surface water has disappeared and the concrete will sustain foot pressure with only approximately ¼ inch indentation.

3.4 CONCRETE WALL FINISHES

A. Complete screeding and darbying of top of walls before excess moisture or bleeding water is present on the surface.

B. Do not begin subsequent finishing operations until surface water has disappeared.

3.5 TOLERANCES

A. Maximum Variation of Surface Flatness for Exposed Concrete Floors: 1/4 inch in 10 ft

END OF SECTION 033500

SECTION 055000 - METAL FABRICATIONS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Section includes:
   1. Fabricated metal items as specified hereinafter.
   2. Miscellaneous metal, shapes and plates not specified elsewhere, but shown on Drawings or required for complete construction.

1.2 RELATED SECTIONS

A. Division 01 – General Requirements.

B. Section 033000 Cast-in-Place Concrete.

C. Section 099600 High Performance Coating.

1.3 QUALITY ASSURANCE – WELDING

A. Steel:
   1. Conform to codes for arc and gas welding in building construction of AWS and to AISC specifications.
   2. Surfaces to be welded shall be free from loose scale, rust, grease, paint, and other foreign material, except mill scale which will withstand vigorous wire brushing may remain.
   3. No welding shall be done when base metal is lower than 0°F.
   4. Quality welding operators in accordance with AWS D1.1. Qualification tests shall be run by recognized testing laboratory approved by Engineer at Contractor's expense.
   5. Welding operators shall be subject to examination for re-qualification using equipment, materials, and electrodes employed in execution of Contract work. Such re-qualification, if ordered by Engineer, shall be done at expense of Contractor.

B. Aluminum: Weld with gas metal arc (GMA) or gas tungsten arc (GTA) processes in accordance with manufacturer's recommendations as approved and in accordance with recommendations of AWS.

C. Reference Standards:
   1. American Institute of Steel Construction (AISC):
      a. Specification for Design, Fabrication, and Erection of Structural Steel for Buildings.
      b. Code of Standard Practice for Steel Buildings and Bridges.
      c. Manual of Steel Construction, 8th Edition.
   2. American Society for Testing and Materials (ASTM):
      a. ASTM A6-82A - Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use.
      b. ASTM A36-81A - Specification for Structural Steel.
      c. ASTM A48-76 - Specification for Gray Iron Castings.

d. ASTM A53-82 - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
e. ASTM A108-81 - Specification for Steel Bars, Carbon, Cold Finished, Standard Quality.
f. ASTM A307-82A - Specification for Carbon Steel Externally Threaded Standard Fasteners.
g. ASTM A325-82 - Specification for High-Strength Bolts for Structural Steel Joints.
h. ASTM A500-82A - Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
i. ASTM A501-81 - Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
j. ASTM A570-79 - Specification for Hot-Rolled Carbon Steel Sheet Strip, Structural Quality.
k. ASTM A572-82 - Specification for High-Strength Low-Alloy Columbian - Vanadium Steels of Structural Quality.
l. ASTM A780-80 - Specification for Repair of Damaged Hot-Dip Galvanized Coatings.

3. American Welding Society (AWS):
   a. AWS A2.4-79 - Symbols for Welding and Non-Destructive Testing Including Brazing.
   b. AWS A5.5-81 - Specification for Low Alloy Steel Covered Arc Welding Electrodes.
   c. AWS A5.17-80 - Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.
   d. AWS D1.1-83 - Structural Welding Code: Steel.
4. American National Standards Institute (ANSI): ANSI B94.12-1977 - Carbide-Tipped Masonry Drills and Blanks for Carbide-Tipped Masonry Drills.
5. Steel Structures Painting Council (SSPC).
6. Aluminum Association (AA): AA SAS-30 - Specifications for Aluminum Structures.
7. American Iron and Steel Institute (AISI).
8. American Hot-Dip Galvanizers Association (AHDGA).

1.4 SUBMITTALS

A. Shop Drawings of items provided detailing materials, section sites, connections, anchors, and painting.

B. Manufacturer's catalog sheets on manufactured items.

C. Provide International Conference of Building Officials (ICBO) or other similar building code organization recommendations regarding safe allowable design loads for expansion anchors

D. Submit in accordance with Section 01 33 00, Submittal Procedures.

1.5 DELIVERY, STORAGE AND HANDLING

A. Accept metal fabrications on site in labeled shipments. Inspect for damage.

B. Protect metal fabrications from damage by exposure to weather.

1.6 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on shop drawings.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Materials shall conform to latest issue of following Specifications:
   1. Steel shapes and plates: ASTM A36.
   2. Cold-formed tubing and Pipe: ASTM A500.
   3. Hot-formed tubing: ASTM A501.
   4. Galvanized steel pipe: ASTM A53, Grade A, Schedule 40, unless noted otherwise.
   5. Stainless steel: Exterior and submerged - AISI, Type 316; Interior AISI, Type 304; Bolts and anchors - AISI, Type 316 or 304.
   6. Aluminum structural shapes and plates: Alloy 6061-T6 or 6063-T6; conform to referenced specifications and ASTM sections found in AA current construction manual series:
      a. Aluminum-alloy extruded bars, rods, shapes and tubes: ASTM B221, alloy 6061-T6.
      b. Aluminum-alloy shapes: ASTM B308, alloy 6061-T6.
      c. Aluminum-alloy sheet and plate: ASTM B-209, alloy 6061-T6 or 6063-T6.
      d. Aluminum-alloy structural pipe and tube: ASTM B429, alloy 6061-T6 or 6063-T6.
      e. Aluminum-alloy seamless extruded tubing: ASTM B241, alloy 6061-T6 or 6063-T6.
      f. Cast aluminum fittings: ASTM B26, alloy 214.
      g. Forged aluminum fittings: ASTM B247, alloy 6061-T6 or 6063-T6.
      h. Cast aluminum treads with abrasive surface: Wooster Type 231.
      i. Aluminum grating treads and landings: Borden Type with 1-1/4" abrasive nosings, or equal.
      j. Aluminum tread plate: ASTM B209; alloy 6061-T6 or 6063-T6. Supply with angles bearing bars, and cross bars. Plating to carry a uniform loading over the specific length with deflection not to exceed ¼-inch.
   7. Connection bolts for steel members: ASTM A325.
   8. Anchor bolts: Exterior and submerged-stainless steel unless otherwise indicated; interior-ASTM A307 galvanized; ½-inch minimum diameter.
   9. Connection bolts for wood members (galvanized unless otherwise shown): ASTM A307.
   10. Connection bolts for aluminum: Stainless steel.
   11. Cast iron: ASTM A48, Class 35B.
   12. Threaded rod: Series 300 stainless steel, unless noted otherwise.

B. Concrete anchors:
   1. Wedge anchors:
      a. Products: 316 stainless steel; Rawl-Stud Anchor by Rawlplug Company, Inc., Wedge Anchor by ITT Phillips Drill Division, Kwik-bolt by Hilti Fastening Systems; or equivalent.

b. Usage: In concrete. Do not use wedge anchors when submerged.

2. Sleeve anchors:
   a. Products: Type 316 stainless steel; Hol-Hugger sleeve anchors by Hilti Fastening Systems, Redhead sleeve anchors by ITT Phillips Drill Division, Rawl Lok/Bolt by Rawlplug Company, Inc.; or equivalent.
   b. Usage: In masonry.
3. Adhesive anchors:
   a. Products: Parabond Capsule Anchors with Type 316 stainless steel stud, nuts, and washers, as manufactured by Molly Division; Heavy Duty Adhesive Anchor with HBP adhesive cartridge and Type 316 stainless steel anchor rod assembly, as manufactured by Hilti Fastening Systems; Williams Adhesive Anchor System with Type 316 stud assembly as manufactured by Williams Form Engineering Corp.; or equivalent.
   b. Usage: In concrete, submerged.

2.2 FABRICATION

A. Connections and workmanship:
1. Fabricate details and connection assemblies in accordance with drawings and with projecting corners clipped and filler pieces welded flush.
2. Weld shop connections, bolt or weld field connections, unless otherwise noted or specified.
3. Provide clips, lugs, brackets, straps, plates, bolts, nuts, washers, and similar items, as required for fabrication and erection.
4. Use connections of type and design required by forces to be resisted and to provide secure fastening.
5. Welding:
   a. Grind exposed edges of welds to 1/8-inch minimum radius. Grind burrs, jagged edges, and surface defects smooth.
   b. Prepare welds and adjacent areas such there is:
      i. No undercutting or reverse ridges on weld bead.
      ii. No weld spatter on or adjacent to weld or any other area to be painted.
      iii. No sharp peaks or ridges along weld bead.
   c. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.
6. Bolting:
   a. Draw up bolts or nuts tight and deform threads where possible. Use bolts of lengths required so bolts do not project more than ½-inch beyond face of nut. Do not use washers unless specified. Provide hexagonal head bolts with hexagonal nuts.
   b. Provide holes required for connection of adjacent or adjoining work wherever noted on Drawings. Locate holes for bolting equipment to supports to tolerance of +1/16-inch of exact dimensions indicated.

B. Fit work together in fabrication shop and deliver complete or in parts, ready to be set in place.

C. Galvanizing:
1. Galvanize after fabrication.

2. Galvanize by hot-dip process conforming to appropriate ASTM and AHDGA specifications.
3. Galvanize in plant having facilities to produce quality coatings and capacity for volume of work.
4. Ship and handle manner avoiding damage to zinc coating.

D. Painting and finishes:
1. Refer to specification Section 09900, Painting.
2. Paint aluminum in contact with concrete in accordance with AA SAS-30. Under no circumstances shall aluminum contact dissimilar metal.

2.3 ANCHOR BOLTS

A. Anchor Rods: ASTM A307; Grade A or as indicated on Drawings.
1. Shape: Straight.
2. Furnish with nut and washer; unfinished.

2.4 ANCHORS

A. Furnish anchors for frames, curbs, sills, and other metal fabrications anchored into concrete or masonry:
1. Fabricate anchors from strap iron, bent to shape, or of weldable studs, welded to backs of members.
2. Where size and spacing are not noted, furnish 1-1/2-inch by ¼- inch anchors for concrete and 1-1/2-inch by 1/8-inch anchors for masonry.
3. Space masonry anchors to fit jointing of adjacent masonry work; in concrete, space anchors at 2-feet on centers.

B. Where anchors and plates or clips are to be built in for attachment of later work, provide bolts in plates for clips, welded to back, with threaded ends extended as required.

C. For attaching work to masonry or concrete where anchors or inserts cannot be built in, provide expansion anchors and machine bolts or screws.

2.5 MOUNTING BRACKETS AND REINFORCING ANGLES

A. 316 SS unless noted otherwise.

B. Anchorage as shown on Drawings.

2.6 LIFTING HOOKS

A. Steel, galvanized after fabrication.

B. Verify exact type and location with Engineer in field.

2.11 MISCELLANEOUS ITEMS

A. Fabricate miscellaneous steel and aluminum framing, supports, and items not forming part of structural steel framework or not indicated to be furnished under structural steel work. Use structural steel plates, shapes, bars, and tubing of sizes and arrangement indicated.

B. Partial list follows:
   1. Guard posts or bollards.
   2. Miscellaneous structural steel.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 – Administrative Requirements: Coordination and project conditions.

B. Verify field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal and aluminum where site welding is required.

B. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.3 INSTALLATION

A. General:
   1. Erect to lines and levels, plumb and true, and in correct relation to adjoining work. Secure parts using concealed connections whenever practicable.
   2. Plumb and true vertical members to tolerance of +1/8-inch in 10-feet. Level horizontal members to tolerance of +1/8-inch in 10-feet.
   3. Provide items such as bolts, shims, blocks, nuts, washers, and wedging pieces to complete installation.
   4. Drill field holes for bolts. Do not burn holes.
   5. New holes or enlargement of unfair holes by use of cutting torch is cause for rejection of entire member.
   6. Perform cutting, drilling, and fitting required for installation of metal fabrications.
   7. Engineer shall observe field welds before prime painting. Clean slag from welds prior to inspection.

B. Layout and install connectors such as expansion bolts and anchor bolts to secure metal fabrications to structure.

C. Concrete anchors:
   1. Drill holes in concrete and masonry work with rotary driven twist drills only. Fill voids in masonry with grout.
   2. Do not install until concrete has reached specified minimum strength (3,000 psi).
   3. Drill bits shall conform to ANSI B94.10 drill bit carbide dimensional standards.

4. Do not install closer than 6-bolt diameters to edge of concrete or masonry, or closer than 12-bolt diameters to another anchor unless detailed on Drawings.
5. Minimum embedment shall be 8-bolt diameters, except 6-bolt diameters embedment is acceptable when bolt is loaded in shear only.
6. Install in accordance to manufacturer's recommendations.

3.4 ADJUSTMENTS AND CLEANING

A. Field repair of damaged galvanized coatings:
   1. Repair galvanized surfaces damaged during shipping or erection/construction operations.
   2. Repair surfaces using zinc-rich paint.
   3. Prepare surfaces and apply in accordance with ASTM A780, Annex A2.

END OF SECTION 055000

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes:
   1. Surface Preparation.
   2. Surface finish schedule.
   3. Paint or coat surfaces described in Painting Schedule shall include, but not be limited to:
      a. Painting of interior building as shown on the room finish schedule.
      b. Painting of all exposed process piping and equipment if recommended by the manufacturer.
   4. Labeling and directional arrows on piping, equipment with valves or electrical connections, valves, and ducts, whether painted or not.

B. Related Sections:
   1. General Requirements – Division 01 (All Sections).
   2. Concrete – Division 03 (All Sections).
   3. Utilities – Division 33
   4. Process Interconnections – Division 40 (All Sections)

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM), Annual Book of ASTM Standards:
   1. ASTM D16 – Definitions of Terms Relating to Paint, Varnish, Lacquer and Related Products, Current Edition.

B. Federal Specification Unit:
   1. FS A-A-3054 - Paint, Heat Resisting (204 C).
   2. FS QPL-TT-P-28-15 - Paint, Aluminum, Heat Resisting (1200 Deg. F).
   3. FS TT-C-555 - Coating, Textured (For Interior and Exterior Masonry Surfaces).

C. SSPC: The Society for Protective Coatings:
   1. SSPC - Steel Structures Painting Manual.
   2. SSPC Paint 16 - Coal Tar Epoxy-Polyamide Black (or Dark Red) Paint.
   3. SSPC SP 2 - Hand Tool Cleaning.
   4. SSPC SP 3 - Power Tool Cleaning.
   5. SSPC SP 5 - White Metal Blast Cleaning.
   6. SSPC SP 6 - Commercial Blast Cleaning.
   7. SSPC SP 7 - Brush-Off Blast Cleaning.
   8. SSPC SP 10 - Near-White Blast Cleaning.
   9. SSPC SP 11 - Power Tool Cleaning to Bare Metal.

1.3 SUBMITTALS

A. Section 013300 - Submittal: Submittal procedures.

B. Materials List:
   1. Submit complete list of materials and painting schedule for all coats required for each type of surface. Deliver no material to job site until list is reviewed by

Engineer.

2. Submit schedule of products proposed for each system if other than those specified in paragraph 2.4, along with complete manufacturer's literature on each coating.
3. List in form permitting identification by container labels.

C. Shop Drawings:
   1. Prepare a complete listing (table) of all items Contractor intends to paint. Do not simply copy these Specifications. Include in the table:
      a. Paint type intended for use for each specific item or location.
      b. Space for color selection by Owner. Provide color charts.
      c. Dry film thickness.
      d. System type.
      e. Finish and surface preparation for each coat and each system on list.
   2. Color selections:
      a. May be adjusted by the Engineer after a specific brand of paint has been selected by Contractor and Shop Drawings have been reviewed by Engineer.
      b. Engineer may specify colors other than those stated in this Section or shown on Drawings.
      c. Contractor to have the final color selections authorized by the Owner before ordering any painting materials.
   3. Duplicate 6 by 8-inch samples of paint and stain colors when requested by Engineer. When possible, apply finishes on identical type materials to which they will be applied on job. Identify each sample as to finish type, formula, color name and number, and gloss.

D. Samples:
   1. Submit two paper chip samples illustrating range of colors available for each surface finishing product scheduled.

E. Manufacturer's Installation Instructions: Submit special surface preparation procedures, and substrate conditions requiring special attention.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Applicator: Company specializing in performing work of this section with minimum 3 years documented experience and approved by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, date of manufacture, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

D. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.

B. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

C. Ensure surface temperatures or surrounding air temperature is above 45°F before applying finishes. Minimum application temperature for epoxy and/or polyurethane coatings is 60°F.

D. Apply all finishes under adequate illumination.

E. Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures about 45°F for 24-hours before, during, and 48-hours after application of finishes, unless required otherwise by manufacturer's instructions.

1.7 QUALITY CONTROL

A. Before proceeding with painting, finish one complete sample panel, space, room or item of each color scheme showing selected color, finish texture, and workmanship. Request review and approval by Engineer of first finished sample panel, space room or item. Use first acceptable sample panel, space, room or item as the standard for similar work throughout.
   1. Approved samples will be kept on job for comparison;
   2. Engineer reserve right to select unopened containers of materials furnished on job and have materials tested at an approved laboratory;
   3. Owner will pay for first test. Retests of rejected materials and tests of replacement materials shall be paid for by Contractor. Remainder of contents of containers not require for testing will be returned to Contractor.

1.8 EXTRA MATERIALS

A. Leave excess material on premises, where directed by Engineer, usable partial cans of paint.

B. Containers to be tightly sealed and clearly labeled for identification.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. This specification lists coating system products manufactured by Tnemec Company, Inc. of Kansas City, Missouri. Materials specified herein are cited as minimum standard of quality which will be acceptable.
   1. Comparable coating systems from the following manufacturers are acceptable.

a. Tnemec Company, Inc.
b. Induron
c. Sherwin Williams

2.2 COMPONENTS

A. Coatings – General: Furnish complete multi-coat systems formulated and recommended by manufacturer for applications indicated, and in thicknesses indicated.
   1. Lead content: None.
   2. Maximum VOC content: As required by applicable regulations.
   3. Colors: Selected from manufacturer's Standard Colors.

2.3 COLORS

A. Architectural colors shall be selected by Owner.

B. Exposed process piping will be painted in accordance with 10 States Standards, Current Edition.

C. Exposed conduit and ductwork in finished painted area, except for color coding, shall be painted the color and texture to match walls or ceilings adjacent or near to it or as directed by Engineer.

D. See color coding and labeling schedule, Part 3.7, for equipment and pipes requiring identification colors.

E. Equipment colors:
   1. Equipment is meant to include machinery or vessel itself plus structural supports, fasteners, and attached portions of electrical conduit.
   2. Paint portions of equipment same color as process piping it serves.

2.4 COATING SYSTEMS

A. System A1: Steel – Structural, Tanks, Pipe & Equipment, Immersion (non-potable water) and Interior Service:
   1. First coat: N69 Hi-Build Epoxoline II, 3.0-5.0 mdft.
   2. Finish coat: N69 Hi-Build Epoxoline II, 4.0-6.0 mdft.

B. System A2: Steel – Structural, Tanks, Pipe & Equipment, Immersion (potable water) Service:
   1. First coat: 91-H2O Hydro-Zinc, 2.5-3.0 mdft.
   2. Intermediate coat: 21 Epoxoline, 6.0-8.0 mdft.
   3. Finish coat: 21 Epoxoline, 6.0-8.0 mdft.

C. System B: Steel - Structural, Tanks, Pipe & Equipment, Exterior, Non-Immersion Service:
   1. First coat: N69 Hi-Build Epoxoline II, 3.0-5.0 mdft.
   2. Intermediate coat: N69 Hi-Build Epoxoline II, 2.0-3.0 mdft.
   3. Finish coat:1095 Endura-Shield, 2.0-5.0 mdft.

D. System C: PVC pipe, Exterior, and Galvanized Steel and Non-ferrous metals, Exterior Service:

1. First coat: N69 Hi-Build Epoxoline II, 2.0-3.0 mdft.
2. Finish coat: 1095 Endura-Shield, 2.0-3.0 mdft.

E. System D: PVC pipe, Interior Service, and Galvanized Steel and Non-ferrous metals, Interior Service:
1. First coat: N69 Hi-Build Epoxoline II, 2.0-3.0 mdft.
2. Finish coat: N69 Hi-Build Epoxoline II, 2.0-3.0 mdft

F. System E1: Ductile-iron pipe, Interior and Immersion (non-potable water) Service:
1. First coat: N69 Hi-Build Epoxoline II, 3.0-5.0 mdft.
2. Finish coat: N69 Hi-Build Epoxoline II, 4.0-6.0 mdft.

G. System E2: Ductile-iron pipe, Immersion (potable water) Service:
1. First coat: N140 Pota Pox Plus, 4.0-5.0 mdft.
2. Finish coat: N140 Pota Pox Plus, 4.0-5.0 mdft.

H. System F: Ductile-iron pipe, Exterior Service:
1. First coat: N69 Hi-Build Epoxoline II, 3.0-5.0 mdft.
2. Intermediate coat: N69 Hi-Build Epoxoline II, 4.0-6.0 mdft.
3. Finish coat: 1095 Endura-Shield, 2.0-3.0 mdft.

I. System G: Factory-primed steel, Doors, Frames, Miscellaneous Equipment – Exterior Service:
1. First coat: Factory primed.
2. Intermediate coat: 27 Typoxy, 2.0-3.0 mdft.
3. Finish coat: 1095 Endura-Shield, 2.0-3.0 mdft.

J. System H: Factory-primed steel, Doors, Frames, Miscellaneous Equipment – Interior Service:
1. First coat: Factory primed.
2. Intermediate coat: 27 FC Typoxy, 2.0-3.0 mdft.
3. Finish coat: N69 Hi-Build Epoxoline II, 2.0-3.0 mdft.

K. System I: Concrete and Masonry, Poured-in-Place, Precast & Dense CMU – Exterior Exposed:
1. First coat: 156 Enviro-Crete, 6.0-8.0 mdft.
2. Finish coat: 156 Enviro-Crete, 6.0-8.0 mdft.

L. System J: Concrete and Masonry, Precast, Poured-in-Place & Dense CMU – Immersion (non-potable) Service:
1. First coat: N69 Hi-Build Epoxoline II, 4.0-6.0 mdft.
2. Finish coat: N69 Hi-Build Epoxoline II, 4.0-6.0 mdft.

M. System K: Concrete and Masonry, Precast, Poured-in-Place & Dense CMU – Interior Exposed:
1. First coat: N69 Hi-Build Epoxoline, 6.0-8.0 mdft.
2. Finish coat: N69 Hi-Build Epoxoline, 6.0-8.0 mdft.

N. System L: Concrete Floors:
1. First coat: 237 Power Tread, 3.0-5.0 mdft.
2. Finish coat: 248 EverThane, 2.0-3.0 mdft, containing 2-4 ounces per gallon of

polypropylene plastic beads.

O. System M1: Galvanized Steel and Non-Ferrous Metals – Immersion (non-potable water) Service:
   1. First coat: N69 Hi-Build Epoxoline II, 2.0-3.0 mdft.
   2. Finish coat: N69 Hi-Build Epoxoline II, 2.0-3.0 mdft.

P. System M2: Galvanized steel and Non-Ferrous Metals – Immersion (potable water) Service:
   1. First coat: Series 21 Epoxoline, 6.0-8.0 mdft.
   2. Finish coat: Series 21 Epoxoline, 6.0-8.0 mdft.

Q. System N: Plaster / Wallboard, Interior Service:
   1. First coat: 151 Elasto-Grip FC, 0.7 -1.5 mdft.
   2. Intermediate coat: N69 Hi-Build Epoxoline, 4.0 – 6.0 mdft.
   3. Finish coat: N69 Hi-Build Epoxoline, 4.0 – 6.0 mdft.

R System O: Wood, Exterior or Interior Service:
   1. First coat: 10-99W Tnemec Primers, 2.0 – 3.5 mdft.
   2. Finish coat: 1029 Enduratone, 2.0 – 3.0 mdft.

S. System P: OSB Board, Interior Moist and Corrosive
   1. Prime: Series 151, 300-400 square feet per gallon.
   2. Finish: Two (2) Coats, Series 113 at 200-300 square feet per gallon per coat.

T. System Q: Concrete and Masonry, Poured-in-Place and Dense CMU – Chemical Containment Area:
   1. Filler: 215 Surfacing Epoxy, 1/32” – 1/8” mdft.
   2. Primer: 201 Epoxoprime, 225 sfpg.
   3. Intermediate: 282 Tneme-Glaze, 180 sfpg.
   4. Finish: 282 Tneme-Glaze, 180 sfpg.

U. System R: Concrete Laminate Floors: Polyurethane concrete system
   1. First coat: 241 Ultra-Tread MVT, broadcast aggregate to refusal at 1/8”
   2. Intermediate coat: 237 Power-Tread grout coat, 14-16 mdft
   3. Finish coat: 248 EverThane, 2.0-3.0 mdft.

PART 3 – EXECUTION

3.1 GENERAL

A. Paint systems shown are to be used for equipment and piping delivered to the site even though they may already be shop primed. Shop-prime coat will not be substituted for the prime coats required by the paint systems listed.

B. Process equipment directly connected to color-coded pipe shall be painted the same color as the pipe.

C. Provide surface preparation, materials, equipment, and labor for painting specified.

D. Apply coating materials and finishes to surfaces of new exposed Work, except surfaces specifically excluded hereinafter. Existing construction shall be painted only where disturbed by new work.

E. Prime unprimed field-fabricated material in manner specified in this Section.

F. Touch up factory-applied and other completed finishes using methods and materials which will produce a repaired surface closely matching original finish.

G. Remove rough areas of structural steel using grinder or other applicable power tools to smooth rough areas on structural steel resulting from cutting and welding.

H. Paint surfaces of physical hazards in accordance with OSHA Section 1910.144.

I. Determine compatibility of primers with paints to be applied over them. If priming, undercoating, or finish coating specified does not conform in every way to recommendations of manufacturers, prepare schedule of recommended coatings and submit to Engineer for review. Any resulting changes shall be made at no additional cost to Owner.

3.2 INSPECTION

A. If surfaces to be finished cannot be put into proper condition for finishing by customary cleaning, sanding and puttying operations or if surfaces were improperly primed by others, immediately report defects to Contractor, in writing, or assume responsibility and rectify any unsatisfactory finish resulting. Commencing of work indicates acceptance of surfaces.

B. Work removed and replaced to correct surface defects due to procedures on unsuitable surfaces shall be at Contractor's expense.

C. Where there are questions as to dryness of surfaces test with dampness indicating machine in presence of Engineer. Apply no paint on plaster when moisture exceeds 8 percent as determined by testing device.

3.3 PROTECTION

A. Adequately protect other surfaces from paint and damage.

B. Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.

C. Place cotton waste, cloths, and material which may constitute a fire hazard in closed metal containers and remove daily from site.

D. Protect electrical plates, nameplates, surface hardware, fittings, and fastenings, prior to painting operations. Do not use solvent to clean hardware which may remove permanent lacquer finish.

3.4 SURFACE PREPARATION AND TOUCH-UP

A. Surface preparation:
   1. Shall conform to recommendations of paint manufacturer.
   2. Shall conform to these Specifications to ensure satisfactory performance of each coating system.
   3. Surfaces, before painting and between coats, shall be dry, smooth, and free from dust, rust, loose mill scale, grease, grit, and frost.

B. Remove mildew, by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry completely. Use wire brushing only to remove loose dirt.

C. Rooms and other areas and spaces: Broom-clean before field painting is started.

D. Aluminum surfaces:
   1. Remove surface contamination by steam, high-pressure water, or solvent acid washing.
   2. Apply etching primer or acid-etch.
   3. Apply paint immediately if etching.

E. Factory-primed steel: Aggressively sand surfaces of factory-primed steel prior to painting.

F. Galvanized steel (non-phosphatized) surfaces:
   1. Surfaces should be clean and dry. Remove dust and dirt by blowing off the surface with high-pressure air or wiping clean with dry rags.
   2. Chemically or mechanically abrade surface to create uniform surface profile.
   3. Remove oil, grease and protective mill coatings by solvent cleaning (SSPC-SP1).
   4. White rust should be removed from galvanized steel by hand or power brushing. Care should be taken not to damage or remove the galvanizing.
   5. Remove rust from old galvanized steel by hand or power tool cleaning (SSPC-SP2 or SP3).

G. Stainless steel surfaces:
   1. Prepared by solvent cleaning prior to coating, using any one of the methods in SSPC-SP1.
   2. Only solvents and cleaning solutions containing less than two hundred ppm of halogens should be used to prevent stress corrosion cracking.
   3. Abrasive blast cleaning procedures outlined by Steel Structures Painting Council for carbon steel may also be used for stainless steel.
   4. Only very hard silica sand or other abrasive media should be used for a fast cutting action and to obtain a sharp angular profile.

H. Iron and steel:
   1. Cleaning methods: Conform to applicable requirements of Steel Structures Painting Council:
      a. **Solvent cleaning (SSPC-SP1):** Removal of dirt, oil, grease and foreign matter with solvents or commercial cleaners using various methods of cleaning such as wiping, dipping, steam cleaning or vapor degreasing. Vapor degreasing or steam cleaning should be employed where coatings will not tolerate any oil or grease residue. The removal of oil and grease

by solvent cleaning is included in all other SSPC Surface Preparation Specifications.

b. **Hand tool cleaning (SSPC-SP2):** Removal of loose rust, mill scale, or old paint by hand wire brushing, hand scraping, hand chipping or hand sanding.

c. **Power tool cleaning (SSPC-SP3):** Removal of loose rust and mill scale by mechanical means such as power sanders, wire brushes, chipping hammers, abrasive grinding wheels or needle guns.

d. **Commercial blast cleaning (SSPC-SP6):** Removal of at least two-thirds (2/3) of all visible rust, mill scale, paint and other foreign matter from each square inch of surface by compressed air nozzle blasting, centrifugal wheels or other specified method.

e. **Near-white blast cleaning (SSPC-SP10):** Removal of ninety-five (95) percent of all visible rust, mill scale, paint and other foreign materials from each square inch of surface by compressed air nozzle blasting, centrifugal wheels or other specified method.

2. Blast cleaning requirements:
   a. Non-immersion: SSPC-SP6.
   b. Immersion: SSPC-SP10.
3. Cleaning for other field painting: SSPC-SP3.
4. Removal of materials such as grease and oil: SSPC-SP1.
5. Surface irregularities from blasting shall be approximately 30 percent of total paint system dry mil thickness.
6. Blast profile requirement for all SP6-SP10 abrasive blast-cleaned surfaces to be 1.5-mil.

I. Ductile-iron pipe:
1. Inspect surfaces and pre-clean with appropriate solvents to remove grease, oil and other soluble contaminants:
   a. Scrub surface with stiff bristle brushes soaked in solvent.
   b. Prior to evaporation remove solvent by wiping with clean, lint-free cloth rags.
   c. Remove rag residue (if any) with dry, oil free compressed air.

2. Measure surface profile (anchor pattern) in accordance with ASTM D4417, Method C:
   a. If the surface profile is less than 1.5 mils, then proceed with brush-off blast cleaning.
   b. If the surface profile is 1.5 mils or greater, then proceed with hand or power tool cleaning.
3. Brush-off blast cleaning:
   a. Removal of all loose annealing oxides, loose rust, dirt and other foreign matter by compressed air nozzle abrasive blast cleaning.
   b. Any dust or other contaminants remaining after blasting shall be removed with dry, oil free compressed air or by vacuum cleaning.
   c. Recheck surface profile prior to painting. A profile depth of at least 1.5 mils is required.
4. Hand or power tool cleaning:
   a. Removal of all loose annealing oxides, loose rust, dirt and other foreign matter with the use of hand or power tools.
   b. Do not use cleaning tools which can burnish or smooth the natural roughness (profile) of the cast iron surface.

c. Any dust or other contaminants remaining after hand or power tool cleaning shall he removed with dry, oil free compressed air or by vacuum cleaning.

5. Protect from moisture:
   a. Cleaned iron surfaces shall be protected from conditions of high humidity, rainfall and surface moisture.
   b. All surfaces must be dry, clean and at least 5°F above the dew point prior to painting.

K. PVC pipe:
1. All surfaces to be uniformly and thoroughly scarified or abraded to create an anchor profile.
2. Any dust or other contaminants remaining after sanding shall be removed with dry, oil free compressed air or by vacuum cleaning.

L. Concrete and masonry:
1. All surfaces to be painted or sealed shall be clean, dry and free of dirt, dust, oils, grease, wax, flaking or loose paint, efflorescence and other deleterious materials.
2. All cracks, chips and other defects in plain concrete surfaces shall be filled prior to coating or sealing.
3. New concrete and masonry should not be coated for at least 28-days to permit the concrete or mortar to cure and dry out.
4. Concrete will be tested for moisture content prior to painting by the following method:
   a. Securely tape a piece of heavy gauge plastic film, about 1-foot square, to the concrete.
   b. Plastic film will act as a moisture barrier and trap any moisture migrating through the concrete.
5. Film:
   a. Pieces of test film should be placed at various locations which are likely to be slow drying out, such as below grade, low spots in floors, inside corners and lower wall areas.
   b. Film should be carefully sealed with tape to prevent the escape of any moisture of vapor which may be trapped behind the film.
   c. Film should be left in-place overnight or longer to allow sufficient time for moisture migration.
   d. If condensation appears on the backside of the film or if the concrete under the film appears to be darker, damp or wet, more drying time shall be allowed and the test then repeated.
6. Surface defects and cleaning:
   a. Surfaces to be coated should be examined for defects such as fins, protrusions, bulges and mortar spatter.
   b. Defects should be corrected by grinding or scraping.
   c. Remove non-degraded release agents, oil, wax, and grease by scraping off heavy deposits and solvent cleaning or washing with a hot trisodium phosphate solution consisting of 2-8 oz. of trisodium phosphate to each gallon of hot water (160°F).
   d. Repeat the cleaning operation until the contamination is removed and flush the area with clean water to remove residual cleaning solution. Allow drying thoroughly before coating.
7. Laitance removal:

a. High-build, high film-strength coatings will not develop optimum adhesion to concrete unless laitance and other loosely bound material are first removed from the surface.
b. Removal shall be by either acid etching or sandblasting.
c. Sandblasting is preferred where practical.

8. Sandblasting:
   a. Care will be taken to define the degree of blast cleaning required for the coating system so the concrete will not be eroded beyond what is necessary.
   b. Two degrees of abrasive blast cleaning are sufficient for most coating systems:
      i. Brush-off blast cleaning.
      ii. Sandblast cleaning.
   c. Brush-off blast cleaning is lightly abrading the surface without entirely removing the surface or exposing underlying aggregate.
   d. Brush-off cleaning will open up sub-surface holes and voids and etch the surface sufficiently for the coating to bond and adhere satisfactorily.
   e. Sandblast cleaning involves the complete removal of the top surface of the concrete, exposing the underlying aggregate.
   f. Removal of the concrete surface shall not be so deep as to undermine or loosen exposed aggregate.
   g. Brush-off blast cleaning will meet the requirements for most non-immersion systems, whereas a greater degree of surface removal may be required for some immersion coating systems.
9. Dry sandblasting equipment using a compressed air blast nozzle is recommended:
   a. Wet or water-vapor blast cleaning should be used only with prior approval and where the coating is not scheduled to be applied immediately after surface preparation.
   b. Abrasive used should be dry silica sand with the maximum particle size which will pass through a 16-mesh screen.
   c. After blast cleaning is completed, sand, dust and loose particles should be removed from the surface by vacuuming or blowing off with high pressure air.
   d. Examine the surface for texture and uniformity, as well as the removal of dust, efflorescence and laitance.
   e. Patch voids and cracks causing discontinuities in the coating or unsightly appearance using a patching compound compatible with the coating system.
10. Compressed air used for nozzle blasting should be periodically checked to verify it is clean, dry and oil free. Oil and water separators should be placed in the airline as close as possible to blast cleaning equipment.
11. Acid etching:
   a. Acid etching solution shall be made with 1 part Muriatic Acid (20° Baume) and 2 to 4 parts of fresh water.
   b. If a chloride-free acid etching solution is required, 85 percent phosphoric acid diluted with 2 to 3 parts of fresh water shall be used.
   c. Stronger acid solutions may be used if the etching action is insufficient, but care should be taken not to etch the concrete so deeply the aggregate is not securely bound.
   d. Residual dust and dirt shall be removed from the surface of the concrete with fresh water, using a high-pressure hose.

e. Excess water shall be removed from the floor with brooms or rubber squeegees and the concrete allowed to dry until the surface is damp, but not wet.
f. Acid etching solution shall be applied uniformly to the concrete by low-pressure spray equipment or plastic sprinkling cans.
g. Spreading operation shall be coordinated with the rinsing operation so acid is not completely spent or has started to dry out before the surface is flushed with fresh water.
h. Rinsing operation shall be started when the bubbling action of the acid begins to subside.
i. Surface shall be rinsed with clean water, using a pressure hose while scrubbing with stiff bristle fiber brooms to remove salt formations and loose material.
j. Rinse a second time using a solution of 1-cup of ammonia to 1-gallon of water.
k. Test with pH paper and continue the rinsing operation until a pH of 7 or higher is obtained.
l. Remove excess water by brooms or rubber squeegees.
m. Etched concrete should be examined for uniformity and texture and should have the feel of medium (100-grit) sandpaper.
n. Surface should be free of surface glaze, laitance, salts and loosely adhering material.
o. Allow the surface to dry a minimum of 72-hours under conditions which will promote drying and then remove all dust and foreign matter by vacuuming.
p. Acid etching shall be used to prepare concrete floors. It shall not be used on vertical surfaces and on slopes or inclines.

M. Gypsum drywall construction:
1. Sand joint compound with fine grit, open-coated sandpaper to provide a smooth flat surface.
2. Avoid heavy sanding of adjacent wallboard, which may raise the nap of the paper covering.
3. Remove dust from the surface by wiping with clean rags or other methods.
4. Putty, patching pencils, caulking or masking tape should not be applied to drywall surfaces to be painted.
5. Lightly scuff-sand tape joints after priming to remove raised paper nap. Take care not to sand through the prime coat and remove dust by wiping with clean rags.

N. Wood:
1. Wood should be clean and dry.
2. Remove surface deposits of sap and pitch by scraping and wiping clean with rags dampened with mineral spirits. Seal knots and pitch pockets with shellac reduced with equal parts of shellac thinner before priming.
3. Sand rough spots with the grain, starting with medium grit sandpaper and finishing with fine grit. Remove sanding dust.
4. After the prime coat is dry, fill cracks and holes with putty or spackling compound. When filler is hard, sand flush with the surface using fine grit sandpaper.
5. Sand lightly between coats with a fine grit, open-coated sandpaper.

3.5 APPLICATION

A. Basic application requirements:
   1. Spread evenly and flow on smoothly without runs, lumps or sags.
   2. Make edges of paint adjoining other materials or colors sharp and clean without overlapping.
   3. All previous coats to thoroughly dry before applying succeeding coats.
   4. Keep pigments, fillers, varnishes, and enamels well-stirred during application. Paint and finishing materials to be free from skins, lumps or other foreign matter when used. Apply materials without additives and without reducing or thinning.
   5. Dry under conditions eliminating possibility of dust becoming impregnated.
   6. Manufacturer-applied paint system:
      a. Abraded areas on factory finished items shall be repaired in strict accordance with manufacturer's directions.
      b. Repaired areas shall be carefully blended into original finish.

B. Priming and sealing:
   1. Shop:
      a. Unless specified in other sections, or in following coating schedules, shop primer for ferrous metal shall be minimum 2-coats at 1.0 mil dry film thickness per coat of rust-inhibitive type containing zinc pigments, complying to SSPC guidelines and compatible with appropriate system specified in painting or coating schedules of this Specification.
      b. Shop primed items shall be inspected at job site for compliance with these specifications. Schedule such inspection with Engineer in advance.
      c. Areas of chipped, peeled or abraded primer shall be hand or power sanded, feathering edges. Spot prime areas with specified primer.
      d. Prior to application of finish coats, shop primed surfaces shall be cleaned free of dirt, oil, and grease.
      e. Holdback areas for welding shall be prepared and primed after welding as required for specified paint system.

   2. Field:
      a. Holdback areas for welding shall be prepared and primed after welding as required for specified paint system.
      b. Do not field prime surfaces to be submerged.

3.6 SURFACES NOT TO BE PAINTED OR SPECIFIED ELSEWHERE

A. Painting is not required for surfaces constructed of the following materials or items:
   1. Glass, vitreous enamel, and chrome plated items.
   2. Stainless steel, aluminum (except where noted), brass, bronze, and copper metals.
   3. Rubber, plastic, and fiberglass structural shapes.
   4. Switch plates, nameplates, and hardware.
   5. Aluminum grating, tread plate, stairs, and handrails.
   6. Interior copper piping. Provide pipe markers as specified.

B. Painting is not required for the following equipment having factory-applied finishes:
   1. Motor control centers and similar electrical panels.
   2. Heating and ventilating equipment.
   3. Lighting fixtures.

4. Meter and instrument panels.
5. Gauges and other miscellaneous equipment.

3.7 PAINTING SCHEDULE

A. Apply specified coating systems to the following items and locations.

Surface	Color	TNEMEC No.	System Number
Exposed Ductile Iron Pipe	True Blue	115F	E1

3.8 PIPE IDENTIFICATION

A. Paint entire outermost surface of all pipelines located within buildings with specific identifying color; paint compatible with surface painted.

B. Provide corrosion resistant, snap-on or stick-on type pipe markers for all pipelines located within buildings with specific identifying code name and flow direction arrows.
1. Space code name with flow arrows at 10-foot intervals.
2. Code name and flow arrow pipe markers shall be manufactured by Seton Name Plate Corp.; or equivalent, conforming to ANSI A13.1. Specifications.
3. Install per ANSI A13.1 specifications and as observed by Engineer.
4. Consult Engineer for specific names to be used on piping.

C. Pipe identifying colors and pipe markers per Pipe Coding Schedule.

Pipe Markers No.	Service	Coating Color (TNEMEC Color)	Pipe Marker Code Name
1	Potable Water	True Blue (11SF Safety Blue)	Potable Water

D. Color schemes requiring “bands” shall include 1-inch wide bands spaced at 18-inch intervals.

E. Chemical feed lines and potable water lines of solid PVC/CPVC materials including conduits for chemical feed tubing, and Stainless Steel Compressed Air lines shall NOT be painted, but shall be color coded using pipe banding tape.
1. Tape shall be vinyl with permanent adhesive, Pipe Banding Tape by Seton Nameplate Company.
2. Tape shall be 2.5” wide and installed at 18” intervals.
3. Piping requiring a two-color system with a “band” shall have a 2.5” wide band for the primary color and a ¾” band, centered on the primary color, for the secondary band color.

3.9 FINAL TOUCH-UP

A. Prior to final completion and acceptance, examine painted and finished surfaces and retouch or refinish as necessary and required to leave surfaces in condition acceptable to Engineer.

B. After doors have been fitted and hung, refinish edges, tops and bottoms.

3.10 CLEANING

A. As Work proceeds and upon completion, promptly remove paint where spilled, splashed, or spattered.

B. During progress of Work keep premises free from any unnecessary accumulation of tools, equipment, surplus materials, and debris.

C. Upon completion of work, remove masking, remove paint and varnish spots from floors, glass, and other surfaces and remove rubbish and accumulated materials of whatever nature not caused by other trades from premises and leave in clean, orderly condition, with floors broom clean.

END OF SECTION 099600

SECTION 223116 – WATER SOFTENER

PART 1 - GENERAL

1.1 DESCRIPTION

A. Includes Brine Regenerated Water Softening Systems.

B. Related Sections:
1. General Requirements – Division 1 (All Sections)
2. Section 400500 – Process Piping
3. Section 400507 – Pipe Hangers, Supports and Anchors
4. Section 400523 – Process Valves

1.2 SUBMITTALS

A. Contractor shall coordinate with the Owner's Water Treatment Service Contractor for purchase, installation, and startup of the water softening system:
1. Water Treatment Service Contractor:

Walter Louis Fluid Technologies
Quincy, IL
217-223-2017
sales@walterlouis.com

B. Product Data: For each type of fixture product.
1. Water softening system and accessories including rated capacities, operating characteristics, furnished specialties, accessories, dimensions of individual components andprofiles.
2. Construction details and piping diagrams of water softening system and components.
3. Wiring diagrams for power, signal, control wiring and monitoring points tied into the owners building monitoring system.
4. Proof of NSF 61 compliance for softeners used for drinking water systems.
5. Operation and maintenance manuals.

1.3 REFERENCE STANDARDS

A. Products in this section shall be built, tested, and installed in compliance with the following quality assurance standards; latest editions, unless noted otherwise.
1. International Plumbing Code
2. Electrical components, devices and accessories: UL listed and labeled as defined as in NFPA 70, Article 100.
3. ASME Boiler and Pressure Vessel Code: Section VII, Division 01, where indicated.
4. ASME compliance for FRP Tanks: Fabricate and label mineral tanks to comply with ASME Boiler and Pressure Vessel Code.
5. National Sanitation Foundation NSF/ANSI-61 (potable drinking water) and NSF-61 Annex G (listed as $\leq 0.25\%$ weighted average lead content) (and/or NSF/ANSI-372) and Annex F.
6. U.S. Safe Drinking Water Act.
7. Missouri Code of State Regulations

1.4 COORDINATION

A. Coordinate size and location of bases and piping.

1.5 WARRANTY

A. Provide a complete parts and labor warranty for a minimum of two years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WATER SOFTENER

A. Provide a pressure type water softener, consisting of a softener tank, valves, piping, and all appurtenances required for a complete and usable system. Constructed to handle up to 120 degrees Fahrenheit water. See Drawings for components that are being replaced.

B. When used for drinking water systems, water softening system shall comply with NSF 61, "Drinking Water System Components – Health Effects"

2.2 PERFORMANCE

A. Provide a water softening system that delivers the output water quality, capacity, and performance indicated below at the specified water input characteristics indicated.

B. Input water characteristics:
   1. Incoming Hardness: 378 ppm
   2. Up to 120 degree Fahrenheit water inlet temperature.

C. Output capacity and performance:
   1. Duplex resin tanks to provide continuous operation.
   2. Peak flow rate: 267 gpm maximum day
   3. Average flow rate: 129 gpm
   4. Target Water Quality: 20 ppm hardness

2.3 RESIN TANK

A. Resin tank shall be designed for 150 psi and be tested at 600 psi with a safety factor of 4:1. Tanks shall be 100 percent fiberglass construction.

B. Tank shall be equipped with an opening in the top head for mineral filling and periodic inspection.

C. Each tank shall be 63 inches in diameter and 72 inches tall.

D. Tank shall have a five-year warranty from the date of substantial completion.

2.4 BRINE SYSTEM:

A. The existing brine tank system shall remain in place.

2.5 DISTRIBUTOR SYSTEM

A. Resin tank shall have a all plastic upper distributor which shall disperse water laterally to avoid channeling within the resin bed at a flow rate up to 200 gpm. The lower distributor shall be of all plastic construction in a hub-radial design with a flow rate of 167 gpm. It shall incorporate fine slot distributors to avoid passing of resin to service in the event of plumbing system upset with a press drop less than 5 psi at the designated flow rates. One layer of gravel shall be provided to aid in the even collection of water and make efficient use of the softening capacity of the resin.

2.6 SOFTENING MEDIA

A. High-capacity sulfonated polystyrene ion-exchange resin that is stable over the entire pH range of the water being treated with good resistance to bead fracture from attrition or shock.
   1. Resin: 180 cubic feet of 10% Cross Linked water softener resin.
   2. Gravel Bed: 45 cubic feet.

B. Minimum exchange capacity of:
   1. Sodium form: 30,000 grains per cubic foot

C. The media polymer type shall be gel formed into spherical beads. The media shall contain no agglomerates, shells, plates or other shapes that might interfere with the normal function of the water softener.

D. The resins shall be manufactured to comply with the food additive regulations, 21 CFR 173.25 as set forth by the US FDA.

2.7 AUTOMATIC CONTROLS

A. Softener control valves shall be configured as shown in the drawings. Control valves shall be pneumatic actuated with spring return fail safe and 24 VDC pilot solenoids with speed controls.
   1. Main service valves shall be three (3)-inch lug wafer butterfly, cast iron body, with stainless steel disc and EPDM seat.
   2. Regen control valves shall be two (2)-inch stainless ball valve with Teflon seats.
   3. Include a blending valve that can be modulated to control softened water output, sized as appropriate for the system.
   4. Backwash valve shall be sized as appropriate for the backwash outlet.
   5. Brine draw/dilution flow control shall be sized as necessary for the provided softener system.
   6. Include a resin trap on the common outlet. Size as appropriate for the system.
   7. Include pressure transducers on the inlet and outlet headers to allow the control system to monitor changes in pressure across the system to allow control to the signal operator to detect issues in the resin tanks.

B. On duplex resin tank systems, the controller shall automatically switched back and forth between charged and expended resin tanks to provide a continuous supply of soft water.

C. Provide a digital demand control system installed on the unit. It shall include a thermal

dispersion type meter and a solid state control device to permit regeneration on a metered volume basis. The totalizing water meter shall be installed in the outlet pipe of the unit. This meter shall continuously measure and record the amount of treated water that has flowed to the service. Regeneration shall not be activated until a user adjustable time of day. The controller shall also indicate the current flow rate and the estimated days remaining before a brine tank refill is required.

D. Controls shall have an adjustable duration of the various steps in regeneration and allow for pushbutton manual operation. Control system shall have 10 year non prorated guarantee. Regeneration shall be initiated based on total gallons softened (programmable) and average daily use, compensated for extra-high or low use, with time of regeneration preset to a user selectable time.

2.8 AUXILIARY EQUIPMENT

A. Provide pressure gauge on inlet and outlet of softener.

B. Provide test cock to sample water in and soft water out.

2.9 BRINE

A. The existing brine tank and brine system shall remain and be incorporated into the new installation.

2.10 INSTRUCTIONS

A. Provide 4 complete sets of installation, operation and maintenance manuals covering the equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Complete installation shall be in accordance with manufacturer's instruction and recommendations. Contractor shall be responsible for receiving all equipment, placing and assembling of all components for a complete and operational system.

B. Make all connections required. Provide rigid connections to softener input and output water connections, using approved joining methods. Hoses shall not be used.

C. Install service valves to isolate the softener system input and output, and to provide a bypass path around the softener to allow softener servicing.

D. Flush, clean, and disinfect per manufacturer’s instructions.

3.2 CHECK, TEST & START-UP

A. Check, test and start-up services shall be provided by a factory trained representative as follows:
   1. Inspect the equipment to verify proper installation.
   2. Set-up the controller and place the equipment into operation.
   3. Test to verify all performance.

B. The manufacturer's representative shall provide a written report within 10 days of the Check, Test, Start-up. Report shall include information on services provided, document all controller settings, and indicate the results of the water quality performance tests.

3.3 TRAINING

A. Factory trained representative shall provide training to Owner maintenance staff on the control and operation of the softening equipment and accessories. This shall include adjusting controller settings, cleaning, other general maintenance procedures, and rebuilding the control valve head. Provide a spare control valve head to demonstrate rebuilding.

END OF SECTION 223116

SECTION 311000 – SITE PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Clearing of surface debris.
   2. Excavating topsoil.
   3. Removing designated trees, shrubs, and other plant life.
   4. Disposal of spoiled materials.

1.2 JOB CONDITIONS

A. Notify corporations, companies, individuals or authorities owning utilities running to property or encountered during excavating operations.

B. Cap or remove services in accordance with instructions by owners of services.

C. Protect, support, and maintain utilities which are to remain.

D. Replace to original condition or better, landscape work such as trees, shrubs, and grass within and outside of construction and grading limits that are damaged.

1.3 SUBMITTALS

A. Not required.

1.4 QUALITY ASSURANCE

A. Conform to applicable codes for environmental requirements, disposal of debris, and use of herbicides.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 CLEARING AND GRUBBING

A. Clear and grub area within limits to be covered with tanks, buildings, walks, parking areas, drives, and where grade to be raised of shrubs, trees, stumps, vegetation, rubbish, and other perishable or objectionable matter. Grub stumps.

B. Remove cleared material from site.

3.2 STRIPPING TOPSOIL

A. Remove topsoil to entire depth in areas where grade is to be raised and in areas to be covered by structure, walk, or paving. Stockpile where designated by Engineer. Stockpile for proper drainage.

B. Strip stockpile areas of vegetation prior to stockpiling.

C. Stripped topsoil shall be free from clay, stones, excessive vegetation, and debris.

D. Use for finish grading.

3.3 DISPOSAL OF SPOIL MATERIAL

A. Contractor is responsible for disposal methods and compliance with all Federal, State, County and City laws, ordinances and regulations.

B. Contractor is responsible for obtaining all permits necessary for disposal.

C. Disposal of spoil material may be by one of the following methods:
   1. Removal and disposal:
      a. Promptly remove cleared debris from site. Burning of debris on-site is not permitted.
      b. Disposal site will be arranged by Contractor subject to approval by Engineer.

END OF SECTION 311000

SECTION 312317 - TRENCHING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pipe bedding requirements.
   2. Trench execution and backfill.
   3. Backfill for manholes, appurtenances and structures.
   4. Sheeting, shoring and bracing.
   5. Cleanup.

B. Related Sections:
   1. Section 011000 - Summary of Work.
   2. Section 014000 - Quality Requirements
   3. Section 310000 – Site Preparation
   4. Section 312319 - Dewatering.
   5. Section 312323 - Fill.
   6. Division 33 - Utilities

1.2 GENERAL REQUIREMENTS

A. Schedule Work to keep streets, sidewalks, and utilities in usable condition. Avoid property owner inconvenience insofar as practicable.

B. Do not trespass on private property or outside the limits of construction. Maintain construction operations on existing right-of-way or easements provided by Owner.

C. Contractor shall provide name(s) and telephone number of person(s) who have access to equipment and are authorized to make emergency repairs to Contractor's Work, such as to correct trench cave-ins, moving excavated material, and correct other problems during weekends and off-work hours, so access can be maintained for firefighting equipment, and to maintain barricades for public safety.
   1. Traffic barricades shall be placed as appropriate in and along roadways and parking areas to keep vehicular traffic away from excavated trenches. See Drawings for the traffic barricade detail.
   2. Trenches shall be backfilled as soon as possible during the workday.
   3. If trenches must be left open overnight, orange construction fencing shall be placed around the excavation. Construction fencing shall be minimum 4 feet tall and be secured by metal fence posts.

D. Disposal area(s):
   1. Remove brush, rubbish, spoil, excess excavated material, and material not suitable for backfill to off-site location of Contractor's choice.
   2. Remove waste material promptly as it is generated by construction operations. Do not permit to accumulate.

1.3 EXISTING UTILITIES

A. Obtain public and private utility locations in the project area(s) prior to construction.

B. Repair existing fences, and culverts, and drain tiles disturbed by construction.

C. Contractor fully responsible for liaison with utility companies and for repairing, at no expense to Owner, utilities damaged by Contractor.

D. In event of break in existing watermain, gas main, sewer, or electric or communication cable, immediately notify responsible official of organization operating utility affected.

PART 2 – PRODUCTS

2.1 PIPE ENVELOPE

A. Applies to full trench width from bottom of trench to 1-foot above top of pipe for plastic pipe and other flexible pipe materials; to pipe centerline for ductile-iron pipe and other rigid pipe materials.

B. Depth of material for pipe bedding shall be as shown on the Drawings.

C. Bedding and initial backfill materials for ductile-iron and other rigid pipe material shall be Type 'A' crushed rock. Bedding and initial backfill materials for plastic pipe and other flexible pipe materials shall be Type 'A' crushed rock.

2.2 REMAINING BACKFILL

A. Applies to backfill above 1-foot above top of pipe for plastic and other flexible pipe materials and above the centerline of the pipe for concrete and other rigid pipe materials.

B. As soon as the condition of the pipe will permit, the entire width of the trench shall be backfilled. Earthen materials or aggregate shall be placed longitudinally along the pipe. Elevation of the haunching material on each side of the pipe shall be the same. Special care shall be taken to completely fill the space under the pipe haunches. Materials shall be placed in maximum 8-inch layers, loose measurement and compacted by ramming or tampering.

C. Granular backfill material shall be Type 'A' crushed rock.

D. Material for earthen backfill may be job-excavated material, free from debris, stones larger than 2-inches, organic matter, and frozen material.

E. Where subgrade conditions warrant extra precautions for the bedding of rigid pipe, Engineer may order the construction of a concrete cradle to support the rigid pipe. Cradle shall be constructed as directed by the Engineer. Extra payment for concrete cradle may be made in accordance with the Contract Documents if not shown on the Drawings.

F. Trenches shall be backfilled in accordance with the following methods, in accordance with the details on the Drawings:

1. **METHOD I** – This method applies to pipes under yards and unimproved areas. In this method, the trench shall be backfilled with excavated materials in a manner that will not dislodge or damage the pipe or cause bridging action in the trench. The material shall be deposited in uniform layers not exceeding 12-inches thick,

loose measure. Each layer shall be compacted by ramming or tamping or, if directed by the Engineer shall be inundated or deposited with water. Pipes in these areas will generally not require water jetting unless the Engineer determines that early settlement is required. If jetting is used, it shall be considered incidental to piping installation and no additional compensation will be allowed. Top 6-inches shall be topsoil. Any rocks or clods greater than 2-inches in diameter shall be removed from the topsoil as it is spread. Top of the trench shall be left neatly rounded to allow for settlement.

2. **METHOD II** – This method applies to alleys or parking areas that do not have permanent surfaces or oil and chip surfaces. In this case, the trench from the top of the granular pipe bedding to 6-inches below the ground surface shall be backfilled with granular backfill materials. The granular material shall be deposited in uniform layers not exceeding 6-inches thick, loose measure, and each layer shall be compacted by ramming or tamping. 6-inches of surface course aggregate shall be applied so that the finished surface of the aggregate is at the proposed surface elevation or matches the existing surface elevation. Material for surface course aggregate shall be crushed limestone.
3. **METHOD III** – This method applies to all pipes buried beneath existing utilities or structures. In this case, the trench from the top of the granular pipe bedding to at least 6-inches above the existing utility or structure shall be backfilled with granular backfill. The granular material shall be deposited in uniform layers not exceeding 8-inches thick, loose measure, and each layer shall be compacted by ramming or tamping. Trench from 6-inches above the existing utility or structure to the surface shall then be backfilled in accordance with another applicable method; I, II or IV.
4. **METHOD IV** – This method applies to any area where the existing or new surface is Portland cement concrete or bituminous concrete. In this case, the trench from the top of the granular pipe bedding to the bottom of the existing or new surface shall be backfilled with granular backfill. Granular material shall be deposited in uniform layers not exceeding 6-inches thick, loose measure, and each layer shall be compacted by ramming or tamping.
5. **METHOD V** – This method applies to pipes buried beneath areas with oil and chip surfaces. Trench from the top of the pipe bedding to 12-inches below the surface shall be backfilled with granular backfill. Next 8-inches of the trench shall be granular subbase material per Specification Section 02511, paragraph 2.1.B. Final 4-inches of the trench shall be a combination of HMA base course and HMA surface course (with a total thickness of 4-inches) with tack coat.
6. **METHOD VI (Not Used)** – This method applies to pipes beneath cultivated fields. Backfill shall be placed as in METHOD I, except no excavated material shall be allowed within the upper zone originally occupied by topsoil. After the backfill reaches the approximately lower limit of the original topsoil zone, the stockpiled topsoil shall be spread in such a manner that natural settlement will not result in a depression along the pipeline. All rocks and boulders greater than 2-inches in diameter shall be removed from the topsoil as it is spread. Sufficient care shall be taken to prevent the inclusion of any material in the topsoil which would be considered unsuitable to agricultural purposes or deemed as a hazard to agricultural equipment. All manholes to be located within this area and indicated on the Drawings to be buried shall have the top of the frame and lid at least 18-inches below the finished ground elevation.
7. **METHOD VII** – This method applies to pipes buried within earthen berms. From the top of the pipe bedding to 12-inches below the proposed finish grade, trench

shall be backfilled with select excavated material (compacted to 90 percent standard proctor) placed in 8-inch layers. Top 12-inches shall be filled with topsoil.

G. Where there is a deficiency of suitable backfill material due to a rejection of part or all of the excavated material as unsatisfactory for backfill purposes, Contractor shall furnish satisfactory backfill material wasted from trench excavation in other locations or from other sources furnished by the Contractor. Backfill furnished and disposal of unsatisfactory material under these circumstances shall be incidental to piping installation.

H. Backfilling shall proceed so that not more than 100-feet intervals between the end of the backfilled section and the end of the laid pipe. No backfill material shall be placed until the Engineer has examined the grade of the pipe.

I. Where the trenches have been sheeted or braced, care must be taken in removing the same to keep the filling well above the lower ends of the sheeting or bracing so as to prevent caving of the sides of the trench sown onto the pipe and displacing them or damaging structures along the sides of the trench.

J. Where the trench excavation is within the public right-of-way, or within 5-feet of a roadway, sidewalk, driveway, or wherever indicated on the Drawings, the trench backfill shall be tamped continuously to the surface with a mechanical tamper of a type approved by the Engineer. All material shall be compacted to 95 percent of the Standard Proctor Density as determined by ASTM D1557. No layer of material being compacted shall exceed 1-foot in depth. Engineer may perform density tests after tamping is complete on any layer.

2.3 BACKFILL FOR MANHOLES, APPURTENANCES, AND STRUCTURES

A. Backfill material as required for adjacent trench.

2.4 SIDEWALK AND PAVEMENT MATERIALS

A. Concrete pavement, and all types of concrete base pavement, may be cut only where, in the manner and to the extent specified herein, or authorized by the Engineer. Cuts shall be no larger than necessary to provide adequate working space for proper installation of pipe and pipeline appurtenances. A concrete saw shall be used for the cutting of concrete pavements along each side of trenches and at structures. All cuts shall be a minimum of 2-inches deep or ¼ the depth of the pavement, which ever is greater.

B. Concrete pavements over trenches excavated for pipelines shall be removed to a width not less than 24-inches wider than the width of the trench at pavement subgrade. Trench width at pavement subgrade shall not exceed the minimum dimension that will allow good and safe construction except that no under cutting will be permitted. Shoulder not less than 12-inches in width, at any point, shall be left between the cut edge of the pavement and top edge of the trench. Pavement cuts shall be made to and between straight lines that, unless otherwise required, shall be parallel to the centerline of the trench.

C. Where the line of the trench parallels the length of concrete walks and the trench location is all or partially under the walk, then the entire walk shall be removed and replaced. If

necessary to remove concrete curbs, gutters, or walks, they shall be replaced to the existing joints.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify with testing laboratory fill materials to be reused is acceptable.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Maintain and protect existing utilities remaining, which pass through work area.

C. Protect plant life, lawns and other features remaining as a portion of final landscaping.

D. Protect benchmarks, existing structures, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

E. Cut out soft areas of subgrade not capable of insitu compaction.

3.3 TRENCH CONSTRUCTION

A. Widths: Trenches shall be excavated to limiting trench widths and pipe clearances to provide adequate working space and clearances for proper pipe installation, jointing, and embedment operation. Also, for the protection of the pipe from external loads, limits to the maximum width of the lower portion of the trench below an elevation 6-inches above the top of the installation pipe shall apply. Such limiting minimum and maximum trench widths together with the minimum permissible clearance between the installed pipe and either trench wall shall be as follows:

Minimum and Maximum Trench Widths*			
Pipe Size, Inches	Minimum Width, Inches	Minimum Sidewall Clearance, Inches	Maximum Width, Inches
6	20	5	30
8	20	5	30
10	23	5	30
12	26	6	30
15	29	6	33
18	32	6	44
24	44	7	56

*Measured 6-inches above top of pipe

B. Tunneling and boring: All excavation shall be done in open trenches except where tunneling or boring is shown on the Drawings or where written consent is given by the Engineer to tunnel or bore.

C. Open trench in advance of Work: Not more than 100-feet of trench shall be opened up in advance of the completed piping or conduit work.

D. Barricading work: Contractor shall provide and maintain the fences, walks, and bridges that are necessary for the public safety and convenience. Contractor shall place sufficient lights on or near the work and keep them burning from sunset to sunrise to ensure the safety of the public. Contractor shall keep watchmen on the work whenever the Engineer deems it necessary. Material delivered to the job shall be placed with minimal interference to traffic.

1. Traffic barricades shall be placed as appropriate in and along roadways and parking areas to keep vehicular traffic away from excavated trenches. See Drawings for the traffic barricade detail.
2. Trenches shall be backfilled as soon as possible during the workday.
3. If trenches must be left open overnight, orange construction fencing shall be placed around the excavation. Construction fencing shall be minimum 4 feet tall and be secured by metal fence posts.

E. Bell holes shall be carefully excavated at proper intervals so that the bells support no part of the load. No more shall be excavated than necessary to ensure the making of good joints.

F. Sheeting and bracing: In limiting trench widths, proper trench wall protection shall be used in accordance with OSHA Standards. If proper trench wall protection is not used, OSHA specified wall slopes shall be required for each type of soil. If wall protection is used, the sides of the trench shall be properly secured and supported by bracing and sheet piling according to approved sheeting methods. Sheeting shall not extend below the top of the pipe. Bracing, sheeting, and shoring will not be considered an extra. Contractor shall sling, shore up, and secure in place all present sewers, water lines, conduits, and structures of a similar nature that are encountered in or near the trenches. Contractor at his expense shall restore any such structure or conduit damaged by the excavation to its original condition.

G. No explosives are to be used.

H. Whenever work is to proceed over private property or other than the traveled way of streets or alleys, the topsoil shall be removed to a depth as directed by the Engineer up to a maximum of 1-foot. Such topsoil shall be stockpiled separately until backfilling operations are completed and then spread in a uniform layer, a minimum of 6-inches thick, over the area disturbed by the work.

3.4 GENERAL

A. Trenches not requiring select backfill: Pile excavated material, suitable for backfill, in an orderly manner a sufficient distance back from edge of excavation to avoid slides or cave-ins (2-foot minimum clear distance).

B. Trenches requiring granular backfill: Place unsuitable excavated material directly on trucks and haul away. No spoil banks permitted.

C. If granular material suitable for trench backfill is encountered in trenches requiring trench backfill: Pile in an orderly manner a sufficient distance back from edge of excavation to avoid slides or cave-ins (2-foot minimum clear distance).

D. Excavate existing utilities sufficiently in advance of pipe laying to determine crossing arrangement. No payment will be allowed for down time due to utility relocation.

E. Excavation shall be open cut.

F Use caution when placing and compacting backfill to avoid placing construction loads on pipe that may damage or displace newly laid pipe.

G. Support, brace or remove utility poles either adjacent to or in trench excavation.

H. Utility mains shown on Drawings, in conflict with new facilities: Perform relocation or make arrangements with utility to perform Work at no additional cost to Owner.

I. Utility mains not shown on Drawings, in conflict with trench excavation or new facilities:
   1. Notify Engineer and utility company immediately.
   2. Authorized relocation performed by Contractor or performed by others at Contractor's expense paid for under provisions of Article 11 of General Conditions.

3.5 SHEETING, SHORING, AND BRACING

A. Construct sheeting, shoring, and bracing where shown on Drawings and where required to hold walls of excavation to protect existing utilities, trees, structures, and other similar features and to provide protection of employees.

B. Design of sheeting, shoring, and bracing shall be responsibility of Contractor and shall comply with OSHA requirements.

C. When movable trench shield is used below centerline of pipe, it shall never be lifted prior to any forward movement, to avoid the caving in of the bottom sides of the trench walls.

3.6 DEWATERING

A. Execute Work in dry conditions.

B. Provide equipment for handling water encountered.

C. Do not lay pipe or pour concrete on excessively wet soil.

D. Prevent surface water from flowing into excavation; promptly remove any water accumulated.

E. Divert stream flow and/or sewage away from areas of construction.

F. Do not discharge water pumped from excavations to existing sanitary sewers.

G. Methods used shall not cause settlement or damage to adjacent property.

H. Also see Section 312319 - Dewatering.

3.7 SIDEWALK AND PAVEMENT REMOVAL

A. Where large portions of existing streets are removed, measure and record exact dimensions and elevations before pavement removal. Streets and curbs shall be rebuilt to same widths and elevations as existed prior to construction.

B. Remove pavement, sidewalk, or curb and gutter to minimum of 1-foot from trench. No undercutting will be permitted.

C. Saw cut vertically; remove on straight lines approximately parallel or perpendicular to centerline of pavement.

D. Concrete and bituminous concrete and bituminous oil and chip pavement:
   1. Cut with concrete saw; minimum vertical cut 1-1/2-inch deep, as needed to give clean break.
   2. Break out remainder of slab.

E. Sidewalk: Saw cut and remove to nearest joint beyond minimum distance of 1-foot from edge of trench.

F. Dispose of waste material in disposal area.

3.8 REPAIR OF EXISTING DRAIN TILES AND STORM SEWERS

A. Drain tiles and storm sewers broken during the trench excavation shall be repaired so their carrying capacities shall not be impaired. Broken drain tiles shall be replaced with larger sized piping, either corrugated metal pipe, PVC plastic pipe SDR-26, or ductile-iron pipe, as noted on the Drawings. Length of the pipe shall be such that it bears a minimum of 2-feet on undisturbed soil on each side of the piping trench, with each drain tile to pipe junction encased in concrete. All repairs of drain tile encountered shall be observed by the Engineer or Owner prior to backfilling. Compacted granular backfill will be required as of any existing utility or structure. Pipe to field tile junction shall be wrapped with burlap or other material prior to concrete encasement to prevent concrete from entering the flow line of the pipe.

B. Drain tiles and storm sewers uncovered during the trench excavation which are laid parallel to the trench shall be protected and kept in service. Those tiles or storm sewers accidentally broken shall be repaired or replaced. If necessary they shall be re-routed around the improvements. Contractor shall receive additional compensation for replacing the broken tiles or storm sewers if, as determined by the Engineer, the Contractor took adequate precautions against their damage.

3.9 RESTORATION OF SURFACES

A. Restoration of surfaces shall include the removal of the existing surface, and disposal of surplus material, and the construction of new surfaces. Type of surface restored shall be equal to or better than the surface removed. Surfaces not removed during excavation but damaged by the Contractor's equipment or operation shall also be removed and replaced or repaired to original condition.

B. Wherever conduits are constructed under traveled roadways, driveways, sidewalks, curbs and gutters, or other traveled surfaces, a temporary surface shall be placed over the top of the trench as soon as possible after compaction has been satisfactorily completed.

Temporary surface shall consist of 12-inches of coarse aggregate, materials as specified for trench backfill (crushed limestone or washed gravel). Top of the temporary surface shall be smooth and meet the grade of the adjacent undisturbed surface. Temporary surface shall be maintained at the Contractor's expense until final restoration of the surface is performed as specified. No permanent restoration of surfaces shall be initiated until authorized by the Engineer. Temporary surfacing shall be required over the entire width of the trench, but any width in excess of the specified trench width shown on the Drawings shall not be used in computing payment quantities.

C. Contractor shall restore all removed or damaged permanent pavements, sidewalks, driveways, curbs, gutters, fences, poles, and other property and surface structures removed or disturbed during or as a result of construction operations to a condition which is equal to or better than the appearance, quality and condition that existed before the work began. Restoration shall be made as soon as possible after compaction of the backfill has been completed.

3.10 SIDEWALK AND PAVEMENT REPLACEMENT

A. Refer to Section 321313 – Concrete Paving and Section 321623 Sidewalks.

3.11 GRASSED SURFACE RESTORATION

A. Refer to Section 329219 - Seeding.

3.12 CLEANUP

A. Contractor shall clean up as the Work proceeds. Premises shall be kept free of accumulations of waste materials and earth, rubbish and other debris resulting from the work. If in the judgment of the Engineer, the Contractor fails to keep the site clean as described herein above, Engineer will recommend to the Owner withholding all progress payment until the site has been cleaned up to the Engineer's satisfaction.

B. All debris and waste materials and salvaged materials unless required by the Specifications to be reused or delivered to the Owner, shall become the property of the Contractor and shall be removed by the Contractor from the construction site.

C. Any dirt, mud, or other debris tracked onto the adjacent streets by any of the Contractor's or supplier's vehicles shall be immediately cleared from the surface. Where truck crossings occur over sidewalks, that shall be kept from all spilled earth and grading materials and shall at all times be maintained in a passable condition for foot traffic.

D. Generally, the transportation of materials to and from the job site shall be over regular streets. When the Contractor's operations or that of its shippers, haulers, or subcontractors are such that dirt, mud, or debris are spilled or otherwise deposited on streets, driveways, or sidewalks, the Contractor shall clean up any large chunks before the close of every day's operation or before it is broken up or becomes impacted on the surface. In case of dispute or Contractor's failure to perform the cleanup work, the Owner may clean the streets and walks, remove the rubbish, etc. and will charge the cost to the Contractor by withholding monies due to cover all charged work.

E. At completion of the Work, Contractor will remove all waste materials, rubbish and debris from and about the premises as well as all tools, scaffolding and surplus materials, and will leave the site clean and ready for occupancy by the Owner. Contractor will restore to their original condition those portions of the site disturbed or damaged by the Contractor's operations.

F. Open burning of debris will not be permitted unless specifically authorized in writing by the Owner, and then only following state, municipal or other local codes, ordinances, rules or regulations.

END OF SECTION 312317

SECTION 312319 – DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

A. Provide and maintain means for removal of water entering all structural and trenching excavations.

B. Dispose of water in a manner not causing damage, pollution, or unsafe conditions to adjacent land and water areas.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PROTECTION

A. Surface runoff: Control grading around the excavation to prevent surface water from running into the excavations for the structure and trenches.

B. Protect adjacent and/or downstream property and structures from damage due to water removal and disposal.

3.2 PREPARATION

A. Provide for safe disposal of removed water.

3.3 DEWATERING

A. Install and maintain dewatering system.

B. Maintain water level within the excavation at or below the surface of the excavation, trench bottom, or base of the bedding course, until all Work to be performed therein is completed.

C. Carry out dewatering operation so the strength of the soil under or alongside of the excavation is not weakened or destroyed.

D. After completion of the structure or conduit installation, restore the normal water table in a manner not to disturb the foundation or the pipe or its foundation.

E. Provide de-silting devices or basins if necessary to protect adjacent property or structures or downstream property or structures.

F. Saturated foundations: Prior to placing any concrete for foundations, remove soils in footing excavation that have become saturated with surface water. Backfill areas to contours and elevations with unfrozen materials.

END OF SECTION 312319

SECTION 312323 – FILL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fill over excavations.

1.2 SUBMITTALS

A. Section 013300 – Submittals: requirements for submittals.

B. Test reports or samples of all fill materials.

C. Materials Source: submit name of fill materials suppliers.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

PART 2 - PRODUCTS

2.1 COARSE AGGREGATES

A. Type A - Coarse Stone: Angular, limestone, washed or screened clean, free of shale, clay, friable material, sand, debris; graded within the following limits:

Sieve Size	Percent Passing
1 inch (25mm)	100
3/4 inch (19mm)	85-100
1/2 inch (16mm)	
3/8 inch (9mm)	15-55
No. 4	0-10
No. 8	
No. 200	

B. Type B:

1. Pea Gravel: Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ASTM C136, to the following:
   a. Minimum Size: 1/4 inch
   b. Maximum Size: 5/8 inch
2. 3/8-inch limestone chips: may be used in place of pea gravel if the following gradation is met:

Sieve Size	Percent Passing
1/2 inch	100
3/8 inch	70 - 100
No. 4	10-30
No. 8	0 - 10
No. 30	0 -5
No. 200	0-1.5

2.2 FINE AGGREGATES

A. Type C - Sand: Natural River or bank sand; washed: free of silt, clay, loam, friable or soluble materials, or organic matter; graded in accordance with ANSI/ASTM C136, within the following limits:

Sieve Size	Percent Passing
No. 4	100
No. 8	10 to 100
No. 100	4 to 30
No. 200	0 to 10

2.3 SUBSOILS

A. Type D – Structural Fill: Approved site excavated material free of organic matter and debris, place in loose fill lifts not to exceed 8 inches in thickness and compacted to minimum standard proctor density as listed in paragraph 3.7, SCHEDULE.

2.4 BORROW MATERIALS

A. Obtain borrow material from off-site source if volume of suitable excavation material is inadequate.

B. Borrow materials shall conform to material specifications for intended use.

2.5 TOPSOILS

A. Friable clay loam surface soil reasonable free of subsoil, clay lumps, stones and other objects over 2-inches in diameter and without weeds, roots and other objectionable materials

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 013100 – Coordination.

3.2 PREPARATION

A. Compact subgrade to density requirements for subsequent backfill materials.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Type ‘A’ fill and compact to density equal to or greater than requirements for subsequent fill material.

C. Scarify top 6 to 8 inches of natural subgrade and compact to 95% Standard Proctor density.

D. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

3.3 BACKFILLING

A. Backfill areas to contours and elevations with unfrozen materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

C. Place fill material in continuous layers as follows:
   1. Subsoil Fill: Maximum 8 inches compacted depth.
   2. Structural Fill: Maximum 8 inches compacted depth.
   3. Granular Fill: Maximum 8 inches compacted depth.

D. Employ placement method that does not disturb or damage other work.

E. Maintain optimum moisture content of backfill materials to attain required compaction density.

F. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.

G. Slope away from building minimum of 2 percent slope for minimum distance of 10-feet, unless noted otherwise.

H. Make gradual grade changes. Blend slope into level areas.

I. Remove surplus backfill materials from site.

J. Leave fill material stockpile areas free of excess fill materials.

3.4 TOLERANCES

A. Top surface of general backfilling: Plus, or minus 1 inch from required elevations.

3.5 FIELD QUALITY CONTROL

A. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

3.6 PROTECTION OF FINISHED WORK

A. Reshape and re-compact fills subjected to vehicular traffic.

3.7 SCHEDULE

A. Unpaved Exterior Areas:
   1. Top six (6) inches black topsoil.

B. Trenched Pipe Envelope:
   1. Type ‘A’ fill (per 2.1.A of this specification) compacted to 95% of maximum in place density.
   2. Fill remainder of trench as indicated on drawings.

END OF SECTION 312323

SECTION 321313 – CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. This section describes the following:
   1. Construction of non-reinforced portland cement concrete pavement and sidewalks on prepared subgrade or subbase as shown on plans and specified herein.
   2. Non-reinforced portland cement pavement includes deformed tie bars and joints; see Standard Drawings.
   3. Thickness of portland cement concrete pavement as shown on plans.

B. Related work specified elsewhere:
   1. Section 013300: Submittals.
   2. Section 033000: Cast-in-Place Concrete.
   3. Section 311000: Site Preparation.
   4. Section 312323: Fill.

1.2 SUBMITTALS

A. Refer to Specification Section 033000 for concrete submittal requirements and tests.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete shall be in accordance with AASHTO M85 mix, modified as follows:
   1. Specific surface, fineness, for all Type I Portland cements shall not exceed 430 m2/kg using Air permeability test. Maximum fineness limits do not apply if the sum of C3S + 4.75C3A is less than or equal to 90.
   2. Type I (Portland Cement), 5,000 psi at 28 days, 4,000 psi at 7 days
   3. A Class 3 durability coarse aggregate shall be used.
   4. Entrained Air Content: 6.0% +/- 1.0%.
   5. Water Cement Ratio: 0.45
   6. Slump: 4” Maximum
   7. Minimum 517 pounds of cement per cubic yard.

B. Admixtures:
   1. Air entraining: ASTM C260.
   2. Fly Ash: Type C, ASTM C618 and C494.
   3. Calcium chloride is not allowed.
   4. Other admixtures may be used subject to approval of Engineer in accordance with ASTM C494 or applicable standards.

C. Fine Aggregate:

Passing 3/8-inch sieve	100
Passing No. 4 sieve	95-100
Passing No. 8 sieve	70-100
Passing No. 16 sieve	45-90
Passing No. 30 sieve	15-65
Passing No. 50 sieve	5-30
Passing No. 100 sieve	0-10

D. Coarse Aggregate:

Passing 3/4-inch sieve	100
Passing 1/2-inch sieve	70-100
Passing 3/8-inch sieve	30-70
Passing No. 4 sieve	0-20
Passing No. 8 sieve	0-6

E. Water: Clean and clear, free from salt, oil, acid, strong alkalis, vegetable matter, or other substances injurious to concrete; water may be heated for cold weather paving operations; anti-freezing agents not permitted.

F. Reinforcing Steel: Shall comply with Section 032000.
1. Dowel bars shall be number four (1/2"), be 24" long and placed at 18" on center (O.C.).
2. Dowel bar placement shall be at 40" maximum spacing and at all connections to existing pavement. Dowel bars shall also be placed at end of day's work.
3. When placed into existing concrete, dowel bars shall be drilled and epoxied into place. Epoxy shall be suitable for pavement applications.

G. Metal expansion tubes: fabricated steel tubes; provide tubes with internal diameter 1/16" larger than dowel bar; bar stop capable of withstanding 20 lb. push, minimum.

H. Metal keyways: fabricated 24 gauge sheet steel; provide lengths in multiples of tie bar spacing; punch to receive tie bars.

I. Supports for reinforcing steel:
1. Support tie bars as required to place and maintain correct location during construction.
2. Welded wire fabric supports: heavy gauge wire, welded or bent to form 4-legged chair; use only with permission of Engineer.
3. Support dowel bars at expansion and contraction joints.

J. Joint Filler: Preformed expansion joint filler: asphalt saturated fiber strips; AASHTO M213; furnish in strips of plan dimensions.

K. Concrete pavement joint sealer:
1. Joint filler shall be gray in color and for concrete pavement.
2. Backer rope: cellulose, cotton or plastic foam suitable for use with hot-poured sealer; size and compression such that it maintains position during filling operation.

L. Sidewalk joint sealer:
1. Joint sealer: gray, one-component, non-priming, self-leveling, pour grade, polyurethane joint sealer; ASTM C920-79, Type S, Grade P, Class 25 or FS TT-5-00230C, Type 1, Class A; Use in sidewalk joints adjacent to buildings and curb and gutter.

M. Liquid curing compound:
1. liquid membrane-forming curing compounds shall be in accordance with ASTM C 309.
2. After the free water has left the pavement surface, the entire surface shall be sealed by spraying with a uniform application of white pigmented membrane curing material. The contractor shall provide satisfactory equipment to ensure uniform mixture and coverage

of curing material, without loss, on the pavement at the rate of not less than one gallon for each 200 square feet. If rain falls on the newly coated pavement before the film has dried sufficiently to resist damage, or if the film is damaged in any other way, the contractor shall apply additional curing material to the affected portions. All areas cut by finishing tools subsequent to the application of the curing material shall immediately be given new applications at the rate specified above.

N. Plastic film: Polyethylene sheeting for curing Portland cement concrete shall be white and shall be in accordance with ASTM C 171.

O. Fly ash: not acceptable for use after October 15 or prior to March 15.

P. Burlap: AASHTO M182, Class 3.

2.2 STORAGE AND PROTECTION OF MATERIALS

A. All materials shall be stored at a certified ready-mix facility.

2.3 QUALITY CONTROL

A. Tests on trial batches and concrete placed at project site:
   1. Slump: 4”
   2. Air Entrainment: 6.0% +/- 1.0%
   3. Minimum compressive strength: ASTM C39; 4,000 psi when tested at 7 days and 5,000 psi when tested at 28 days.
   4. Quantity of compression cylinders as specified in Section 033000 - Cast-in-Place Concrete; cast, protect and cure cylinders in accordance with ASTM C31; all concrete testing performed by ACI certified field testing technician per ASTM C94, Section 14.
   5. Unit weight of fresh concrete.

2.4 MIXING

A. Mix at batch plant, deliver to site in trucks with continuous mix.

PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION

A. Prepare subgrade or subbase as specified in Section 311000 – Site Preparation

3.2 PAVEMENT CONSTRUCTION

A. Setting and removing forms:
   1. Forms shall be sufficiently supported to avoid displacement during paving operations. Both straight and curved forms shall be supported in such position that the face of the form shall be vertical on tangents and perpendicular to the superelevated section on curves. The top of the form shall not vary more than 1/8 inch from the true grade line during placing, compacting and finishing operations. The form alignment shall not vary more than 1/4 inch from the true alignment.
   2. Forms shall be removed carefully to avoid damage to the concrete base or pavement. Honeycombed areas not rejected shall be immediately repaired. If the forms are removed less than 72 hours after placing concrete, the sides of the concrete shall be

cured by one of the methods specified above. Any trench excavated for the forms shall be entirely backfilled so water will not stand next to the concrete base or pavement.

B. Finishing: concrete shall be leveled with a bullfloat or scraping with a straightedge. The surface should be finished no more than necessary to remove irregularities. All edges, tooled joints and isolation joint should be rounded with the appropriate tools. As soon as the finished concrete has set sufficiently to maintain a texture, the surface shall be broomed to develop a skid-resistant surface and uniform appearance.

C. Construct joints as shown on Drawings; seal as specified hereinafter.
1. Round edges of concrete adjacent to header boards and expansion joint material to 1/8" radius.

D. Seal all joints before pavement is opened to Contractor's forces or general traffic; seal only dry and clean joint surfaces; slightly under-fill joints, keep sealer off of adjacent pavement.
1. Heat joint sealer to required temperature in thermostatically controlled heating kettle approved by Engineer; do not overheat.

3.3 CURING AND PROTECTION

A. Apply liquid curing compound in fine spray to form continuous, uniform film on surface and vertical edges of pavement and curbs.

B. Concrete pavement less than 36 hours old shall be protected during cold weather as follows:
1. Use of insulated blankets to keep uncured concrete from freezing.

C. Concrete damaged by excessive scaling, popouts, shrinkage cracks, rain or freezing shall be removed and replaced at Contractor's expense.

3.4 RESTRICTIONS

A. Weather:
1. Place no concrete when existing or forthcoming stormy or inclement weather prevents good workmanship, when subgrade is frozen or if air temperature is 38^{o} F. or below and falling; use no aggregates containing frozen lumps.
2. With favorable weather conditions, start paving operations when temperature of concrete delivered to subgrade is 40^{o} F. or higher.
3. Continue paving operations as long as concrete temperature requirement is met and air temperature remains above 38^{o} F.

B. Night Operation: only upon authorization by facility.

C. Use of pavement:
1. Time for pavement for use will be determined by results of tests on cylinders taken during concrete placement.
2. Pavement may be opened to Contractor's forces after 7 days for purpose of removing coverings and building shoulders if tests of cylinders from section show compressive strength of 4,000 psi or higher.
3. Open pavement to general traffic when authorized by Engineer.
5. Concrete placed in cold weather may require additional curing time, as directed by Engineer; keep all vehicles off pavement until such curing time has been completed.

3.5 DEFECTS

A. Pavement containing fractures, spalls, random cracks, significant popouts or shrinkage cracks, or other unacceptable defects: remove and replace at no cost to Owner; rout and seal all random cracks which develop prior to project completion.

END OF SECTION 321313

SECTION 321500 – AGGREGATE BASE COURSE

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes:
   1. This section consists of furnishing, hauling, placing, compacting, and shaping to obtain desired cross-section and profile for crushed stone base and surface course for parking areas and for crushed stone surfaced roadways and driveways.

B. Related Sections:
   1. Section 311000 – Site Preparation

1.2 SUBMITTALS

A. Submit certification that aggregate source is approved by Engineer for material specified.

B. Submit in accordance with Section 013300 – Submittals.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Aggregate for Base Course: aggregate for base shall consist of crushed stone, sand and gravel or reclaimed asphalt or concrete. The aggregate shall not contain more than 15 percent deleterious rock and shale. The fraction passing the No. 40 sieve shall have a plasticity index not to exceed six. Any sand, silt and clay, and any deleterious rock and shale shall be uniformly distributed throughout the material.

Gradation:

Sieve	Percent by Weight Passing
1-inch	100 Passing
1/2-inch	60-90 Passing
No. 4	35-60 Passing
No.	30 10-35 Passing
No. 200	0-15

PART 3 – EXECUTION

3.1 PREPARATION

A. Subgrade preparation shall be prepared in accordance with these specifications and be to 95% Standard Proctor density.

3.2 EQUIPMENT

A. Compaction Equipment:
   1. Be of such design that operation shall not disturb subgrade or subbase.
   2. Equipment may be used provided it is demonstrated that they will consistently produce specified density and gradation.
   3. Compaction equipment known as sheep-foot rollers shall not be used to compact base or surface material.

B. Equipment for Applying Water: equipment shall be capable of uniformly spreading water without creating ponding.

C. Proportioning Equipment: When base material is composed of more than one aggregate, proportioning equipment shall include system of calibrated gates.

D. Spreading Equipment: Capable of uniformly spreading base material to required thickness.

3.3 CONSTRUCTION

A. Construct crushed stone base on prepared subgrade or subbase in accordance with following requirements.

1. Delivery of Base Material:
    a. Pre-wet aggregate before delivery of aggregate to subbase.
    b. Engineer may control rate of delivery of aggregate to reduce time aggregate will remain on subbase in uncompacted condition to practical minimum.
2. Moisture Content:
    a. At time base material is delivered to subbase, water shall be uniformly distributed throughout material so that all particles are uniformly wetted.
    b. Amount of water shall be within 2.0 percentage points of amount determined as field optimum to produce maximum density, together with stability with field compaction procedure. Moisture content will usually be 85 to 90 percent of optimum.
    c. Maintain moisture content in aggregate until compaction of base has been completed
3. Spreading Aggregate:
    a. Spread wetted base and surface material to width and depth that base will conform to desired profile and cross-section. Compacted thickness shall be a minimum 9 inches for base material and a minimum 6 inches for surface material with a total combined thickness of 15 inches.
    b. Maximum compacted thickness of material that may be spread for compaction as single course will be limited to that which will be uniformly and satisfactorily compacted for full depth of such course by compaction equipment employed.
    c. Spread so that uniformity of base and surface material and its moisture content is maintained. When spreader does not spread to full design width in one operation, Engineer may require special handling of center joint to avoid segregation. Special handling may include motor patrol cut of joint after initial compaction, followed by spreading cut material in path of second spreading operation.
    d. Contractor shall be responsible for obtaining designated thickness and for application rates. Any course determined to be deficient in thickness may be corrected by increased thickness of subsequent lift of course; however, thickness of course of 1/2 or 3/8 in. mixture size shall not be increased by more than 1/4 in. to correct deficiency.
4. Compaction:
    a. Promptly after material has been spread, thoroughly and uniformly compact to not less than 95 percent of maximum density (Standard Proctor Test).
5. Aggregate Base Under Existing Pavement to be Replaced (subbase):
    a. In areas where the existing pavement is to be replaced and the grade is altered, the difference shall be adjusted by the installation of additional aggregate base. This base material shall be compacted to a minimum of 95 percent of maximum density (Standard Proctor Test).

B. On areas of pavement removal and replacement where the base has failed:

a. Upon the determination of the field inspector, the base has failed, the contractor shall remove the base and replace with a minimum of 6" of new base material. This base material shall be compacted to a minimum of 95 percent of maximum density (Standard Proctor Test). Prior to installation of the new base, the subgrade shall be compacted to a minimum of 95 percent of maximum density (Standard Proctor Test).

END OF SECTION 321500

SECTION 321623 - SIDEWALKS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. Certification shall be provided by producer that Portland cement concrete furnished is in accordance with design mix specifications.

B. Reference Standards:
   1. American Association of State Highway and Transportation Officials (AASHTO):
      a. AASHTO M213-81 - Preformed Expansion Fillers for Concrete Paving and Structural Construction.
      b. AASHTO M153-70 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Considerations.
      c. AASHTO M148-82 - Liquid Membrane-Forming Compounds for Curing Concrete.

1.2 SUBMITTALS

A. Submit in accordance with Section 013300 – Submittals Certification

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete: Comply with Section 033000.

B. Expansion Joint Filler: Grey joint filler

PART 3 - EXECUTION

3.1 PREPARATION

A. Moisten subgrade prior to placing concrete.

3.2 FORMING

A. Wood or metal, straight and sufficient length to resist springing, tipping or other displacement during process of depositing and consolidating concrete.

B. Full depth of sidewalk 4 inch minimum or as shown on plans.

C. Secure, stake, brace, and hold firmly to required line and grade, and sufficiently tight to prevent leakage of mortar.

D. Clean and oil forms before placing concrete.

3.3 REINFORCING

A. 4x4 welded wire fabric shall be placed on chairs to the mid-point of the sidewalk thickness.

3.4 INSTALLATION

A. Forms shall be checked by Engineer before concrete is placed.

B. Consolidate and spade sufficiently to bring mortar to surface. Strike off and float with wooden float.

C. Steel trowel and brush surface before mortar is set.

D. Before giving concrete final finish, check surface with 10-ft. straightedge. Correct variations in surface of more than 1 inch by adding or removing concrete while concrete is still plastic.

E. Round edges of sidewalks along forms and joints with edger of 1/4 in. radius.

3.5 JOINTS

A. Contraction Joints:
   1. Slot or groove at least 1-1/2 inches deep and 1/4 inch wide formed by inserting metal parting strip in concrete after it has been stuck off and consolidated and while concrete will retain its shape and finish joint edge.
      a. When approved by Engineer, contraction joint may be sawed. Saw joint at least 1-1/2 inches deep and 1/8 inch wide. Saw as soon as practicable after concrete has set sufficiently to preclude raveling during sawing and before any shrinkage cracking takes place in concrete.
   2. Construct transverse joints at right angles to centerline of sidewalk and longitudinal joints parallel to sidewalk centerline.
   3. Divide sidewalk into sections with contraction joints. Spacing shall be 5 feet as indicated on the plans or approved by the Engineer.
   4. On slabs constructed in partial widths, place transverse joints in line with like joints in previously constructed slabs.

B. Expansion Joints:
   1. Place 1 in. expansion joint filler between sidewalk and building or other rigid structure.
   2. Extend expansion joint filler full depth of sidewalk with top slightly below finished surface of sidewalk.
   3. On long lengths of sidewalk, 3/4 inch expansion joints shall be placed at minimum of 50-ft intervals.

C. Sidewalk Joint Sealer:
   1. Joint sealer: gray, one-component, non-priming, self-leveling, pour grade, polyurethane joint sealer; ASTM C920-79, Type S, Grade P, Class 25 or FS TT-5-00230C, Type 1, Class A. Use in sidewalk joints adjacent to buildings and curb and gutter.

3.6 PROTECTION AND CURING

A. Erect and maintain suitable barricades as may be necessary to exclude traffic from newly constructed sidewalk. Sidewalk damaged by traffic or otherwise damaged prior to acceptance shall be repaired or replaced at expense of Contractor.

B. After finishing, concrete shall be cured and protected utilizing curing compound in Section 321313.

END OF SECTION 321623

SECTION 329219-SEEDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, and Division Specification sections.

1.2 DESCRIPTION OF WORK

A. Furnish all materials, labor, equipment and services necessary to perform all Work.

B. Work included in this Section includes clearing of weeds, seed bed preparation, installation of turf reinforcement mat and seeding operations required for seeding of all disturbed areas of the project that are not to be paved.

1.3 SPECIFICATIONS AND STANDARDS

A. U.S. Department of Agriculture: SRA 156 U.S. Department of Agriculture, Rules and Regulations under the Federal Seed Act.

B. American Joint Committee on Horticultural Nomenclature Standard: 1942 Edition Standardized Plant Names.

1.4 SUBMITTALS

A. Section 013300 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on seed to be sown.

PART 2 - PRODUCTS

2.1 SEED

A. All seed shall be furnished in sealed, standard containers, unless otherwise approved. Seed which has become wet, moldy, or otherwise damaged will not be acceptable.

B. Each container of seed shall be fully labeled in accordance with the Federal Seed Act and seed certifications.

C. Seed shall be Fescue, 97 percent pure live seed

D. Tags for seed shall show type furnished. Upon acceptance of the seeded areas, a final check of total quantities of seed used will be made against total area seeded and if minimum rates of application or specified quantities have not been met, the Engineer will require distribution of additional quantities of these materials to make up minimum application specified.

2.2 FERTILIZER

A. Fertilizer shall be uniform in composition, free-flowing, suitable for application with approved equipment and delivered to the site unopened in original containers each bearing the manufacturer's guaranteed analysis and in conformity with state fertilizer laws. Fertilizer shall contain the following minimum percentage of plant food by weight.
   1. 12 percent available nitrogen

2. 12 percent available phosphoric acid
3. 12 percent available potash

B. Fertilizer application rates shall be 600 pounds per acre.

C. Fertilizer shall show grade furnished. Upon acceptance of the seeded areas, a final check of total quantities of fertilizer used will be made against total area seeded and if minimum rates of application or specified quantities have not been met, the Engineer will require distribution of additional quantities of these materials to make up minimum application specified.

PART 3 - EXECUTION

3.1 GROUND PREPARATION

A. General: the ground areas are to be seeded and fertilized installation of seeding operations required for seeding of all disturbed areas of the project that are not to be paved. Equipment necessary for the proper preparation of the ground surface and for handling and placing all required materials shall be on hand, in good condition and shall be approved before the Work is started.

B. Clearing: Prior to tillage, seeding or other specified operations, all vegetation which might interfere with the indicated treatment of the areas shall be mowed, grubbed, raked and the debris removed from the site. Prior to or during grading and tillage operations, the ground surface shall be cleared of materials which might hinder final operations. Areas which have been disturbed shall be finish graded.

C. Tillage: After the areas required to be seeded have been brought to the finish grades as specified, they shall be thoroughly tilled to a depth of at least 6 inches by plowing, disking, harrowing or other approved methods until the condition of the soil is acceptable to the Engineer. Work shall be performed only during period when beneficial results are likely to be obtained. When conditions are such by reason of drought, excessive moisture, or other factors that satisfactory results are not likely to be obtained, Work shall be stopped. Work shall be resumed only when desired results are likely to be obtained.

D. Leveling: Any undulations or irregularities in the surface resulting from tillage, fertilizing or other operations shall be leveled with a float drag before seeding operations are begun.

E. Fertilizing: Fertilizer shall be distributed uniformly at the 13.77 pounds per 1,000 square feet over the areas to be seeded and shall be incorporated into the soil to a depth of at least 3 to 4 inches by disking, harrowing or other approved methods. The incorporation of fertilizer may be a part of the tillage operation hereinbefore specified. Fertilizer shall be incorporated into the soil a minimum of 10 days before seed is planted.

F. Inspection: A minimum of 48 hours prior notice must be given to the Construction Administrator before fertilizing may commence.

G. Planting Time: All seeding Work shall be done between the dates of March 15 to May 15 for spring planting and from August 15 to October 31 for fall planting except as otherwise directed in writing by the Construction Administrator.

3.2 SEEDING

A. General: Prior to seeding, any previously prepared seedbed areas compacted or damaged by interim rains, traffic, or other cause shall be reworked to restore the ground condition

previously specified. Contractor should use construction fencing to minimize damage to prepared seedbeds until seeding work can be completed.

B. Seeding: Seed shall be uniformly distributed at the rate of 8 pounds per 1,000 square feet using a mechanical spreader. Seed shall be raked in or otherwise covered with soil to a depth at least one-quarter inch.

C. Rolling: Immediately after seeding, except for slopes 3 horizontal to 1 vertical and greater, the entire area shall be firmed with a roller not exceeding 90 pounds for each foot of roller width.

D. Inspection: A minimum of 48 hours prior notice must be given to the Construction Administrator before seeding may commence.

3.3 INSTALLATION OF TURF REINFORCEMENT MAT

A. Mat shall be rolled out in place. Mat shall be applied without stretching and shall lie smoothly but loosely on the soil surface. The Contractor shall refer to the drawings provided by the manufacturer for details of Mat fastening.

B. Application of the mat shall occur the same day that the seeding of an area has taken place.

C. Mat completely cover all areas which are shown on the drawings to be protected. After installation, the entire area shall be rolled with a smooth roller weighing between 200 to 250 pounds. After rolling, the mat shall be in intimate contact with the soil surface at all points. Any clods, etc. which hold the fabric off the ground should be removed. The fabric shall be forced down into any depressions and held there with a staple.

3.4 MAINTENANCE

A. General: The project areas shall be kept clean at all times and care shall be taken that use of the premises shall not be unduly hampered by Work herein specified. The intent of this Section is to ensure a healthy, well-established turf, and prevent soil erosion.

B. Responsibility: The Owner shall be responsible for maintenance of all seeded areas upon completion of seeding and general acceptance by the Construction Administrator.

C. Damage: Damage to seeded areas during the project shall be repaired by the persons responsible for causing such damage.

3.5 GENERAL ACCEPTANCE

A. The Construction Administrator shall make an inspection of the seeded areas upon completion of seeding. Seeded areas shall be considered acceptable if the specified quantities of fertilizer & seed have been properly applied.

3.6 GUARANTEE

A. The Contractor is responsible for the proper application of the fertilizer & seeding. Watering, weeding, re-seeding, and mowing will be the responsibility of the Owner after the Construction Administrator approves Substantial Completion.

END OF SECTION 329219

SECTION 331400 - WATER UTILITY SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Description of System:
   1. Includes site piping, equipment, and accessories for potable water distribution as specified herein or indicated on drawings.
   2. Related Sections:
      b. Section 312317: Trenching
      c. Section 400500: Process Piping
      d. Section 400507: Hangers and Supports for Process Piping
   3. System includes plugging lines and providing necessary thrust restraint for water main until connections to systems, listed above, are made.

1.2 QUALITY ASSURANCE

A. Reference Standards:
   1. American Society for Testing and Materials (ASTM):
      a. ASTM A74-82 - Specification for Cast Iron Soil Pipe and Fittings.
      b. ASTM C76-82B - Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
   2. American Water Works Association (AWWA):
      a. AWWA C151-81 - Standard for Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water and Other Liquids.
      b. AWWA C900-81 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4-in. through 12-in., for Water.
      c. AWWA C500 - Standard for Gate Valves, 3 through 48 in. NPS, for Water and Sewage Systems.

PART 2 – PRODUCTS

2.1 PIPE MATERIALS

A. Ductile-iron pipe (DI):
   1. Use: Site water distribution, pressure applications.
   2. Manufacture in accordance with all applicable requirements of AWWA C151 / ANSI A21.51 for 4-inch and larger diameter pipe, pressure class rated, Class 350 (minimum) and shall be in 18 or 20-foot lengths.
   3.. Thickness of Ductile Iron Pipe shall be determined by considering trench load and internal pressure separately in accordance with AWWA C150 / ANSI A21.50.
   4. Ductile iron pipe shall be cement mortar lined with a seal coat in accordance with AWWA C104 / ANSI 21.4. Outside coat shall be a minimum of 1-mil bituminous paint according to AWWA C151 / ANSI A21.51 Section 51-8.1.
   5. Each joint of ductile iron pipe shall be hydrostatically tested before the outside coating and inside lining are applied at the point of manufacturer to 500-psi. Testing may be performed prior to machining bell and spigot. Failure of ductile iron pipe shall be defined as any rupture or leakage of the pipe wall.
   6. All materials used in production of the pipe are to be tested in accordance with AWWA C151 for their adequacy within the design of the pipe, and certified test

results are to be provided to Owner upon request. All certified tests, hydrostatic and material are to be performed by an independent testing laboratory at the expense of the pipe manufacturer.

7. Pipe joints may be either mechanical joint or push-on pipe sizes 4 through 48-inches:
   a. Push-on joint shall conform to AWWA C151/ANSI A21.51 (such as "Fastite," "Tyton," or "Bell-Tite."). Dimensions of the bell, socket, and plain end shall be in accordance with the manufacturer's standard design dimensions and tolerances. Gasket shall be of such size and shape to provide an adequate compressive force against the plain end and socket after assembly to affect a positive seal.
      Gaskets shall be vulcanized natural or vulcanized synthetic rubber, and comply with AWWA C111/ANSI A21.11.
   b. Mechanical joint shall be used at the specific locations indicated on the Drawings or as authorized by the Engineer. Mechanical joint shall consist of:
      i. A bell cast integrally with the pipe or fitting and provided with an exterior flange having cored or drilled bolt holes and interior annular recesses for the sealing gasket and the spigot of the pipe or fitting.
      ii. A pipe or fitting spigot.
      iii. Plain rubber (Styrene Butadiene [SBR]) per AWWA C110 / ANSI A21.11 sealing gasket.
      iv. Separate ductile iron follower gland having cored or drilled bolt holes.
      v. Alloy steel Tee Head bolts and hexagon nuts. All threads are Coarse-Thread Series Class 2A, External and Class 2B, Internal, per ANSI B1.1. Nuts to be furnished in accordance with ASTM A563, Standard Specification for Carbon and Alloy Steel Nuts.
   c. Joint shall be designed to permit normal expansion, contraction, and deflection of the pipe or fitting while maintaining a leak proof joint connection. Mechanical joint shall conform to the requirements of Federal Specification WW-P-421, AWWA C111/ANSI A21.11, and ASTM A 53 Standard Specification of Ductile Iron Castings.
8. Mechanical joint restraint:
   a. Restrained joints shall consist of the use of a mechanical joint restraint system, using Megalug series 1100 mechanical joint restraint by EBAA Iron Sales, Inc., Alpha by Romac, Victaulic; or equivalent.
   b. Restrained joint pipe shall be TR-Flex or Lok-Tyte as manufactured by United States Pipe and Foundry Company, Lok-Fast or Lok-Ring as manufactured by American Cast Iron Pipe Company, Snap-lok as manufactured by Griffin Pipe Products Company; or equivalent.
9. Fittings:
   a. Fittings shall be ductile iron, grade 70-50-05, and shall conform to AWWA C110 / ANSI A21.10 or AWWA C153 / ANSI 21.53 for compact fittings, pipe sizes 4 through 48-inches with the exception of manufacturer’s proprietary design dimensions and thicknesses for iron, in accordance with AWWA C110/ANSI A21.10.
   b. All ductile iron fittings shall have a minimum working pressure rating of 350-psi and shall be cement mortar lined and bituminous coated

(minimum 1-millimeter), in accordance with AWWA c. C104/ANSI A 21.4.

C. Fittings shall be tested and the manufacturer shall provide certified test results when requested by Owner. Testing shall include hydrostatic proof testing of fittings. Glands, gaskets, and bolts shall conform to AWWA C111/ANSI A21.11.

d. Acceptable manufacturers are: Victualic, American Cast Iron Pipe Company, Griffin Pipe Company, Union/Tyler Pipe Company, U. S. Pipe & Foundry Company; or equivalent.

e. Acceptable types of fittings are:

i. Full body mechanical joint fittings: Full-body ductile iron mechanical joint fittings shall be Class 250 minimum and shall conform to AWWA C110/ANSI A21.10. Glands, Gaskets and Bolts shall conform to AWWA C111/ANSI A21.11.

ii. Mechanical joint compact fittings: Compact fittings shall be minimum class 350 and shall comply with AWWA C153 / ANSI A21.53, pipe sizes 4 through 48-inches. Glands, gaskets and bolts shall conform to AWWA C111 / ANSI A21.11.

iii. Mechanical joint restraints: Joint restraints shall consist of the use of a joint restraint system using Megalug series 1100 mechanical joint restraint by EBAA Iron Sales, Inc.; Alpha by Romac, Victaulic; or equivalent.

iv. Nuts and Bolts shall be stainless steel.

10. Polyethylene encasement:

a. Encase all DIP site piping in polyethylene wrap.

b. Polyethylene wrap in tube or sheet form for piping encasement shall be manufactured of virgin polyethylene material conforming to the requirements of ANSI/ASTM Standard Specification D1248.

c. Minimum thickness for linear low-density polyethylene film is 0.008-inches (8-mils).

d. Minimum thickness for high-density, cross-laminated polyethylene film is 0.004-inches (4-mils).

e. Installment methods as set forth in ANSI/AWWA C105/A21.5 and DIPRA's "Polyethylene Encasement" brochure shall be followed.

B. Polyvinyl Chloride Pipe (PVC): AWWA C900 or AWWA C905 with gray iron pipe equivalent outside diameter

1. Use: Water main and large diameter water service piping.

2. Minimum wall thickness.

a. DR 18.

3. Joints: Push-on with elastomeric gaskets, AWWA C900; solvent weld joints and fittings are not acceptable.

4. Fittings:

a. Fittings shall be ductile iron, grade 70-50-05, and shall conform to AWWA C110 / ANSI A21.10 or AWWA C153 / ANSI 21.53 for compact fittings, pipe sizes 4 through 48-inches with the exception of manufacturer's proprietary design dimensions and thicknesses for iron, in accordance with AWWA C110/ANSI A21.10.

b. All ductile iron fittings shall have a minimum working pressure rating of 350-psi and shall be cement mortar lined and bituminous coated (minimum 1-millimeter), in accordance with AWWA C104/ANSI A 21.4.

c. Fittings shall be tested and the manufacturer shall provide certified test results when requested by Owner. Testing shall include hydrostatic proof testing of fittings. Glands, gaskets, and bolts shall conform to AWWA C111/ANSI A21.11.

d. Acceptable manufacturers are: American Cast Iron Pipe Company, Griffin Pipe Company, Union/Tyler Pipe Company, or U. S. Pipe & Foundry Company; or equivalent.

e. Acceptable types of fittings are:

i. Full body mechanical joint fittings: Full-body ductile iron mechanical joint fittings shall be Class 250 minimum and shall conform to AWWA C110/ANSI A21.10. Glands, Gaskets and Bolts shall conform to AWWA C111/ANSI A21.11.

ii. Mechanical joint compact fittings: Compact fittings shall be minimum class 350 and shall comply with AWWA C153 / ANSI A21.53, pipe sizes 4 through 48-inches. Glands, gaskets and bolts shall conform to AWWA C111 / ANSI A21.11.

iii. Mechanical joint restraints: Joint restraints shall consist of the use of a joint restraint system using Megalug series 1100 mechanical joint restraint by EBAA Iron Sales, Inc.; Alpha by Romac, Victaulic; or equivalent.

iv. Nuts and bolts shall be stainless steel.

5. Mechanical joint restraint:

a. Restrained joints shall consist of the use of a mechanical joint restraint system, using Megalug series 1100 mechanical joint restraint by EBAA Iron Sales, Inc.: or equivalent. Bolt heads are to be "auto-torque" twist off. Nuts and bolts shall be stainless steel.

b. Restrained joint pipe shall be TR-Flex or Lok-Tyte as manufactured by United States Pipe and Foundry Company, Lok-Fast or Lok-Ring as manufactured by American Cast Iron Pipe Company, Snap-lok as manufactured by Griffin Pipe Products Company; or equivalent

2.2 VALVES

A. Buried Butterfly Valves

1. AWWA Class 150B butterfly valves for buried installations; Sesto, Pratt, DeZurick; or equivalent.

2. Provide with mechanical joint end connections; conform to ANSI/AWWA C111/A21.11.

3. Design:

a. Valve shafts shall be of the through-type for sizes 3 to 24-inch. Shafts shall be locked to the disc by o-ring sealed taper pins retained with stainless steel nuts. Through-type shafts shall be supplied on 30-inch and larger valves when specified.

b. Valve discs shall be of the solid type without external ribs or vanes to obstruct flow.

c. Resilient seats shall be located on the valve disc and shall provide a 360° continuous, uninterrupted seating surface. Resilient seats shall be field adjustable and replaceable.

e. Sleeve bearings shall be provided in the valve hubs and shall be self-lubricating nylatron or teflon lined, fiberglass backed.

f. Thrust bearings shall be provided and shall be adjustable on valves 30-inch and larger.
g. Shaft seals shall be of the V-type and shall be replaceable without removal of the valve from the line or the shaft from the valve.

4. Materials:
   a. Body: Class 150B valve bodies shall be ASTM A126, Class B gray iron or ASTM A536 Grade 65-45-12 ductile iron.
   b. Valve disc shall be ASTM A536 Grade 65-45-12 ductile iron.
   c. Shafts shall be ASTM A276 Type 304, or ASTM A564, Type 630 Stainless Steel.
   d. Resilient seat shall be Buna-N and mate to a Type 316 Stainless Steel body seat ring.
   e. Hardware: All seat retaining hardware shall be Type 316 stainless steel.
5. Provide standard 2-inch operating nut for manual operation. Buried service actuators shall be packed with grease and sealed for temporary submergence to 20-feet of water. Install valve box atop operating nut for valve operation.
6. Valve exteriors for buried service shall be coated with an epoxy coating. Valve interiors shall be coated with an NSF/ANSI 61 epoxy coating approved for potable water. Fusion bonded epoxy shall be supplied on the exterior and interior when specified.

B. Resilient Wedge Gate Valves
1. Type permitting repacking under pressure when wide open.
2. Exposed Valves: Non-rising stem with handwheel; open counterclockwise.
3. Buried Valves: Non-rising stem with 2" square operating nut; open counterclockwise.
4. Meet AWWA C509 - Permanently Bonded SBR Rubber to cast iron wedge ASTM D428.

C. Valve Boxes
1. Provide valve box for each buried valve.
   a. Valve box shall be complete, assembled unit consisting of adjustable box and extension stem with 2-inch square operating nut.
   b. Box section: Hand-adjustable to required depth through coupling gland with O-ring seal.
   c. Stem assembly: Telescoping design with torque capacity of 1,000-ft-lb.
   d. Equip lower end of box with self-centering alignment ring to center box over valve nut.
   e. Lid shall drop into valve box top, rotate 90º to retain, and lock in place with single bolt.
   f. Arrange entire assembly to prevent dirt and grit from entering valve box assembly.
   g. Lid shall be marked "Water" or “Sewer,” as appropriate, and have directional arrow for open rotation.
   h. Materials:
      i Valve box, base, alignment ring, and top: High-density polyethylene.
      ii. Extension steel: Galvanized steel tubing.
      iii Bolts and screens: Stainless steel.
      iv. Lid: Cast iron.

2.3 DISINFECTION AGENT

A. Liquid Chlorine complying with AWWA B300 and AWWA B301.

B. Sodium Hypochlorite complying with AWWA B300.

C. Calcium Hypochlorite complying with AWWA B300.

D. All disinfecting agents to be NSF 60 certified. Supply and store in the original container.

2.4 THRUST BLOCKS

A. Applies to thrust blocks for pipe lines with working pressure greater than 15 psig.

B. Provide thrust blocks where piping changes direction or dead ends unless properly restrained joint is used.

C. Carry thrust block to undisturbed soil for bearing where feasible.

D. Minimum area of thrust block bearing against undisturbed soil, SF:

Pipe Size	90°Bend	45°Bend	22-1/2° Bend	Dead End
4" & Smaller	4	2	1	3
6"	6	3	2	4
8"	11	6	3	8
10"	17	9	5	12
12"	24	13	6	17
14"	33	18	9	23
16"	43	23	11	31
18"	54	29	15	38
20"	66	36	18	47
24"	97	52	26	68

1. Add 1/2 SF to values above for thrust blocks bearing against disturbed soil.

E. Compute thrust block bearing area for 24" and larger pipe sizes based on following formulas:

$$A = \frac{R}{S}, \qquad R = 1.57D^2P\ sin\left(\frac{d}{2}\right)$$

A = Thrust Block Bearing Area, SF.
R = Total Resultant Thrust at Bend, lbs.
S = Allowable Soil Bearing Load; use 2,000 lbs/SF.
D = Outside Pipe Diameter, in.
P = Internal Pipe Pressure, psig.
d = bend angle, degrees.

F. Minimum thickness of thrust block: 18".

G. See Standard Drawings for thrust block details.

2.5 CONNECTIONS BETWEEN DISSIMILAR PIPES

A. Provide manufactured adapter or coupling as specified in Section 400500. If not available, provide concrete collar 6-inches thick and 12-inches each way from joint for gravity piping. Cover joint with burlap "diaper" band. Bind at edge with No. 9 tie wires.

B. Provide special adapters for pressure piping, as required, with pressure rating not less than lowest rated pipe connected. Submit details to Engineer for review.

C. Provide dielectric isolators between pipes of different metallic make-up

2.6 WARNING AND TRACER TAPE

A. Mark location of all buried pipe lines using yellow plastic lined metallic tape. Also install tracer wire for all buried plastic piping.

B. Material: Polyethylene lined metallic tape.

C. Message:
   1. Continuous top line: "CAUTION".
   2. Continuous bottom line: "(PIPE FUNCTION) PIPE BELOW", except for gas pipe use: "GAS PIPE BELOW".

D. Tape width: 3-inch.

E. Manufacturer: Seton Name Plate Corporation, or equivalent.

F. Install continuous tracer wire adjacent to plastic pipe in trench and extend to ends of plastic pipes:
   1. Wire: Solid, AWS size #12, insulated, direct bury, Type UF.
   2. Underground splices: Use Scotchcast splicing kits, 3M Company; or equivalent.
   3. Terminate wires at ground surface at ends of PVC pipe with appropriate terminating kit.

4. Test tracer wire for continuity after installation. Repair or replace as necessary.

PART 3 – EXECUTION

3.1 GENERAL INSTALLATION

A. Protect pipe joints and valves from injury while handling and storing.

B. Do not use deformed, defective, gouged or otherwise impaired pipe joints or valves.

C. Clean bell and spigot surfaces of dirt and foreign matter before jointing pipe.

D. Make joints in strict accordance with manufacturers' recommendations.

E. Rap and blow out piping and valves before and after installation.

F. Provide flexible joint at connection to all structures or provide pipe joint within 2’ of outside face of structure for differential settlement; provide details to Engineer for review.

G. Provide adjustable U-bolts for tied pipe where shown on drawings; U-bolts as recommended by pipe manufacturer for pipe size shown on plans; shop coat U-bolts.

H. Comply with trenching: Section 312317.

3.2 PRESSURE PIPE INSTALLATION

A. Lay pipe in dry; minimum earth cover: 5’-6”; lay to depths or grades shown on drawings.

B. Clean pipe interior of foreign material before lowering into trench; keep clean at all times by closing open ends of pipe and fittings.

C. Before installation of metallic pipe, tap pipe lightly with light hammer to detect cracks; defective, damaged or unsound pipe will be rejected.

D. Place in trench in sound, undamaged condition; do not injure pipe coating or lining; do not use end hooks to install or move pipe; use web slings.

E. Cut pipe in neat and workmanlike manner without damage to pipe.
1. Mechanical pipe cutters subject to approval of Engineer.
2. Bevel cut ends of metallic push-on type pipe.
3. Completely coat damaged ends of cut metallic pipe with sealer compatible with pipe liner; spray-on type sealer which will adhere to lining at any temperature; pipe and fittings showing blisters or holes will be rejected by Engineer on site.

F. Use suitable fittings where grade or alignment requires offsets of more than 5/8” per foot (3 degrees per joint).

G. Slope air and gas piping 1/4” per foot minimum toward drip traps and drip legs inside buildings.

H. Install warning tape in trench directly over plastic pipe for full length of pipe and buried 1’ to 2’; wrap around valves.

I. Plug or cap and block all pipe ends or fittings left for future connections.

J. Uncover existing mains a sufficient time ahead of pipe laying operations to determine fittings required to make connections; make connections between existing and new mains with specials and fittings as required.
1. Contractor responsible for cost of side cuts.

K. Comply with AWWA C-600.

L. Comply with trenching: Section 312317.

M. Scheduling and construction of connections to existing mains shall be in conformance with Owner requirements.
1. Contact the Owner for scheduling.

2. Provide minimum 48 hours notice to Owner for water shut-off request. Owner will determine time and duration of shut-off.
3. Owner will operate all distribution system valves.

3.3 POTABLE WATER AND SEWER CONFLICTS

A. Maintain minimum 10’ lateral separation between potable water piping and any gravity sewer piping.

B. Maintain minimum 18” vertical separation between bottom of potable water piping and top of gravity sewer piping with potable water above gravity sewer.

C. At pipe crossings where minimum separation cannot be maintained, provide 20’ length of ductile iron pipe for sewer centered on potable water pipe at no extra cost to Owner. Pressure test iron sewer pipe as specified herein.

D. Adequately support existing water main to prevent settling or breakage.

3.4 DISINFECTION

A. Thoroughly flush main prior to disinfection.

B. Disinfect according to AWWA C651. The tablet method contained in AWWA C651 is not to be used unless approved by the Engineer.

C. Keep piping to be chlorinated isolated from lines in service and from points of use.

D. Coordinate disinfection and testing with the Engineer.

E. Obtain the test water samples, unless otherwise provided by the Engineer.

F. Procedure:
1. Induce a flow of potable water through the pipe.
2. Introduce highly chlorinated water to the pipe at a point within 5 pipe diameters of the pipe's connection to an existing potable system, or within 5 pipe diameters of a closed end, if there is no connection to an existing system.
3. Introduce water containing a minimum of 25 mg/L free chlorine until the entire new pipe contains a minimum of 25 mg/L free chlorine.
4. Retain chlorinated water in the pipe for at least 24 hours and no more than 48 hours.
5. Operate all valves and hydrants in new main to assure full disinfection; repeat test procedure if necessary.
6. Thoroughly flush main after test until extremities indicate same chlorine residual as supply water.

G. Test water mains according to AWWA C651, including collection of two consecutive sets of acceptable bacteria samples 24 hours apart. If the initial disinfection procedure fails to produce satisfactory bacteriological results or if other water quality is affected, repeat the disinfection procedure.

H. Contractor shall provide sample containers and pay costs for testing and transportation.

3.5 FIELD QUALITY CONTROL

A. Comply with pipe testing procedures specified in Section 014000.

END OF SECTION 331400

SECTION 400500 - PROCESS PIPING

PART 1 – GENERAL

1.1 WORK INCLUDED

A. All process piping, fittings, accessories and appurtenances shown or specified and required for complete piping systems within structures. Include all connections to all treatment units, equipment and controls.

B. All piping, fittings, and accessory materials necessary for piping not shown on Drawings. This piping includes:
   1. Vents and drains.
   2. Piping required for proper operations of piping system equipment, including drain valves for low points in piping. No additional compensation allowed for drain piping and small valves.
   3. Connections to all monitoring and other instruments and control apparatus, including pressure gauges and other appurtenances required for satisfactory operation of piping system and proper functioning of instruments and controls.
   4. Piping required for chemical feed systems.
   5. Piping required for potable and non-potable water systems.
   6. All flanges, unions, bolts, gasket material, reducing fittings, bushings and adapters.

1.2 SUBMITTALS

A. Include the following information as a minimum:
   1. Identify pipe service, design temperature, and material to be used for each service.
   2. Proposed adapters between dissimilar piping materials.
   3. Pipe material, pressure class and/or schedule number.

1.3 RELATED SECTIONS

A. Section 223116 – Water Softener

B. Section 400507 – Pipe Hangers, Supports, and Anchors

C. Section 400523 – Process Valves

PART 2 – PRODUCTS

2.1 PIPE MATERIALS

A. Ductile-iron pipe (DI): AWWA C115/A21.15 manufactured in accordance with AWWA C150/A21.50 thickness Class 52.
   1. Joints: shall be working pressure rating equal to the pressure rating of the connected pipe. Dielectric fittings or isolation joints shall be provided between all dissimilar metals.
   2. Flanges: AWWA C110/A21.10. Gaskets, bolts and nuts shall be provided with flanged joints in sufficient quantity for the complete assembly of each joint.
      a. Bolts, Nuts, and Washers: ASTM A 307, Grade B.

b. Gaskets: 1/8-inch thick plain rubber (SBR) per AWWA C110/A21.11.

3. Fittings: Flanged conforming to AWWA C110/A21.10, rated for 250 psi service.
4. Bolt circle and bolt holes of the flanges shall conform to Class 150 flanges per ANSI B16.1.
5. For tie-in to existing flanges, field check existing flanges for nonstandard bolt hole configurations and design as required to assure new pipe and flange mate properly.
6. Lining: Standard cement lining with seal coat conforming to AWWA C104/A21.4.
7. Coating: Pipe shall receive shop surface preparation, shop priming, and field painting. See Section 099600.

B. Stainless Steel (SS): ASTM A312, ASTM A778, and ASTM A774.
1. Grade: TP316
2. Thickness: Schedule 10S with dimensions conforming to ASME B36.19M, unless otherwise specified.
3. Joints: Piping shall be joined by welded fittings or flanges. Dielectric fittings or isolation joints shall be provided between all dissimilar metals.
4. Fittings:
a. Welded: Butt-welding fittings conforming to ASTM A403/A403M Grade TP316.
b. Flanges: Internal bores of flanges and flanged fittings shall be the same as associated pipe. Flanges shall be welding neck or socket type. Flanges and flanged fittings shall be ASTM A182/182M Grade TP316, Class 150 ASME B16.5 flat face. Gaskets, bolts, and nuts shall be provided with flanged joints in sufficient quantity for the complete assembly of each joint.
i. Bolts, Nuts, and Washers: 316SS.
ii. Gaskets: 1/8-inch thick full face type.

C. Polyvinyl Chloride, (PVC and CPVC): ASTM D-1784, Type 1, Grade 1 pipe. Schedule 80.
1. Joints: Shall be Socket Weld, Flanged, Threaded, or Grooved
2. Fittings:
a. Socket Type: ASTM D-2567, Solvent cement conforming to ASTM D2565 or F493.
b. Flange Type: F-439 and D-4024.
c. Threaded type; ASTM D-2464 and F-437.
d. Grooved Type; Grooved mechanical couplings 316SS or composite with 316SS Bolts, nuts and washers.

2.2 PIPE THROUGH WALLS AND SLABS

A. Wall pipes:
1. Provide wall pipes with intermediate flanges on all wet face to exposed dry face concrete walls and floors. Material to be ductile-iron unless noted. Pipe ends to match connecting piping.
2. Clow Corporation; or equivalent.
3. Fabricate wall pipes to dimensions required to suit requirements or conditions.
4. Space intermediate flange to center in wall or floor or as shown on Drawings.
5. Refer also to details shown on the Drawings.

B. Wall sleeves:
1. Provide wall sleeves where shown on Drawings.
2. Refer also to details shown on the Drawings.

C. Mechanical seals:
   1. Use wall sleeves on new construction where shown for pipes passing through floors, walls, or roof slabs.
   2. Core drill holes in existing concrete construction for pipes passing through floors, walls or slabs.
   3. Materials: Cast iron or polyethylene with intermediate flange on piping 3-inches and larger. Galvanized stainless steel pipe with anchor ring or lugs on piping smaller than 3-inch.
   4. Sleeve length: Extend 2-inches above floors, flush with other surfaces.
   5. Clearance: As recommended by seal manufacturer.
   6. Seal: Mechanical, link-type, modular, field-assembled, insulating, positive-sealing.
   7. After seal is installed, place non-shrink grout over bolts in annular space between pipe and wall sleeve.

2.3 COUPLINGS AND ADAPTERS

A. Restrained Flexible Couplings and Flanged Coupling Adapters:
   1. Couplings shall be AWWA C219.
   2. Materials:
      a. Castings: Ductile Iron Meeting ASTM A 536
      b. Gaskets: Compounded for water and sewer service per ASTM D200.
      c. Bolts and Nuts: 304 stainless steel.
   3. Pressure rating:
      a. 350 psi.
   4. Compatible pipe materials: Ductile Iron, Cast Iron, PVC (IPS, C900, C905).
   5. Acceptable Manufactures: Victualic, Krausz Hymax Grip, Romac Alpha, EBAA 3800 Mega-Coupling, or equal.

PART 3 – EXECUTION

3.1 DISINFECTION

A. Thoroughly flush main prior to disinfection.

B. Disinfect according to AWWA C651. The tablet method contained in AWWA C651 is not to be used unless approved by the Engineer.

C. Keep piping to be chlorinated isolated from lines in service and from points of use.

D. Coordinate disinfection and testing with the Engineer.

E. Obtain the test water samples, unless otherwise provided by the Engineer.

F. Procedure:
   1. Induce a flow of potable water through the pipe.
   2. Introduce highly chlorinated water to the pipe at a point within 5 pipe diameters of the pipe's connection to an existing potable system, or within 5 pipe diameters of a closed end, if there is no connection to an existing system.

3. Introduce water containing a minimum of 25 mg/L free chlorine until the entire new pipe contains a minimum of 25 mg/L free chlorine.
4. Retain chlorinated water in the pipe for at least 24 hours and no more than 48 hours.
5. Operate all valves and hydrants in new main to assure full disinfection; repeat test procedure if necessary.
6. Thoroughly flush main after test until extremities indicate same chlorine residual as supply water.

G. Test water mains according to AWWA C651, including collection of two consecutive sets of acceptable bacteria samples 24 hours apart. If the initial disinfection procedure fails to produce satisfactory bacteriological results or if other water quality is affected, repeat the disinfection procedure.

H. Contractor shall provide sample containers and pay costs for testing and transportation.

END OF SECTION 400500

SECTION 400507 - PIPE HANGERS, SUPPORTS AND ANCHORS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Furnish complete system of pipe supports and anchors, with necessary inserts, bolts, nuts, restraining and hanger rods, washers, miscellaneous steel, and other accessories.

B. Absence of pipe supports and details on Drawings shall not relieve Contractor of responsibility for providing them throughout the facility.

1.2 RELATED SECTIONS

A. Section 011000: Summary of Work.

B. Section 400500: Process Piping.

C. Section 400523: Process Valves.

1.3 QUALITY ASSURANCE

A. Source quality control:
   1. Firms regularly engaged in manufacture of pipe supports, hangers, anchors and related products.
   2. Provide factory fabricated piping hangers and supports, clamps, hanger rod attachments, building attachments, saddles, shields, thrust anchorage, and other miscellaneous products indicated or shop fabricated supports. Comply with MSS SP-58 and manufacturer's published product information. Where MSS type not indicated, provide proper selection for installation requirements and comply with MSS SP-58 and manufacturer's published product information.

B. Design criteria: Pipe support system components shall withstand dead loads imposed by weight of pipes filled with water plus insulation, valves or fittings, internal pressures, pump/blower vibrations, horizontal/vertical thrusts and have a minimum safety factor of 5.

C. Reference Standards:
   1. Manufacturer's Standardization Society (MSS):
      a. MSS SP58 - Pipe Hangers and Supports - Materials, Design, Manufacturer, Selection, Application, and Installation.
   2. American Society for Testing and Materials (ASTM):
      a. ASTM A36-81A - Specification for Structural Steel.
      b. ASTM A307 - Specification for Carbon Steel Externally Threaded Standard Fasteners.
   3. American National Standards Institute (ANSI): ANSI B31.1-1983 - Power Piping.

1.4 SUBMITTALS

A. Submit in accordance with Section 013300.

B. Pipe supporting system, including manufacturer's product data, dimensions, sizes, types, location, maximum loadings, thrust anchorage, and installation instructions.

1.5 JOB CONDITIONS

A. Support piping, in general, as described hereinafter. MSS types indicated are typical of types and quality of standard pipe supports and hangers to be employed.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Unistrut; Eaton B-Line; Grinnell; Carpenter-Paterson; or equivalent.

2.2 MATERIALS

A. Stainless Steel shall be used for piping hanger and support system material in all areas of facility, except in hazardous chemical storage and feed areas.

B. Hazardous, chemical storage and feed areas:
   1. Provide a non-metallic hanger and support system which includes all necessary fasteners, channel splice plates, brackets, sealants, hangers, clamps, etc.
   2. Nonmetallic fasteners shall be manufactured from long glass fiber reinforced polyurethane to ensure strength and corrosion resistance.

2.3 HORIZONTAL PIPING HANGERS AND SUPPORTS

A. General:
   1. Unless otherwise shown or specified, hangers for 2-1/2-inch and smaller pipe shall be split-ring, adjustable swivel, clevis or roller type. Hangers for 3-inch pipe or greater shall be clevis or roller type.
   2. Hangers for use with spring supports shall be split-ring or clamp type.
   3. Hangers for fiberglass reinforced pipe shall be saddle type.
   4. Each hanger shall be designed to permit at least 1-1/2 inch vertical adjustment after installation.

B. Adjustable swivel split-ring hanger: MSS Type 6.

C. Adjustable clevis hanger: MSS Type 1

D. Adjustable band hanger: MSS Type 7

E. Adjustable swivel-band hanger: MSS Type 10.

F. Clamp: MSS Type 4.

G. Single roll support: MSS Type 41, including axle roller and threaded sockets.

H. Adjustable roller hanger: MSS Type 43, including axle roller and clevis.

I. Roll / Stand: MSS Type 44, including roller, stand and axle.

J. Adjustable roll / base: MSS Type 46, including roller, adjustable base, and stand.

K. Brackets:
   1. Structural Shapes complying with:
      a. Light duty: MSS Type 31.
      b. Medium duty: MSS Type 32.
      c. Heavy duty: MSS Type 33.

L. Adjustable saddle support: MSS Type 38, including saddle, pipe and reducer.

M. Stanchion saddle support: MSS Type 37, including saddle and U-bolt.

N. Strap or wire hangers not acceptable.

2.4 VERTICAL PIPING CLAMPS

A. 2-Bolt riser clamp: MSS Type 8.

B. 4-Bolt riser clamp: MSS Type 42, include pipe spacers at inner bolt holes.

2.5 HANGER RODS AND ATTACHMENTS

A. Hanger rods:
   1. Threaded both ends or continuous threaded.
   2. Rods shall conform to following sizes:

Pipe Size	Minimum Rod Diameter, inches
Up to 2-inch	3/8
2-1/2 to 3-inch	½
4-inch	5/8
6-inch	¾
8 to 12-inch	7/8
14-inch and larger	1
Trapeze hangers	As required

B. Turnbuckles: MSS Type 13.

C. Weldless eye nut: MSS Type 17.

D. Eye socket: MSS Type 16.

E. Clevis: MSS Type 14.

2.6 BUILDING ATTACHMENTS

A. Individual concrete inserts:
   1. MSS Type 18.
   2. MSS Type 19.

3. Minimum safe load: 1,100 lbs.

B. Continuous concrete inserts:
   1. Unistrut, P-3200 Series.
   2. Fee and Mason, Figure 9000.
   3. Superstrut.
   4. Or equivalent.

C. Top beam c-clamp: MSS Type 19.

D. C-clamps: MSS Type 23.

E. Channel clamp: MSS Type 20.

F. Top I-beam clamp: MSS Type 25.

G. Side beam clamp: MSS Type 27.

H. Concrete anchors: Minimum safety factor: 5.

2.7 SADDLES AND SHIELDS

A. Protection saddles: MSS Type 39.

B. Protection shields: MSS Type 40.

2.8 MISCELLANEOUS MATERIALS

A. Shop fabricated anchors and supports:
   1. Steel plates, shapes and bars.
   2. Restraining rods.
   3. Fabricate in accordance with Section 055000.

B. Concrete: In accordance with Section 033000.

PART 3 – EXECUTION

3.1 GENERAL

A. Proceed with installation of hangers, supports, and anchors only after required building structural work has been completed and concrete support structure has reached 28-day compressive strength as specified in Section 033000.

B. Install hangers, supports, clamps, and attachments from building structure; comply with MSS SP-58. Group parallel runs of horizontal piping to be supported together on trapeze type hangers where possible.

C. Install supports to provide indicated pipe slopes and maximum pipe deflections allowed by ANSI B31.1 are not exceeded.

D. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.

E. Install supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

F. Piping shall be free to move when expands or contracts, except where fixed anchors are indicated. Where adequate hanger rod swing length cannot be provided or where pipe movement based on expansion of 1-inch per 100-feet for each 100°F change in temperature exceed ½-inch, provide approved roller supports.

G. Support piping 2-inch and larger on trapeze hangers on rollers.

H. Prevent contact between dissimilar metals. Where concrete or metal pipe support is used, place 1/8-inch thick Teflon, asbestos, neoprene rubber or plastic strip under piping at point of bearing. Cut to fit entire area of contact between pipe and support.

I. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, plastic coated or by other recognized industry methods. Electrician's tape is not acceptable isolation method.

J. Apply anti-seize compound to nuts and bolts.

3.2 INSTALLATION OF BUILDING ATTACHMENTS

A. Support piping from structural framing, unless otherwise noted.

B. Concrete inserts:
   1. Locate inserts so total load on insert does not exceed manufacturer's recommended maximum load. Location of inserts shall be approved by Engineer.
   2. Where necessary to anchor supports to hardened concrete or completed masonry, use concrete anchors.

C. Attach to structural steel with beam clamps.

D. Do not support piping from other piping.

3.3 THRUST ANCHORS AND GUIDES

A. Thrust anchors:
   1. For suspended piping, center thrust anchors as closely as possible between expansion joints and between elbows and expansion joints. Anchors shall hold pipe securely and be sufficiently rigid to force expansion and contraction movement to take place at expansion joints and/or elbows and preclude separation of joints.
   2. Provide thrust anchors as required to resist thrust due to changes in diameter or direction or dead ending of pipe lines. Anchorage shall be required wherever bending stresses exceed allowable for pipe. Wall pipes may be used as thrust anchors.
   3. Restraining rod size and number shall be as recommended by MSS.

B. Pipe guides shall be provided adjacent to sliding expansion joints in accordance with recommendations of National Association of Expansion Joint Manufacturers.

3.4 PIPE SUPPORTS

A. Spacing:

Type of Pipe, Size in inches	Maximum Pipe Support Spacing, feet
Steel	
10 and larger	22
8	19
6	17
4	14
3-1/2	13
3	12
2-1/2	11
2	10
1-1/2	9
1	7
¾	6
1/2	5
Copper	
4	12
3-1/2	11
3	10
2-1/2	9
2	8
1-1/2	8
1-1/4	7
1	5
3/4	5
1/2	5
Plastic – Schedule 80 at 100°F	
8	9-1/2
6	9
4	7-1/2
3	7
2	6
1-1/2	5-1/2
1	5
¾	4-1/2
1/2	4-1/2
For plumbing application plastic piping shall be supported at maximum of 4-foot spacing.	

Cast-Iron and Ductile-Iron	
30 and larger	20
24	18
20	18
18	16
16	16
14	16
12	14
10	12
8	12
6	12
4	10
3	10
For plumbing application cast-iron and ductile-iron piping shall be supported at maximum of 5-feet spacing.	

B. Where piping of various sizes is to be supported together, space supports for smallest pipe size or install intermediate supports for smaller diameter pipe.

C. Provide minimum of 2 pipe supports for each pipe run.

D. Where piping connects to equipment, support by pipe support and not equipment, unless approved by equipment manufacturer.

E. Unless otherwise shown or authorized by Engineer, place piping running parallel to walls approximately 1-1/2-inch out from face of wall and at least 3-inches below ceiling.

F. Pedestal pipe supports shall be adjustable with stanchion, saddle, and anchoring flange.

G. Piping supports for vertical piping passing through floor sleeves shall be riser clamps.

H. Support piping in manner preventing undue strain on valve, fitting or equipment. Provide pipe supports at changes in direction or elevation, adjacent to flexible couplings, adjacent to non-rigid joints, and where otherwise shown. Do not install pipe supports and hangers in equipment access areas.

I. Stacked horizontal runs of piping along walls may be supported by metal framing system attached to concrete insert channels.

J. Where coatings are required paint hangers, clamps, protective shields, metal framing support components, and hanger accessories in accordance with Section 09 96 00.

END OF SECTION 400507

SECTION 400523 - PROCESS VALVES

PART 1 – GENERAL

1.1 WORK INCLUDED

A. All process valves and accessories shown or specified and required for complete piping systems.

B. Related Sections
1. Section 223116 – Water Softener
2. Division 33 – Utilities.
3. Section 400500 – Process Piping.
4. Section 400507 – Pipe Hangers, Supports, and Anchors.

1.2 SUBMITTALS

A. Include the following information as a minimum:
1. Valve types, sizes, weights, dimensions, materials, locations and pressure ratings.
2. Valve operator types, sizes, weights, dimensions and materials.

B. Operation and Maintenance Data:
1. Valve supplier shall submit suitable operation and maintenance data in accordance with Section 013300.

PART 2 – PRODUCTS

2.1 VALVES IN GENERAL

A. Use valve of single manufacturer for each classification in so far as possible.

B. Provide all special tools required for repacking and disassembly of materials.

C. Laying dimensions of flange valves per ANSI B-16.10.

D. Mechanical or push-on joints for iron pipe per ANSI A21.11.

E. Provide adapters if required to join pipe and valves.

F. Valve connections:
1. Provide valves suitable to connect to adjoining piping as specified for pipe joints. Use pipe size valves.

2.2 WAFER CHECK VALVES

A. Stainless Steel Check Valves
1. Dual Door Wafer Style Swing Check.
2. Pressure Class 150.
3. Body: ASTM A351 CFM cast 316 stainless steel.
4. Disc: Spring Loaded ASTM A351 cast 316 stainless steel.
4. EPDM resilient seat.

5. APCO Model CDD, or equal.

2.3 RESILIENT WEDGE GATE VALVE

A. Type permitting repacking under pressure when wide open.

B. Non-rising stem with handwheel. Open counterclockwise. Valves positioned 7-feet or more above floor level shall be equipped with chain wheel with chain extending to 3-feet above floor.

D. Meet AWWA C509. Permanently bonded EPDM rubber to cast iron wedge ASTM D428 or resilient seat with epoxy coated interior.

E. Joint: flanged as specified for adjacent piping.

F. Lining: Epoxy-lined in accordance with AWWA C550.

G. Mueller, Clow, Kennedy, or equal.

2.4 BUTTERFLY VALVES

A. AWWA butterfly Valve (flanged style) shall be DeZurik, Pratt, Bray; or equivalent. Rubber seated butterfly valve per AWWA C504 with externally adjustable stem packing. Valves shall conform to NSF Standard 61. Sizes as shown on Drawings:
   1. Body:
      a. Cast Iron, ASTM A126, Class B.
      b. Ductile Iron, ASTM A536 Grade 65-45-12.
   2. Provide trunnions for shaft bearings. Body thickness: AWWA C504.
   3. Disc:
      a. Stainless Steel, Type 316, ASTM A743.
   4. Shaft: ASTM A276, Type 304 or Type 316 stainless steel, turned ground and polished.
   5. Seat: EPDM rubber seat molded and bonded in body.
   6. Do not mount valve with all thread running total length through valve and tapped on both ends. Use separate bolts from each direction.

B. High performance lug/wafer body butterfly valves for mounting between class 125/150 flanges shall be DeZurik, Pratt, Bray, or equivalent. Valves shall conform to NSF Standard 61. Size as shown on Drawings:
   1. Body:
      a. Stainless Steel, Type 316.
   2 Disc:
      a. 316 Stainless Steel
   2. Shaft shall be one piece 2205 duplex stainless steel conforming to ASTM 479. Seat material shall be RPTFE suitable for potable water service.
   3. Lug body valves should be threaded from both ends and should be installed with separate bolts entering valve from each side

C. Operators: Design to hold valve at any position between fully open and fully closed without creeping or fluttering:

1. Valves less than 6-foot above floor: Manual infinite throttle positioning with hand wheel gear operator, position indicator, and mechanical travel stops.
2. Valves more than 6-foot above floor: Gear operators with chain operation.

2.5 PLASTIC BALL VALVES

A. PVC Ball Valves:
1. True union ball valve, Socket end connections.
2. Type 1, Grade 1 PVC per ASTM D1784.
3. PTFE seats and EPDM o-ring seals.
4. Valve handles shall be polypropylene with built-in lockout mechanism.
5. All valve components shall be replaceable.
6. Asahi, Spears, Chemtrol, or equal.

2.6 CONTROL VALVES

A. See Section 223116 – Water Softener

2.6 AIR RELEASE VALVES

A. Air Release Valves:
1. Hydrostatically tested to AWWA C512 Standard.
2. Cast iron or 316 Stainless Steel Body, with stainless steel float.
3. Size: 2”

2.7 AIR/VACUUM VALVES

A. Valve shall vent large quantities of air out thru the orifice when pipe fills and close tight when liquid enters, then permit large quantities of air to re-enter thru the orifice when pump stops to prevent vacuum forming in the piping system.

B. Main valve parts shall be a body, cover, baffle, float and seat.

C. Baffle:
1. Shall shield the float from direct impact of air and water to prevent premature float closure.
2. Seat shall slip fit into the baffle or cover and lock in place without any distortion, but easily removable.

D. 1/2 to 3-inch Valves:
1. Entire float and baffle assembly must be shrouded with a water diffuser to prevent water slamming float shut.
2. Outlet to be threaded or flanged.

E. Discharge Orifice:
1. Fitted with a double-acting throttling device to regulate and restrict air venting.

F. Materials:
1. Body: Cast Iron, ASTM A126 Grade B.
2. Float: Stainless Steel, ASTM A240.
3. Seat: EPDM.

4. Water Diffuser: Brass, ASTM B16.
5. Double Acting Throttling Device: Malleable Iron with 304SS adjustment screw and 316SS spring, and Teflon plug.
6. Exterior Paint: Universal primer for use in contact with potable water.

2.8 VALVE TAGS

A. All valves shall be identified with 2-inch diameter, 3/32-inch thick, engraved PVC tag, and colored black with white numbers and letters.

B. Tags shall be attached to the valve by heavy aluminum or brass beaded chain soldered so chain and tag cannot be removed.

2.9 VALVE OPERATION

A. Manual
1. Provide handwheels or lever operators on exposed valves.
2. Buried valves: Operate as shown on Drawings or specified herein.
3. Operating force shall not exceed 40 pounds.
4. Provide chainwheel and chain for valves over 7 feet above floor.

PART 3 – SCHEDULE (Not Used)

END OF SECTION 400523