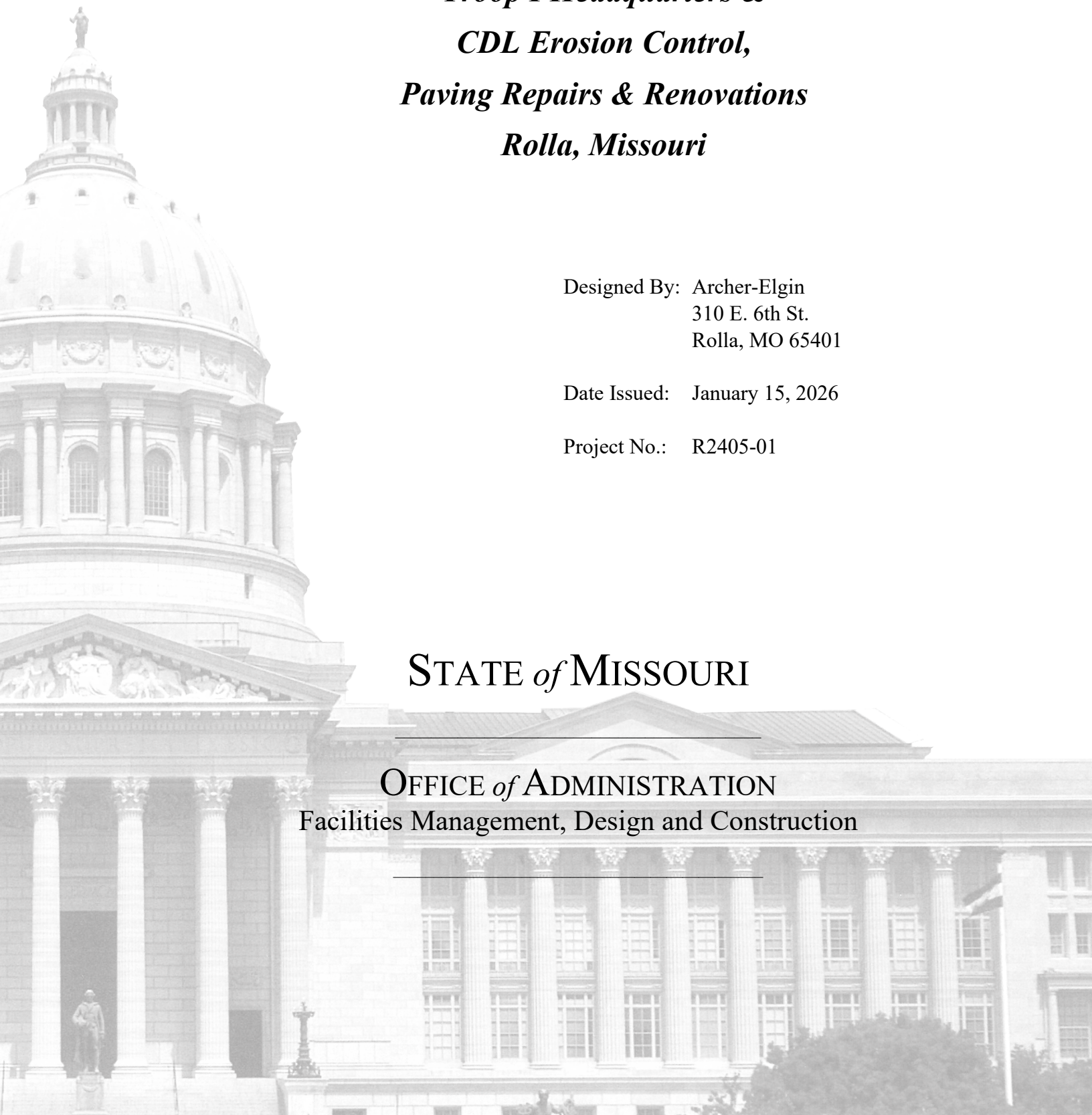
PROJECT MANUAL

Troop I Headquarters &
CDL Erosion Control,
Paving Repairs & Renovations
Rolla, Missouri

Designed By: Archer-Elgin
310 E. 6th St.
Rolla, MO 65401

Date Issued: January 15, 2026

Project No.: R2405-01



STATE *of* MISSOURI

OFFICE *of* ADMINISTRATION
Facilities Management, Design and Construction

SECTION 000107

PROFESSIONAL SEALS AND CERTIFICATIONS

PROJECT NUMBER: (R2405-01 "Troop I Headquarters & CDL Erosion Control, Paving Repairs, and Renovations")

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:

CIVIL **CAMERON SCHWEISS, P.E.** **MO PE-2014017010**	**STRUCTURAL** **STEVEN L. STACK, P.E., S.E.** **MO PE-2009002097**

Cameron J Schweiss, P.E. 2014017010

Steven L. Stack, P.E. 2009002097

ELECTRICAL **TONY WELLNITZ, P.E.** **MO PE-2023000202**	

Tony Wellnitz, P.E. 2023000202

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1. 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

1. 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

	TITLE	SHEET #	DATE	CAD #
1.	Cover Sheet	G-001	1/15/2026	G-100.dwg
2.	Civil General Notes	C-001	1/15/2026	C-001.dwg
3.	Existing Topographic Survey& Demolition Plan	C-100	1/15/2026	C-100.dwg
4.	Pavement Repair Plan	C-101	1/15/2026	C-101.dwg
5.	Site Plan	C-200	1/15/2026	C-200.dwg
6.	Proposed Parking Lot Plan	C-201	1/15/2026	C-201.dwg
7.	Grading Plan	C-300	1/15/2026	C-300.dwg
8.	Storm Profiles	C-301	1/15/2026	C-301.dwg
9.	Civil Details	CD-500	1/15/2026	C-500.dwg
10.	Civil Details	CD-501	1/15/2026	C-501.dwg
11.	Civil Details	CD-502	1/15/2026	C-502.dwg
12.	Structural Notes	S-010	1/15/2026	S-010.dwg
13.	Foundation Plan	S-100	1/15/2026	S-100.dwg
14.	Foundation Details	S-200	1/15/2026	S-200.dwg
15.	Demo Plan & Floor Plan	A-101	1/15/2026	A-101.dwg
16.	Upper Demo Plan & Upper Foor Plan	A-102	1/15/2026	A-102.dwg
17.	Roof Plan	A-103	1/15/2026	A-103.dwg

18.	Demo Elevations & New Elevations	A-104	1/15/2026	A-104.dwg
19.	CDL Building Demo Plan, Floor Plan, & Elevations	A-201	1/15/2026	A-201.dwg
20.	Specifications	A-801	1/15/2026	A-801.dwg
21.	Electrical Site Plan	E-100	1/15/2026	E-100.dwg
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23.	Electrical Schedules	E-102	1/15/2026	E-102.dwg
24.	Photometrics	E-103	1/15/2026	E-103.dwg

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. Troop I Headquarters & CDL Erosion Control, Paving Repairs & Renovations
Troop I Headquarters
Rolla, Missouri
Project No.: R2405-01

3.0 BIDS WILL BE RECEIVED:

A. Until: 1:30 PM, April 23, 2026

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

4.0 DESCRIPTION:

A. Scope: The project includes remediating poor subgrade, repairing existing pavement, and installing new asphalt pavement. Stormwater piping and structures will be improved or replaced as a part of the new pavement improvements. A new covered parking structure and modifications to both the maintenance garage and CDL buildings are also included.

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 AM, April 2, 2026, at Troop I Headquarters, 1301 Nagogami Road, Rolla, MO 65401

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

6.0 HOW TO GET PLANS & SPECIFICATIONS:

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

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

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

7.0 POINT OF CONTACT:

A. Designer: Archer-Elgin, Jack Medows, 573-364-6362, email: jack@cmarcher.com

B. Project Manager: Nathan Graessle, 573-508-6646, email: nathaniel.graessle@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.e-verify.gov/employers/enrolling-in-e-verify. The contractor shall be responsible for ensuring that all subcontractors and suppliers associated with this contract enroll in E-Verify.

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

10.0 - CONTRACT SECURITY

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

11.0 - 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: **Troop I Headquarters & CDL Erosion Control, Paving Repairs & Renovations**
Troop I Headquarters
Rolla, Missouri

Project Number: **R2405-01**

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

ARTICLE 3. LIQUIDATED DAMAGES

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

ARTICLE 4. CONTRACT SUM

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

Base Bid: $

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

TOTAL CONTRACT AMOUNT: ($CONTRACT AMOUNT)

UNIT PRICES: The Owner accepts the following Unit Prices:

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

ARTICLE 5. PREVAILING WAGE RATE

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

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

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

The Contractor has been granted a waiver of the 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. Unit Prices (Section 004322)
        iii. Proposed Contractors Form (Section 004336)
        iv. MBE, WBE, SDVE Compliance Evaluation Form(s) (Section 004337)
        v. MBE, WBE, SDVE Eligibility Determination Form for Joint Ventures (Section 004338)
        vi. MBE, WBE, SDVE Good Faith Effort (GFE) Determination Form (Section 004339)
        vii. Missouri Service Disabled Veteran Business Form (Section 004340)
        viii. Affidavit of Work Authorization (Section 004541)
        ix. 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, home addresses of all workers, occupation and craft, number of hours worked and actual wages paid for each individual employee, of the Contractor and all subcontractors working on the project

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

    c) Certified copies of all payrolls

    d) As-built drawings

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

ARTICLE 6 -- INSURANCE AND BONDS

ARTICLE 6.1 -- BOND

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

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

ARTICLE 6.2 – INSURANCE

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

B. Minimum Scope and Extent of Coverage

1. General Liability

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

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

2. Automobile Liability

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

3. Workers' Compensation and Employer's Liability

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

4. Builder's Risk or Installation Floater Insurance

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

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

C. Minimum Limits of Insurance

1. General Liability

Contractor

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

2. Automobile Liability

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

3. Workers' Compensation and Employers Liability

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

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

D. Deductibles and Self-Insured Retentions

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

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

E. Other Insurance Provisions and Requirements

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

1. General Liability

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

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

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

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

2. Automobile Insurance

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

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

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

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

3. Workers' Compensation/Employer's Liability

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

4. All Coverages

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

F. Insurer Qualifications and Acceptability

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

G. Verification of Insurance Coverage

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

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

ARTICLE 7 – SUSPENSION OR TERMINATION OF CONTRACT

ARTICLE 7.1 - FOR SITE CONDITIONS

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

ARTICLE 7.2 - FOR CAUSE

A. Termination or Suspension for Cause:

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

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

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

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

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

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

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

ARTICLE 7.3 -- FOR CONVENIENCE

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

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

B. Upon receipt of notification, the Contractor shall:

1. Cease operations when directed.

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

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

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

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

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

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

SECTION 007300 - SUPPLEMENTARY CONDITIONS

1.0 GENERAL:

A. These Supplementary General Conditions clarify, add, delete, or otherwise modify standard terms and conditions of DIVISION 0, BIDDING AND CONTRACTING REQUIREMENTS.

2.0 CONTACTS:

Designer:
Jack Medows
Archer-Elgin
310 E. 6th St.
Rolla, MO 65401
Telephone: 573-364-6362
Email: jack@cmarcher.com

Construction Representative:
Jesse Flower
Division of Facilities Management, Design and Construction
301 W. High Street
Jefferson City, MO 65101
Telephone: 573-619-4395
Email: jesse.flower@oa.mo.gov

Project Manager:
Nathan Graessle
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, Missouri 65101
Telephone: 573-508-6646
Email: nathaniel.graessle@oa.mo.gov

Contract Specialist:
April Howser
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, Missouri 65101
Telephone: 573-690-9874
Email: april.howser@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

MIKE KEHOE, Governor

Annual Wage Order No. 32

Section 081
PHELPS COUNTY

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

Original Signed by
Logan Hobbs, Director
Division of Labor Standards

Filed With Secretary of State: **March 10, 2025**

Last Date Objections May Be Filed: **April 9, 2025**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$61.06
Boilermaker	$29.28*
Bricklayer-Stone Mason	$58.85
Carpenter	$65.41
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	$29.28*
Plasterer	
Communication Technician	$59.79
Electrician (Inside Wireman)	$59.57
Electrician Outside Lineman	$29.28*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	$29.28*
Glazier	$29.28*
Ironworker	**$73.95**
Laborer	$48.49
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	$29.28*
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	$69.45
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	$50.50
Plumber	$74.34
Pipe Fitter	
Roofer	$56.10
Sheet Metal Worker	$75.33
Sprinkler Fitter	$69.38
Truck Driver	$29.28*
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.

Heavy Construction Rates for
PHELPS County

Section 081

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	$29.28*
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$29.28*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	$50.92
General Laborer	
Skilled Laborer	
Operating Engineer	$65.88
Group I	
Group II	
Group III	
Group IV	
Truck Driver	$51.88
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

1.01 RELATED DOCUMENTS

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

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The Troop I Headquarters & CDL Erosion Control, Pavement Repairs, & Renovations (Project) shall involve upgrades to the storm drainage, asphalt/concrete pavement, and garage & CDL Inspection building. The project will also include the addition of a new parking lot and a new covered parking structure.

1. Project Location: 1301 Nagogami Rd, Rolla, MO 65401
2. Owner: Missouri State Highway Patrol, PO BOX 128, Rolla, MO 65401

B. Contract Documents, dated **1/15/2025** were prepared for the Project by C.M. Archer Group P.C. dba Archer-Elgin Engineering & Surveying, Located at 310 E. 6th St, Rolla, MO 65401.

C. The Work consists of coordinating, scheduling, incorporating, and providing all equipment, materials and labor necessary to:

1. Remediate poor subgrade, repair existing pavement, and install new asphalt pavement;
2. Install new storm piping and storm structures;
3. Construct a new covered parking structure;
4. Rehabilitate and modify the existing garage building with new siding, overhead doors, man doors, and ventilation;
5. Rehabilitate the existing CDL Inspection Building with new siding;
6. Regrade portions of the site for better surface runoff.

Work shall include, but not be limited to: unclassified excavation, shoring and bracing, dewatering, trenching, bedding, backfill, grading, erosion control, pavement, seeding and mulching; miscellaneous piping, fittings, valving, manholes, vaults, connections to new and existing structures; supply, installation and integration of equipment; temporary electric services, extension of new electric circuits, equipment racks, demolition of existing power circuits; start-up and acceptance testing; site cleanup and restoration; and any incidental items necessary for a complete and functional installation.

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

1.03 WORK SEQUENCE

A. General: Construction sequence shall be in accordance with requirements herein subject to Owner's need for continuous operation of existing facilities:

1. Contractor(s) shall submit a proposed schedule and construction sequence in accordance with the general conditions relating to preliminary matters at the project preconstruction meeting. Contractor shall coordinate with staff when working on the Garage Building rehabilitation to minimize disturbance.

B. Continuous Service of Existing Facilities: Where the Work is on or adjacent to existing facilities, exercise caution and schedule operations to ensure that functioning of present facilities will not be endangered. Shutdown of Owner's operating facilities to perform the Work shall be held to a minimum length of time and shall be coordinated with Owner who shall have control over the timing and schedules of such shutdowns.

C. Completed Areas: Owner intends to place in service, in accordance with the provisions for use of completed Work set forth in the General Conditions, the facilities as soon as they are sufficiently complete and ready for their intended use.

D. Coordination: The Contractor shall be required to provide at least a seventy-two (72) hour notification of the shut down of any facilities necessary for him to perform his work. He shall also provide to the Owner, at least 2-3 weeks in advance, a written plan of work which identifies the stages, length of shutdown time, and other contingency plans for review and approval by the Engineer and Owner.

1.04 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: Allow for Owner occupancy and use by the public.

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.

1.05 OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate owner usage. Perform the Work so as not to interfere with the Owner's operations.

B. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. The Designer will prepare a Certificate of Partial Occupancy for each specific portion of the Work to be occupied prior to substantial completion.

2. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy, the Owner will operate and maintain mechanical and electrical systems serving occupied portions for the building.

3. Upon occupancy, the Owner will assume responsibility for maintenance and custodial service for occupied portions for the building.

1.06 OWNER-FURNISHED PRODUCTS

A. N/A

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

1.01 WORK RESTRICTIONS

A. General: The Contractor shall limit his use of the premises to the work indicated, so as to allow for Owner occupancy and use by the public.

B. Use of the Site: Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project construction.

1. Keep existing driveways and roadways open to traffic at all times. Coordinate open-cut crossings of roads to allow at least one lane of through traffic at all times.

2. At all times fire lanes are to remain unblocked and accessible.

3. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas indicated. If additional storage is necessary, obtain and pay for such storage off-site.

4. Excavation areas cannot be left open when not being worked and must be closed off at the close of business. In lieu of daily backfill, place adequate construction barriers and/or fencing conforming to federal Occupation Safety and Health Administration (OSHA) Regulation 29 CFR, Part 1910, Subpart D, Occupational Safety and Health Standards, General Industry Standards.) around the excavated area.

5. Water service for the facility(ies) shall not be disturbed, and construction shall be staged to afford continuous water service for the facility(ies).

6. Where disruption to water service must occur to make process/utility interconnection, submit a written plan a minimum of 72 hours prior to the commencement of construction documenting construction activities to be performed and the anticipated duration of the outage. Make every effort to minimize interruptions of service. Construction activities may proceed only after the owner’s written approval of the proposed sequencing plan.

7. Lock automotive-type vehicles, such as passenger cars and trucks and other mechanized or motorized equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.

END OF SECTION

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.
2. Division 1 Section "Unit Prices" for procedures for using unit prices.

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

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

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

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

1.4 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, Designer of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Designer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Designer from the designated supplier.

1.5 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

A. Weather Allowance: Included within the completion period for this Project (20) Twenty "bad weather days".

END OF SECTION 012100

SECTION 012200 – UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Quantities of Units to be included in the Base Bid are indicated in Section 004322 – Unit Prices.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Unit Prices.

B. Related Sections include the following:

1. Division 1 Section "Allowances" for procedures for using Unit Prices to adjust quantity allowances.
2. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.3 DEFINITIONS

A. Unit Price is a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

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

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of Unit Prices. Methods of measurement and payment for Unit Prices are specified in those Sections.

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

A. Unit Price No. 1

1. Description: Joint Sealant Repair according to Specification Section 32 13 73 "Concrete Paving Joint Sealants."
2. Unit of Measurement: Linear Feet
3. Base Bid Quantity: 5,000 LF

END OF SECTION 012200

SECTION 012300 - ALTERNATES

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 governing Alternates.

1.3 DEFINITIONS

A. Definition: An alternate is an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents..

1. The cost for each alternate is the net addition to the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.

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

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate the Alternate Work into the Project.

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

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

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

D. Schedule: A “Schedule of Alternates” is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each alternate.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: *Add 18’x10’ Canopy to southernmost overhead door on the Garage Building. This will be a PEMB stand alone structure that includes roofing material and foundations.*

B. Alternate No. 2: *Provide 8" downspout collection piping from Garage building and new covered parking structure. This downspout collection pipe will tie into structure CI-10. Price should include all work associated with installing the downspout collection pipe.*

END OF SECTION 012300

SECTION 012600

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

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

B. Related Sections include the following:

1. Division 1, Section 013115 “Project Management Communications” for administrative requirements for communications.

2. Division 0, Section 007213, Article 4.0 "Changes in the Work" for Change Order requirements.

1.03 REQUESTS FOR INFORMATION

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

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

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

1.04 MINOR CHANGES IN THE WORK

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

1.05 PROPOSAL REQUESTS

A. The Designer or Owner Representative will issue a detailed description of proposed Changes in the Work that may require adjustment to the Contract Amount or the Contract Time. The proposed Change Description will be issued using the “Request for Proposal” (RFP) form. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by the Designer or Owner Representative are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.

2. Within ten (10) working days after receipt of Proposal Request, submit a proposal for the cost adjustments to the Contract Amount and the Contract Time necessary to execute the Change. The Contractor shall submit his proposal on the appropriate Change Order Detailed Breakdown form. Subcontractors may use the appropriate Change Order Detailed Breakdown form or submit their proposal on their letterhead provided the same level of detail is included. All proposals shall include:

a. A detailed breakdown of costs per Article 4.1 of the General Conditions.

b. If requesting additional time per Article 4.2 of the General Conditions, include an updated Contractor's Construction Schedule that indicates the effect of the Change including, but not limited to, changes in activity duration, start and finish times, and activity relationship.

1.06 CHANGE ORDER PROCEDURES

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013100

COORDINATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

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

1. Coordination Drawings.
2. Administrative and supervisory personnel.
3. Project meetings.

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

C. Related Sections include the following:

1. Division 1, Section 013200 "Schedules" for preparing and submitting Contractor's Construction Schedule.
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.

1.03 COORDINATION

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

B. 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.

1.04 SUBMITTALS

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

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

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.05 PROJECT MEETINGS

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

1. Minutes: Designer will record and distribute meeting minutes.

B. Progress Meetings: The Owner’s Construction Representative will conduct Monthly Progress Meetings as stated in Articles 1.8.B and 1.8.C of Section 007213 “General Conditions”.

1. Minutes: Designer will record and distribute to Contractor the meeting minutes.

C. Preinstallation Conferences: Contractor shall conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of Manufacturers and Fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Designer and Construction Representative of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration including requirements for the following:

a. Contract Documents

b. Options

c. Related RFIs

d. Related Change Orders

e. Purchases

f. Deliveries

g. Submittals

h. Review of mockups

i. Possible conflicts

j. Compatibility problems

k. Time schedules

l. Weather limitations

m. Manufacturer's written recommendations

n. Warranty requirements

o. Compatibility of materials

p. Acceptability of substrates

q. Temporary facilities and controls

r. Space and access limitations

s. Regulations of authorities having jurisdiction

t. Testing and inspecting requirements

u. Installation procedures

v. Coordination with other Work

w. Required performance results

x. Protection of adjacent Work

y. Protection of construction and personnel

3. Contractor shall record significant conference discussions, agreements, and disagreements including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

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

6. Revise paragraph below if Project requires holding progress meetings at different intervals. Insert special intervals such as "every third Tuesday" to suit special circumstances.
7. Project name
8. Name and address of Contractor
9. Name and address of Designer
10. RFI number including RFIs that were dropped and not submitted
11. RFI description
12. Date the RFI was submitted
13. Date Designer's response was received
14. Identification of related DSI or Proposal Request, as appropriate

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013115

PROJECT MANAGEMENT COMMUNICATIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

B. Division 1, Section 013300 - Submittals

C. Division 1, Section 012600 – Contract Modification Procedures

1.02 SUMMARY

A. Project Management Communications: The Contractor shall use the Internet web based project management communications tool, E-Builder® ASP software, and protocols included in that software during this project. The use of project management communications as herein described does not replace or change any contractual responsibilities of the participants.

1. Project management communications is available through E-Builder® as provided by "e-Builder®" in the form and manner required by the Owner.

2. The project communications database is on-line and fully functional. User registration, electronic and computer equipment, and Internet connections are the responsibility of each project participant. The sharing of user accounts is prohibited

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

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

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

E. Authorized Users: Access to the web site will be by individuals who are authorized users.

1. Individuals shall complete the E-Builder New Company/User Request Form located at the following web site: https://oa.mo.gov/facilities/vendor-links/contractor-forms. Completed forms shall be emailed to the following email address: OA.FMDCE-BuilderSupport@oa.mo.gov.

2. Authorized users will be contacted directly and assigned a temporary user password.

3. Individuals shall be responsible for the proper use of their passwords and access to data as agents of the company in which they are employed.

F. Administrative Users: Administrative users have access and control of user licenses and all posted items. DO NOT POST PRIVATE OR YOUR COMPANY CONFIDENTIAL ITEMS IN THE DATABASE! Improper or abusive language toward any party or repeated posting of items intended to deceive or disrupt the work of the project will not be tolerated and will

result in deletion of the offensive items and revocation of user license at the sole discretion of the Administrative User(s).

G. Communications: The use of fax, email and courier communication for this project is discouraged in favor of using E-Builder® to send messages. Communication functions are as follows:

1. Document Integrity and Revisions:

   a. Documents, comments, drawings and other records posted to the system shall remain for the project record. The authorship time and date shall be recorded for each document submitted to the system. Submitting a new document or record with a unique ID, authorship, and time stamp shall be the method used to make modifications or corrections.

   b. The system shall make it easy to identify revised or superseded documents and their predecessors.

   c. Server or Client side software enhancements during the life of the project shall not alter or restrict the content of data published by the system. System upgrades shall not affect access to older documents or software.

2. Document Security:

   a. The system shall provide a method for communication of documents. Documents shall allow security group assignment to respect the contractual parties communication except for Administrative Users. DO NOT POST PRIVATE OR YOUR COMPANY CONFIDENTIAL ITEMS IN THE DATABASE!

3. Document Integration:

   a. Documents of various types shall be logically related to one another and discoverable. For example, requests for information, daily field reports, supplemental sketches and photographs shall be capable of reference as related records.

4. Reporting:

   a. The system shall be capable of generating reports for work in progress, and logs for each document type. Summary reports generated by the system shall be available for team members.

5. Notifications and Distribution:

   a. Document distribution to project members shall be accomplished both within the extranet system and via email as appropriate. Project document distribution to parties outside of the project communication system shall be accomplished by secure email of outgoing documents and attachments, readable by a standard email client.

6. Required Document Types:

   a. RFI, Request for Information.
   b. Submittals, including record numbering by drawing and specification section.
   c. Transmittals, including record of documents and materials delivered in hard copy.
   d. Meeting Minutes.
   e. Application for Payments (Draft or Pencil).
   f. Review Comments.
   g. Field Reports.
   h. Construction Photographs.
   i. Drawings.
   j. Supplemental Sketches.

k. Schedules.
l. Specifications.
m. Request for Proposals
n. Designer's Supplemental Instructions
o. Punch Lists

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

1. 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.

2. 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.

3. 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.

[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 not be sufficient 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

SECTION 013200

SCHEDULE – BAR CHART

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

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

PART 2 - PRODUCTS – (Not Applicable)

PART 3 - EXECUTION

3.01 SUBMITTAL PROCEDURES

A. The Contractor shall submit to the Designer, within ten (10) working days following the Notice to Proceed, a Progress Schedule including Schedule of Values showing the rate of progress the Contractor agrees to maintain and the order in which he proposed to carry out the various phases of Work. No payments shall be made to the Contractor until the Progress Schedule has been approved by the Owner.

1. The Schedule of Values must have the following line items included with the value of the item as indicated below:

a. O&M's (Owner's Manual)

1) $1,000,000.00 (One million) and under – 2% of the total contract amount

2) Over $1,000,000.00 (One million) – 1% of the total contract amount

b. Close Out Documents

1) $1,000,000.00 (One million) and under – 2% of the total contract amount

2) Over $1,000,000.00 (One million) – 1% of the total contract amount

c. General Conditions

1) No more than 10%

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

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

3.02 CONSTRUCTION PROGRESS SCHEDULE – BAR CHART SCHEDULE

A. Bar-Chart Schedule: The Contractor shall prepare a comprehensive, fully developed, horizontal bar chart-type Contractor's Construction Schedule. The Contractor for general

construction shall prepare the Construction Schedule for the entire Project. The Schedule shall show the percentage of work to be completed at any time, anticipated monthly payments by Owner, as well as significant dates (such as completion of excavation, concrete foundation work, underground lines, superstructure, rough-ins, enclosure, hanging of fixtures, etc.) which shall serve as check points to determine compliance with the approved Schedule. The Schedule shall also include an activity for the number of "bad" weather days specified in Section 012100 – Allowances.

1. The Contractor shall provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week.

    a. If practical, use the same Schedule of Values breakdown for schedule time bars.

2. The Contractor shall provide a base activity time bar showing duration for each construction activity. Each bar is to indicate start and completion dates for the activity. The Contractor is to place a contrasting bar below each original schedule activity time for indicating actual progress and planned remaining duration for the activity.

3. The Contractor shall prepare the Schedule on a minimal number of separate sheets to readily show the data for the entire construction period.

4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on schedule with other construction activities. Include minor elements involved in the overall sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.

5. Coordinate the Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other required schedules and reports.

6. Indicate the Intent to Award and the Contract Substantial Completion dates on the schedule.

B. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by the following:

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

C. Work Stages: Use crosshatched bars to indicate important stages of construction for each major portion of the Work. Such stages include, but are not necessarily limited to, the following:

1. Subcontract awards
2. Submittals

3. Purchases
4. Mockups
5. Fabrication
6. Sample testing
7. Deliveries
8. Installation
9. Testing
10. Adjusting
11. Curing
12. Startup and placement into final use and operation

D. Area Separations: Provide a separate time bar to identify each major area of construction for each major portion of the Work. For the purposes of this Article, a “major area” is a story of construction, a separate building, or a similar significant construction element.

1. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

a. Revise list below to suit Project.

b. Structural completion.

c. Permanent space enclosure

d. Completion of mechanical installation

e. Completion of the electrical portion of the Work

f. Substantial Completion

3.03 SCHEDULE OF SUBMITTALS

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

B. Prepare the schedule in chronological order. Provide the following information

1. Scheduled date for the first submittal
2. Related Section number
3. Submittal category
4. Name of the Subcontractor
5. Description of the part of the Work covered
6. Scheduled date for resubmittal
7. Scheduled date for the Designer’s final release or approval

C. Distribution: Following the Designer’s response to the initial submittal schedule, print and distribute copies to the Designer, Owner, subcontractors, and other parties required to comply with submittal dates indicated.

1. Post copies in the Project meeting room and temporary field office.
2. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned part of the Work and are no longer involved in construction activities.

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

3.04 SCHEDULE OF INSPECTIONS AND TESTS

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

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

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

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

END OF SECTION

SECTION 013300

SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

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

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for submittals required for performance of the Work including the following:

1. Shop Drawings
2. Product Data
3. Samples
4. Quality Assurance Submittals
5. Construction Photographs
6. Operating and Maintenance Manuals
7. Warranties

B. Administrative Submittals: Refer to General and Supplementary Conditions other applicable Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:

1. Construction Progress Schedule including Schedule of Values
2. Performance and Payment Bonds
3. Insurance Certificates
4. Applications for Payment
5. Certified Payroll Reports
6. Partial and Final Receipt of Payment and Release Forms
7. Affidavit – Compliance with Prevailing Wage Law
8. Record Drawings
9. Notifications, Permits, etc.

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

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

1.03 SUBMITTAL PROCEDURES

A. The Contractor shall comply with the General and Supplementary Conditions and other applicable sections of the Contract Documents. The Contractor shall submit, with such promptness as to cause no delay in his work or in that of any other contractors, all required submittals indicated in Part 3.1 of this section and elsewhere in the Contract Documents. Coordinate preparation and processing of submittals with performance of construction

activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
    a. The Designer reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

B. Each drawing and/or series of drawings submitted must be accompanied by a letter of transmittal giving a list of the titles and numbers of the drawings. Each series shall be numbered consecutively for ready reference and each drawing shall be marked with the following information:

1. Date of Submission
2. Name of Project
3. Location
4. Section Number of Specification
5. State Project Number
6. Name of Submitting Contractor
7. Name of Subcontractor
8. Indicate if Item is submitted as specified or as a substitution

1.04 SHOP DRAWINGS

A. Comply with the General Conditions, Article 3.2.

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

C. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings including the following information:

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

1.05 PRODUCT DATA

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

B. The Contractor shall collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer’s installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information including the following information:

    a. Manufacturer's printed recommendations
    b. Compliance with Trade Association standards
    c. Compliance with recognized Testing Agency standards
    d. Application of Testing Agency labels and seals
    e. Notation of dimensions verified by field measurement
    f. Notation of coordination requirements

2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

1.06 SAMPLES

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

B. The Contractor shall submit full-size, fully fabricated samples, cured and finished as specified, and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.

1. The Contractor shall mount or display samples in the manner to facilitate review of qualities indicated. Prepare samples to match the Designer's sample including the following:

    a. Specification Section number and reference
    b. Generic description of the Sample
    c. Sample source
    d. Product name or name of the Manufacturer
    e. Compliance with recognized standards
    f. Availability and delivery time

2. The Contractor shall submit samples for review of size, kind, color, pattern, and texture. Submit samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

    a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least three (3) multiple units that show approximate limits of the variations.

    b. Refer to other Specification Sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

    c. Refer to other Sections for samples to be returned to the Contractor for incorporation in the Work. Such samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of sample submittals.

    d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.

3. Field samples are full-size examples erected onsite to illustrate finishes, coatings, or finish materials and to establish the Project standard.

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

1.07 QUALITY ASSURANCE DOCUMENTS

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

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

C. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the Manufacturer certifying compliance with specified requirements.

1. Signature: Certification shall be signed by an officer of the Manufacturer or other individual authorized to contractually bind the Company.

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

E. Construction Photographs: The Contractor shall submit record construction photographs as specified in this Section and in other Sections of the Contract Documents.

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

1.08 OPERATING AND MAINTENANCE MANUALS AND WARRANTIES

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

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 REQUIRED SUBMITTALS

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

SPEC SECTION	TITLE	CATEGORY
013100	Coordination	Certification
013100	Coordination	Shop Drawings
013200	Schedules	Construction Schedule
013200	Schedules	Schedule of Values
013200	Schedules	List of Subcontractors
013200	Schedules	Major Material Suppliers
013513	Site Security and Health Requirements	Product Data
013513	Site Security and Health Requirements	Certification
013513	Site Security and Health Requirements	Construction Schedule
131200	Pre-Engineered Buildings	Certification
131200	Pre-Engineered Buildings	Shop Drawings
260519	Low Voltage Electrical Power Conductors and Cables	Product Data
260526	Grounding and Bonding for Electrical Systems	Product Data
260526	Grounding and Bonding for Electrical Systems	Test Report
260533	Raceway and Boxes for Electrical Systems	Product Data
262726	Wiring Devices	Product Data
262816	Enclosed Switches and Circuit Breakers	Product Data
312513	Erosion Control Materials	Materials Lists
312513	Erosion Control Permit Compliance	Certification
321123	Base Courses Materials	Certifications & Shop Drawings
321216	Asphalt Paving Mix Design	Shop Drawings
321216	Asphalt Paving Materials	Certifications
321313	Concrete Paving Mix Designs	Shop Drawings & Certifications
321313	Concrete Paving Joint Sealant	Product Data
323113	Chain Link Fences	Shop Drawings

SPEC SECTION	TITLE	CATEGORY
329219	Seed Planting	Schedule
329219	Seeding Materials	Certifications
334100	Storm Utility Drainage Piping Storm Sewer Pipe Material and Structures	Shop Drawings

END OF SECTION

SECTION 013513.25

SITE SECURITY AND HEALTH REQUIREMENTS (MSHP)

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. A list of the names of all employees who will submit fingerprints for a background check, and the signed privacy documents identified below for each employee.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 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. All construction personnel shall visibly display issued identification cards.

3.2 FIRE PROTECTION, SAFETY, AND HEALTH CONTROLS

A. The Contractor shall take all necessary precautions to guard against and eliminate possible fire hazards.

1. Onsite burning is prohibited.
2. The Contractor shall store all flammable or hazardous materials in proper containers located outside the buildings or offsite, if possible.
3. The Contractor shall provide and maintain, in good order, during construction fire

extinguishers as required by the National Fire Protection Association. In areas of flammable liquids, asphalt, or electrical hazards, 15-pound carbon dioxide or 20-pound dry chemical extinguishers shall be provided.

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

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

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

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

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

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

H. Alcoholic beverages, Marijuana (Cannabis) in any form, or illegal substances shall not be brought upon the Facility premises. The Contractor's workers shall not be under the influence of any intoxicating substances while on the Facility premises.

3.3 MSHP SECURITY CLEARANCE REQUIREMENTS

A. Contractor Background Screening Policy: As a normal business activity, the Missouri State Highway Patrol (MSHP) may contract with external companies to perform various duties for the Missouri State Highway Patrol. Any personnel working for a contractor, and who has access to criminal justice information is required to pass a background check prior to beginning work on the contract. A contractor's proposed candidate may also be required to undergo a MSHP approved drug screening. This background check requirement will be included as part of all PAQs or solicitations for bids. The contract/PAQ award is contingent upon the proposed candidate background checks being completed.

B. This background check will include, but not be limited to, state of residency and national fingerprint-based record checks. If the proposed candidate lives outside the United States, the contractor will submit similar documentation from their respective country. Qualification to work on contract will be based upon the following criteria:

1. A felony conviction or guilty plea will be an automatic disapproval of the candidate.
2. Any conviction whether misdemeanor or felony, involving violence, crimes against children, and all sexual crimes regardless of timeframe will be an automatic disapproval of the candidate.
3. Candidates will be disqualified if it is confirmed there are outstanding arrest warrants for the candidate.

4. Any other misdemeanor convictions and guilty pleas may be considered for automatic disapproval. The State CSO (CJIS Security Officer) has final authority regarding if the nature or severity of the misdemeanor offense(s) does or does not warrant a disqualification.

C. For misdemeanors, consideration will be given to the relationship between the information obtained in the background check and the responsibilities of the position. Time and severity of crime may also be considered as factors in a disqualification. Candidates may submit a written request for waiver through their contracting company if they have been disapproved and wish to contest the decision. The request will need to explain the circumstances of the crime and justification for a waiver.

D. Contractors will be required to undergo a background check at a minimum once every five years. If there is a significant gap between contracts, candidates may be required to undergo a background check before working under a new contract.

E. The CSO or their designee will maintain a list of contractors who have been approved to work at the MSHP.

F. If a candidate goes through a background check with one contractor and then goes to work at a different contractor, the candidate will not be required to undergo a separate background check unless the timeframe exceeds five-year limit.

G. The CSO for the MSHP has the right to approve or disapprove any candidate and has the right to revoke a candidate's approval at any time.

H. The FBI CJIS Security Policy requires the MSHP to conduct background checks on all contractors needing MSHP access.

I. Contractors working on-site and/or need escorted access are required to provide name, date of birth and social security number to enable the MSHP to run a name-based background check prior to their arrival on-site.

1. The FBI CJIS Security Policy requires the Missouri State Highway Patrol to conduct fingerprint background checks on vendors and contractors who require, or may require, virtual and/or unescorted physical access to criminal justice information. Provided are background check instructions managed by the MSHP CJIS Security Audit and Compliance Unit. For further assistance please email securityaudit@mshp.dps.mo.gov or call 573-526-6153 x2622. 1)Fingerprint Submission - register online at www.machs.mo.gov

    a. *Fingerprint instructions attached separately*Payment $43.50 is due at registration*Required fingerprint card information below*
    b. 4-digit Registration Number:-9120
    c. Complete Name
    d. Date of Birth
    e. Social Security Number
    f. ORI: MOMHP2300
    g. OCA Designation: CONTRACTOR
    h. Agency Name: MSHP-SACU

J. Security Awareness Certification - take online at www.cjisonline.com

1. Vendor accounts and Vendor Admin profiles are created by the MSHP SACU, securityaudit@mshp.dps.mo.gov

2. *Vendor Account - Provide company name, mailing address, and phone number of vendor/contractor.
3. *Vendor Admin - Provide name, email address, and phone number you want designated as the Vendor Admin to manage user accounts.

K. Security Addendum Certification - form is attached separately. Signature page may be downloaded to user's account under Certification Details Tab/Documents. If this is not an option, email signature form to securityaudit@mshp.dps.mo.gov.

L. MSHP Required Security Forms - Forms attached separately. Please return signature pages to securityaudit@mshp.dps.mo.gov.

M. The Missouri Central Vendor File: As a normal business activity, Missouri law enforcement agencies may contract with external companies to perform various duties for their agency. Any personnel working for a vendor or contractor, and who has access to criminal justice information, is required to pass a background check prior to beginning work on the contract per FBI CJIS Security Policy. To better streamline this process for vendors and contractors performing work at more than one Missouri law enforcement agency, the Missouri State Highway Patrol has implemented a program to manage these background check files centrally called the Missouri Central Vendor File. This allows contractors to perform fingerprint checks and complete security awareness training requirements one time rather than with each contracting agency. Unless otherwise notified, vendors and contractors who submit background checks using the MSHP Background Check Process will automatically be vetted and added to the MO Central Vendor File. Background results can be provided upon request sent to securityaudit@mshp.dps.mo.gov.

3.4 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.

3.5 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 013513.25

SECTION 014000

QUALITY REQUIREMENTS

Part 1 - GENERAL

1.01. SUMMARY:

A. General: Required inspection and testing services are intended to assist in the determination of probable compliance of the work with requirements specified or indicated. These required services do not relieve the Contractor of responsibility for compliance with these requirements or for compliance with requirements of the contract documents.

B. Definitions: The requirements of this section relate primarily to customized fabrication and installation procedures, not to the production of standard products. Quality control services include inspections and tests and related actions including reports, performed by independent agencies and governing authorities, as well as directly by the Contractor. These services do not include Contract enforcement activities performed directly by the Engineer.

1. Specific quality control requirements for individual units of work are specified in the sections of these specifications that specify the individual element of the work. These requirements, including inspections and tests, cover both production of standard products and fabrication of customized work. These requirements also cover quality control of the installation procedures.

2. Inspections, tests and related actions specified in this section and elsewhere in the Contract Documents are not intended to limit the Contractor's own quality control procedures which facilitate overall compliance with requirements of the Contract Documents.

3. Requirements for the Contractor to provide quality control services as required by the Engineer, the Owner, governing authorities or other authorized entities are not limited by the provisions of this section.

1.02. RESPONSIBILITIES:

A. Contractor Responsibilities: Except where they are to be provided by another identified entity, inspections, tests and similar quality control services are the Contractor's responsibility; these services also include those specified to be performed by an independent agency and not directly by the Contractor. Costs for these services shall be included in the Contract Price. The Contractor shall employ and pay an independent agency, testing laboratory, or other qualified firm to perform quality control services specified.

B. Retest Responsibility: Where results of required inspections, tests of similar services prove unsatisfactory and do not indicate compliance of related work with the requirements of the Contract Documents, then retests are the responsibility of the Contractor, regardless of whether the original test was the Contractor's responsibility. Retesting of work revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on the original work.

C. Responsibility for Associated Services. The Contractor is required to cooperate with the independent agencies performing required inspections, tests, and similar services. Provide such auxiliary services as are reasonably requested. Notify the testing agency sufficiently in

advance of operations to permit assignment of personnel. These auxiliary services include but are not necessarily limited to the following:

1. Providing access to the work.
2. Taking samples or assistance with taking samples.
3. Delivery of samples to test laboratories.
4. Security and protection of samples and test equipment at the project site.

D. Coordination: The Contractor and each independent agency engaged to perform inspections, tests and similar services for the project shall coordinate the sequence of their activities so as to accommodate required services with a minimum of delay in the progress of the work. In addition, the Contractor and each independent testing agency shall coordinate their work so as to avoid the necessity of removing and replacing work to accommodate inspections and tests. The Contractor is responsible for scheduling times for inspections, tests, taking of samples and similar activities.

1.03. QUALITY ASSURANCE:

A. Qualifications for Service Agencies: Except as otherwise indicated, engage inspection and test service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories and which are recognized in the industry as specialized in the types of inspections and tests to be performed.

1.04. SUBMITTALS:

A. General: Submit a certified written report of each inspection, test, or similar service, directly to the Engineer in triplicate. If Contractor is responsible for the service, submit a certified written report of each inspection, test, or similar service through the Contractor, in duplicate.

Qualifications statement for service agencies demonstration conformance to abovementioned requirements.

1. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to, the following:
    a. Name of testing agency or test laboratory.
    b. Dates and locations of samples and tests or inspections.
    c. Names of individuals making the inspection or test.
    d. Designation of the work and test method.
    e. Complete inspection or test data.
    f. Test results.
    g. Interpretations of test results.
    h. Notation of significant ambient conditions at the time of sample-taking and testing.
    i. Comments or professional opinion as to whether inspected or tested work complies with requirements of the Contract Documents.

j. Recommendations on retesting, if applicable.

1.05. SERVICES WITH EQUIPMENT AND MATERIALS FURNISHED UNDER THIS CONTRACT:

A. Contractor shall furnish the services of qualified field personnel from the manufacturers and suppliers of equipment and materials furnished and installed under this Contract, as required to perform all manufacturer's field services called for in the Specifications.

B. He shall perform no work related to the installation or operation of equipment or materials furnished and installed under this Contract without direct observation and guidance of the supplier's or manufacturer's field personnel (where such service is specified) unless Engineer concurs otherwise.

C. The supplier's or manufacturer's field personnel shall perform the following:

1. Observe the erection, installation, start-up, and testing of equipment.
2. Instruct and guide Contractor in proper procedures.
3. Supervise pre-operational testing, start-up, and final operational check, and any required adjustments of equipment.
4. Instruct Owner's designated personnel in proper operation and maintenance of all equipment.

D. All supplier's and manufacturer's field personnel are to advise Engineer of their arrival at the site and furnish to him a written report covering all Work done at least once each week and when completed.

1.06. PLACING EQUIPMENT IN OPERATION:

A. Contractor shall place all equipment and materials installed under this Contract into successful operation according to instructions of the supplier or manufacturer, including making of all required adjustments, tests, operation checks, and the following:

1. Cleaning, sounding, blowing-out, flushing of lubricating oil and water systems and other pipelines.
2. Lubrication (lubricants supplied by Contractor unless specified to be furnished by Owner or others).
3. Tests of lubrication system safety interlocks and system performance.
4. Final alignment checks and measurements made under observation of Engineer and Owner. Alignment checks shall include opening connections if required to ensure there are no abnormal stresses on equipment from pipes, ducts, or other attachments. Alignment shall be within tolerances specified by the manufacturer, and measurements shall be recorded and furnished to Engineer.
5. Motor rotation checks before connecting couplings.
6. Inspection of sleeve bearings for adequate contact. Include scraping bearings for at least 80-percent contact and demonstrating contact area to Owner and Engineer before final assembly of bearing caps.

7. Checking of anchor-bolt tensions, grout, and shims. Anchor bolts shall be tightened with calibrated torque wrenches using care not to over-stress bolts.

B. After run-in and acceptance of alignment, major equipment shall be affixed in place using standard tapered dowels with jack-out nuts at head end to facilitate removal.

C. All above operations shall be recorded on forms furnished by Engineer.

D.

E. All necessary attendants and personnel shall be furnished as part of the work to accomplish the above operations until such time as individual items, systems, equipment, or sections of the plant are acceptable for operation by Owner.

F. Contractor shall provide attendants on continuous basis as required to complete events.

G. Contractor will provide fuel, electricity, water, and lubricants for placing equipment in operation.

1.07. PERFORMANCE TESTS:

A. Equipment and Materials Furnished under this Contract:

1. Refer to technical specification sections for acceptance testing requirements.

2. No tests will be conducted on equipment or materials for which manufacturer's field service is specified unless manufacturer's Field Representative is present and declares in writing that the equipment and materials are ready for such test.

3. Contractor will be notified so that he can have a representative, or manufacturer's representative, present during any tests of equipment or materials for which manufacturer's field service is not specified.

4. The tests will be made as set forth in the Specifications unless the interested parties mutually agree upon some other manner of testing.

Part 2 - PRODUCTS (Not Applicable).

Part 3 - EXECUTION

1.08. REPAIR AND PROTECTION:

A. General: Upon completion of inspection, testing, sample-taking, and similar services performed on the work, repair damaged work. Protect work exposed by or for quality control service activities, and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION

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. Water service and distribution
2. Temporary electric power and light
3. Temporary heat
4. Ventilation
5. Telephone service
6. Sanitary facilities, including drinking water
7. Storm and sanitary sewer

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

1. Field offices and storage sheds
2. Temporary roads and paving
3. Dewatering facilities and drains
4. Temporary enclosures
5. Hoists and temporary elevator use
6. Temporary project identification signs and bulletin boards
7. Waste disposal services
8. Rodent and pest control
9. Construction aids and miscellaneous services and facilities

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

1. Temporary fire protection
2. Barricades, warning signs, and lights
3. Sidewalk bridge or enclosure fence for the site
4. Environmental protection

1.3 SUBMITTALS

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

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

1.4 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

B. Standards: Comply with NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations”. ANSI A10 Series standards for “Safety Requirements for Construction and Demolition”, and NECA Electrical Design Library “Temporary Electrical Facilities”.

1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 “National Electric Code”.

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

1.5 PROJECT CONDITIONS

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

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

PART 2 - PRODUCTS

2.1 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.

B. Lumber and Plywood: Comply with requirements in Division 6 Section “Rough Carpentry”.

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

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

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

E. Paint: Comply with requirements of Division 9 Section “Painting”.

1. For job-built temporary offices, shops, sheds, fences, and other exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.

2. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.

3. For interior walls of temporary offices, provide two (2) quarts interior latex-flat wall paint.

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

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

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

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

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

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

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

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

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

H. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated re-circulation, or combustion type. Provide units properly vented and

fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

I. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers, or a combination of extinguishers of NFPA-recommended classes for the exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 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 Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

1. Sterilization: Sterilize temporary water piping prior to use.

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

D. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear.

1. Install electric power service underground, except where overhead service must be used.

2. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125V, AC 20ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

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

F. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching.

1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

G. Temporary Heating: Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

1. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP gas or fuel-oil heaters with individual space thermostatic control.

2. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.

H. Temporary Heating and Cooling: The normal heating and/or cooling system of the building shall be maintained in operation during the construction. Should the Contractor find it necessary to interrupt the normal HVAC service to spaces, which have not been vacated for construction, such interruptions shall be pre-scheduled with the Construction Representative.

I. 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.

J. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a health and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

1. Provide paper towels or similar disposable materials for each facility.

2. Provide covered waste containers for used material.

3. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

4. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45°F to 55°F (7°C to 13°C).

K. 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. Field Offices: Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip office as follows:

1. Furnish with a desk and chairs, a 4-drawer file cabinet, plan table, plan rack, and a 6-shelf bookcase.

C. Storage Facilities: The Owner will provide storage onsite as designated by the Facility Representative or the Construction Representative. Areas for use by the Contractor for storage will be identified at the Pre-Bid Meeting.

D. Temporary Paving: Construct and maintain temporary roads and paving to support the indicated loading adequately and to withstand exposure to traffic during the construction period. Locate temporary paving for roads, storage areas, and parking where the same permanent facilities will be located. Review proposed modifications to permanent paving with the Designer.

1. Paving: Comply with Division 2 Section “Hot-Mixed Asphalt Paving” for construction and maintenance of temporary paving.

2. Coordinate temporary paving development with subgrade grading, compaction, installation and stabilization of subbase, and installation of base and finish courses of permanent paving.

3. Install temporary paving to minimize the need to rework the installations and to result in permanent roads and paved areas without damage or deterioration when occupied by the Owner.

4. Delay installation of the final course of permanent asphalt concrete paving until immediately before Substantial Completion. Coordinate with weather conditions to avoid unsatisfactory results.

5. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration, and supervision.

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

F. 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.

G. Project Identification and Temporary Signs: Prepare project identification and other signs of size indicated. 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.

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

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

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

B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonable predictable and controllable fire losses. Comply with NFPA 10 “Standard for Portable Fire Extinguishers” and NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations”.

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one (1) extinguisher on each floor at or near each usable stairwell.

2. Store combustible materials in containers in fire-safe locations.

3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.

4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

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

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.

D. 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.

3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:

   a. Replace air filters and clean inside of ductwork and housing.

   b. Replace significantly worn parts and parts subject to unusual operating conditions.

   c. Replace lamps burned out or noticeably dimmed by hours of use.

END OF SECTION 015000

SECTION 017400

CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

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

B. Environmental Requirements: Conduct cleaning and waste-disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.

1. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

2. Burning or burying of debris, rubbish, or other waste material on the premises is not permitted.

PART 2 - PRODUCTS

2.01 MATERIALS

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

PART 3 - EXECUTION

3.01 PROGRESS CLEANING

A. General

1. Retain all stored items in an orderly arrangement allowing maximum access, not impending drainage or traffic, and providing the required protection of materials.

2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this Work.

3. At least once each week, and more often if necessary, completely remove all scrap, debris, and waste material from the jobsite.

4. Provide adequate storage for all items awaiting removal from the jobsite, observing all requirements for fire protection and protection of the ecology.

B. Site

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

2. Weekly, inspect all arrangements of materials stored onsite. Re-stack, tidy, or otherwise service all material arrangements.

3. Maintain the site in a neat and orderly condition at all times.

C. Structures

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

2. Weekly, sweep all interior spaces clean. “Clean” for the purposes of this paragraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and handheld broom.

3. In preparation for installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.

4. Following the installation of finish floor materials, clean the finish floor daily while work is being performed in the space in which finish materials have been installed. “Clean” for the purposes of this subparagraph, shall be interpreted as meaning free from all foreign material which, in the opinion of the Construction Representative, may be injurious to the finish of the finish floor material.

3.02 FINAL CLEANING

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

B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for the entire Project or a portion of the Project.

1. Clean the Project Site, yard and grounds, in areas disturbed by construction activities including landscape development areas, of rubbish, waste material, litter, and foreign substances.

2. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

3. Remove petrochemical spills, stains, and other foreign deposits.

4. Remove tools, construction equipment, machinery, and surplus material from the site.

5. Remove snow and ice to provide safe access to the building.

6. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

7. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

8. Broom clean concrete floors in unoccupied spaces.

9. Vacuum clean carpet and similar soft surfaces removing debris and excess nap. Shampoo, if required.

10. Clean transparent material, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

11. Remove labels that are not permanent labels.

12. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

    a. Do not paint over “UL” and similar labels, including mechanical and electrical nameplates.

13. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

14. Clean plumbing fixtures to a sanitary condition free of stains, including stains resulting from water exposure.

15. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

16. Clean ducts, blowers, and coils if units were operated without filters during construction

17. Clean food-service equipment to a sanitary condition, ready and acceptable for its intended use.

18. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures.

19. Leave the Project clean and ready for occupancy.

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

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

E. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of lawfully.

F. Where extra materials of value remain after Final Acceptance by the Owner, they become the Owner’s property.

END OF SECTION

SECTION 030001

CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Concrete and Materials.
2. Reinforcing.
3. Form Work.
4. Grouts.
5. Related Chemicals and Compounds.
6. Moisture Barriers and Stops.
7. Concrete Anchors.

1.02 SUBMITTALS

A. Product Data: Submit data for proprietary materials and items including reinforcement and forming accessories, admixtures, patching compounds, water stops, joint systems, curing compounds, grouts, sealants and finishing compounds.

B. Test Report and Mill Certifications.

C. Shop Drawings, Reinforcement: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bend bars, arrangement of concrete reinforcement. Include special reinforcement required and openings through concrete structures.

D. Concrete mix design for each mix used with aggregate gradation information.

1.03 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the latest editions of the following codes, specifications and standards, except where more stringent requirements are shown or specified:

1. American Society for Testing and Materials (ASTM):
   - C31 - Making and Curing Concrete Test Specimens in the Field
   - C33 - Concrete Aggregates
   - C39 - Compressive Strength of Cylindrical Concrete Specimens
   - C40 - Organic Impurities in Sands for Concrete
   - C42 - Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
   - C88 - Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
   - C94 - Ready-Mixed Concrete
   - C143 - Slump of Portland Cement Concrete

C150 - Portland Cement
C172 - Sampling Fresh Concrete
C192 - Making and Curing Concrete Test Specimens in the Laboratory
C231 - Test for Air Content of Freshly Mixed Concrete by the Pressure Method
C233 - Testing Air-Entraining Admixtures for Concrete
C260 - Air-Entraining Admixtures for Concrete
C309 - Liquid Membrane-Forming Compounds for Curing Concrete
C311 - Sampling and Testing Fly Ash or Natural Pozzolans for Use as Mineral Admixtures in Portland Cement Concrete
C494 - Chemical Admixtures for Concrete
C595 - Blended Hydraulic Cements
C1240 - Silica Fume for Use in Hydraulic-Cement Concrete and Mortar
A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C618 - Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

2. American Concrete Institute (ACI):
211.1 - Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete
301 - Specifications for Structural Concrete Buildings
304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
305 - Committee Report on Hot-Weather Concreting
306 - Committee Report on Cold-Weather Concreting
309 - Recommended Practice for Consolidation of Concrete
318 - Building Code Requirements for Reinforced Concrete

3. Concrete Reinforcing Steel Institute:

Manual of Standard Practice (CRSI).

PART 2 - PRODUCTS

2.01 FORM MATERIALS

A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed faced plywood or other acceptable panel-type materials, to provide continuous straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on the drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

C. Form Coatings: Provide commercial formulation form-coating compounds that will neither bond with, stain nor adversely affect (cause injury to) concrete surfaces, and will not impair subsequent treatments of concrete surfaces. Clean forms of sawdust, dust, dirt, and other foreign materials.

D. Form Ties: Break-back, coil, or screw-type, except where otherwise specified. Water seal coil type in walls below grade and walls of water-bearing structures. Coil type shall leave conical depression in concrete. Space ties as required against pressure of fresh concrete.

E. Chamfer Strips: 3/4" chamfer except where otherwise indicated. Place in all forms to provide chamfer where concrete will have exposed projecting corners or exposed projecting edges, or both.

2.02 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed except as otherwise specified. Column ties and stirrups of any size shall conform to ASTM A 615, Grade 60, unless otherwise indicated.

Fabrication of Reinforcing Bars: Fabricate with cold bends conforming to the recommended dimensions shown in ACI 318. Field fabrication will be allowed only if the Contractor has equipment to properly fabricate steel. Attach metal or plastic tags with identifying mark corresponding to mark number on drawing.

B. Steel Wire: ASTM A 82, plain, cold-drawn, steel.

C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

D. Welded Deformed Steel Wire Fabric: ASTM A 497.

E. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications, unless otherwise specified. Metal accessories shall be plastic coated (CRSI, Class 1) or stainless steel protected (CRSI, Class 2) where legs will be exposed in finished concrete surfaces. Do not use rocks, broken bricks, wood blocks, concrete fragments, or reinforcing bars driven into the ground for support of steel reinforcement.

For slabs on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs. Precast concrete block bar supports may be used. Blocks shall be made with a minimum of 9 sacks of cement per cubic yard and have a minimum compressive strength of 3000 psi in 7 days. Each block shall have a minimum of 9 square inches of bearing area. Space as required by the particular condition of weight, bearing surface and rigidity of the steel reinforcement.

2.03 CONCRETE MATERIALS

A. General:

1. Silica fume pozzolans will be allowed.
2. Fly Ash:
    a. Class "C" and "F" fly ashes shall conform to ASTM C618, Table 1 and 2.

b. Fly ash, if used, shall be at least 15 percent and no more than 25 percent of the total cementitious material, cement plus fly ash.

3. Ground granulated blast-furnace slag:

a. Slag conforming to ASTM C989 may be included in mix designs with all cement types. Slag, if used, shall be at least 25 percent and no more than 50 percent of the total cementitious material, cement plus slag.

b. Slag shall not be combined with fly ash in the same mix.

B. Portland Cement:

1. ASTM C150 Type I/II, IP, II, or IL cement shall be used on the following structures:

a. All concrete for this project

2. The Portland Cement product of only one mill or any one brand shall be used on the project.

C. Aggregates: Coarse and fine aggregates conforming to ASTM C 33 shall be separately furnished and stored. Pit run or naturally mixed aggregates will not be accepted, nor will mixing of aggregates from different sources or alternating batches of different aggregates in one stockpile be permitted.

D. Fine Aggregate: Conform to ASTM C33 except deleterious substances shall not exceed (by weight) 0.25 percent for clay lumps, 2.0 percent for material finer than No. 200 sieve, 0.25 percent for coal and lignite, and 0.25 percent for all other deleterious materials. Maintain fine aggregate free of ice and frozen lumps.

E. Coarse Aggregate: Conform to ASTM C33 except that deleterious substances shall not exceed the maximum allowed in ASTM C33 for Class 4S coarse aggregates.

Flat particles with maximum particle dimensions of 2-1/2 times the average thickness shall not exceed 5.0 percent. Blast furnace slag will not be permitted. Maintain coarse aggregate free of ice and frozen lumps. Grading requirements shall be ASTM C33 size Number 57 (1" to No. 4) for all concrete unless approved in writing by the Engineer.

F. Mixing Water: Drinkable and free from foreign materials in amounts harmful to concrete and embedded steel, shall be acceptable without testing. Expense of testing water shall be paid by Contractor.

G. Air-Entraining Admixtures: Conform to ASTM C260 and manufacturer's recommendations for use. Testing of air-entraining admixtures shall conform to ASTM C233. Obtain manufacturer’s recommendations for coordinating dosage with superplasticizer.

H. Water-Reducing Admixtures: Conform to ASTM C494, Type A; contain not more than 0.1 percent chloride ions and conform to manufacturer's recommendations for use. Technical assistance of the manufacturer's field representative shall be furnished upon request.

I. High-Range Water-Reducing Admixtures (Super Plasticizer): ASTM C494, Type F or Type G, containing not more than 0.1 percent chloride ions. Super plasticizer used to raise slump above the initial slump shall be applied to the mix at the site.

J. Water-Reducing, Non-Chloride Accelerator Admixture: ASTM C494, Type E, and containing not more than 0.1 percent chloride ions.

K. Water-Reducing, Retarding Admixtures: ASTM C494, Type D, containing not more than 0.1 percent chloride ions.

L. Certification: Provide admixture manufacturer's written certification that chloride ion content complies with specified requirements.

Calcium chloride or admixtures containing more than 0.1 percent chloride ions are not permitted.

M. Technical assistance of admixture manufacturer's field representative shall be furnished on request.

2.04 RELATED MATERIALS

A. Waterstops: Provide centerbulb-type waterstops at all construction joints below grade and all construction joints in water retaining structures unless otherwise indicated. Unless the drawings show otherwise, use polyvinyl chloride water stop #705 or #724 as manufactured by Greenstreak Plastic Products, or approved equal. Waterstop shall conform to Corps of Engineers CRD-C 572.

B. Moisture Barrier: Provide 6 mil polyethylene moisture barrier cover where indicated on drawings. Moisture barrier shall not be used in locations other than those indicated on the drawings.

C. Smooth Dowel Bars and Caps: Smooth dowel bars shall be 3/4" 0/ A36 smooth bars with no deformations at the ends. Dowel bars shall be fitted with caps at each end to provide for 1" minimum movement.

D. Expansion Joint Material: Non-extruding (PVC) closed cell foam expansion joint filler conforming to ASTM D-1667, thickness as shown on the drawings. Use Sonneborn Vinylfoam, or approved equal.

E. Plain Grout: One part portland cement to 2 parts sand by volume. Keep water to a minimum as required for placing by the dry packing method. Place after the mixed grout has been allowed to stand for 2 hours. The sand and cement shall be as specified for concrete.

F. Nonshrink Grout: CRD-C 621, factory pre-mixed grout. Required for setting handrail posts, for setting equipment recommended by the manufacturer to be set with nonshrink grout, and in other places indicated. Grout shall be non-metallic, as manufactured by one of the following:

1. Sika Grout, Sika Corporation
2. Crystex, L and M Construction Chemicals, Inc.
3. Five Star Grout, Five Star Products, Inc.
4. Masterflow 713 Grout, Master Builder's Company.
5. Saurereisen F-100, Saurereisen Cements Company.
6. Supreme Grout, Gifford-Hill & Company.
7. Or approved equal.

Prepare and place conforming to manufacturer's printed instructions.

G. Grout for Bonding: One part cement to 1-1/2 parts sand by weight. Keep water to a minimum. Apply immediately prior to concrete placement.

H. Chemical Hardener: Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 pounds of fluosilicates per gallon.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Surfhard; Euclid Chemical Co.

b. Lapidolith; Sonneborn-Contech.

c. Saniseal; Master Builders.

d. Burk-O-Lith; The Burke Co.

e. Or approved equal.

2. Moisture-Retaining Cover: One of the following, complying with ASTM C171:

a. Waterproof paper.

b. Polyethylene film.

c. Polyethylene-coated burlap.

I. Liquid Membrane Forming Curing Compound: Liquid membrane forming compound conforming to ASTM C309, Type 1. ASTM C309, Type 2, shall be used as specified for Hot Weather Concreting. Curing compound used on floors to be painted, tiled or covered with resilient floor covering shall be guaranteed not to interfere with application of paint, tile mortar, or tile adhesive after a 28-day curing period.

J. Concrete Anchors:

1. All anchors not cast in place shall be polyester resin or amine epoxy adhesive type.

2. Bolts to conform to ASTM A167, type 304 stainless steel.

3. Install in strict conformance with manufacturer's printed instructions. Furnish sizes and embedments indicated, or as directed by Engineer.

4. Furnish anchors manufactured by one of the following:

a. Simpson Strong-Tie.

b. Hilti Inc.

c. ITW Redhead

5. Concrete anchors shall not be substituted for indicated cast-in-place anchor bolts without prior written authorization by the Engineer for each specific anchor group or location.

2.05 LABORATORY TESTING OF MATERIALS FOR USE IN CONCRETE

A. An approved independent testing laboratory shall be selected and paid by the Contractor to perform all required laboratory tests of materials proposed for use in the production of concrete and to determine mix proportions when laboratory trial batches are required. The laboratory shall report the results of the testing and mix designs as follows:

1. Engineer, Home Office (1 copy).

2. Resident Project Representative, Field Office (1 copy).

3. Contractor (copies as required).

4. Concrete supplier (copies as required).

All laboratory test results shall be submitted to the Engineer for approval no less than 30 days prior to the proposed date of construction.

B. Contractor shall deliver representative samples of all proposed concrete materials to the laboratory for the following testing:

1. Fine aggregate: to be tested according to ASTM C33, ASTM C40, and ASTM C88.

2. Coarse aggregate: to be tested according to ASTM C33 and ASTM C88.

3. Mixing water, if other than potable water is proposed for use and, in the opinion of the Engineer, there is reason to suspect its acceptability, then using the design mix, the laboratory shall make 2 concrete test cylinders using proposed water and 2 concrete test cylinders using potable water conforming to ASTM C192. All cylinders shall be tested conforming to ASTM C39. Age of cylinders at test shall be 28 days unless an earlier age is authorized.

4. Air-entraining admixture shall be tested conforming to ASTM C233.

2.06 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for all concrete (unless otherwise specified) on the basis of field experience; but in the case where sufficient or suitable strength test data is not available, concrete shall be proportioned on the basis of laboratory trial mix design as specified in ACI 301.

B. Concrete Qualities Required: Design mixes to provide normal weight concrete with the following properties:

1. Minimum 28-day compressive strength = 4000 psi for all construction unless otherwise indicated.

2. Initial slump of concrete shall be 3 inches plus or minus 1 inch. Higher final slumps are acceptable where an approved super plasticizer is used.

3. Air content shall be between 5 to 7 percent.

Concrete shall be homogeneous, readily placeable and uniformly workable, proportioned to conform to ACI 211.1.

C. Cement Content: Each cubic yard of concrete shall contain not less than the quantity of cement stated below:

ASTM C33 Coarse Aggregate Size Number	Minimum Cement Per Cubic Yard
#57 (1" to #4)	540 Lbs.
#67 (3/4" to #4)	560 Lbs.
#7 (1/2" to #4)	600 Lbs.

The water content of the concrete mix shall be calculated by the ratio (by weight) of water to cement("W/C Ratio"). The weight of water shall be the total water in the mix, including free

moisture in the aggregate. The W/C ratio shall not exceed 0.38 for concrete in all portions of any structure which contains or conveys water or sewage. The W/C ratio shall not exceed 0.45 for all other concrete.

If the W/C ratio specified herein along with the use of an ASTM C494 Type A water reducer does not supply the specified initial slump or sufficient workability, then an approved high-range water-reducing admixture may be used. Under no circumstances shall water be added which adjusts the slump beyond the specified initial slump, or which exceeds the specified W/C ratio.

For cast-in-place concrete only, a maximum of 25 percent by weight of Portland cement content per cubic yard may be replaced with fly ash at a rate of 1 LB fly ash for 1 LB cement.

If fly ash is used, the water to fly ash plus cement ratio shall not exceed the maximum water cement ratio specified in this specification section.

D. Super Plasticizer: An approved super plasticizer shall be incorporated in the 0.38 W/C ratio mix design for formed portions of structures, including walls and columns.

E. Mix Design:

1. Field experience using test results within the preceding 90 days with the materials and plant to be employed may be the basis of mix proportions provided that not less than 30 consecutive satisfactory compressive strength tests on concrete using the proposed Portland cement and other materials with a similar mix are available. A compressive strength test is defined as the average 28-day compressive strength of 2 companion cylinders made conforming to ASTM C172 and ASTM C31 and tested conforming to ASTM C39. The standard deviation of such tests shall be computed as a basis for design of the mix. The design average strength shall exceed the specified strength in accordance with the following formulae:

    a. When standard deviation is greater than 500 psi, Design Average Strength = Specified Minimum Strength - 500 + 2.326 x Standard Deviation.

    b. When standard deviation is less than 500 psi, Design Average Strength = Specified Minimum Strength + 1.343 x Standard Deviation.

    c. Submit previous test data, calculated standard deviation, and the proposed mix proportions to Engineer for approval prior to placing concrete.

2. When laboratory trial batches are used as a basis for determining mix proportions, all such work shall be performed by the laboratory as specified in the part "Laboratory Testing of Materials for Use in Concrete."

    a. Laboratory trial batches shall be used to establish a water-cement ratio compression strength curve with at least 3 points, each representing the strength of a separate trial batch. At least 1 point shall be above and 1 below the strength required. Each point on the curve shall represent the average of at least 3 specimens tested at 28 days or an earlier age when approved by Engineer. The slump and air content shall be the maximum limits specified in this part, "Concrete Qualities Required."

    b. A point on the water-cement ratio compressive strength curve shall be selected that will provide an average strength at least 1200 psi greater than the specified minimum strength.

    c. Laboratory reports establishing mix proportions shall be sent to Engineer, and his approval obtained prior to placing all concrete.

F. Measurement of materials shall conform to ACI 304. Measure materials within 1 percent by weight for aggregates and cement, and within 1-1/2 percent by volume or by weight for water.

G. Mixing and delivery shall conform to ACI 304. Cement temperature when added to mix shall not exceed 170°F. Batch Plant Mixer shall conform to Mixer Manufacturers Bureau Concrete Mixer Standards, AGC, adequate to handle 1 or more full-sack batches. Charge with 5 percent to 10 percent of the mixing water both in advance and after the addition of aggregates and cement. Charge with remaining water uniformly with the other materials. Avoid charging in excess of manufacturer's rating. Discharge mixed concrete completely prior to recharging. The mixing time shall start immediately when all ingredients except the last of the water are in the mixer. Minimum mixing time shall conform with mixer manufacturer's instructions, but not be less than the following:

Capacity of Mixer Cubic Yards	Minimum of Time of Mixing Minutes
1 or less	1 minute
2	1 minute, 15 seconds
3	1 minute, 30 seconds
4	1 minute, 45 seconds
5	2 minutes
6	2 minutes, 15 seconds

Add 15 seconds of mixing time for each additional cubic yard of concrete.

H. Mixing of concrete at the plant off the jobsite requires a central mixer or truck mixer. Transport in a truck mixer turning at agitation speeds only. Water added to concrete having a slump below the specified minimum shall be at Contractor's risk. If the water added produces a slump greater than the specified maximum, the concrete will be rejected. If water is added, the concrete shall be remixed for a minimum of 25 revolutions. Truck mixer shall conform to "Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers Bureau," of the National Ready-Mix Concrete Association. Ready-mixed concrete shall be produced and delivered conforming to ASTM C94 as applicable. Contractor shall furnish Owner with a concrete delivery ticket for each load of concrete. The ticket shall have the following information recorded:

1. Batch plant name and ticket number.
2. Mix number.
3. Time batched.
4. Time arrived on jobsite.
5. Amount of concrete (by volume).
6. Quantities of materials batched (by weight).
7. Amount of water added at jobsite by Contractor.

PART 3 - EXECUTION

3.01 FORMS

A. Design, erect, support, brace and maintain formwork to conform to ACI 318 and ACI 347. Adequately brace, stiffen and support forms to prevent perceptible deflection or settlement,

and to hold plumb or level and true to line. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position. Construct sufficiently tight to prevent mortar leakage. Avoid offsets between adjacent forms and construct so that shores, braces and stiffening members are in line with those below. Use wales, strongbacks, shores and bracing as required. Provide for openings, offsets, sinkages, keyways, recesses, moldings, restrictions, reglets, chamfers, blocking, screeds, buldheads, anchorages and inserts, and other features required for the work.

B. Design, fabricate and construct formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.

C. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Locate temporary openings on forms at inconspicuous locations.

D. Chamfer all exposed corners and edges of concrete structures, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

E. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retightening forms and bracing after concrete placement to eliminate mortar leaks and maintain proper alignment.

3.02 REMOVAL OF FORMS

A. No shores, bracing, supports or other formwork shall be loosened or removed until the concrete members supported thereby have acquired sufficient strength to safely support their own weight and any other possible loads. The minimum time between concrete placement and form removal shall be determined either by field-cured test specimens or in accordance with the time specified for the member involved. If the Contractor elects to determine the required time by means of test specimens, all costs in connection therewith shall be his responsibility. Test specimens shall be made, field-cured, and tested as specified. No forms or supports shall be loosened or removed until tests indicate strength of members as follows:

Structural Member	Percent of design compressive or flexural strength
Unshored slab and beam forms for forms which can be removed without disturbing shores	70
Slab or beam shoring	85
Wall and beam side forms	40

B. If field-cured test cylinders are not used as the basis for determination of time in place for formwork, the following criteria shall apply:

1. Formwork not supporting weight of concrete, such as sides of beams, walls and similar parts of the work, may be removed after cumulatively curing at not less than

50°F (10°C) for 24 hours after placing concrete, provided concrete is sufficiently hard and will not be damaged by form removal operations, and provided curing and protection operations are maintained.

2. Formwork supporting weight of concrete, such as beam soffits, columns, joints, slabs and other structural elements, may not be removed in less than 14 days of cumulative curing at not less than 50°F (10°C), nor until the concrete has attained design minimum 28-day compressive strength.

C. Remove forms in a manner to avoid damage to the structure, with particular care for corners and edges.

3.03 RE-USE OF FORMS

A. Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.04 PLACING REINFORCEMENT

A. Place in accordance with the contract drawings, Chapters 7 and 12 of ACI 318 and the Manual of Standard Practice of the Concrete Reinforcing Steel Institute.

B. Clean reinforcement of loose rust and mill scale, earth, ice and other materials which reduce or destroy bond with concrete. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Tie securely with 16-gage or larger annealed iron wire. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

C. Place reinforcement to obtain at least minimum coverages for concrete protection. Minimum coverage shall conform to Chapter 7 of ACI 318 unless otherwise indicated.

D. Install welded wire fabric in the longest practical lengths. Lap adjoining pieces at least one full mesh plus 2 inches and lace splices with wire, unless otherwise indicated. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.05 JOINTS

A. Construction Joints: Locate and install joints which are not indicated or specified in conformance with ACI 318. Obtain Engineer's approval of joints located by Contractor prior to preparation of reinforcing steel drawings.

Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints. Clean and break laitance or other foreign material from bonding surfaces. Tighten forms remaining in place (where applicable) to prevent seepage between forms and hardened concrete.

B. Waterstops: Provide water stops and shear keys specified in any new construction joints requested by Contractor. Install waterstops to form continuous diaphragm in each joint. Make provisions to support and protect exposed waterstops during progress of work. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions. Lapping of waterstops will not be allowed.

C. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs on-grade at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, equipment foundations and elsewhere as indicated.

D. Contraction (Control) Joints: Maintain true alignment with straightedge and locate as indicated. Joints shall be grooved except where sawed joints are indicated.

Install grooved joints during finishing process. Width of groove shall not exceed 1/4" and depth shall be at least ¼ of slab thickness. Sawed joints shall be installed as soon as the concrete surface is firm enough to resist tearing or damage by the power blade and before random shrinkage cracks can occur. Make joints approximately 1/8" wide with depth as indicated. Seal joint with the same type sealant specified for expansion joint sealant.

3.06 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Provide for accurate installation of embedded items. Securely fix floor drains and pressure relief valves in place to prevent flotation while placing concrete. Uniformly and accurately slope floor slab toward the drains. Protect pipe sleeves from moisture during cold weather. Protect anchor bolt threads from concrete splatter.

3.07 CONCRETE PLACEMENT

A. Placement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in-place. Notify other crafts to permit installation of their work. Moisten wood forms immediately before placing concrete where form coatings are not used. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

1. Notify Engineer at least 24 hours prior to each placement of concrete.

B. General: Conform to ACI 304. Bonding surfaces shall be clean, free of laitance and foreign materials. Face horizontal bonding surfaces with 1" thick coat of fresh "grout for bonding." Wet all other surfaces. Place concrete on properly prepared and unfrozen subgrade and only in dewatered excavation and forms. Use forms for all concrete except where otherwise indicated or specified. Do not place concrete that has partially hardened or has been contaminated by foreign materials. Prevent mud or foreign materials from entering the concrete or forms during placement operations.

C. Conveying: Convey concrete from the mixer and deposit in place by methods which will prevent the desegregation or loss of materials. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to provide a practically continuous flow of concrete at the delivery end. Aluminum conveying equipment shall not be used.

D. Depositing: Deposit concrete continuously or in layers of such thickness that 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. Place concrete in continuous horizontal lifts not to exceed 2 feet, and place concrete against bulkheads and keyways at vertical joints. Maximum free drop of concrete shall be 5 feet in walls 10 inches or less in thickness with 1-foot additional drop allowed for each inch of wall thickness over 10 inches, with a maximum drop of 10 feet.

E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within the limits of construction joints, until the placing of a panel or section is completed. When moisture barrier is used, keep lapped joints closed and take precautions to avoid puncturing the barrier. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

F. Consolidation: Consolidate concrete in conformance with ACI 309. Characteristics and application of concrete vibrators shall be as set forth in Table 5.1.4. Provide an adequate number of vibrators of sufficient capacity to keep up with the maximum rate of concrete placement. Vibrate concrete only until the concrete is thoroughly consolidated and the voids filled as evidenced by the leveled appearance of the concrete at the exposed surface and the embedment of the surface aggregate. Insert vibrators vertically to the full depth of the layer being placed and into the previous layer a minimum of 6 inches. Do not insert vibrators into lower layers of concrete that have begun to set. Do not drag vibrators through concrete. Insert and withdraw vibrators slowly with the vibrator running continuously so that no hole will be left in the concrete. Do not flow concrete from one location to another by the use of a vibrator. Use form vibrators only where sections are too thin or where sections are inaccessible for internal vibrators.

G. Time Requirements: Place concrete at a sufficient rate to assure that lift below is still plastic and that no cold joints will be formed. Place concrete within 45 minutes after mixing. This period may be extended to 1 hour and 30 minutes provided that the combined air temperature, relative humidity, and wind velocity are such that the plasticity of the fresh concrete is satisfactory for placement and consolidation and that the specified mixing water is not exceeded. Concrete which has partially set shall not be retempered but shall be discarded.

H. Placing Concrete at Joints: Bed horizontal joints with 1 inch of grout for bonding. Take precautions to ensure tight, well-bonded construction joints with no air pockets or voids, and to avoid bending or displacing waterstops while placing fresh concrete. Delay construction at a joint a minimum of 24 hours where placement is continued past the joint except where otherwise indicated.

I. Hot-Weather Placing of Concrete: When the temperature is 90°F or above, or is likely to rise above 90°F within a 24-hour period after the concrete placement or when there is any combination of high air temperature, low relative humidity and wind velocity which would impair concrete strength or quality, follow the recommendations of ACI 305. Concrete shall have a maximum temperature of 85°F during placement. Dampen subgrade and forms with cool water immediately prior to placement of concrete. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature. Protect freshly placed concrete immediately after placement so that the rate of evaporation as determined by ACI 305 does not exceed 0.2 pound per square foot per hour. Protect concrete with suitable insulation, if rapidly decreasing nighttime temperatures occur, which would cause thermal shock to concrete placed during warm daytime temperatures. Protect the concrete with temporary wet covering during any appreciable delay between placement and finishing.

J. Cold Weather Placement of Concrete: When the temperature is 40°F or is likely to fall below 40°F during a 24-hour period after concrete placement, follow the recommendations of ACI 306 to prevent loss of concrete strength or quality. Minimum temperature for concrete as mixed shall be indicated on lines 2, 3 and 4 of Table 1.4.1 of ACI 306. Maximum temperature for concrete as mixed shall be 10°F greater than the corresponding minimum temperature. Place and maintain concrete so that its temperature is never less than the temperature indicated on line 1 of Table 1.4.1 of ACI 306. Maintain the required temperature for the time duration indicated on Table 1.4.2 of ACI 306. Monitor temperatures of concrete at corners or edges of formwork as applicable. Do not expose concrete to carbon monoxide or carbon dioxide fumes from heaters or engines. Oil or coke burning salamanders will not be permitted. Personnel shall be present at all times to maintain safe, continuous operation of heating system. Control temperature and humidity of protected concrete so that excessive drying of concrete surfaces does not occur. Calcium chloride will not be permitted as a concrete accelerator or to thaw frozen subgrade prior to concrete placement.

3.08 FINISHING - UNFORMED SURFACES

A. Screed Finish: Use as first stage for all concrete finishes. Use as final finish on surfaces that will be covered by additional concrete, grout placement, mortar setting bed (except as otherwise specified) or earth backfill. Immediately after screeding, use a wood float, darby or bullfloat to eliminate high and low spots and to embed large aggregate. This shall be done in a manner to produce even, uniform surfaces so that surface irregularities do not exceed 3/8" in 10' when used as final finish.

B. Floated Finish: Use as second stage of broomed or troweled finish. Use as final finish on surfaces to receive ceramic tile or quarry tile, and on surfaces which are to be covered with membrane of elastic waterproofing. Float with mechanical or hand float. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats. On surfaces not to receive troweled finish, finish with wood or cork float after mechanical floating to a true uniform surface so that surface irregularities do not exceed 1/8" in 10', except at floor drains.

C. Broomed Finish: Use as final finish on all outdoor slabs including pavements and sidewalks. After floated finish, draw a stiff bristle broom across the surface making uniform corrugations, perpendicular to the direction of traffic, not more than 1/16" deep.

D. Troweled Finish: Use as final finish on inside floors and on all other unformed surface not otherwise indicated or specified. Trowel with steel trowel, mechanical or hand, to obtain a smooth, dense finish. The final troweling shall be done after the concrete has become hard enough so that no mortar adheres to the edge of trowel and a ringing sound is produced as the trowel passes over the surface. Do not trowel before surface water has evaporated or been removed with a squeegee. Finish to a true uniform surface so that surface irregularities do not exceed 1/8" in 10', except at floor drains. Do not add sand or cement to the floor surface.

E. Chemical-Hardener Finish: Apply chemical-hardener finish to interior concrete floors where indicated. Apply liquid chemical-hardener after complete curing and drying of the concrete floor and in strict compliance with manufacturer's printed instructions.

F. Repair finished unformed surfaces that contain defects which affect durability or appearance of concrete. Surface defects include crazing, cracks in excess of 0.01 inch wide, or which penetrate to reinforcement or completely through non- reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets and other objectionable conditions. Repair surface defects as specified in the Part I.2, ‘Repair of Defective Surfaces.’

G. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days and before application of any surface preparation including, but not limited to, chemical-hardeners.

3.09 FINISHING - FORMED SURFACES

A. Surface finish for exterior above-grade areas and any surface receiving coatings shall be required as follows. Surface defects shall be repaired as outlined in I.2 through I.4. Remove or grind down all form marks, fins or irregularities which project more than 1/8" from the surface. Surface shall be finished to a smooth uniform texture by using a carborundum brick or other methods as approved by Engineer.

B. Repair of Defective Surfaces: Defined as any concrete surface showing misalignment, rock pockets, poor joints, holes from ties, voids, honeycomb, or any other defective area. Repair as soon as the forms have been removed. Chip surface back to a minimum depth of 1/2", chip edges perpendicular to surface, prewet depression, and brush with cement immediately before patching. Patch surfaces using stiff mortar with same sand-cement ratio as original concrete and with minimum water for placing. Blend with white cement to match existing concrete color. Compact mortar into depressions so that after curing, hole is filled and mortar is flush with surface. Use hammer and ramming rod for compacting the holes. Moist cure for three days or use curing compound. Engineer shall be notified of areas containing defects or where reinforcing steel is exposed prior to determination of repair method.

3.010 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid drying at end of final curing period.

B. Curing Methods: Cure all concrete by one of the following methods unless specified otherwise:

1. Leave in forms for a minimum of 7 days. Keep formwork wet to prevent drying of concrete surfaces.
2. Use saturated bats, soaker hoses, or sprinkler for a minimum of 7 days. Keep concrete continuously wet.
3. Using 1 coat of a liquid membrane-forming compound conforming to ASTM C309, Type 1. Apply immediately after removal of forms (which have been continuously wet); or in case of a slab, after the concrete has been finished and is hardened sufficiently to walk on.
4. Using polyethylene sheets applied in full contact with surfaces.
5. Hot weather curing of unformed surfaces shall commence immediately after finishing and continue for 24 hours. Curing shall consist of application and maintenance of water-saturated material to all exposed surfaces: horizontal, vertical, and otherwise. After the 24-hour interval, continue curing using either a moist cure for 6 days, application of 1 coat of curing compound conforming to ASTM C309, Type 2, or

application and maintenance of curing paper or heat-reflecting plastic sheets for 6 more days.

Begin curing formed concrete immediately after placing. Curing shall consist of keeping forms continuously wet for 24 hours. After the 24-hour period, continue curing by loosening forms and applying soaker hoses so that water runs down along concrete surfaces for a minimum of 6 additional days, or, strip forms and apply a curing compound conforming to ASTM C309, Type 2.

6. Cold weather curing of concrete shall conform to the section on Cold Weather Placement of Concrete.

Cure floor surfaces where concrete hardener is indicated with "Curing- Hardening Compound" as specified in this section.

3.011 LOW-STRENGTH CONCRETE

A. Low-strength concrete is defined as concrete whose 28-day test (average of 2 cylinder breaks) is less than the minimum 28-day strength required. Remove and replace with acceptable concrete when the quality and the location of the low-strength is such that Engineer considers the strength or durability of the structure is impaired and so orders. Low-strength concrete shall be considered defective work as defined in GENERAL CONDITIONS.

B. Potentially Low-Strength Concrete: Defined as concrete whose 7-day test is less than 70 percent of the specified minimum 28-day compressive strength.

Construction delays caused by low-strength or potentially low-strength concrete shall not relieve Contractor from responsibility for late completion even though extensions of time may be granted.

3.012 MISCELLANEOUS CONCRETE ITEMS

A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work by other trades is in place. Mix, place and cure concrete as herein specified to blend with in-place construction.

B. Equipment Bases and Foundations: Construct equipment bases, pads, and foundations as indicated or, when not indicated, conforming to equipment manufacturer's requirements. Reinforce conforming to typical detail unless otherwise indicated. Equipment bases shall include concrete, reinforcing steel, form work (as required) and anchor bolts. Place grout for equipment installed under this contract. Finish top area of bases between anchor bolts and forms with a troweled finish.

3.013 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. Field Testing of Concrete and Making of Concrete Test Cylinders: Contractor shall furnish test equipment, test cylinder molds, and ACI Certified Grade I Field Testing personnel to perform all required field tests, make the required concrete test cylinders, and deliver test cylinders to the laboratory. The prescribed test shall be made in the presence of or with the concurrence of the Owner/Engineer.

Concrete sampling for tests and cylinder making shall be done conforming to ASTM C172. Prepare test cylinders conforming to ASTM C31, with not less than one set of cylinders (4

cylinders) for strength tests of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 100 cubic yard of concrete. Slump Test conforming to ASTM C143 and Air Content Test conforming to ASTM C231. Discard concrete used for slump and air tests. Slump and Air Test results shall be furnished to the Testing Laboratory for inclusion in the Cylinder Test Reports.

A slump and air test shall be taken from the first batch of concrete delivered to the site for each days' pour, for each class of concrete, to check the consistency of the concrete. Compressive strength cylinders, slump, air, and temperature tests shall be taken from a random sample taken at a random point during any given concrete pour as determined by the Resident Project Representative and/or the Engineer.

B. Additional Testing Due to Variances in Concrete: Should the consistency of the concrete visually appear to vary from what is specified, the Resident Project Representative and/or Engineer can require one additional test (slump, cylinders, air and temperature) to determine that the concrete meets the specified criteria. All costs for additional testing shall be paid for by the Contractor.

C. Laboratory Testing of Concrete During Construction:

1. An independent testing laboratory will be selected and paid by the Contractor to perform the required laboratory tests and statistical evaluations of concrete being used in the work. The laboratory will cure and test concrete cylinders conforming to ASTM C192 and C39, testing 2 cylinders at 7 days of age, and 2 at 28 days of age.

2. The Engineer shall have the right to observe all phases of concrete cylinder curing and testing. Should the Engineer observe any deviations from the prescribed testing procedures that he considers detrimental to concrete strength test results, he shall immediately notify the Owner in writing. The Contractor shall make arrangements with the testing laboratory to receive copies of test reports. The costs of providing a maximum of 2 copies of each report will be paid by the Contractor.

3. Should the statistical data indicate an unacceptable combination of average strength and standard deviation, Contractor shall take immediate corrective action. Should the statistical data indicate an excessive margin of safety, the concrete mix may be modified subject to Engineer's approval.

END OF SECTION

SECTION 131200

PRE-ENGINEERED BUILDINGS

PART 1 GENERAL

1.01 SUMMARY

A. The work associated with this section includes the design, fabrication, and shipment of a pre-engineered metal building package as detailed in the project drawings.

1.02 BUILDING TYPE

A. The pre-engineered building shown is a single span, rigid frame type metal building of the nominal length, width, eave height, and roof pitch indicated on the project drawings and as specified herein.

1. Manufacturer's standard components may be used, providing components, accessories, and complete structure conform to architectural design appearance shown and to specified requirements.

1.03 SUBMITTALS

A. Shop Drawings:

1. Product Technical Data:

a. Acknowledgment and certification that products submitted meets requirements of standards referenced.

b. Manufacturer’s technical reference manual containing all the manufacturer’s standard construction details and specifications. Include manufacturer’s erection manual containing all details and methods for installation of building frame, roof system, wall system and accessories. Indicated items not utilized for this installation.

c. Structural calculations stamped and signed by a professional Structural Engineer licensed in the State of Missouri. Include list of design loads and loads transmitted to the foundation through columns or walls and location where loads occur. Submit calculations for information only.

2. Fabrication Drawings:

a. Erection drawings minimum scale: 1/8 in = 1 ft – 0 in

b. Details and sections minimum scale: 1-1/2 in = 1 ft 0 in

c. List of all design loads and combinations of loads

d. Size and location of each component of the building. Include clearance under structural framing members and cross-sections of components.

e. Fasteners and details of fasteners connecting each component of the building.

f. Size, location and details of anchor bolts, base plates, and all other components fastened to the foundation.

g. Details of wall panels, roof panels, finishes, flashing, closures, closure strips, trim, gutters, downspouts, calking, and all other miscellaneous components.

B. Samples:

1. Metal color and finish samples of roof and wall panels, roof trim, wall trim and interior liner panel colors for Owner's selection. Color chart is not acceptable.

C. Operations and Maintenance Manuals:

D. Miscellaneous Submittals:

1. Manufacturer's Qualifications.

2. Manufacturer's approval of erector.

1.04 QUALITY ASSURANCE

A. Referenced Standards:

1. American Architectural Manufacturers Association (AAMA):

a. 621, Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.

2. American Institute of Steel Construction (AISC):

a. 303, Code of Standard Practice for Steel Buildings and Bridges (referred to herein as AISC Code of Standard Practice).

3. ASTM International (ASTM):

a. A36, Standard Specification for Carbon Structural Steel.

b. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

c. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

d. A490, Standard Specification for Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.

e. A792, Standard Specification for Steel Sheet, 55 percent Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

f. C991, Standard Specification for Flexible Fibrous Glass Insulation for Metal Buildings.

g. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

4. American Welding Society (AWS):

    a. D1.1, Structural Welding Code - Steel.

5. FM Global (FM).

6. Metal Building Manufacturer's Association (MBMA):

    a. Low Rise Building Systems Manual.

7. Research Council on Structural Connections (RCSC):

    a. Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts, referred to herein as Specification for Structural Joints.

8. Steel Structures Painting Council/NACE International (SSPC/NACE).

    a. SP 6/NACE No. 3, Commercial 1 Blast Cleaning.

9. Underwriters Laboratories, Inc. (UL):

    a. Building Materials Directory.

10. Building code:

    a. International Code Council (ICC): International Building Code and associated standards, 2018 Edition including all amendments, referred to herein as Building Code.

B. Building Design Criteria:

1. Structural Framing: Design primary and secondary structural members and exterior covering materials for applicable loads and combinations of loads in accordance with the Metal Building Manufacturer's Association's (MBMA) "Design Practices Manual".

2. Structural Steel: For design of structural steel members, comply with requirements of the American Institute of Steel Construction's (AISC) "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" for design requirements and allowable stresses.

3. Light Gage Steel: For design of light gage steel members, comply with requirements of the American Iron and Steel Institute's (AISI) "Specification for the Design of Cold Formed Steel Structural Members" and "Design of Light Gage Steel Diaphragms" for design requirements and allowable stresses.

4. Welded Connections: Comply with requirements of the American Welding Society's (AWS)" Standard Code for Arc and Gas Welding in Building Construction" for welding procedures.

5. Design Loads: Criteria for basic design loads, as well as auxiliary and collateral loads, shall be per the 2018 International Building Code for Building Risk Category II, unless otherwise modified herein.

    a. Roof Live Loads:

1. Roof Panels shall be designed for 50-psf uniformly distributed live load or a 200-lb concentrated (point) live load applied over a 1-ft by 1-ft area at the center of the maximum roofing panel span. The most severe condition shall govern the design.

2. Roof Framing Members shall be designed for 20-psf non-reducible live load per the applicable building code. The specified roof panel loading need not apply.

3. The above-mentioned loads shall be applied in addition to other applicable loads and shall be applied to the horizontal projection of the roof.

b. Snow Loads:

1. Design structure for snow load as set forth in the Building Code. Where appropriate, account for snow load drift as specified by the Building Code.

2. The following site conditions shall be utilized in the design:

a. Basic Ground Snow Load: 20.0-psf

b. Importance Factor: 1.0

c. Wind Loads:

1. Design structure for wind loading as set forth in the Building Code.

2. The following site conditions shall be utilized in the design:

a. Basic Wind Speed: 106-mph

b. Site Exposure Class: C

c. Importance Factor: 1.0

d. Seismic Loads:

1. Design structure for seismic forces as set forth in the Building Code.

2. The following site conditions shall be utilized in the design:

a. Site Class: D

b. Importance Factor: 1.0

c. Risk Category: II

e. Auxiliary Loads:

1. Consider other superimposed loads as part of the design requirements and combine with normal design (dead, live, seismic, wind, etc) loads as prescribed hereafter.

a. Static Loads: Collateral Dead Load of 5.0-psf

f. Combination of Loads:

1. The combining of dead, live, wind, seismic, auxiliary, etc., loads for design purposes shall be as detailed in the International Building Code 2018, unless otherwise specified.

2. Horizontal sway deflection of the building due to 10 year MRI loads shall not exceed H/200 (H being the height of the structure).

6. Steel Frame – Shall clear span full width of building. Interior columns are not permitted.

7. Building Foundation (by others): Anchor bolt diameter and base plates shall be designed by the PEMB designer. All footings, foundations, anchor bolt embedment and piers will be designed based on final loadings and reactions. Column bases shall be designed as pinned. Footings shall not resist moment.

C. Manufacturer's Qualifications:

1. Provide pre-engineered metal buildings as produced by a manufacturer with not less than 5 years successful experience in the fabrication of pre-engineered metal buildings of the type and quality required.

2. Manufacturer must be a member in good standing of the MBMA.

3. Manufacturer must be an AISC Quality Certified Fabricator in the category of Metal Building Systems (MB).

D. Erector's Qualifications:

1. Pre-engineered building shall be erected by a firm that has not less than 5 years successful experience in the erection of pre-engineered buildings like those required for this project.

2. Erector must be approved in writing by the metal building manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store prefabricated components, sheets, panels, and other manufactured items so they will not be damaged or deformed.

B. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight ventilated covering. Store metal sheets or panels so that water accumulations will drain freely. Do not store sheets or panels in contact with other materials which might cause staining.

1.06 WARRANTIES

A. The building manufacturer shall furnish a written warranty covering materials and workmanship, color finishes, etc. Such warranties shall cover the full cost of the material and labor to replace or repair.

B. Wall panels shall carry a 10-year guarantee and roof panels shall carry a 20-year guarantee.

C. The building manufacturer shall furnish a 5-year weather tightness guarantee.

D. Should the building manufacturer not be able to furnish the above guarantees, it will be assumed that the Contractor can furnish the above requirements.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Metal building systems:

1. Butler Building Systems.
2. NCI Building Systems
3. Nucor Building Systems
4. Star Building Systems
5. Varco Pruden Buildings
6. Alliance Building Systems
7. Or Approved Equal

B. Fiberglass batt or blanket Insulation:

1. Owens-Corning Fiberglass Corp.
2. United States Gypsum Company (USG)
3. Certainteed
4. Or Approved Equal

2.02 MATERIALS & ACCESSORIES

A. Hot-Rolled Structural Shapes: W-shapes and WT-shapes shall comply with requirements of ASTM A36 or A992, grade 50; all other rolled sections shall comply with the requirements of ASTM A36.

B. Tubing or Pipe: Comply with requirements of ASTM A500, Grade B (46-ksi minimum yield).

C. Members Fabricated from Plate or Bar Stock: Comply with requirements of ASTM A36.

D. Members Fabricated by Cold Forming: Comply with requirements of ASTM A607, Grade 50.

E. Anchor Bolts/Rods: Comply with requirements of ASTM F1554, Grade 55 with weldability supplement S1 or ASTM A307, Grade A. All anchors shall be galvanized. Final embedment details shall be confirmed by the Engineer upon receipt of anchor bolt and loading information contained within the approved Shop Drawings received from the Building Manufacturer.

F. Fasteners:

1. Bolts for Structural Framing: Comply with requirements of ASTM A307 or A325 as necessary for design loads and connection details. Provide shop painted bolts, except when structural framing components are in direct contact with roofing and siding panels. Provide zinc-plated or cadmium-plated bolts when structural framing components are in direct contact with roofing and siding panels.

2. Other Fasteners: Provide self-tapping screws, bolts, nuts, self-locking rivets, self- locking bolts, end-welded studs, and other suitable fasteners as standard with the manufacturer, designed to withstand design loads.

    a. Provide metal-backed neoprene washers under heads of fasteners bearing on weather side of panels.

    b. Use zinc-aluminum, galvanized, cadmium plated fasteners, or approved equal.

    c. Locate and space fastenings in true vertical and horizontal alignment. Use proper type fastening tools to obtain controlled uniform compression for positive seal without rupture of neoprene washer.

    d. Provide fasteners with heads matching color of roofing or siding sheets by means of plastic caps or factory-applied coating.

G. Roof Panels:

1. Provide steel roof panel with a standing seam interlocking rib configuration having a minimum thickness of 24 GA. Panels shall meet the requirements of AAMA 621.

2. Panels shall have a factory applied finish in accordance with the requirements of paragraph 2.03.G.

3. Panel length shall be sufficient to cover entire length of unbroken roof slope up to 40-ft.

4. Provide concealed fasteners.

H. Roof Crickets: Provide roof crickets on all roof curbs to direct water to each side of the curb. Roof cricket material shall match roof panels.

I. Roof Penetration Flashing (maximum 13-in dia.)

1. Flashing material: EPDM rubber with and aluminum sealing ring base.

2. Provide a minimum projection above the weather surface of the roof of 8-in.

3. Configure the flanges to match the roof panel.

J. Exterior Wall Panels:

1. Provide steel wall panels having a minimum thickness of 26 GA. Panels shall meet the requirements of AAMA 621.

2. Panels shall have a factory applied finish in accordance with the requirements of paragraph 2.03.G.

3. Panel length shall be sufficient to cover entire height of unbroken wall up to 40-ft.

K. Insulation: Shall consist of glass or inorganic fibers and resinous binders formed into flexible blankets or semi-rigid sheets, having a minimum thermal conductivity (k-value at 75 degrees F) of 0.27.

1. Roof and Wall: Fiberglass, ASTM C991, Type 1.

2. Insulation shall beet the requirements of ASTM E84, not greater than 25 for flame spread.

3. Roof insulation minimum R-30, “Simple Saver” double layer type, or approved equal.

4. Wall insulation minimum R-19, insulation shall have laminated vinyl facing with foil scrim vapor retarder. Permeability rating of the vinyl shall not be more than 0.02.

L. Retainer Strips: Provide 26-ga. formed galvanized steel retainer clips colored to match the insulation facing.

M. Gutters & Downspouts:

1. Provide minimum 4-in by 4-in gutter and minimum 3-in by 5-in downspout in manufacturer’s standard profile best suited for the project.

2. Shall consist of 0.040-in (minimum) thick aluminum.

3. Final finish shall be same as roof panels.

N. Non-Shrink Grout: As required by PEMB designer.

O. Closures: Neoprene

P. Calking and Sealants: As recommended by the manufacturer to provide watertight assembly.

Q. Trim: Same material as wall or roof panel.

2.03 FABRICATION

A. General:

1. Fabricate building, structure, roof and wall panels, accessories and trim in accordance with the requirements of AISC and MBMA.

2. Fabricate components in such a manner that once assembled, they may be disassembled, repackaged, and reassembled with a minimum amount of labor. Clearly and legibly mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.

3. Provide all necessary clips, flashing, angles caps, channels, closures, bases and any other miscellaneous trim required for complete water and airtight installation.

a. Provide an inside closure at the base of all corrugated panels and an outside closure at the top of all corrugated panels in addition to all other closure strips required. Form closure strips to fit the corrugation of the metal panels and securely support in place. Closure strips shall fit between corrugated panels and trim or flashing as required to completely separate the interior of the building from the exterior.

b. Provide flashing at all intersection of wall panels and roof panels, and above all openings in wall and roof panels, in addition to all other flashing required. Form flashing to completely contain water on the outside of the building and to be watertight and securely fastened in place.

c. Provide caulking at all edges where metal panel trim or flashing is adjacent to the foundation of the building in addition to all other caulking required. Securely adhere caulk material to the foundation and the metal panel trim or flashing.

4. Fabricate and prepare material for shipment knocked down.

5. Factory punch frame to receive all fasteners.

B. Structural Framing

1. Rigid Frames shall be fabricated from hot-rolled structural steel. Provide built-up "I-beam" shape or open web type rigid frames consisting of either tapered or parallel flange beams and a combination straight and tapered columns. Provide frames factory welded and shop painted. Furnish frames complete with attachment plates, bearing plates and splice members. Factory punch or drill frames for bolted field assembly.

   Provide length of span and spacing of frames indicated. Slight variations in length of span and frame spacing may be acceptable if necessary to meet manufacturer's standard.

   Provide rigid frames at end walls where required by PMB design.

2. End Wall Columns: Provide factory welded, shop painted end wall columns of not less than 14-ga. built-up "I" shape or cold-formed sections.

3. Wind Bracing: Provide portal frame wind bracing in lieu of cross bracing; comply with requirements of ASTM A36 or A572, Grade D.

C. Secondary Framing: Provide not less than 16-ga. shop painted rolled formed sections for the following secondary framing members:

   Purlins.
   Eave struts.
   Endwall beams.
   Flange bracing.

   Provide not less than 14-ga. cold-formed galvanized steel sections for the following secondary framing members:

   Base channels.
   Sill angles.
   Endwall structural members (except columns and beams).
   Purlin spacers.

D. Framed Openings and Penetrations:

1. Provide all necessary subframing to support wall openings for door, windows, louvers, pipe or duct penetrations, etc. Manufacturer shall coordinate all opening sizes and locations with project specific materials with Contractor.

2. Size and location of openings/penetrations shall be as shown on the project drawings. Metal building manufacturer shall be responsible for providing the correct size opening for the scheduled penetrations.

3. Jambs, lintels and girts: Steel, with factory applied prime coat.

4. Provide trim to cover all exposed areas of opening frames to match the wall panels.

E. Roof Openings and Penetrations

1. Provide all necessary subframing to support roof mounted equipment and to frame roof penetrations. Material gage to be determined by metal building manufacturer for the size of the equipment or opening.

2. Size and location of roof mounted equipment and/or roof openings shall be as indicated on the project drawings. Metal building manufacturer shall be responsible for providing correct size of opening for scheduled penetration.

3. Purlins, angles, clips: Steel with factory applied prime coat.

F. Wall Mounted Equipment:

1. Provide any necessary subframing to support proposed wall mounted equipment. Material gage to be determined by the metal building manufacturer for the size of equipment or opening. Contractor shall coordinate all wall mounted equipment sizes and locations with the building manufacturer.

G. Finishes:

1. All structural components shall be the manufacturer's standard shop applied rust-inhibitive coating.

2. Clean all ferrous surfaces of oil, grease, loose rust, loos mill scale and other foreign substances. Clean all primary and secondary structural members, not noted as being galvanized, in accordance with SSPC SP 6/NACE No. 3.

3. Wall and roof panels:

a. Exterior Surfaces (Roof & Wall): Provide a thermosetting flouropolymer resin enamel (Kynar) which is FM Class I rated, meeting the minimum requirements of AAMA 621. Exposed screw heads shall match the color of the panel. Color(s) to be selected by Owner.

b. Interior Surface (Wall): Provide the manufacturer's standard shop applied polyester coating in a color to be selected by Owner.

2.04 MAINTENANCE MATERIALS

A. Provide 4-oz of touch-up paint for each color provided on the building:

PART 3 EXECUTION

3.01 ERECTION

A. Install products in accordance with the manufacturer's instructions. Installation tolerance shall be in accordance with the AISC Code of Standard Practice. Install produces straight, without bowing, sagging, or warping.

3.02 ROOFING AND SIDING

A. General: Arrange and nest sidelap joints so that prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line. Protect factory finishes from damage.

1. Provide weatherseal under ridge cap. Flash and seal roof panels at eave and rake with neoprene closures to exclude weather.

B. Roof Sheets: Provide sealant tape at lapped joints of roof sheets, and between roof sheeting and protruding equipment, vents, and accessories.

1. Apply continuous ribbon of sealant tape to clean, dry surface of weather side of fastenings on end laps, and on side laps of corrugated nesting type, ribbed or fluted panels and elsewhere as necessary to make roof sheets weatherproof to driving rains.

C. Wall Sheets: Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete and elsewhere as necessary for waterproofing. Handle and apply sealant and back-up in accordance with the sealant manufacturer's recommendations.

1. Align bottoms of wall panels and fasten panels with blind rivets, bolts or self-tapping screws. Fasten flashings, trim around openings, and similar elements with self-tapping screws. Fasten window and door frames with machine screws or bolts. When building height requires two rows of panels at gable ends, align lap of gable panels over wall panels at eave height.

2. Install screw fasteners with power tool having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in pre-drilled holes.

D. Sheet Metal Accessories: Install gutters, downspouts, ventilators, louvers, and other sheet metal accessories in accordance with manufacturer's recommendations for positive anchorage to building and weathertight mounting. Adjust operating mechanism for precise operation.

E. Thermal Insulation: Install insulation concurrently with installation of roof panels in accordance with manufacturer's published directions. Install blankets straight and true in one-piece lengths with both sets of tabs sealed to provide a complete vapor barrier. Locate insulation on the underside of roof sheets, extending across the top flange of purlin members and held taut and snug to roofing panels with retainer clips. Install retainer strips at each longitudinal joint, straight and taut, nesting with roof rib to hold insulation in place. Tape all joints and tears in the vapor barrier with tape recommended by vapor barrier manufacturer.

F. Install liner panels in accordance with Manufacturer’s recommendations. Provide a completely airtight seal around all building structural members and bracing when these members penetrate the liner panel.

G. Install door frames, window frames, trim and other miscellaneous items in accordance with manufacturer’s instruction and details.

3.03 ADJUSTING AND CLEANING

A. Touch up paint any scratch factory finished surfaces or remove and replace as directed by the Engineer.

B. Remove and replace any damaged wall or roof panels, frames, etc., as directed by Engineer.

END OF SECTION

SECTION 260100

ELECTRICAL WORK SUMMARY

PART 1 GENERAL

1.01 SUMMARY AND DESCRIPTION OF WORK:

A. The extent of the Electrical work under this specification, including furnishing, installing, connecting, and testing of all electrical, control, and instrumentation components and systems; as indicated by provisions of this section, construction drawings, as required per packaged process equipment installations, and as required per latest revisions of the National Electric Code, National Electric Safety Code, and local building codes/ordinances.

B. Electrical work to include, but not limited to:

1. Temporary and permanent electrical, services to project sites per local utility companies' requirements.
2. Temporary lighting and convenience power facilities during construction.
3. Demolition and removal of indicated existing street light poles structures, pole mounted electric metering and distribution devices, concrete bases, and all related hardware and materials, as indicated and directed by the Owner.
4. New area lighting, electric distribution, and area electric service entrance main panelboard and distribution system & components.
5. New area street lighting and receptacles electrical, control, & distribution equipment & systems.
6. Equipment racks, enclosures, and control panels assembly, mounting, supporting, identification, and labeling.
7. 240VAC, 1-phase, 60Hz, 3 wire service entrance conduit, conductors, and grounding system from utility system to facility's new service entrance equipment.
8. Underground concrete, steel reinforced and direct buried conduit duct bank systems to include, but not limited to: traffic rated underground electric pull boxes; buried detectable electric warning tape; conduit system mandrel testing & MOP cleaning; all related excavation, trenching, bedding materials, backfill, and compaction; and related subgrade preparations.
9. Underground electric distribution, street lighting, and receptacles systems' electric branch circuits' conductors, connections, termination, and testing.
10. Electrical distribution & lighting structures grounding system installation and testing.
11. 240/120VAC 1-phase 60 Hz wiring installations and connections to electrical and lighting equipment, lighting fixtures, and receptacles, required circuitry components as indicated and required per equipment manufacturer's requirements.
12. New Sidewalk lighting system installation, connections/terminations, adjustments, testing, and place in service for a complete and operational system.
13. Field testing of electrical, lighting, and subsurface snow melt system equipment including calibration, startup, adjustments, and service.

1.02 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1, Specification sections, apply to work of this section.

1.03 QUALITY ASSURANCE

A. National Electric Code (latest revision)

B. National Electric Safety Code (latest revision)

1.04 SUBMITTALS

A. Submit compliance submittals in accordance with Division 1.

B. Submit manufacturer's data including specifications, factory test results, installation instructions and general recommendations for each type of electrical equipment.

PART 2 PRODUCTS

2.01 GENERAL

A. Only reasonably perfect, new materials of the best design, manufacture, quality and workmanship, free from defects, deterioration, abuse, mishandling or neglect shall be used in this electrical installation. Industrial or specification grade materials are to be used throughout. Materials damaged or deteriorated from any causes whatsoever will not be permitted and shall not be used.

B. Materials, including their component parts, used in this electrical installation shall conform to the rules and standards, both mandatory and recommendatory, of the NEC and NESC for their application.

C. All Underwriters Laboratories, Inc., labels, markings, etc., shall remain on materials, and any materials which should bear UL, Inc., labels, marks, etc., that do not have the same shall be removed from the electrical installation or be labeled by authorized persons.

D. Materials that are similar as to construction, type, or use shall be uniform as to appearance, make, and type throughout the electrical installation.

E. Record drawings and equipment operations and maintenance manuals shall be provided per Division 1 at the completion of all electrical work.

PART 3 PERFORMANCE

3.01 REQUIREMENTS

A. Refer to individual work sections of Division 26 for specific electrical work performance requirements.

3.02 TESTING

A. Test all electrical equipment upon completion of installation to ensure that the equipment operates satisfactorily and to conform to Contract documents. The Owner and the Engineer shall be notified in writing at least 10 working days prior to scheduled equipment testing.

B. All equipment testing shall be recorded on test log documentation indicating as a minimum: date, time, type of test, equipment tested, test criteria, test pass and fail level, test equipment, test equipment calibration certifications and dates, and all required voltages, currents, ohms, and mhos. Provide two copies each to the Owner and the Engineer.

C. Furnish temporary power source of proper type for testing purposes when normal supply is not available at the time of testing.

3.03 COORDINATION AND SCHEDULING

A. Delay installation of exposed conduit, lighting fixtures, or other equipment until all piping, pipe hangers, ducts, and equipment which are above have been installed, unless a written release is given by the Engineer for specific cases.

B. Coordinate installation of equipment and wiring with the established construction schedule as required by Division 1.

C. Coordinate with local electrical coop. and telephone company for all interface and connection requirements.

D. Coordinate all electrical work with all other utilities and process installations (new and existing) so as to minimize disturbance of each utility system's existing and/or new installations.

E. The wiring indicated on the drawings is based on typical requirements of the type of equipment indicated. The field wiring required to be completed, as a part of this project shall be determined based on the equipment supplied as part of this contract. These adjustments to the wiring system shall be completed at no additional cost. The Contractor shall obtain the actual power and control requirements for each piece of equipment to be installed or modified by this contract. Prior to the start of field installation, equipment wiring coordination drawing shall then be prepared by the Contractor and submitted to the Engineer showing the actual wiring to be installed as a part of this project. This shall include all proposed conduit and wire sizes. As the project is constructed, this document shall be updated with actual wiring locations, termination point numbers, wire labels, and other appropriate information. Upon completion of the project, a reproducible set of "record drawings" based on this information shall be submitted to the Engineer.

3.04 WORK ON EXISTING EQUIPMENT

A. Do not remove any equipment from service without obtaining permission from Owner and Engineer.

B. Perform work that requires taking equipment out of service at times designated by Owner so as to cause minimum interruption of system operation.

C. Continue work with as many workmen as can be efficiently utilized from the time any equipment is removed from service until equipment is tested and back in service.

D. Connect electrical equipment to provide same phasing as existing equipment, unless otherwise specified or indicated.

3.05 DOCUMENTATION

A. Contractor shall be responsible for submitting to the Engineer for approval, equipment-interface power and control loop diagrams and detailed wiring diagrams for all equipment supplied to this specific project. The electrical arrangements indicated on the drawings are based upon information supplied by various suppliers during the design phase of the project. However, dependent upon actual equipment supplied, modification may be necessary to provide a fully functional and operational system. These modifications, if applicable, shall be the responsibility of the Contractor. The specified and indicated components shall be supplied as a minimum.

B. Contractor shall provide one complete set of Record Drawings with wiring connections and wire numbers shown.

C. Contractor shall provide electrical system and grounding system test reports upon project completion.

END OF SECTION

SECTION 260126

FIELD TESTING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. This section covers field testing of all wire, cable and electrical equipment and machinery.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1, Specification sections, apply to work of this section.

B. This section is a Division 26 Basic Electrical Materials and Methods section and is part of each Division 26 section and other Divisions making reference to field testing specified herein.

1.03 QUALITY ASSURANCE

A. **Applicable Standards:**

1. American National Standards Institute (ANSI): Comply with:
    a. C37.20: Switchgear Assemblies, Including Metal-Enclosed Bus.
2. Insulated Cable Engineers Association (ICEA):
    a. S-19-81: Rubber-Insulated Wire and Cable for Transmission and Distribution of Electrical Energy.
    b. S-66-524: Cross-Linked Thermosetting Polyethylene - Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
    c. S-68-516: Ethylene-Propylene-Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
3. National Electrical Code (NEC).
4. National Electrical Manufacturers Association (NEMA).

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products of one of the following manufacturers:

1. Ground Test Set:
    a. Associated Research, Inc.
    b. James G. Biddle Company
    c. Fluke Corporation
    d. Or approved equal
2. Multimeter:
    a. Simpson Electric Company
    b. Fluke Corporation
    c. Keysight Technologies
    d. Or approved equal

3. Insulation Test Set:

    a. Associated Research, Inc.
    b. James G. Biddle Company
    c. Fluke Corporation
    d. Or approved equal

B. **Test Reports:**

1. Submit as specified in Division 1.
2. Maintain in duplicate a written record of all tests showing date, personnel making test, equipment used, equipment or material tested, tests performed, and results.
3. Notify Engineer two weeks prior to commencement of all testing except for megger tests.

2.02 EQUIPMENT

A. Provide all testing equipment required which includes all or some of the following:

1. Wet- and dry-bulb thermometer.
2. 500V and 1,000V meggers.
3. One Multimeter (Volts-Ohms-Amperes) rated 20 K ohms per volt or better.
4. One-phase rotation meter, 60 Hz.
5. Commercial model three-point ground test set, James G. Biddle Company "Megger" Ground Tester, Fluke Corporation “Basic Geo Earth Ground Tester Kit”, Associated Research, Inc., "Vibroground" tester, or approved equal.
6. Miscellaneous cable, test lights, receptacles, plugs, and other equipment as required.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Test all wire, cable, and electrical equipment installed or connected by Contractor to assure proper installation, setting, connection (with connectors attached to conductors), and functioning as indicated or to conform to Contract Documents and manufacturer's instructions.

B. Conduct all tests except megger insulation testing in the presence of Engineer or Owner and under the supervision of equipment manufacturer's field engineer.

C. Include all tests recommended by the equipment manufacturer unless specifically waived by Engineer.

D. Include all additional tests issued by Engineer that he deems necessary because of field conditions, to determine that equipment and material and systems meet requirements of Contract Documents.

E. Be responsible for all damage to equipment or material due to improper test procedures or test apparatus handling.

3.02 PERFORMANCE TESTING

A. 240V Insulated Case Breaker Tests:

1. Check ground connection.
2. Visually inspect each breaker and operate manually.
3. Check adjustable magnetic trips against values furnished by Engineer.
4. Megger each pole for freedom from grounds.
5. Check all connections.
6. Check for proper current rating for circuit to which connected.

B. Control and Instrument Switch Tests:

1. Inspect all contacts and shunts, cleaning contacts if required.

2. Operate switch and note that all design functions are performed in proper sequence.

C. Wire and Cable Tests: (Feeders and Control Circuits Only)

1. Megger all 600V insulated wire with a 500V megger for one minute, and values must be approximately as follows:

Conductor Capacity Amperes	Resistance Ohms
0-24	1,000,000
25-50	250,000
51-100	100,000
101-200	50,000
201-400	25,000
501-800	12,000
Over 800	5,000

a. Determine the values with all panelboards, switches, and overcurrent devices in place. Do not connect motors and transformers during meggering. Megger wire and cable after installation, not on the cable reel.

2. Check all control cable by megger tests similar to those described for 600V insulated wire. Check all control wiring for tightness of terminal contacts and continuity through each "run" of control circuiting. Thoroughly verify all wiring by means of battery-powered lights, buzzers, bells, or telephones. After completing these checks and tests on a given control circuit, attach a temporary cardboard tag on each end of cable tested which bears date and name of Contractor's representative responsible for checking. Follow this procedure for each control circuit cable. Provide all phasing tests and make all changes necessary to assure proper rotation of all motors, the proper polarity on all transformer wiring, and such other phasing tests as may be required for the equipment being connected under this Contract.

D. Grounding Tests:

1. Measure resistance of ground system at each ground riser.
2. Record results and notify Engineer if any reading exceeds 10 ohms.
3. Test at least three of each type of ground connections and not less than 25 percent of all ground connections.
4. Test by the following method for resistance measurement:
   a. Commercial instrument method using equipment as specified in this Section.

END OF SECTION

SECTION 260513

WIRES AND CABLES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of electrical wire and cable work is indicated by drawings and schedules.

B. Types of electrical wire, cable, and connectors specified in this section includes the following:

1. Copper conductors.
2. Split-bolt connectors.
3. Wirenut connectors.

C. Applications of electrical wire, cable, and connectors required for project are as follows:

1. For lighting circuits.
2. For equipment circuits.
3. For grounding.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1, Specification sections, apply to work of this section.

B. This section is a Division 26 Basic Electrical Materials and Methods section and is part of each Division 26 section and other Divisions making reference to electrical wires and cables specified herein.

1.03 QUALITY ASSURANCE

A. **National Electrical Code (NEC):** Comply with NEC requirements as applicable to construction, installation and color coding of electrical wires and cables.

B. **Underwriters Laboratories, Inc. (UL):** Comply with applicable requirements of UL Std. 83, "Thermoplastic-Insulated Wires and Cables," and Std. 486A. "Wire Connectors and Soldering Lugs for Use with Copper Conductors." Provide wiring/cabling and connector products which are UL listed and labeled.

C. **NEMA/ICEA:**

1. Comply with NEMA/ICEA Std. Pub/No.'s WC 5, "Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy."
2. Pub/No. WC-30, "Color Coding of Wires and Cables," pertaining to electrical power type wires and cables.
3. Pub/No. S-66-524, "Cross-Linked Thermosetting Polyethylene-Insulated Wire and Cable.
4. Pub/No. S-68-516, "Ethylene-Propylene Rubber Insulated for Power Cables.

D. **IEEE:** Comply with applicable requirements of IEEE Stds 82, "Test Procedures for Impulse Voltage Tests on Insulated Conductors" and Std. 241, "IEEE Recommended Practice for Electric Power Systems in Commercial Buildings" pertaining to wiring systems.

E. **ASTM:** Comply with applicable requirements of ASTM B1, 2, 3, 8 and D-753. Provide copper conductors with conductivity of not less than 98% at 20°C (68°F).

1.04 SUBMITTALS

A. Submit compliance submittals in accordance with Division 1.

B. Submit manufacturer's data on electrical wires, cables, connectors and splices.

C. Submit proposed methods for cable termination and splicing.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver wire and cable properly packaged in factory-fabricated type containers, or wound on NEMA-specified type wire and cable reels.

B. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris and traffic.

C. Handle wire and cable carefully to avoid abrasing, puncturing and tearing insulation and sheathing. Ensure that dielectric resistance integrity of wires/cables is maintained.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products of one of the following manufacturers (for each type of wire, cable, and connector):

1. Wire and Cable:

   a. Apex Wire and Cable Corp.
   b. American Insulated Wire Corp.
   c. American Wire and Cable Co.
   d. Anaconda-Ericsson Inc; Wire and Cable Div.
   e. Belden Div.; Cooper Industries.
   f. Brand-Rex Div.; Pyle National Co.
   g. Cerro Wire and Cable Corp.
   h. General Cable Corporation.
   i. Phelps Dodge Cable and Wire Co.
   j. Rome Cable Corp.
   k. Southwire Company.
   l. Triangle PWC, Inc.

2. Connectors:

   a. AMP, Inc.
   b. Appleton Electric Co; Emerson Electric Co.
   c. Burndy Corporation.
   d. Brand-Rex Div., Pyle National Co.
   e. Electrical Products Div.; Midland-Ross Corp.
   f. General Electric Co.
   g. Gould, Inc.
   h. Ideal Industries, Inc.
   i. Leviton Mfg. Company.
   j. 3M Company.
   k. O-Z/Gedney Co.
   l. Southport Industries Inc.
   m. Square D Company.
   n. Thomas and Betts Corp.

2.02 WIRES AND CABLES

A. **General:** Provide electrical wires, cables, and connectors of manufacturer's standard materials, as indicated by published product information, designed and constructed as recommended by manufacturer, for a complete installation, and for application indicated. Except as otherwise indicated, provide copper conductors with conductivity of not less than 98% at 20°C (68°F).

B. **Building Wires:** Provide factory-fabricated wires of sizes, ampacity ratings, and materials for applications and services indicated. Where not indicated, provide proper wire selection as determined by Installer to comply with project's installation requirements, NEC and NEMA standards. Utilize the following UL-type wires with construction features which fulfill project requirements as indicated or specified:

1. Type THWN-2/THHW: For dry and wet locations; max operating temperature 90°C (194°F). Insulation, flame-retardant, moisture- and heat-resistant, thermoplastic; outer covering, nylon jacket; conductor, annealed copper.

2.03 CONNECTORS

A. **General:** Provide UL-type factory-fabricated, metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Where not indicated, provide proper selection as determined by Installer to comply with project's installation requirements, NEC and NEMA standards.

B. **Power Cable Connectors:**

1. Designed and sized for the specific cable being constructed.
2. Solderless, pressure-type connectors constructed of noncorrodible tin-plated copper.
3. Vinyl preinsulated ring tongue for wire sizes 12-2 AWG and uninsulated rectangular tongue for wire sizes 1-750 mcm.
4. Rated current carrying capacity equal to or greater than the cable being connected.

C. **Control, Instrument and Specialty Cable Connectors:**

1. Designed and sized for the specific cable being connected.
2. Solderless, pressure-type connectors constructed of noncorrodible tin-plated copper.
3. Vinyl preinsulated type.

2.04 CABLE SUPPORTS

A. Type "R" wedging plug for cables in vertical conduit risers - O.Z.

B. Basket-type wire mesh grip for cables in vertical tray or conduit risers.

2.05 WIRE OR CONDUCTOR MARKERS

A. Vinyl cloth with clear vinyl protective shield.

B. Black printed numbers or letters on white background.

C. Self-sticking.

PART 3 EXECUTION

3.01 INSTALLATION OF WIRES AND CABLES

A. **General:**

1. Install electrical cables, wires and wiring connectors as indicated, in compliance with applicable requirements of NEC, NEMA, UL, and NECA's "Standard of Installation," and in accordance with recognized industry practices.
2. Coordinate wire/cable installation work including electrical raceway and equipment installation work, as necessary to properly interface installation of wires/cables with other work.
3. Pull conductors simultaneously where more than one is being installed in same raceway.

4. Use pulling compound or lubricant, where necessary; compound used must not deteriorate conductor or insulation. Soap cannot be used as a pulling lubricant.
5. Use pulling means including, fish tape, cable, rope and basket weave wire/cable grips which will not damage cables or raceway.
6. Install exposed cable, parallel and perpendicular to surfaces, or exposed structural members, and follow surface contours, where possible.
7. Keep conductor splices to minimum.
8. Install splices and tapes which possess equivalent-or-better mechanical strength and insulation ratings than conductors being spliced.
9. Use splice and tape connectors which are compatible with conductor material.
10. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Std. 486A and B.

3.02 FIELD QUALITY CONTROL

A. Provide manufacturer's field services as specified in Division 1.

B. Field testing as specified in this Division.

END OF SECTION

SECTION 260533

RACEWAYS

PART 1 GENERAL

1.01 SUMMARY AND DESCRIPTION OF WORK

A. The work under this specification includes furnish and installing as a complete job, all raceways, fittings, and supports for the raceway system is indicated by drawings and schedules.

B. Types of raceways in this section include the following:

1. Rigid metal conduit
2. Rigid nonmetallic conduit.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Divisions 1 Specification sections, apply to work of this section.

B. This section is a Division 26 Basic Materials and Methods section and is part of each Division 26 section and other divisions making reference to electrical raceways specified herein.

1.03 QUALITY ASSURANCE

A. Standards

1. National Electrical Manufacturers Association (NEMA): Comply with applicable requirements of NEMA standards pertaining to raceways.
   a. FB1 - Conduit Fittings, Cable Fittings, and Accessories.
2. Underwriters' Laboratories, Inc. (UL): Comply with provisions of UL safety standards pertaining to electrical raceway systems; and provide products and components which have been UL-listed and labeled.
   a. UL-6 – Rigid Metal Electrical Conduit
   b. UL-514 - Electrical Outlet Boxes and Fittings.
3. National Electrical Code (NEC): Comply with requirements as applicable to construction and installation of raceway systems (latest revision).
4. American National Standards Institute (ANSI): Comply with requirements as applicable to conduit and raceways.
   a. C80.1 - Rigid Steel Conduit, Zinc-Coated.
   b. C80.5 - Rigid Aluminum Conduit

1.04 SUBMITTALS

A. Submit compliance submittals in accordance with Division 1.

B. Submit manufacturer's data including specifications, installation instructions and general recommendations for each type of raceway required.

C. Submit conduit/accessories, type, and intended installation locations.

PART 2 PRODUCTS

2.01 MATERIALS

A. METAL CONDUIT

1. General: Provide rigid metal conduit, and fittings of types, grades, sizes and weights (wall thickness) for each service indicated. Where sizes are not indicated, provide proper selection as determined by Installer to fulfill wiring requirements and comply with applicable portions of NEC for raceways.
   a. Each length of threaded conduit shall be furnished with coupling on one end and metal or plastic thread protector on other end.
   b. UL listed and labeled conduit on each length, fittings, and accessories.
2. Rigid Metal Conduit
   a. Rigid Steel
      1) Conform to ANSI C80.1.
      2) Mild ductile steel, circular in cross section with uniform wall thickness sufficiently accurate to cut clean threads.
      3) Each length threaded on both ends with thread protector on one end and galvanized coupling on the other.
      4) All scale, grease, dirt, burrs and other foreign matter removed from inside and outside prior to application of coating materials.
      5) Galvanized by the hot-dip process as follows:
         a) Interior and exterior surfaces coated with a solid, unbroken layer of 99 percent virgin zinc by dipping.
         b) Coating not to show fixed deposits of copper after four 1-minute immersions in a standard copper sulfate solution.
         c) One coat of zinc chromate finish on inside and outside surfaces to prevent oxidation and white rust.
   b. Rigid Aluminum Conduit
      1) Conform to ANSI C80.5 and FS WW-C-540.
      2) Rigid aluminum 6063 Alloy and T-1 temper.
      3) Shipped with thread protectors to shield threads.
   c. Fittings and Couplings
      1) Fittings and couplings for exposed rigid conduit systems shall be threaded hub, cast alloy, of the type indicated.
      2) All conduits shall have galvanized steel covers with neoprene gaskets and captive screws. Both Aluminum and steel fittings shall have interchangeable steel covers. Couplings and elbows fabricated, coated and finished by the same process as conduit.
      3) Fittings for Rigid Steel shall be threaded hub malleable iron, Appleton Form 35 or approved equal.
      4) Fittings for Aluminum shall be threaded hub malleable iron, Appleton Form 85 or approved equal.
   d. Final treatment of acid to form a corrosion-resistant coating of zinc chromate on galvanized surfaces.
   e. Watertight fittings shall be used throughout.

B. Non-metallic Conduit

1. General: Provide nonmetallic conduit, ducts and fittings of types, sizes and weights (wall thickness) for each service indicated. Where types and grades are not indicated, provide proper selection to comply with applicable provisions of NEC for raceways. Provide underground duct systems complete with duct spacers, manhole hardware and "pulling in" rope.
2. Schedule 40 PVC (Polyvinyl Chloride). NEMA Standards Pub. No. TC2, Type 3. Conform to UL 651.
    a. UL listed
    b. Sunlight resistant
    c. Rated for use with 90-degree conductors
    d. Heavy wall
3. Conduit, Tubing, and Duct Accessories: Provide conduit, tubing and duct accessories of types, sizes, and materials, complying with manufacturer's published product information, which mate and match conduit and tubing. NEMA Standards Pub. No TC3.

PART 3 EXECUTION

3.01 INSTALLATION OF ELECTRICAL RACEWAYS

A. Install electrical raceways where indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA "Standard of Installation," and complying with recognized industry practices. Minimum size for rigid conduit shall be 3/4-in. diameter trade size and minimum size for liquid-tight flexible conduit shall be 1/2-in. diameter trade size.

B. Coordinate with other work as necessary to interface installation of electrical raceways and components with other work.

C. Coat underfloor metal raceways with bitumastic type protective coating prior to placing concrete.

D. Level and square raceway runs and install at proper elevations/heights.

E. Complete installation of electrical raceways before starting installation of cable-wires within raceways.

F. Wherever possible, install horizontal raceway runs above water piping.

G. Install all conduit penetrations at lower sections of enclosures/control panels to prevent/reduce condensation & moisture from dripping onto enclosure components.

H. Install flexible conduit seal material at all conduit penetrations to electrical boxes and enclosures. Sealing material shall be Pergamum type Virginia KMP or approved equal.

I. Applications
    1. Rigid steel conduit systems
        a. Exterior locations, above ground when NOT exposed to open wells, channels, sumps, or basins.
        b. Interior locations - concrete slab and decking surface elbow/sweep terminations risers and extended vertically minimum of 42 inches to electrical equipment, unless otherwise indicated.
        c. Ground both ends of conduit runs to electrical system ground.
    2. Rigid Aluminum conduit systems
        a. Exposed and concealed interior work.
        b. Exposed exterior work in locations to/near open wells, channels, sumps, and basins.
        c. In Hazardous locations (As a substitute for rigid galvanized conduit, as allowed by the NEC).
        d. Ground both ends of conduit runs to electrical system ground.

3. Rigid Nonmetallic Conduit

    a. Concealed in walls, floors, slabs, and ceilings.

    b. Not exposed to physical damage

    c. Consider conduit's expansion and contraction characteristics during location selection and installation process.

    d. Schedule 40 PVC in underground concrete encased ducts. All traffic areas, road crossings, and potential heavy equipment locations shall be concrete encased.

    e. Direct Buried installation shall be Schedule 80 PVC for areas not subject to physical damage.

J. Adjusting and Cleaning:

1. Upon completion of installation of raceways, inspect interiors of raceways; remove burrs, dirt and construction debris prior to installing cable and conductors.

END OF SECTION

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SECTION 260583

ELECTRICAL CONNECTIONS FOR EQUIPMENT

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of electrical connections for equipment is indicated by drawings and schedules. Electrical connections are hereby defined to include connections used for providing electrical power to equipment.

B. Applications of electrical power connections specified in this section include the following:

1. To lighting fixtures.
2. To grounds including earthing connections.
3. To control systems and equipment

C. Electrical connections for equipment, not furnished as integral part of equipment, are specified in other Division 26 sections and are work of this section.

D. Electrical identification for wire/cable conductors is specified in Division 26 section, "Electrical Identification," and is work of this section.

E. Raceways and wires/cables required for connecting electrical units of equipment are specified in applicable Division 26 sections and are work of this section.

F. Refer to sections of other Divisions for specific individual equipment power requirements, not work of this section.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. This section is a Division 26 Basic Electrical Materials and Methods section and is part of each Division 26 section making reference to electrical connections for equipment specified herein.

1.03 QUALITY ASSURANCE

A. **National Electrical Code (NEC):** Comply with applicable requirements of NEC as to type products used and installation of electrical power connections (terminals and splices) for junction boxes, motor starters, and disconnect switches.

B. **Institute of Electrical and Electronic Engineers (IEEE):** Comply with Std 241, "IEEE Recommended Practice for Electric Power Systems in Commercial Buildings" pertaining to connections and terminations.

C. **American National Standards Institute (ANSI):** Comply with applicable requirements of ANSI/NEMA and ANSI/EIA standards pertaining to products and installation of electrical connections for equipment.

D. **Underwriters Laboratories (UL):** Comply with UL Std 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors" including, but not limited to, tightening of electrical connection products and materials which are UL listed and labeled.

PART 2 PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. **General:** For each electrical connection indicated, provide complete assembly of materials, including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape,

electrical solder, electrical soldering flux, heat-shrinkable insulating tubing, cable ties, solderless wire-nuts, and other items and accessories as needed to complete splices and terminations of types indicated.

B. **Wires, Cables and Connectors:**

1. General: Provide wires, cables, and connectors complying with Division 26 basic electrical materials and methods section "Wires and Cables."
2. Wires/Cables: Unless otherwise indicated, provide wires/cables (conductors) for electrical connections which match, including sizes and ratings, of wires/cables which are supplying electrical power. Provide copper conductors with conductivity of not less than 98% at 20°C (68°F).
3. Electrical Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing and boots, electrical solder, electrical soldering flux, wirenuts and cable ties as recommended for use by accessories manufacturers of type services indicated.

PART 3 EXECUTION

3.01 INSTALLATION OF ELECTRICAL CONNECTIONS

A. Install electrical connections as indicated, in accordance with equipment manufacturer's written instructions and with recognized industry practices and complying with applicable requirements of UL, NEC and NECA's "Standard of Installation" to ensure that products fulfill requirement.

B. Coordinate with other work, including wires/cables, raceways and equipment installation, as necessary to properly interface installation of electrical connections for equipment with other work.

C. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams. Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment.

D. Cover splices with electrical insulating material equivalent to, or of greater insulating resistivity rating than, electrical insulation rating of those conductors being spliced.

E. Prepare cables and wires by cutting and stripping covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated. Exercise care to avoid cutting through tapes which will remain on conductors. Also avoid "ringing" copper conductors while skinning wire.

F. Trim cables and wires as short as practicable and arrange routing to facilitate inspection, testing and maintenance.

G. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Accomplish tightening by utilizing proper torquing tools, including torque screwdriver, beam-type torque wrench, and ratchet wrench with adjustable torque settings. Where manufacturer's torquing requirements are not available, tighten connectors and terminals to comply with torquing values contained in UL's 486A.

H. Fasten identification markers to each electrical power supply wire/ cable conductor which indicates their voltage, phase and feeder number in accordance with Division 26 section "Electrical Identification." Affix markers on each terminal conductor as close as possible to the point of connection.

PART 4 FIELD QUALITY CONTROL

A. Upon completion of installation of electrical connections and after circuitry has been energized

with rated power source, test connections to demonstrate capability and compliance with requirements of Section 16800. Ensure that direction of rotation of each motor fulfills requirements. Correct malfunctioning units at site, then retest to demonstrate compliance.

END OF SECTION

SECTION 262726

WIRING DEVICES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. The extent of wiring device work is indicated by drawings and schedules. Wiring devices are defined as single discrete units of electrical distribution systems which are intended to carry but not utilize electric energy.

B. Types of electrical wiring devices in this section include the following:

1. Receptacles.
2. Ground-fault circuit interrupters.
3. Switches.

1.02 RELATED DOCUMENTS

C. Drawings and general provisions of Contract, including Division 1 Specification sections, apply to work of this section.

D. This section is a Division 26 Basic Electrical Materials and Methods section and is part of each Division 26 section making reference to wiring devices specified herein.

1.03 SUBMITTALS

A. Submit compliance submittals in accordance with Division 1.
B. Submit manufacturer's data on electrical wiring devices.

1.04 QUALITY ASSURANCE

A. **National Electrical Code (NEC):** Comply with NEC as applicable to installation and wiring of electrical wiring devices.
B. **Underwriters Laboratories, Inc. (UL):** Comply with applicable requirements of UL 20, 486A, 498 and 943 pertaining to installation of wiring devices. Provide wiring devices which are UL listed and labeled.
C. **Institute of Electrical and Electronic Engineers (IEEE):** Comply with applicable requirements of IEEE Std 241, "Recommended Practice for Electric Power Systems in Commercial Buildings," pertaining to electrical wiring systems.
D. **National Electrical Manufacturers' Association (NEMA):** Comply with applicable portions of NEMA Stds Pub/No. WD 1, "General-Purpose Wiring Devices," WD 2, "Semiconductor Dimmers for Incandescent Lamps," and WD 5, "Specific-Purpose Wiring Devices."

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide wiring devices of one of the following manufacturers (for each type and rating of wiring device):

1. Appleton Electric Co.
2. Arrow-Hart Div., Crouse-Hinds Co.
3. Bryant Electric Co.
4. Eagle Electric Mfg. Co.
5. General Electric Co.
6. Cooper
7. Hubbell
8. Harvey Hubbell Inc.

9. Leviton Mfg. Co.
10. Pass and Seymour, Inc.
11. Slater Electric Co.
12. Square D Co.
13. Sierra-Electric
14. Red DotABB/Thomas & Betts.
15. Or approved equal.

2.02 FABRICATED WIRING DEVICES

A. **General:** Provide factory-fabricated wiring devices, in types, colors, and electrical ratings for applications indicated and which comply with NEMA Stds Pub/No. WD 1. Provide ivory color devices and stainless-steel wall plates except as otherwise indicated.

B. **Receptacles:**

1. Heavy-Duty Duplex: Provide heavy-duty duplex receptacles, 2-pole, 3-wire, grounding, 20 amperes, 125 volts, with metal plaster ears, design for side and back wiring, with NEMA configuration 5-20R unless otherwise indicated. Provide "specification grade" receptacles.

2. Ground-Fault Duplex: Provide “Termination” type ground-fault, heavy-duty duplex receptacles, capable of being installed in a 2-3/4" deep outlet box without adapter, grounding type, rated 20 amperes, 120 volts, 60 Hz; with solid-state ground-fault sensing and signaling; with 5 milliamperes ground-fault trip level; equip with NEMA configuration 5-20R.

3. Weatherproof: Provide with heavy-duty duplex receptacle and weatherproof “while-in-use” cover, with stainless steel hinge pin, for mounting on an FS or FD box.

4. Simplex: Provide heavy-duty simplex receptacle, single phase, 2 pole, 30 amperes, 125 volts, flush mount and with weatherproof “while-in-use” cover. Simplex receptacle shall be NEMA configuration L5-30R

C. **Switches:**

1. Pilot Switch: Provide 20 ampere, 120-277 volt Pilot Light Toggle Switch (Light On with Load On configuration), industrial grade with thermoplastic housing material, red LED indicator light, and clear weatherproof box cover

2. Switch: Provide 20 ampere, 120-277 volt, 2-pole, 3-way toggle switch designed for back and side wiring, rated for indoor use

PART 3 EXECUTION

3.01 INSTALLATION OF WIRING DEVICES

A. Install wiring devices as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation," and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate with other work, including painting, electrical boxes, and wiring work, as necessary to interface installation of wiring devices with other work.

C. Mount switches at 4' above the floor.

D. Mount receptacles at 1'-6" above the floor in finished areas and 4'-0" above the floor in unfinished areas, unless noted otherwise on drawings.

E. Install wiring devices only in electrical boxes which are clean, free from excess building materials, dirt, and debris.

F. Install wiring devices after wiring work is completed.

G. Install wall plates after painting work is completed.

H. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A and B. Use properly scaled torque indicating hand tool.

3.02 PROTECTION OF WALLPLATES AND RECEPTACLES

A. Upon installation of wall plates and receptacles, advise Contractor regarding proper and cautious use of convenience outlets. At time of Substantial Completion, replace those items which have been damaged, including those burned and scored by faulty plugs.

3.03 GROUNDING

A. Provide equipment grounding connections for wiring devices in accordance with Section 16450. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounds.

3.04 TESTING

A. Prior to energizing circuitry, test wiring for electrical continuity and for short-circuits. Ensure proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements and in accordance with Field Testing, Section 16800.

END OF SECTION

SECTION 265113

LIGHTING FIXTURES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of lighting work is indicated by drawings and schedules.
B. Types of lighting fixtures are designated on the drawings and specified in this section.
C. Spare fixtures, lamps, and hardware as indicated and specified in this section.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. This section is a Division 26 Basic Electrical Materials and Methods section and is part of each Division 26 section and other Divisions referring to lighting fixtures specified here in.

1.03 SUBMITTALS

A. **Product Data:** Submit manufacturer's technical product data on lighting fixtures in accordance with Division 1.

B. **Compliance Submittals:** Submit fixture drawings in booklet form with separate sheet for each fixture, assembled in "luminaire type" alphabetical or numerical order, with proposed fixture and accessories clearly indicated on each sheet.

C. **Maintenance Data:** Submit maintenance data and parts list for each lighting fixture and accessory, including "trouble-shooting" maintenance guide. Include that data, product data, and submittal drawings in operation and maintenance manual; in accordance with requirements of Division 1.

D. **Required Information:** Include, as a minimum, construction data, ballast information, photometric data, catalog data, lamp type, lamp color, dimensional data, and fixture voltage.

1.04 QUALITY ASSURANCE

A. **National Electrical Code (NEC):** Comply with NEC as applicable to installation and construction of lighting fixtures.

B. **National Electrical Manufacturers Association (NEMA):** Comply with applicable requirements of NEMA Stds Pub/No.'s LE 1 and LE 2 pertaining to lighting equipment.

C. **Illuminating Engineering Society (IES):** Comply with IES RP-1 pertaining to office lighting practices and RP-15 regarding selection of illuminance values for interior office lighting.

D. **Underwriter's Laboratories (UL):** Comply with UL standards, including Stds 486A and B pertaining to lighting fixtures. Provide lighting fixtures and components which are UL-listed and labeled.

E. **Certified Ballast Manufacturers (CBM)**: Provide lamp ballasts which comply with Certified Ballast Manufacturers Association standards and carry the CBM label.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Handle lighting fixtures carefully to prevent damage, breaking, and scoring. Do not install damaged fixtures or components; replace with new.

B. Store lighting fixtures in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

PART 2 PRODUCTS

2.01 Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

A. **Luminaires:** Acceptable manufacturers, or approved equal, for each luminaire are specified on the drawings. To include, but not limited to:

1. American Electric Lighting (AEL)
2. Aquity Brand Company—Holophane
3. Cooper Lighting
4. Hubbell Lighting
5. Lithonia Lighting
6. King Luminaire
7. H.E. Williams, Inc.

2.02 LUMINAIRES

A. **General:** Provide lighting fixtures, of sizes, types, and ratings per specification sheets, complete with, but not limited to, housings, energy- efficient lamps, lamp holders, reflectors, energy-efficient ballasts, starters, and wiring. Ship fixtures factory-assembled, with parts required for a complete installation. Design fixtures with concealed hinges and catches, with metal parts grounded as common unit, and so constructed as to dampen ballast-generated sounds.

B. **Wiring:** Provide electrical wiring within fixture suitable for connecting to branch circuit wiring as follows:

1. NEC Type AF for 120 Volt, minimum No. 18 AWG.
2. NEC Type SF-2 for 277 Volt, minimum No. 18 AWG.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which lighting fixtures are to be installed and substrate for supporting lighting fixtures. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.02 INSTALLATION OF LIGHTING FIXTURES

A. Install lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation," NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.

B. Coordinate with other electrical work as appropriate to properly interface installation of lighting fixtures with other work. Shift locations if required to avoid interference with piping, ducts, equipment, or other apparatus at no cost to the Owner.

C. Provide fixtures and/or fixture outlet boxes with hangers to properly support fixture weight. Submit design of hangers, method of fastening, other than indicated or specified herein, for review by Engineer.

D. Tighten connectors and terminals, including screws and bolts, to comply with tightening torques specified in UL Stds 486A and B.

E. Support surface-mounted fixtures greater than 2' in length at a point in addition to the outlet box fixture stud.

F. **SPARE PARTS:** At completion and Owner project acceptance, furnish Owner with:

1. One (1) spare fixture of each type of LED fixture installed.

3.03 ADJUSTING AND CLEANING

A. Clean lighting fixtures of dirt and debris upon completion of installation.
B. Protect installed fixtures from damage during the remainder of construction period.

3.04 FIELD QUALITY CONTROL

A. Upon completion of installation of lighting fixtures, and after circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.
B. Refer to Division 1 sections for the replacement/restoration of lamps in lighting fixtures, where used for temporary lighting prior to Date of Substantial Completion.

END OF SECTION

SECTION 310000

EARTHWORK

PART 1 - GENERAL

1.01. SUMMARY

A. This Section includes site preparation activities and items of earthwork necessary to complete the project.

1.02. SUBMITTALS

A. Submit sieve analysis reports for all granular materials

1. Analysis shall include the source location and material description

2. Analysis shall have been performed within 12 months of the submittal.

B. Submit to Engineer for approval the name, location, and qualifications of the independent soils testing agency selected and hired by the Contractor for compaction testing and soils inspection. Include the name and qualifications of the supervising professional engineer to be designated the Soils Engineer.

C. Submit certified soils inspection and testing results as the work progresses:

1. In-place moisture-density soil test reports. Fully document each specific location or stationing information, lift or approximate elevation, and date and other pertinent information.

2. Inspection records of subgrade and compaction. Fully document each with specific location or stationing information, lift or approximate elevation, and date or other pertinent information.

1.03. QUALITY ASSURANCE

A. American Society of Testing and Materials (ASTM):

D698 - Test method for laboratory compaction characteristics of soil using Standard Effort (12,400 ft-lbf-ft)

D1556 - Standard test method for density and unit weight of soil in place by the Sand-Cone Method.

D1557 - Test method for laboratory compaction characteristics of soil using Modified Effort (56,000 ft-lbf/ft^3(2,700 KN-M/M^3))

D2167 - Standard test method for density and unit weight of soil in place by the Rubber Balloon Method.

D2922 - Standard test methods for density of soil and soil aggregate in place by Nuclear methods (shallow depth)

D2937 - Standard test method for density of soil in place by the Drive Cylinder Method.

D4253 - Standard test method for Maximum Index Density and unit weight of soil using a Vibratory Table.

D4718 - Standard practice for correction of unit weight and water content for soils containing oversize particles.

B. American Association of State Highway and Transportation Officials Standard Method of Test (AASHTO):

T-96 - Resistance to degradation of small size coarse aggregate by abrasion and impact by the Los Angeles Machine.

T-99 - The moisture density relations of soils using a 2.5 KG (5.5 lb) rammer and a 305 mm (12 in) drop.

T-104 - Soundness of aggregate by use of Sodium Sulfate or Magnesium Sulfate test.

1.04. SITE CONDITIONS

A. Provide full access to public and private premises and fire hydrants, at street crossings, sidewalks and other points as designated by Owner to prevent interruptions of facility operations or travel.

B. Lines and grades shall be as indicated on the plans.

C. Contractor shall be responsible for all construction layout/staking to construct the work from control data furnished or established by the Engineer.

D. Carefully maintain all bench marks, monuments and other reference points. Contractor shall be responsible for replacement if disturbed or destroyed.

E. Disposition of Existing Facilities, Structures and Property:

1. Adequately protect from damage all existing utilities, structures and property and remove or relocate only as indicated, specified or as directed by the Engineer.

2. Report inactive and abandoned utilities encountered in excavating and grading operations. Remove, plug, or cap as directed.

3. Confine operations to that area provided through easements, licenses, agreements and rights-of-way. The Contractor's entrance upon any lands outside of that area provided by easements, licenses, agreements or public rights-of-way, shall be at the Contractor's sole liability.

PART 2 - PRODUCTS

2.01. MATERIALS

A. Materials Classification:

1. All materials encountered, regardless of type, character, composition, or condition thereof, shall be unclassified.

B. Excavation shall include all materials found within the designated limits for excavation.

1. Determine quantity of various materials to be excavated prior to submitting Bid Form.

2. Arrangements for entry to site for purpose of conducting subsurface investigations, including test borings, shall be made with Owner.

C. Material properties for compaction:

1. Cohesionless materials include gravels, gravel-sand mixtures, sands and gravelly sands exclusive of clayey and silty material - materials which are free-draining and for which impact compaction will not produce a well-defined moisture-density relationship curve and for which the maximum density by impact methods will generally be less than by vibratory methods.

2. Cohesive materials include silts and clays generally exclusive of sands and gravel - materials for which impact compaction will produce a well-defined moisture-density relationship curve.

D. Waste Materials:

1. Includes excess suitable material and material unsuitable for use in the Work.
2. Remove from work area as excavated.
3. Keep excess suitable material segregated from other waste material.
4. Dispose of waste material on site as directed by the Engineer, or off site.
5. Grade waste areas and leave them with an orderly and neat appearance.

E. Borrow Materials:

1. Refers to all backfill and embankment material obtained from approved locations on or off the jobsite.
2. Borrow shall include all excavating, handling and final disposal of material as specified.
3. Material removed from borrow area(s) shall be approved by the Engineer.
4. Leave on-site borrow area(s) graded to drain and to present a neat appearance.

F. Granular Fill and Pipe Embedment Materials.

1. Material shall be crushed limestone or crushed natural gravel with the following gradation:

Sieve Designation	Percent Passing By Weight
1"	100
1/2"	55-90
No. 4	8-40
No. 10	0-15
No. 200	0-4

2. Material shall not have a loss of more than 15% after 5 cycles when tested for soundness with sodium sulfate as described in AASHTO T104.
3. Use:
   a. Under slabs on grade.
   b. To correct over excavation in trenches.
   c. As pipe embedment.

G. Aggregate Drainage Materials:

1. Material shall be crushed limestone or crushed natural gravel with the following gradation:

SIEVE DESIGNATION	PERCENT PASSING BY WEIGHT
1"	100
3/4"	50-100
1/2"	0-15
NO. 10	0-4

2. Material shall not have a loss of more than 15% after 5 cycles when tested for soundness with sodium sulfate as described in AASHTO T104.
3. Use:
   a. Under slabs and mats where pressure relief valves or perforated drains are used for groundwater control.
   b. At base of walls where perforated drains are shown.

H. 1-IN Minus (MoDOT Type 1) Aggregate:

1. Material shall consist of crushed stone, sand and gravel or reclaimed asphalt or concrete. Aggregate shall have the following gradation:

SIEVE DESIGNATION	PERCENT PASSING BY WEIGHT
1"	100
1/2"	60-90
NO. 4	35-60
NO. 30	10-35

2. Aggregate shall not contain more than 15 percent deleterious rock and shale.
3. The fraction of material passing the No. 40 sieve shall have a minimum plasticity index of six (6).
4. Any sand, silt and clay or deleterious rock, shale shall be uniformly distributed throughout the material
5. Use:
   a. Under slabs and mats where engineered granular fill is required to remediate highly plastic and low strength soils.
   b. As directed on the plans.

I. Base Stabilization Rock:

1. Crusher run limestone, 4" maximum size.

J. Topsoil Materials:

1. Includes those materials obtained from excavation or borrow area(s) which are free from roots, rocks and debris and which are suitable for supporting growth of vegetation.

K. Backfill Materials:

1. Include suitable approved materials from excavations and borrow area(s).

2. Shall be friable sandy or silty clay containing fine material sufficient to provide a dense mass free of voids and capable of satisfactory compaction.

3. Shall be free of roots or other organic matter, refuse, cinders, ice, snow, frozen earth, or other unsuitable matter.

4. Do not use material containing gravel, stones, or shale particles greater in dimension than one-half the depth of the layer to be compacted.

a. Larger rocks may be incorporated in embankments where specifically directed by the Engineer.

PART 3 - EXECUTION

3.01. CLEARING AND GRUBBING

A. Perform clearing and grubbing where indicated and as necessary to perform excavation, trenching, embankment, borrow and other work required.

B. Clearing:

1. Clearing includes felling and disposal of trees and brush. Remove only those trees necessary for prosecution of the work. Preserve and protect all trees not specifically required to be removed.

2. Temporarily remove existing fences within the limits of clearing.

C. Grubbing:

1. Removal and disposal of tree stumps and roots larger than 3 inches in diameter.

2. Remove to a depth of at least 18 inches below existing grade.

3. Backfill all excavated depressions with approved material and grade to drain.

3.02. DEMOLITION

A. Remove existing equipment or structures as indicated, or as required to perform new construction.

B. Materials not indicated or specified to be relocated or returned to Owner shall be disposed of as specified in "Disposal of Debris" in this section.

C. Relocation and return of material or equipment:

1. Carefully dismantle, in manner to avoid damage, all materials and equipment specified or indicated to be relocated or returned to Owner.

2. Store materials and equipment to be reused in a manner to avoid corrosion, staining, breakage, or damage.

3. Material or equipment specified or indicated to be relocated or returned to the Owner and damaged due to Contractor's negligence shall be repaired or replaced as directed by Engineer.

D. Obstructions:

1. Sidewalks, driveways, curb and gutter, drainage structures and similar obstructions permitted to be removed shall be cut in straight lines or removed to the nearest construction joint if located within five feet of the edge of the excavation. In no case shall the joint or line of cut be less than one foot outside the edge of the excavation. Surface obstructions removed to permit construction shall be reconstructed as specified and to the dimensions, lines and grades of original construction.

2. Fences interfering with construction, and located within public rights-of-way or as may be allowed for in permits or agreements, may be removed by the Contractor. Provide narrow trench openings in fence with a temporary gate, maintained in a closed position except to permit passage of equipment and vehicles. Fences within temporary construction easements may be removed by the Contractor provided that temporary fencing is installed in such a manner as to serve the purpose of the fencing removed. The Contractor shall locate and record all fence corners prior to removal. Restore all removed fencing to the condition existing prior to construction unless otherwise specified or directed. The Contractor shall be solely liable for the straying of any fenced or corralled animals or other damage caused by any fence so removed.

3.03. STRIPPING

A. Remove topsoil from areas within limits of excavation, trenching, borrow and areas designed to receive embankment or compacted fill.

B. Scrape areas clean of all brush, grass, weeds, roots and other unsuitable material.

C. Strip to a minimum depth of 6 inches, and to a sufficient depth to remove excessive roots in heavy vegetation or brush areas and as required to segregate topsoil.

D. Stockpile topsoil reasonably free of subsoil, debris and stones larger than 2-inch diameter, in sufficient quantity to complete the work. Stockpile shall not interfere with construction operations and existing facilities.

3.04. DISPOSAL OF DEBRIS

A. Dispose of debris off the jobsite at a location provided by the Contractor.

B. Combustible waste material and debris may be burned if permitted by local regulations. Burning is subject to the Contractor obtaining required permits and conducting burning operations in accordance with Federal, State and local regulations.

3.05. EXCAVATION SUPPORT

A. Support excavations and slopes using sheeting, bracing, or other means as necessary to:

1. Protect life and property.

2. Conform to Federal, State and local regulations.

3. Avoid excessively wide cuts in unstable material.

4. Protect existing structures and facilities from soil movement.

B. Plan layout of excavation operations to protect adjacent property and existing structures and facilities.

C. Take precautions against movement or settlement of existing structures. Establish and record elevations of existing facilities near excavations before excavating. Remove sheeting and bracing in a manner that does not create voids or induce settlement of adjacent soil.

D. If existing or adjacent structures show structural distress, or become endangered by any condition or event, cease operations immediately and notify Engineer. Do not resume operations prior to correction or modification of procedures leading to the unstable condition.

3.06. EXCAVATION

A. General:

1. Includes excavation for the installation to the alignment and elevation indicated of ground wires, electrical conduits, storm drainage pipes, process piping and structures.

B. Trenches:

1. Ground Wires and Electrical Conduits:

a. Remove material required for alignment and elevation, or minimum depth of installation.

2. Pipes:

a. Trench depth to provide embedment and to remove unsuitable bottom material.

b. Trench width, at top of pipe and below, to be between pipe outside diameter plus 1 foot (minimum) and plus 2 foot (maximum).

c. Trench walls to be vertical below the top of pipe and may be vertical or sloped above top of pipe as determined by the stability of the material being trenched.

d. Trenches to be sheeted and braced when required.

e. Maximum length of open trench shall comply with local codes and shall not exceed 400 feet.

f. Erect barriers or other appropriate protection to prohibit accidental or unauthorized entry of persons into trenches.

C. Structures: Perform as specified for "Trenches" and as follows:

1. Excavate area adequate to permit erection and removal of forms.

2. Trim to neat lines where concrete is to be deposited against earth.

3. Excavate by hand in areas where space and access will not permit use of machines.

4. Notify Engineer immediately when excavation has reached the depth indicated. Do not proceed further until approved.

5. Restore bottom of excavation to proper elevation in areas over excavated, as follows:

a. For structures supported by piles or caissons, with compacted embankment.

b. For structures supported by concrete footings or mats, with concrete.

6. Excavate rock, where encountered, to a distance of at least three (3) feet away from outside of structure walls. Bench any additional rock excavation required for stability during construction to maintain vertical cuts. Perform such additional excavation and furnish any additional backfill subsequently required at no extra cost to Owner.

D. Blasting:

1. Blasting shall not be allowed within the scope of this project without written authorization of the Owner and Engineer,

3.07. DEWATERING

A. Control grading around excavations to prevent surface water from flowing into excavation.

B. Drain or pump surface and groundwater as required to continually maintain all excavations and trenches free of water or mud. Commence when water first appears and continue until work is complete to the extent that no damage will result from the presence of water.

C. Discharge to approved drains or channels. Contractor shall obtain State or local permits for discharge if such are required. Water discharged to streams shall be free of silt and other objectionable materials. Discharge water so that the work in progress and other properties are not damaged. Do not interfere unduly with the use of streets, alleys, private drives, or entrances.

D. Use pumps of adequate capacity to ensure rapid drainage.

E. Construct and use drainage channels and subdrains as required.

F. Remove unsuitable excessively wet materials and replace with approved material.

3.08. STOCKPILING

A. Stockpile in amounts sufficient for and in a manner to segregate materials suitable for backfilling trenches and structures.

B. Do not obstruct or prevent access to roads and drives.

C. Do not obstruct drainage patterns.

D. Stockpile material in such a manner as to limit potential for erosion and inundation as a result of local or global flooding. Coordinate stockpiles locations with Owner.

3.09. COMPACTION AND TESTING FOR EMBANKMENT, BACKFILLING, AND SUBGRADE

A. Perform wetting or drying of compacted material as required to obtain specified density. Moisture content at time of placement shall not be less than optimum or more than 4 percent above optimum as determined by ASTM D 698.

B. Do not place snow, ice or frozen earth in compacted soil and do not place compacted soil on a frozen surface.

C. Remove waste material, trees, organic material, rubbish, or other deleterious substances from soil to be compacted.

D. An acceptable testing laboratory shall be selected and paid for by the Contractor to perform all laboratory and field soil testing necessary to demonstrate compliance with compaction requirements. The soil density testing frequency shall be as follows:

1. For trenches within street right-of-way, or under drives or parking lots, density tests representative of each three (3) feet of trench depth shall be taken at five hundred (500) linear foot intervals along the lines. Concentrate tests at cross streets and drives.

2. For trenches outside the street right-of-way, density tests representative of each three (3) feet of trench depth shall be taken at one thousand (1000) linear foot intervals along the lines.

3. For structural backfill, density tests representative of each 100 cubic yards of fill shall be taken.

4. For compacted subgrade, density tests representative of each 500 square yards of subgrade shall be taken.

E. Perform testing in accordance with ASTM D 698 where AASHTO T-99 or "Standard Proctor" has been indicated. AASHTO T-99 may be used only with prior written approval of the Engineer.

F. Cohesionless material shall be compacted to 75% of relative density as determined by ASTM D4253 unless otherwise noted.

3.010. EMBANKMENT

A. Placement:

1. Place to the contours and elevations indicated.

2. Place embankment material in lifts not exceeding eight (8) inches (uncompacted depth).

3. When rocks larger than four inches are present, they shall be scattered and thoroughly consolidated with sufficient compacted soil to completely fill all voids between the rocks. Exclude rocks larger than one half the depth of the lift from the top two (2) feet of the embankment.

B. Compaction:

1. Cohesive material in embankment shall be compacted to 95% of maximum density at optimum moisture as determined by ASTM D 698.

2. Cohesionless material in embankment shall be compacted to 75% of relative density as determined by ASTM D4253.

3.011. BACKFILLING

A. Place backfill to the elevations indicated.

B. In areas requiring 95 percent compaction, place backfill in lifts not exceeding eight (8) inches (uncompacted depth). Place in twelve (12) inch maximum lifts in other areas.

C. Obtain compaction specified by normal methods and equipment. Accomplish without inundation or flooding.

D. Complete promptly after approval to proceed.

E. Backfill failing to meet specified densities shall be removed or scarified and recompacted to meet specified densities.

F. Use acceptable topsoil materials for top layers of compacted backfill in pasture land, lawns, parks, and gardens.

G. Trenches:

1. Backfill pipes in 6 inch lifts deposited alternately on opposite sides of pipe to a plane 12 inches above pipe.

2. Compact backfill to 95 percent of maximum density (ASTM D 698) under all areas to be surfaced with concrete, asphaltic concrete, or gravel, including streets, drives, sidewalks, and parking areas, and under developed lots and lawns. Compact all other backfill to 90 percent of maximum density (ASTM D 698).

3. No rock greater than one (1) foot, measured along its longest axis, shall be placed within two (2) feet of the top of a pipe in any backfill. No rocks greater than one (1) foot will be allowed in the backfill above service line terminations, tees and wyes.

H. Structures:

1. Compact backfill to 95 percent of maximum density (ASTM D 698) under all structures and in excavations adjacent to structures.

2. Backfill only after concrete has attained 70 percent of its design strength.

3. Backfill adjacent to structures only after, in the opinion of the Engineer, a sufficient portion of the structure has been completed to resist the imposed soil load.

4. Remove all forms and debris from excavation prior to placing backfill.

5. Backfill within one (1) foot of structure shall be free of gravel, rock or shale particles larger than four (4) inches.

6. Bring lifts up simultaneously on all sides of structures.

7. Exercise caution in the use of heavy equipment in areas adjacent to structure to avoid high lateral stress on the structure walls. Use only light equipment to place backfill within twenty (20) feet of the structure.

8. Where structural excavation has been through rock, backfill with compacted granular fill to top of rock formation, unless indicated otherwise on the drawings. Where entire excavation is in rock, terminate granular backfill 2 feet below finished grade. Place geotextile filter fabric over granular backfill and continue backfill to finish grade with suitable approved material.

3.012. SUBGRADE PREPARATION

A. General:

1. Excavate or place embankment as required to construct subgrades to elevations and grades indicated.

2. Remove all unsuitable material and replace with approved embankment material. Perform all wetting, drying, shaping, and compacting required to prepare a suitable subgrade.

B. Roughen subgrade for embankment by discing or scarifying and wet or dry the top 6 inches as required to insure bond with embankment.

C. Extend subgrade the full width of surfaced areas plus one foot.

D. Compact the top six inches of subgrades for traffic areas and slabs on grade to 95 percent of maximum density (ASTM D 698).

E. Proofroll subgrade after moisture conditioning and compaction to identify soft or disturbed areas. Use a fully loaded tandem axle dump truck or equipment providing an equivalent loading for proofrolling. Undercut and replace soft areas identified by proofrolling with structural backfill if so directed by the Engineer.

3.013. GRANULAR FILL, PIPE EMBEDMENT

A. Place on subgrades where indicated prior to placing concrete slabs on grade.

B. Place in trench to limits indicated. Provide for proper support of pipe and even distribution around pipe.

C. Compact as indicated, in lifts not to exceed 6 inches, using approved vibratory equipment.

D. Trenches: At intervals not to exceed 400 feet, or closer if so indicated, provide trench bedding cut-off wall 5 feet in length constructed of select impermeable material hand-placed and compacted around pipe.

3.014. PLACEMENT OF TOPSOIL

A. Place topsoil on all areas indicated.

B. Placement:

1. Clear site of vegetation heavy enough to interfere with proper grading and tillage operations.

2. Clear surfaces of all stones or other objects larger than 3 inches in thickness or diameter, all roots, brush, wire, grade stakes, or other objectionable material.

3. Loosen subgrade by discing or scarifying to a depth of 2 inches wherever compacted by traffic or other causes to permit bonding of the topsoil to the subgrade.

4. Distribute topsoil over required areas without compaction other than that obtained with spreading equipment.

5. Place material within following limits:

   a. Not less than four (4) inches in depth.

   b. Not more than six (6) inches in depth.

6. Shape cuts, fills and embankments to contours indicated.

7. Grade to match contours of adjacent areas and permit good natural drainage.

8. Grade a gentle mound over trenches.

C. After spreading topsoil, clear surface of stones or other objects larger than two (2) inches in thickness or diameter and of objects that might interfere with planting and maintenance operations.

D. Protect areas from erosion until grass is established. Repair eroded areas as required.

3.015. MAINTENANCE AND REPAIR

A. Maintenance:

1. Protect newly graded areas from actions of the elements.

2. Settling or erosion shall be filled, repaired and grades reestablished to elevations and slopes indicated.

B. Correction of Settlement:

1. Settlement of embankments, backfill, or trenches occurring within the One Year Correction Period after Final Acceptance shall indicate defective work and shall be promptly corrected if the settlement results in the following:

   a. Visible depressions, ruts, or ground slumping.

   b. Pooling of water where positive slope existed or has been required.

   c. Voids beneath or beside slabs or structures.

   d. Movement of soil exposing unfinished or waterproofed structure surfaces.

   e. Movement of structures or facilities, including but not limited to foundation settlement, differential settlement, cracking, misalignment of adjacent objects, or movement of vertical elements out of plumb.

2. Contractor shall correct settlement and damages arising from or attributable to the settlement.

3. Make repairs within ten (10) days from and after due notification by Owner of embankment or backfill settlement and resulting damage.

4. Make own arrangements for access to the site for purposes of correction and maintenance of corrected areas.

END OF SECTION

SECTION 312513

EROSION CONTROL

PART 1 - GENERAL

1.01. SUMMARY

A. This item shall consist of temporary control measures during the life of a contract to control air pollution, soil erosion, and siltation through the use of berms, dikes, dams, sediment basins, fiber mats, gravel mulches, grasses, slope drains, and other erosion control devices or methods.

The temporary erosion control measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period.

Temporary control may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites.

1.02. SUBMITTALS

A. Prior to the commencement of construction activities, submit:

1. A detailed proposal of all methods of control and preventative measures to be utilized to limit discharge of soil sediment and other significant materials from the construction site.
2. A drawing of the work area, haul routes, storage areas, access routes, etc. Provide a detailed assessment of the current land conditions, including trees and vegetation.
3. A copy of the NPDES permit for storm water discharges from the construction site, when applicable.
4. A copy of the stormwater pollution prevention plan (SWPPP) for review and comment by the Owner and Engineer.

1.03. RELATED SECTIONS

A. Section 310000 – Earthwork

1.04. REFERENCES

A. "Protecting Water Quality, a Field Guide to Erosion, Sediment and Storm Water Best Management Practices for Development Sites in Missouri and Kansas".

PART 2 - PRODUCTS

2.01. MATERIALS

A. Compost Berms:

1. Compost should consist of both fine and coarse grades for maximum filtration. Fine grades shall have a maximum particle size of 3/8" to 1/2". Coarse grades shall have a maximum particle size of 2" to 3". All berms shall have a ratio of coarse and fine material of 1:1. No particle should be greater than 3".
2. The recommended moisture content ranges from 20-50%.
3. The percentage of carbon based materials in finished compost should range between 40-70%.
4. The pH should be between 5.0 and 8.5.
5. Nitrogen Content: 0.5-2.0%.
6. Compost should have a minimum soluble salt level between 4.0 and 6.0 mmhos/cm.
7. Compost must be weed and pesticide free, with manmade materials comprising less than 1%

B. Erosion Control Blankets:

1. Erosion control blanket shall be an extended-term machine produced blanket of 70 percent agricultural straw and 30 percent coconut fiber matrix with a functional longevity of up to 24-months. The blanket shall be of consistent thickness with the straw and coconut evenly distributed of the entire area of the blanket.
2. The blanket shall be covered on the top side with heavy weight photodegradable polypropylene (3.0lbs/1000 sq. ft) netting having ultraviolet additives to delay breakdown and an approximate mesh opening of 0.5 by 0.5-inches.
3. The blanket shall have a light weight (1.5lbs/1000 sq. ft) photodegradable polypropylene netting on the bottom, with a mesh opening of approximately 0.5 by 0.5-inches.
4. The blanket shall be sewn together with degradable thread.

C. Fertilizer. Fertilizer shall be a standard commercial grade and shall conform to all Federal and state regulations and to the standards of the Association of Official Agricultural Chemists.

D. Grass. Grass which will not compete with the grasses sown later for permanent cover shall be a quick-growing species (such as ryegrass or cereal grasses) suitable to the area providing a temporary cover.

E. Inlet Pavement Filters:

1. Inlet pavement filters shall consist of 9-inch diameter tubes made of synthetic filter fabric filled with recycled discrete synthetic fibers.
2. Pavement filter length shall be 24-inches greater than inlet curb opening or grate dimension.
3. Aggregate filter pouch shall be present for use with grated or combination inlets.

F. Mulches. Mulches may be hay, straw fiber mats, netting, bark, wood chips, or other suitable

material reasonably clean and free of noxious weeds and deleterious materials.

G. Silt Fence:

1. The geotextile fabric shall be composed of high-tenacity polypropylene, nylon, polyester ethylene yarns, which are woven into a stable network such that the yarns retain their relative position.

2. The geotextile fabric shall be inert to biological degradation and resistant to naturally encountered chemicals, alkalis and acids.

3. The geotextile fabric shall meet AASHTO M288-00 specification for Class 1 unsupported silt fence.

4. Support posts shall be 1.25” (min.) diameter hardwood or 1lbs/linear foot steel. The posts shall have projections for fastening the geotextile fabric.

5. The height of the silt fence shall not exceed 36-inches above the existing grade. The storage height of the fence should not exceed 18-inches.

H. Slope Drains. Slope drains may be constructed of pipe, fiber mats, rubble, portland cement concrete, bituminous concrete, or other materials that will adequately control erosion.

I. Straw bales:

1. Straw bales shall consist of rectangular-shaped bales of hay or straw weighing at least 50 pounds per bale with a minimum size of 1.0' x 1.5' x 3.0'.

2. The hay or straw material shall be free from primary noxious weed seeds and rough or woody materials.

J. Triangular Silt Dike:

1. Temporary silt dikes shall be triangular-shaped, having a height of at least eight to ten inches (8" - 10") in the center with equal sides and a sixteen- to twenty-inch (16" - 20") base.

2. The triangular-shaped inner material shall be urethane foam.

3. The outer cover shall be a woven geotextile fabric placed around the inner material and allowed to extend beyond both sides of the triangle two to three (2' - 3') feet.

4. Standard length of each dike will be seven feet (7') unless otherwise indicated on the plans.

5. The Dikes shall be attached to the ground with wire staples. The staples shall be No. 11 gauge wire and be at least six to eight (6" - 8") inches long. Staples shall be placed as indicated on the installation detail.”

K. Straw Wattles:

1. Straw wattles shall consist tightly rolled bales of hay or straw, having a diameter of at least eight to twenty inches (8”-20”).

2. The hay or straw material shall be free from primary noxious weed seeds and rough or woody materials.

3. Stakes shall be willow or wooden stakes.

L. Other. All materials shall meet commercial grade standards and shall be approved by the Engineer before being incorporated into the project.

2.02. SIGNIFICANT MATERIAL INVENTORY

A. The following list of significant materials that might potentially be released with storm water discharges from the job site during construction. The contractor shall be responsible for monitoring and assuring that the materials listed in the inventory do not migrate off site via storm water runoff during construction.

Material Trade Name	Chemical/Physical Description	Storm Water Pollutants
Erosion	Solid Particles	Soil, sediment
Fertilizer	Liquid or solid grains	Nitrogen, phosphorus
Pesticides (insecticides, fungicides, herbicides, rodenticides)	Various colored to colorless liquid, powder, pellets, or grains	Chlorinated hydrocarbons, organophosphates, carbonates, arsenic
Asphalt	Black solid	Oil, petroleum distillates
Concrete	White solid	Limestone, sand
Plaster	White granules or powder	Calcium Sulphate, calcium carbonate, sulfuric acid
Glue, adhesives	White or yellow liquid	Polymers, epoxies
Paints	Various colored liquid	Metal oxides, Stoddard solvent, talc, calcium carbonate, arsenic
Curing compounds	Creamy white liquid	Naphtha
Wood preservatives	Clear amber or dark brown liquid	Stoddard solvent, petroleum distillates, arsenic, copper, chromium.
Hydraulic oil/fluids	Brown oily petroleum hydrocarbon	Mineral oil
Gasoline	Colorless, pale brown or pink petroleum hydrocarbon	Benzene, ethyl benzene, toluene, xylene, MTBE
Diesel Fuel	Clear, blue-green to yellow liquid	Petroleum distillate, oil & grease, naphthalene, xylenes
Antifreeze/coolant	Clear green/yellow liquid	Ethylene glycol, propylene glycol, heavy metals (copper, lead, zinc)

PART 3 - EXECUTION

3.01. GENERAL.

A. The contractor shall be responsible for managing storm water runoff and erosion during the course of construction. The contractor shall implement BMPs as deemed necessary to adequately retain sediment and construction materials on-site. Any modifications to the implemented BMPs shall be documented using the appropriate forms, which shall be kept in a log book. The log book shall be kept on the job site and shall be available immediately for review by governing authorities, at their request.

B. All BMPs shall be inspected once a week and immediately after each significant rain event (0.5-inches in 24-hours). All appropriate measures must be taken to repair BMPs if damage is observed during the investigations.

C. The appropriate inspection and maintenance forms must be filled out during each inspection. The inspection and maintenance forms must be saved in the log book for the project. The log book shall be kept on the job site and shall be available immediately for review by

governing authorities, at their request. The inspection and maintenance forms may be found in Specification Section 02370.3.20, located in the Project Manual.

D. The contractor shall establish a minimum of one temporary construction entrance per development site to provide access to adjacent public right-of-way. All vehicular access to the site(s) shall occur via the temporary construction entrance.

E. No area shall be left denuded for longer than 14 consecutive days. Areas left denuded for longer than 14 consecutive days without heavy construction traffic or work shall be temporarily seeded and mulched so as to limit erosion.

F. All temporary diversion berms, diversion ditches and soil stockpile areas shall be seeded and mulched immediately after grading.

G. Where possible, the contractor shall maintain and protect existing trees and vegetation.

H. After the site has been seeded and permanent vegetation has been established, the contractor shall remove each BMP as indicated on each BMP detail sheet. Excess debris and sediment shall be removed from each BMPs and wasted on the site in such a manner as to eliminate any movement of the material off of the site.

I. In the event of a conflict between these requirements and pollution control laws, rules, or regulations of other Federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

3.02. MATERIAL MANAGEMENT PRACTICES

A. All materials stored on-site shall be stored in a neat, orderly manner in their appropriate containers. If possible, materials shall be stored under a roof or other enclosure.

B. Products shall be kept in their original containers with the manufacturer's label. Substances shall not be mixed with one another unless recommended by the manufacturer. Whenever possible, all of the product shall be used up before disposing of the container. The manufacturer's recommendations for the proper use and disposal of their products shall be followed. The construction manger shall inspect the on-site materials daily to ensure the proper use and disposal.

C. Hazardous products shall be kept in resealable containers. Original labels and material safety data shall be retained. All federal, state and city regulations shall be followed when disposing of any hazardous waste.

3.03. SPILL CONTROL PRACTICES

A. All on-site vehicles shall be monitored for leaks and shall receive regular preventative maintenance to reduce the chance of leakage.

B. Concrete trucks shall only wash-out or discharge surplus concrete, or drum-wash water, at dedicated concrete truck wash-out areas. No excess concrete or drum wash water shall be released from the site. The contractor shall be responsible for creating dedicated concrete truck wash-out areas and communicating the locations of the areas to all subcontractors.

C. Petroleum products shall be stored in tightly sealed containers which are clearly labeled.

D. All asphaltic substances used on-site shall be applied according to the manufacturer’s recommendations.

E. Fertilizers shall be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer shall be worked into the soil to limit exposure to storm water. The contents of any partially used bags of fertilizer shall be transferred to a sealable plastic container to avoid spills.

F. All spills shall be cleaned up immediately after discovery. The manufacturer's recommended methods for spill cleanup shall be relayed to site personnel and they shall be made aware of the location of the cleanup supplies. Materials and equipment necessary for spill cleanup shall be stored on-site. In case of a spill, the spill area shall be kept well ventilated and cleanup personnel shall wear the appropriate clothing to prevent injury from contact with the hazardous substance. Spills of toxic and hazardous material, regardless of the size of the spill, shall be reported to the appropriate state and local government agencies immediately after discovery.

3.04. ADDITIONAL SITE BMPS

A. The following is a list of additional site management BMPs that will be incorporated to prevent contamination of storm water runoff.

1. Provide trash containers onsite and perform regular site clean up for proper disposal of solid waste. Solid waste shall include, but not be limited to, scrap building materials, product/material packaging, food and drink containers.
2. Provide containers for the disposal of waste paints, solvents, cleaning compounds, etc.
3. Store construction materials away from drainage courses and low areas.
4. Install containment berms and drip pans at petroleum product and liquid storage tanks and containers.
5. Concrete trucks shall not discharge surplus concrete or wash water on the ground or into ditches on site. Dedicated concrete truck wash-out areas will be designed to ensure concrete particles will not be released from the construction site.

3.05. COMPOST BERMS.

A. Installation Procedure:

1. For slopes 3:1 or less, install a compost berm 1-2 ft high and 2-4 ft wide at the base. For maximum filtration properties, install the berm in a trapezoidal shape, with a 4-6 ft base, and a 2-3 ft wide top. Larger berms should be used for steeper slopes. The basic rule of thumb is that the base should be twice the height of the berm.
2. Berms can be placed around the perimeter of affected areas, if the area is flat or the perimeter is on contour. Berms should be placed using "smiles" and j-hooks. Do not place berms where they cannot pond water. See typical Silt Fence Placement details for further installation information.
3. For steeper slopes, an additional berm can be constructed on the top shoulder of the slope.
4. Do not use compost berms in areas of concentrated flow, as they are intended to control and filter sheet flow only.
5. Once adequate stabilization of all up hill areas has been achieved, compost berms can be left onsite and seeded, or spread out in place as a soil enhancement.

B. Maintenance and Inspection Procedure:

1. Inspect the compost berm weekly and after each significant storm event (0.5-inch of rain in 24-hours). Repair any erosion near the compost berm immediately.
2. Remove sediment from the compost berm when sediment dike is approximately 1/2

the total height of the berm.

3.06. DIVERSIONARY CHANNEL.

A. Installation Procedure:

1. Temporary diversion channels must be installed as a first step in the land-disturbing activity and must be functional prior to upslope land disturbance.

2. The channel should be cleared grubbed and adequately compacted to prevent failure.

3. Temporary or permanent seeding and mulch shall be applied to the channel immediately following its construction.

4. The channel should be located to minimize damages by construction operations and traffic.

B. Maintenance and Inspection Procedure:

1. The measure shall be inspected once a week and after every significant storm event (0.50-inches in 24-hours). Any necessary repairs to the channel should be performed immediately.

2. Damages caused by construction traffic or other activity must be repaired before the end of each working day.

3. If vegetation has not been established, reseed damaged and sparse areas immediately

3.07. EROSION CONTROL BLANKET.

A. Installation Procedure:

1. Grade and shape area of installation. Remove all rocks, clods, vegetative or other obstructions so that the installed blankets, or mats will have direct contact with the soil.

2. Prepare seedbed by loosening 2-3 inches of topsoil above final grade. Incorporate amendments, such as lime and fertilizer, into soil according to soil test and the seeding plan. Seed area before blanket installation for erosion control and re-vegetation. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be reseeded. Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

3. U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats to the ground surface. Wire staples should be a minimum of 11 gauge. Metal stake pins should be 3/16 inch diameter steel with a 1 1/2 inch steel washer at the head of the pin. Wire staples and metal stakes should be driven flush to the soil surface. All anchors should be 6-8 inches long and have sufficient ground penetration to resist pullout. Longer anchors may be required for loose soils. For installation of erosion control blankets and turf reinforcement mats on slopes and in channels, refer to manufacturer's installation instructions.

4. Lay the erosion control blanket loosely, on top of the graded and seeded soil and stake or staple to maintain contact with soil. Do not stretch the blanket. The erosion control blanket shall be installed such that the roll length extends in a down hill direction, perpendicular to the contour lines.

B. Maintenance and Inspection Procedure:

1. The measure shall be inspected once a week and after every significant storm event (0.50-inches in 24-hours). Any necessary repairs to the channel should be performed immediately.

2. If wash-out or breakage of the erosion control blanket occurs, reinstall the blanket only after repair and reseeding of slope or drainage way.

3.08. INLET PAVEMENT FILTER.

A. Installation Procedure:

1. Install curb inlet pavement filter in front of the curb inlet opening, as directed by BMP manufacturer. Each end of the filter shall overlap the curb inlet opening approximately 12".

B. Maintenance and Inspection Procedure:

1. Inspect the curb inlet pavement filter weekly and basin after each significant storm event (0.5-inch of rain in 24-hours). Clean all accumulated silt and debris located in the vicinity of the filter.

3.09. MULCHING.

A. Installation Procedure:

1. Mulch shall be applied to any site where soil has been disturbed and the protective vegetation has been removed, as a means of providing temporary stabilization of soil, until permanent stabilizing vegetation is established. On steep slopes, greater than 2.5:1, or where the mulch is susceptible to movement by wind or water, the mulch material should be hydraulically applied or the straw mulch should be appropriately anchored. Hydraulic fiber mulches and/or tackifying agents shall be used to effectively bind the straw together and prevent displacement by wind or rain.

2. Straw mulch shall be applied to a depth of 2-4 inches on seeded sites, unless it is incorporated into the soil by tracking, disking, or other techniques. The mulch layer shall have a uniform thickness across the site. For seeded sites, apply 1.5 to 2 tons of straw mulch per acre. For unseeded sites, apply 2 to 3 tons of straw mulch per acre. The straw mulch shall not be applied at rates higher than 3 tons/acre (7 tons/ha). Straw mulch may be applied by hand on small sites and blown on by machine on large sites.

3. Prior to mulching, install any needed erosion and sediment control practices such as diversions, grade stabilization structures, berms, dikes, grass-lined channels and sediment basins, etc.

4. Straw mulch must be anchored immediately to minimize loss by wind or water. Straw mulch is commonly anchored by:

a. Crimping, Tracking, Disking, or Punching into the Soil;

1) On small sites, where straw has been distributed by hand, it can be anchored by hand punching it into the soil every 1-2 feet with a dull, round-nosed shovel. A sharp shovel will merely cut the straw and not anchor it.

2) A mulch anchoring tool is a tractor drawn implement designed to punch and anchor mulch into the top 2-8 inches of soil. This practice affords maximum erosion control but is limited to flatter slopes where equipment can operate safely.

3) Tracking is the process of cutting straw into the soil using a bulldozer or other equipment that runs on cleated tracks. Tracking is used primarily on slopes 3:1 or shallower; where this type of equipment can safely operate. This is an effective way to crimp straw on fill slopes. Tracking equipment must operate up and down the slope so the cleat tracks are perpendicular to flow.

b. Covering with a Netting

1) Nettings of biodegradable paper, plastic or cotton netting can be used to cover straw mulch.

c. Spraying with Asphaltic or Organic Tackifier;

1) Polymer tackifiers are generally applied at rates of 40-60 lbs/ac, however manufacturer’s recommendations may vary. Organic tackifiers are generally applied at rates of 80-120 lbs/acre, however manufacturer's recommendations vary.

2) Applications of liquid mulch binders shall be heavier at edges, in valleys, and at crests of banks and other areas where the mulch may be moved by wind or water. All other areas shall have a uniform application of the tackifier.

3) Tacking with cellulose fiber mulch at a rate of 750 lbs/ac.

B. Maintenance and Inspection Procedure:

1. Inspect the mulch weekly and after each significant storm event (0.5-inch of rain in 24-hours). Repair any erosion near the mulch immediately.

3.010. RIPRAP OUTLET PROTECTION.

A. Installation Procedure:

1. Prepare the subgrade to the required lines and grades shown on the plans. The subgrade will have to be cut sufficiently deep so that the finished grade of the riprap will be at the elevation of the surrounding grade. Brush, trees, stumps and other deleterious materials must be removed before installation of the riprap.

2. The sand and gravel filter blanket shall then be placed after the subgrade is prepared. For gravel, spread the filter stone in a uniform layer of the specified depth. If a filter fabric is used in the place of sand or gravel, place the filter fabric directly on the prepared foundation, making sure to overlap the edges of the fabric by 12-inches and place anchor pins every 3-feet along the overlap. Geotextile filter fabric shall be Lynx 180EX, 8-oz, non-woven geotextile fabric. A 4-inch layer of fine gravel or sand may needed above the filter fabric where large stones are used or machine placement is difficult.

3. Riprap (Min. 8"-12", Average Size =10"). Riprap shall be crushed limestone (no sandstone or other deleterious material).

4. Riprap material should be placed in one operation. The Riprap should not be placed by dumping through chutes or other methods that could possibly cause segregation of stone sizes. Care must be taken to not dislodge the underlying base of filter when the placing of the riprap material.

5. The toe of the riprap should be keyed to a stable foundation at its base. The toe should be excavated to the depth of 1.5 times the design thickness of the riprap and should extend horizontally from the slope.

B. Maintenance and Inspection Procedure:

1. The riprap outlet protect should be inspected weekly and after each significant rainfall event (0.5-inches in 24-hours). Repair any scour or dislodged stones.

3.011. ROCK CHECK DAM.

A. Installation Procedure:

1. Divert runoff from undisturbed areas away from the rock dam and basin area.

2. Excavate the foundation for the apron, using it as a temporary sediment basin during construction of the dam.

3. Clear and grub the area under the dam, removing and properly disposing of all root material, brush and other debris. Grade the earth abutments no steeper than 2.5:1; 3:1 where vehicles must cross. Smooth the dam foundation.

4. Cover the entire foundation, including both earth abutments, with filter fabric, making sure the upstream strips overlap the downstream strips at least 1 foot and the upslope end is keyed in. Filter fabric shall be Lynx 180EX, 8-oz, non-woven geotextile fabric.

5. Construct the dam to planned dimensions. Key the stone into channel banks and

extend it beyond the abutments a minimum of 18-inches to prevent flow around the dam.

6. Once the dam is in place, clear the sediment basin area properly disposing of the cleared material.

B. Maintenance and Inspection Procedure:

1. Inspect the rock dam weekly and basin after each significant storm event (0.5-inch of rain in 24-hours).

2. Remove sediment when it accumulates to half the height of the dam.

3. Check the dam and abutments for erosion, piping or rock displacement and repair immediately.

4. If the basin does not drain between storms, replace the stone on the upstream face of the dam.

5. Once the construction site has become permanently stabilized, remove the structure and any unstable sediment. Smooth the basin site to blend with the surrounding area and stabilize. All water and sediment should be removed from the basin prior to dam removal. Sediment should be placed in designated disposal areas and not allowed to flow into streams or drainage ways during structure removal.

3.012. SEEDING.

A. Installation Procedure:

1. Seeding Material and Application Rates:

a. Annual rye grass, wheat, or oats should be used for temporary seeding. Apply the rye grass at 120 lbs. per acre. Apply the wheat or oats at 100 lbs. per acre.

b. A mixture of 65% kentucky bluegrass and 35% chewing fescue or creeping red fescue should be used for permanent seeding. Apply the mixture at 2 lbs. per 1000 square feet.

2. Seeded Preparation:

a. Install necessary mechanical erosion and sedimentation control practices before seeding, and complete grading according to the approved plan.

b. Lime and fertilizer needs should be determined by soil test. Apply the lime and fertilizer evenly and incorporate into the top 4-6 inches of soil by discing or other suitable means.

3. Seeding:

a. All seeding shall be performed during favorable weather conditions and only during normal and accepted planting seasons when satisfactory growing conditions exist. The planting operations shall not be performed during times of extreme drought, when ground is frozen or during times of other unfavorable climatic conditions unless otherwise approved by owner's representative. The contractor assumes full and complete responsibility for all such plantings and operations.

b. Seed should be labeled in accordance with the U.S. Department of agriculture rules and regulations under the federal seed act and comply with the requirements of the missouri seed law. Labels contain important information on seed purity, germination, and presence of weeds. Weed seed should not exceed

1.0% by weight of the mixture.

c. Apply seed uniformly with a cyclone seeder, drill, cultipacker seeder, or hydroseeder. Small grains should be planted no more than 1 inch deep, and grasses and legumes no more than 1/2 inch.

d. Seeding - Maintenance:

1) Generally, a permanent stand of vegetation cannot be determined to be fully established until soil cover has been maintained for one full year from planting. Inspect seeded areas for failure and make necessary repairs and re-seedings within the same season, if possible.

3.013. SILT FENCE.

A. Installation Procedure:

1. Posts shall be placed on the downstream side of the fabric and shall be spaced at a maximum of 6-ft, unless supported by 16-guage backing wire with a 6" mesh. If the silt fence is supported by a backing wire, a maximum post spacing of 10-feet is allowed. The posts shall be driven at least 2-feet into the ground.

2. A trench for anchoring the fabric shall be dug along the upslope side of the posts. The trench shall be at least 6 inches wide and 6 inches deep. The fabric shall be laid in the trench, which then shall be backfilled and compacted to prevent water and sediment from passing underneath the fabric fence.

3. The filter fabric shall be furnished in a continuous roll cut to the length of the silt fence to avoid splices. When splices are necessary, the fabric shall be spliced at a support post with a minimum 6-inch overlap, folded over, and securely fastened.

B. Maintenance and Inspection Procedure:

1. Inspect silt fence for proper installation and compaction by pulling up on the fence while kicking the toe of the fabric. If the fence comes out of the ground, do not "accept" the installation.

2. Silt fences and filter barriers shall be inspected weekly and after each significant storm (0.5-inch in 24 hour). Any required repairs shall be made immediately.

3. Sediment should be removed when it reaches 1/2 height of the fence or 18-inches maximum. The removed sediment shall conform with the existing grade and be vegetated or otherwise stabilized.

4. Silt fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized and any sediment stored behind the silt fence has been removed.

3.014. STRAW BALE SEDIMENT TRAP.

A. Installation Procedure:

1. Grade and shape area of installation. Remove all rocks, clods, vegetative or other obstructions so that the installed blankets, or mats will have direct contact with the soil.

2. Straw Bale Sediment Traps (SBST) shall be place in small drainage channels to limit the transference of sediment from the site. The straw bales will be placed

downstream of the specified areas to be cleared and graded. The bales shall be placed on even contours.

3. If SBSTs are to be used as perimeter controls, the SBST shall be installed on an even contour, 6-ft from the toe of slope.

4. Bales shall be placed in a row with ends tightly abutting the adjacent bales. Bales should be stacked no more than one bale high. Straw, rocks or filter fabric shall be used to fill any gaps between bales.

5. Each bale shall be embedded in the soil a minimum of 4". Once each bale is placed, backfill bale and tamp backfill material to prevent erosion under or around the bales.

6. Bales shall be securely anchored in place by stakes or rebars driven through the bales. The first stake in each bale shall be driven towards previously laid bale to force the two together. Drive the stakes at least 18-inches into the ground.

7. Bales shall remain in place and maintained until site vegetation has been reestablished (normally one full growing season).

B. Maintenance and Inspection Procedure:

1. The measure shall be inspected once a week and after every significant storm event (0.50-inches in 24-hours). Any necessary repairs to the channel should be performed immediately.
2. If wash-out or breakage of the erosion control blanket occurs, reinstall the blanket only after repair and reseeding of slope or drainage way.

3.015. TEMPORARY CONSTRUCTION ENTRANCE.

A. Installation Procedure:

1. The temporary construction entrance shall meet the requirements of the necessary permitting agencies.

2. The temporary construction entrance should be crowned to provide for adequate drainage. All drainage must be directed away from existing public right of ways.

3. Clear all vegetation, roots and other obstructions in preparation for the entrance. The entrance shall be graded and compacted prior to placement of the geotextile fabric.

4. Place Lynx 180EX, 8-oz, non-woven geotextile fabric on compacted subgrade.

5. Place 2" to 4" of crushed stone (Ave Dia = 2") on top of the geotextile fabric.

B. Maitenance and Inspection Procedure:

1. The temporary construction entrance will be inspected weekly and after each significant rainfall event (0.5-inches in 24-hours). Repair any washout of crushed stone.

2. Replace crushed stone if tracking of sediment onto public right of way occurs.

3. All sediments, and all other materials, tracked onto public roadways shall be removed immediately

3.016. TEMPORARY SEDIMENTATION BASIN.

A. Installation Procedure:

1. The temporary sediment basin shall be constructed on-site by excavating or building an embankment before any clearing or grading work begins.

2. Areas under the embankment and any structural works shall be cleared, grubbed and

stripped of any vegetation and rootmat. In order to facilitate cleanout and restoration, the basin area shall be cleared, grubbed and stripped of any vegetation.

3. Embankment and structural works shall be installed as shown on the details. A cut-off trench shall be excavated along the centerline of the earth fill embankments. The minimum depth shall be 2 feet. The cut-off trench shall extend up both abutments to the riser crest elevation.

4. Fill material for the embankment should be clean mineral soil free of roots, woody vegetation, oversized stones, rocks or other objectionable material. The fill material shall contain sufficient moisture so that it can be formed by hand into a ball without crumbling. Fill material shall be placed in 6-inch lifts, continuous layers over the entire length of the fill. Compacting shall be obtained by routing the hauling equipment over the fill so that the entire surface of each layer of the fill is traversed by at least one wheel or tread track of the equipment, or by the use of a compactor. The embankment should be constructed to an elevation of 10 percent higher than the design height to allow for settlement if compacting is achieved with hauling equipment. If compactors are used for compacting, the overbuild may be reduced to not less than 5 percent.

5. The principle spillway riser shall be securely attached to the discharge pipe by welding all around. All connections shall be watertight. The pipe and riser shall be placed on a firm, smooth soil foundation. The connection between the riser and the riser base shall be watertight.

6. Pervious materials such as sand, gravel or crushed stone shall not be used as backfill around the pipe or anti-seep collars. The fill material around the pipe spillway shall be placed in 4-inch layers and compacted under the shoulders and around the pipe to at least the same density as the adjacent embankment. A minimum of 2 feet of compacted backfill shall be placed over the pipe spillway before crossing it with construction equipment.

7. The emergency spillway shall not be installed in fill.

8. Elevations, design width, and entrance and exit channel slopes are critical to the successful operation of the emergency spillway.

9. Baffles shall be constructed with straw bale sediment barriers or silt fence.

10. The embankment and emergency spillway shall be stabilized with vegetation immediately following construction.

11. Construction operations shall be carried out in such a manner that erosion and water pollution will be minimized.

B. Maintenance and Inspection Procedure:

1. Inspect sedimentation basins weekly and after each significant storm event (0.5-inches in 24-hours).
2. All damages caused by soil erosion or construction equipment shall be repaired before the end of each working day.
3. Remove sediment when the sediment storage zone is half full. This sediment shall be placed in such a manner that it will not erode from the site. The sediment shall not be deposited downstream from the embankment or in or adjacent to a stream or floodplain.
4. When temporary structures have served their intended purpose and the contributing drainage area has been properly stabilized, the embankment and resulting sediment deposit shall be leveled or otherwise disposed of in accordance with the approved erosion and sediment control plan.

5. If the basin does not drain between storms, replace the stone on the upstream face of the dam.

6. Once the construction site has become permanently stabilized, remove the structure and any unstable sediment. Smooth the basin site to blend with the surrounding area and stabilize. All water and sediment should be removed from the basin prior to dam removal. Sediment should be placed in designated disposal areas and not allowed to flow into streams or drainage ways during structure removal.

3.017. TEMPORARY SEDIMENT TRAP

A. Installation Procedure:

1. The temporary sediment trap shall be constructed on-site by excavating or building an embankment before any clearing or grading work begins.

2. Areas under the embankment shall be cleared, grubbed and stripped of any vegetation and rootmat. In order to facilitate cleanout and restoration, the basin area shall be cleared, grubbed and stripped of any vegetation.

3. The embankment shall be installed as shown on the details. A cut-off trench shall be excavated along the centerline of the earth fill embankments. The minimum depth shall be 2 feet. The cut-off trench shall extend up both abutments to the spillway crest elevation.

4. Fill material for the embankment should be clean mineral soil free of roots, woody vegetation, oversized stones, rocks or other objectionable material. The fill material shall contain sufficient moisture so that it can be formed by hand into a ball without crumbling. Fill material shall be placed in 6-inch lifts, continuous layers over the entire length of the fill. Compacting shall be obtained by routing the hauling equipment over the fill so that the entire surface of each layer of the fill is traversed by at least one wheel or tread track of the equipment, or by the use of a compactor. The embankment should be constructed to an elevation of 10 percent higher than the design height to allow for settlement if compacting is achieved with hauling equipment. If compactors are used for compacting, the overbuild may be reduced to not less than 5 percent.

5. Geotextile fabric shall be Linq 180EX, non-woven or approved equal. Install geotextile fabric on the base of the channel, extending it up the sides to the top of the embankment. Key all free edges of geotextile fabric 6" into subgrade.

6. Riprap shall be 3" to 9" diameter (mean diameter = 6") crushed limestone. Place riprap to the lines and grades, working smaller stones into voids to achieve a dense mass. The spillway crest should be level with a minimum width of 5 feet.

7. Cover the inside face of the stone outlet section with a 1-foot layer of well graded stone (2-inch minus).

8. Set a clean-out measurement stake in the basin at a height equal to one-half the distance from the bottom to the spillway crest.

9. Elevations, design width, and entrance and exit channel slopes are critical to the successful operation of the spillway.

10. Flow diversion baffles shall be constructed with silt fence.

11. The embankment shall be stabilized with vegetation immediately following construction. Place silt fence at toe of embankment slope, immediately downhill of

temporary sediment trap.

12. Construction operations shall be carried out in such a manner that erosion and water pollution will be minimized.

B. Maintenance and Inspection Procedure:

1. The measure shall be inspected once a week and after every significant storm event (0.50-inches in 24-hours). Any necessary repairs to the channel should be performed immediately.

2. All damages caused by soil erosion or construction equipment shall be repaired before the end of each working day.

3. Remove sediment when the sediment storage zone is half full. This sediment shall be placed in such a manner that it will not erode from the site. The sediment shall not be deposited downstream from the embankment or in or adjacent to a stream or floodplain.

4. When temporary structures have served their intended purpose and the contributing drainage area has been properly stabilized, the embankment and resulting sediment deposit shall be leveled or otherwise disposed of in accordance with the approved erosion and sediment control plan.

3.018. TRIANGULAR SILT DIKE

A. Installation Procedure:

1. Clear and grub channel bottom and remove all debris, roots, brush, etc. Perform preliminary grading of channel.

2. Cut a 3" to 6" square trench at the leading edge of the front geotextile apron. The front geotextile apron shall be tucked into the trench and 6" No. 11 gauge wire staples shall be driven through the fabric into undisturbed earth. The staples must be installed at 4'-0" cts. The trench must then be backfilled with soil.

3. The apron, triangular silt dike and other appurtenances must be secured to the soil with 6" No. 11 gauge wire staples spaced at 2'-0" cts. Where triangular silt dike units overlap, staples shall be placed at the center of each unit.

4. The triangular silt dike shall extend up the channel bank so that there is a minimum of 1’-0” elevation difference between the terminus of the dike and the top of the dike located in the channel bottom, so as to eliminate the potential for flows around the edges of the triangular silt dike unit.

B. Maintenance and Inspection Procedure:

1. Inspect the triangular silt dike weekly and after each significant storm event (0.5-inch of rain in 24-hours). Repair any erosion near the dike immediately.

2. Remove sediment from the dike when sediment dike is approximately 1/2 the total height of the dike.

3.019. STRAW WATTLE

A. Installation Procedure:

1. Prepare the slope before the wattling procedure is started.

2. Shallow gullies should be smoothed as work progresses.

3. Dig small trenches across the slope on contour, to place rolls in. The trench should be deep enough to accommodate half the thickness of the roll. When the soil is loose and uncompacted, the trench should be deep enough to bury 2/3 of its thickness because the ground will settle.

4. It is critical that rolls are installed perpendicular to water movement, parallel to the slope contour.

5. Start building trenches and install rolls from the bottom of the slope and work up.

6. Construct trenches at the contour intervals of three to twelve feet (3'-12') apart depending on the steepness of slope. The steeper the slope, the close together the trenches.

7. Lay the roll along the trenches fitting it snugly against the soil. Make sure no gaps exist between the soil and straw wattle.

8. Use a straight bar the drive holes through the wattle and into the soil for the willow or wooden stakes.

9. Drive the stake through prepared hole into soil. Leave only 1 or 2 inches of stake exposed above the roll.

10. Install stakes at least every 4 feet apart through the wattle, additional stakes any be driven on the downslope side of the trenches on highly erosive or very steep slopes.

B. Maintenance and Inspection Procedure:

1. Inspect straw wattles weekly and after each significant event (0.5-inches in 24-hours).

2. All damages caused by soil erosion or construction equipment shall be repaired before the end of each working day.

3. Remove sediment when the sediment storage zone is half full. This sediment shall be placed in such a manner that it will not erode from the site. The sediment shall not be deposited downstream from the embankment or in adjacent to a stream or floodplain.

4. When temporary structures have served their intended purpose and the contributing drainage area has been properly stabilized, the embankment and resulting sediment deposit shall be leveled or otherwise disposed of in accordance with the approved erosion and sediment control plan.

3.020. SCHEDULE.

A. Prior to the start of construction, the Contractor shall submit schedules for accomplishment of temporary and permanent erosion control work, as are applicable for clearing and grubbing; construction; paving; and structures at watercourses. The Contractor shall also submit a proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials. Work shall not be started until the erosion control schedules and methods of operation for the applicable construction have been accepted by the Engineer.

3.021. RECORD KEEPING.

A. The contractor shall create and maintain a log book documenting all monitoring and repair operations associated with each BMP. The log book shall include the forms contained within this specification. The forms contained within this specification include:

1. Form 1 – Inspection form for Structural Controls

a. Form 1 shall be completed each time an inspection of structural controls occurs. Structural Controls include, but are not limited to: inlet protection, rock dams, silt fences, straw bale sediment traps, temporary sediment traps, temporary sediment basins, triangular silt dikes, etc.

2. Form 2 – Inspection form for Stabilization Measures

   a. Form 2 shall be completed each time an inspection of stabilization measures occurs. Stabilization measures include, but are not limited to: temporary seeding, permanent seeding, mulching, hydroseeding, sodding, etc.

3. Form 3 – Inspection Certification Form.

   a. Form 3 shall be completed after each inspection to legally certify that the inspection has been performed and that the site has been found to be in compliance with the project plans and specifications.

4. Form 4 – Form for changes in Pollution Prevention Plan

   a. Form 4 shall be completed after changes are made to the proposed BMPs and project plans due to unforeseen conditions and construction techniques.

B. The log book shall be maintained at the job site at all times, in a neat and orderly fashion. The log book shall be available immediately for review by the engineer, the owner and local, state and federal governing authorities during normal business hours.

C. The log book shall contain copies of all local, state and federal land disturbance permitting issued for the project.

FORM NO. 1 – INSPECTION FORM FOR STRUCTURAL CONTROLS

Inspector: _____ Date:_____

Days Since Last Rainfall:_____

Amount of Last Rainfall:_____

Location of Control	In Place?	Condition of Control	Sediment Depth (in)	Washed-out or overtopped?

Maintenance Required:

_____

_____

_____

_____

_____

_____

_____

To Be Performed By: _____

On or Before: _____

FORM NO. 2 – INSPECTION FORM FOR STABILIZATION MEASURES

Inspector: _____ Date:_____

Days Since Last Rainfall:_____

Amount of Last Rainfall:_____

Area	Date of Last Disturbance	Stabilized ?	Stabilized With?	Condition

Stabilization Required:

_____

_____

_____

_____

_____

_____

_____

To Be Performed By: _____

On or Before: _____

Form No. 3 – Inspection Certification Form

Project: _____

This certification must be completed after each inspection to signify that the inspection has been properly completed and the site has been found to be in compliance with the Storm Water Pollution Prevention Plan.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____

Name: _____

Title: _____

Company: _____

Address: _____

Telephone: _____

Date: _____

Form No. 4 – Form for Changes in Pollution Prevention Plan

Inspector: _____

Date: _____

Summary of Required Changes:

_____
_____
_____
_____
_____
_____

Reason(s) for Changes:

_____
_____
_____
_____
_____
_____

Inspector Signature: _____

Date: _____

END OF SECTION

SECTION 321123

AGGREGATE BASE COURSES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes crushed rock base and surface course.

1.02 SUBMITTALS

A. Compliance submittals:

1. Submit as specified in Division 1.
2. Includes, but not limited to, the following:
   a. Test results from testing laboratory indicating compliance with the specifications.
   b. Certification of conformance with the specifications.

1.03 QUALITY ASSURANCE

A. Applicable Standards:

1. American Society for Testing and Materials (ASTM):

   C117 - Material Finer than 76-um (No. 200) Sieve in Mineral Aggregates by Washing.

   C131 - Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

   C136 - Sieve or Screen Analysis of Fine and Coarse Aggregates.

   D423 - Liquid Limit of Soils.

   D424 - Plastic Limit and Plasticity Index of Soils.

2. American Association of State Highway and Transportation Officials (AASHTO):

   T99 - The Moisture Density Relations of Soils Using a 5.5-Pound (2.5 kg) Rammer and a 12-Inch (305 mm) Drop.

PART 2 - PRODUCT

2.01 GENERAL

A. Crushed rock base and surface course shall consist of aggregate specified.

2.02 AGGREGATE

A. Aggregate shall be crushed stone or crushed gravel, free from lumps or balls of clay or other objectionable matter, and reasonably free from thin and elongated pieces of dirt. Aggregates shall consist of angular fragments, durable and sound, and shall be reasonably uniform in density and quality.

B. Percentage of wear shall not exceed 50 after 500 revolutions as determined by ASTM C131.

C. Aggregate shall contain 75 percent by weight of pieces with two or more fractured surfaces if material is crushed gravel.

D. Portion of aggregate passing No. 40 sieve shall be as follows:

1. Liquid Limit: Not more than 25 determined by ASTM D423.

2. Plastic Index: Not more than 6 determined by ASTM D424.

E. Gradation shall not vary from low limit on one sieve to high limit on adjacent sieve or vice versa. Test by ASTM C136 and C117, and conform to the following table:

	Percent by Weight Passing Square-Mesh Sieve		
Sieve Designation	**Surface Course**	**Base Course**	**2"/Type 7**
1 ½ -inch	--	--	100
1-inch	100	100	60-80
1/2-inch	--	60-90	
3/8-inch	65*	--	
No. 4	5-25	40-60	
No. 8	--	--	15-50
No. 30	--	15-35	
No. 200	--	--	0-12

*Indicates Maximum

2.03 EQUIPMENT

A. General Requirements:

1. Maintain all equipment, tools, machines used in the performance of the work required by this Section in a satisfactory working condition at all times.

2. Equipment shall be subject to the approval of the Engineer.

B. Power Rollers:

1. Rollers shall be self-propelled, three wheel, or tandem-type with wheels equipped with adjustable scrapers.

2. Weight shall not be less than eight tons.

C. Tamping Rollers:

1. Rollers shall consist of one or more units arranged to adapt to uneven ground surfaces.

2. Rolling units of multiple type shall be pivoted on the main frame.

3. When fully loaded, rollers shall exert at least 300 psi on the combined areas of tamping feet in contact with the ground.

4. Each unit shall be equipped with a watertight cylindrical drum with length 48 inches or greater.

5. Tamping feet shall project not less than 7 inches from drum surface, with feet spaced not less than 10 inches, nor more than 10 inches measured diagonally from center to center.

D. Rubber-Tired Rollers:

1. Rollers shall consist of two axles on which are mounted not less than nine pneumatic-tired wheels, mounted so the rear group of tires do not follow in the tracks of the forward wheels but will be centered between the forward wheels.

2. The axles shall be mounted in a rigid frame provided with a loading platform or body suitable for ballast loading.

3. Inflate tires uniformly.

4. May be self-propelled.

5. Tow with pneumatic-tired tractors or other pneumatic-tired equipment.

E. Blade Graders shall be self-propelled with a wheelbase of not less than 15 feet, and a blade of not less than 10 feet.

F. Sprinkling equipment shall consist of tank trucks, pressure distributors, or other similar equipment designed to apply water uniformly and in controlled quantities to variable width of surface.

G. Hauling equipment shall consist of pneumatic-tired vehicles and dump bodies suitable for dumping materials in windrows or layers on the subgrade.

H. Tampers shall be mechanical (of an approved type) and hand-operated, weight not less than 50 pounds, and have a face area of not more than 100 square inches.

I. Miscellaneous equipment shall consist of scarifiers, tractors, spring-tooth or spike-tooth harrows, windrow equalizers, spreaders, and other equipment suitable for construction of select material.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Stockpiles:

1. Clear and level storage sites prior to stockpiling.

2. Place in the manner and at locations designated by Engineer, providing separate stockpiles for materials from separate sources.

3. Stockpile material in such a manner as to limit the potential for erosion and inundation as a result of localized and global flooding. Coordinate the stockpile locations with the owner.

B. Cold-Weather Limitations:

1. Construction shall be prohibited when atmospheric temperature is below 35 degrees F.

2. Do not place base course on frozen subgrade, or surface course on frozen base.

3. Protect base course, surface course and subgrade in freezing weather and repair areas damaged by freezing by reshaping and recompacting.

C. Preparation of Subgrade:

1. Clear all vegetable matter such as trees, brush, down timber and other objectionable materials found on or above the surface.

2. Scalp all excavation and embankment areas removing material such as sod, grass, residue or agricultural crops and decayed vegetable matter from the surface of the ground.

3. Grub and dispose of all vegetable matter such as stumps, roots, buried trees and brush encountered below the surface of the ground or subgrade to a minimum depth of 6 inches.

4. When deleterious materials are encountered below ground line which may be detrimental to the proposed improvement, these shall be removed to a depth necessary to provide adequate support for the proposed improvement.

5. The subgrade surface shall be brought to the specified lines, grades and cross-section by repeatedly adding or removing material and compacting to the specified density.

6. The top 6 inches of subgrade for pavements shall be compacted to 95 percent of the maximum density for the material used as determined by ASTM D-698 and within a tolerance of plus 2 percent and minus 3 percent of the optimum moisture at maximum density as determined by the moisture density curve obtained.

7. The newly finished subgrade shall be repaired from action of the elements or others. Any settlement or erosion that occurs prior to placing the pavement thereon, shall be repaired and the specific lines, grades and cross-section reestablished.

8. Any subgrade that has become unacceptable shall be reworked as necessary to restore the subgrade to shape, tolerance, density, and moisture content range for such density, immediately prior to the placing of the pavement.

D. Grade Control: Establish and maintain by means of grade stakes placed in lanes parallel to the centerline of the area to be paved and spaced so string lines may be stretched between stakes.

3.02 MIXING AND PLACING OF MATERIALS

A. Deposit and spread material in a uniform layer and compact to the thickness indicated on the plans and as specified below. Spread material uniformly on the prepared subgrade from moving vehicles or spreader boxes.

1. Level material to the required contour and grades with blade graders.

2. Remove those portions of the layer which become segregated in spreading and replace with satisfactory mixture or remix as requested by Engineer.

3. Add water to the extent necessary to prevent segregation during mixing operations.

4. Add material to the mixture in such amounts and sizes as requested by the Engineer.

B. Shaping and Compacting Mixed Materials:

1. Compact in layers no less than three nor more than seven inches thick.

2. Roll to specified compaction requirements throughout full depth of layer with tamping rollers, power rollers, rubber-tired rollers or combination.

3. Shape and smooth by blading and rolling with power roller or rubber-tired roller, or both.

4. Hand-tamp in places not accessible to rolling equipment.

5. Aerate by blade graders, harrows, or other approved equipment when mixture is moistened by rain.

C. Degree of Compaction:

1. Base compaction on weight per cubic foot of material passing 3/4-inch sieve and compact to at least 100 percent of density at optimum moisture.

2. Determine and control compaction in accordance with AASHTO T99.

D. Smoothness Test:

1. Surface shall show no deviation in excess of 3/8-inch in any 10 feet when tested with a 10-foot straightedge applied parallel with and at right angles to the centerlines of the paved area.

2. Correct any deviation in excess of this amount by loosening, adding or removing material, reshaping, watering, and compacting as requested by the Engineer.

3.03 MAINTENANCE

A. Maintain finished base course in a condition satisfactory to the Engineer until job completion or until surface is placed upon it.

3.04 WAYBILLS AND DELIVERY TICKETS

A. Submit daily to the Engineer during progress of work.

END OF SECTION

SECTION 321216

ASPHALT PAVING

PART 1 - GENERAL

1.01. SUMMARY

A. Section Includes: Asphaltic pavement for the purpose of repair of cut areas in existing asphalt paved areas.

1.02. REFERENCES

A. 2023 (English) Edition of the “Missouri Standard Specifications for Highway Construction”, Section 403 per the Missouri Highway and Transportation Commission.

1.03. DESCRIPTION OF WORK

A. Extent of asphaltic pavement restoration paving area is shown on the drawings.

B. Prepared subbase is specified in Section 310000 - Site Preparation and Earthwork.

1.04. SUBMITTALS

A. Furnish samples, manufacturer's product data, test reports, and materials' certifications as required in referenced sections for concrete and joint fillers and sealers.

PART 2 - PRODUCTS

2.01. MATERIALS

A. Coarse Aggregate:

1. Shall consist of sound, durable rock, free from cemented lumps or objectionable coatings.

    a. Test: AASHTO T 96, does not exceed 50% wear.

2. The percentage of deleterious substances shall not exceed the following values.

Deleterious Material	Percent by Weight
Deleterious Rock	8.0
Shale	1.0
Other Foreign Material	0.5

3. Crushed stone shall be obtained from rock of uniform quality.

    a. Test sourced from any approved ledges, and trial mix sample shall meet the following criteria.

Property	Value
Los Angeles Abrasion, AASHTO T 96, percent loss, max	50
Absorption, AASHTO T 85, percent, max	4.0

4. Gravel aggregate shall be washed sufficiently to remove any objectional coating and shall meet the following criteria.

Property	Value
Los Angeles Abrasion, AASHTO T 96, percent loss, max	50
Absorption, AASHTO T 85, percent, max	5.5

5. Steel slag consisting principally of a fused mixture of oxides and silicates shall be a synthetic aggregate produced as a by-product of basic oxygen, electric or open hearth steel making furnace.

B. Fine Aggregate:

1. Shall be a fine, granular material passing the 3/8-inch sieve, naturally produced by the disintegration of rock of siliceous nature and/or manufactured by the mechanical reduction of sound durable rock.

2. The percentage of deleterious substances shall not exceed the following values.

Deleterious Material	Percent by Weight
Clay lumps and shale	1.0
Total lightweight particles, including coal and lignite	0.5
Other deleterious substances	0.1

3. Lightweight particle requirement will not apply to wet bottom boiler slag, angular chert sand, or manufactured sand.

4. Mineral filler shall be in accordance with AASHTO M 17. Prior to use manufacturer shall provide a certified test report with results tested in accordance with applicable section AASHTO M 17 and MoDOT test method TM-73.

5. Hydrated lime shall be thoroughly dry and free of lumps.

a. Test: AASHTO M 303, Type I or II, expect gradation shall be in accordance with AASHTO T 37.

C. Asphalt Binder: Comply with requirements of Section 1015.10 in the 2023 (English) Edition of the “Missouri Standard Specifications for Highway Construction”, for asphalt binder material.

a. Additives:

2. Fiber additives for stone matrix asphalt mixture may be either cellulose or mineral fiber.

a. Test: AASHTO M 325 in accordance with MoDOT Test Method TM 60.

3. Anti-Strip additive shall not be detrimental to the bituminous mixture.

a. Testing: Type I

Test	Test Method
Specific Gravity @ 77 F	AASHTO T 228
Brookfield Viscosity 77 F using an RVT viscometer. The report shall include a corresponding test temperature, speed, spindle and model of Instrument.	ASTM D2196
Pensky-Martens Closed Cup Flash Point or Cleveland Open Cup Flash Point	ASTM D93 AASHTO T 48
Infrared Spectrum (neat material)	Appropriate Method

b. Testing: Type II

Test	Test Method

Weight per Gallon @ 77 F	ASTM D1475
Brookfield Viscosity 77 F using an RVT viscometer. The report shall include a corresponding test temperature, speed, spindle and model of Instrument.	ASTM D2196
pH	Appropriate Method
Percent Solids	ASTM D1644 Method A
Infrared Spectrum (latex portion)	Appropriate Method

c. Heat stability shall comply with requirements of Section 1071.5.2 in the 2023 (English) Edition of the “Missouri Standard Specifications for Highway Construction”.

d. Shall not significantly lower the unconditioned strength of AASHTO T 283.

1) Testing shall comply with requirements of requirements of Section 1071.5.3 in the 2023 (English) Edition of the “Missouri Standard Specifications for Highway Construction”.

D. Refer to Section 403 in the 2023 (English) Edition of the “Missouri Standard Specification for Highway Construction”, for more material requirements.

PART 3 - EXECUTION

3.01. INSTALLATION

A. Asphaltic pavement shall be installed in accordance with MoDOT specifications noted above and all other related specifications noted therein.

B. Do not place asphalt until the subbase has been checked for line and grade. Do not place asphalt around manholes or other structures until they are at the required finish elevation and alignment.

C. Protect finished asphalt paving, complying with applicable requirements of Section 403 in the 2023 (English) Edition of the “Missouri Standard Specification for Highway Construction”.

END OF SECTION

SECTION 321373

CONCRETE PAVING JOINT SEALANTS

PART 1 - **GENERAL**

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
1. Hot applied joint sealants.
2. Hot-applied, fuel-resistant joint sealants.
3. Joint-sealant backer materials.
4. Primers.

1.03 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Coordinate with project manager

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Paving-Joint-Sealant Schedule: Include the following information:Joint-sealant application, joint location, and designation.
1. Joint-sealant manufacturer and product name.
2. Joint-sealant formulation.
3. Joint-sealant color.

1.05 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of joint sealant and accessory.

1.06 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.

2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.02 HOT-APPLIED JOINT SEALANTS

A. Hot-Applied, Single-Component Joint Sealant: ASTM D 6690, Type I.

1. Products: Subject to compliance with requirements, provide one of the following products to include, but are not limited to, the following:

    a. Crafco Inc
    b. Meadows, W.R.,Inc
    c. Right Pointe.
    d. Approved Equal

B. Hot-Applied, Single-Component Joint Sealant: ASTM D 6690, Type I or Type II.

1. Products: Subject to compliance with requirements provide one of the following products to include, but are not limited to, the following::

    a. Crafco Inc
    b. Right Pointe
    c. Approved Equal.

C. Hot-Applied, Single-Component Joint Sealant: ASTM D 6690, Type I, II, or III.

1. Products: Subject to compliance with requirements, provide one of the following products to include, but are not limited to, the following::

    a. Crafco Inc; RoadSaver 222.
    b. Meadows, W.R.,Inc; Sealtight 3405.
    c. Right Pointe; JTS 3405 Regular 003
    d. Approved Equal.

D. Hot-Applied, Single-Component Joint Sealant: ASTM D 6690, Type IV.

1. Products: Subject to compliance with requirements, provide one of the following products to include, but are not limited to, the following::

    a. Crafco Inc; RoadSaver 231.

b. Meadows, W.R.,Inc; Sealtight 3405M.
c. Approved Equal.

2.03 HOT-APPLIED, FUEL-RESISTANT JOINT SEALANTS

A. Hot-Applied, Fuel-Resistant, Single-Component Joint Sealants: ASTM D 7116, Type I or Type II.

B. Hot-Applied, Fuel-Resistant, Single-Component Joint Sealants: ASTM D 7116, Type III.

2.04 JOINT-SEALANT BACKER MATERIALS

A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.

B. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

C. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.05 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.03 INSTALLATION OF JOINT SEALANTS

A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.

C. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.
3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:

1. Place joint sealants so they fully contact joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:

1. Remove excess joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.04 CLEANING AND PROTECTION

A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint

sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.05 PAVING-JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Joints within concrete paving.

1. Joint Location:

    a. Expansion and isolation joints in concrete paving.
    b. Contraction joints in concrete paving.
    c. Other joints as indicated.

2. Joint Sealant: Multicomponent, nonsag, urethane, elastomeric joint sealant.
3. Joint-Sealant Color: match concrete color specified or per Owner approval.

B. Joint-Sealant Application: Joints within concrete paving and between concrete and asphalt paving.

1. Joint Location:

    a. Joints between concrete and asphalt paving.
    b. Joints between concrete curbs and asphalt paving.
    c. Other joints as indicated.

2. Joint Sealant: Hot-applied, single-component joint sealant.
3. Joint-Sealant Color: Approved by Owner.

END OF SECTION

SECTION 323113

CHAIN LINK FENCE AND GATES

PART 1 GENERAL

1.01 SUMMARY

A. Fencing shall be chain link with three-strand barbed wire extension provided in the alignment and height indicated on the drawings.

1.02 SUBMITTALS

A. Submit in accordance with the requirements of Division 1.

B. Submit manufacturer's product specifications, shop drawings and installation instructions. Include details of construction, components, gate and fence height and post spacing dimensions.

C. Submit Cantilever Slide Gate frame, posts, concrete footings, and all other structural members sized by gate supplier's Engineer of Record.

1.03 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):

a. A 121 – Standard Specification for Metallic-Coated Carbon Steel Barbed Wire
b. A 153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
c. A 392 – Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric
d. C 94 – Standard Specification for Ready-Mixed Concrete
e. F 626 – Standard Specification for Fence Fittings
f. F 900 – Standard Specification for Industrial and Commercial Steel Swing Gates
g. F 1083 – Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
h. F 1184 – Standard Specification for Industrial and Commercial Horizontal Slide Gates

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2. American Welding Society

a. AWS D1.2 Structural Welding Code.

B. Certifications:

1. The aluminum welders and welding process must be certified.
2. Manufacturer shall supply gate design performance certification.

1.04 WARRANTY

A. Shall be as specified in Division1.

PART 2 PRODUCTS

2.01 COMPONENTS

A. Framework: Corner, line and gate posts shall be Schedule 40 steel pipe with 1.8 ounces of zinc coating per square foot of surface area conforming to Standard specification ASTM F1083. Posts shall meet the requirements of ASTM F1043, Heavy Industrial and ASTM F 1184 – Standard Specification for Industrial and Commercial Horizontal Slide Gates, Type II, Class 2.

1. Line and Corner Posts:

Fabric Height	Line Post O.D.	Corner Post O.D.
Under 6'	2"	2-1/2"
6' to 8'	2"	2-1/2"
8' to 12'	2-1/2"	3"

2. Swing Gate Posts:

Single Gate Width	Double Gate Width	Post O.D. Type II
Up to 6'	Up to 12'	3"
7' to 12'	13' to 25'	4"

3. Cantilever Slide Gate Posts:

Cantilever Slide Gate	Post O.D. Type II
	4" minimum

Note: Cantilever slide gate posts shall be sized by Suppliers Engineer of Record.

B. Brace and Rails: Brace and rails shall be 1 1/4" NPS Schedule 40 Steel pipe conforming to ASTM F1083.

C. Fabric:

1. Zinc-coated fabric shall be galvanized before weaving with a minimum 2.0 ounces of zinc per square foot of surface area and conform to ASTM A-392, Class 2.

2. Fabric to be 9 gauge wire woven in a 2" diamond mesh.

3. Fabric shall have twisted and barbed top selvage and knuckled bottom selvage.

D. Fence Fittings: Post and line caps, rail and brace ends, sleeves-top rail, tie wires and clips, tension and brace bands, tension bars and truss rods shall conform to ASTM F626.

E. Swing Gate: Sing gates shall conform to ASTM F900. Materials for gates shall be as specified for fence framework and fabric.

F. Cantilever Slide Gate:

1. Cantilever Slide Gate Frame: The gate frame shall be fabricated from 6063-T6 aluminum alloy extrusions. The top member shall be a 3" x 5" (76mm x 127mm) aluminum structural channel/tube extrusion weighing not less than 3.0 lb/lf (4.4kg/m). To maintain structural integrity this frame member shall be "keyed" to interlock with the “keyed” track member. If fabricated as a single horizontal piece, the bottom member shall be a 2" x 5" (51mm x 127mm) aluminum structural tube weighing not less than 2.0 lb/lf (2.9kg/m). If fabricated in two horizontal pieces, the bottom member shall be a 5" (127mm) aluminum structural channel weighing not less than 2.6 lb/lf (3.8kg/m). When the gate frame is manufactured in two horizontal pieces or sections, they shall be spliced in the field (the gate frame shall be fabricated in one or multiple sections depending on size requirements or project constraints).

2. Cantilever Slide Vertical Members (Chain Link):The vertical members at the ends of the gate frame shall be “P” shaped in cross section with a nominal base dimension of no less than 2” x 2” (51mm x 51mm) and weighing not less than 1.6 lb/lf (2.3kg/m). Major 2” x 2” (51mm x 51mm) vertical members weighing not less than 1.1 lb/lf shall separate each bay and shall be spaced at less than gate height intervals. Intermediate 1” x 2” (25mm x 51mm) vertical members weighing not less than .82 lb/lf shall alternate between 2” x 2” major members.

3. Cantilever Slide Gate Track: The gate frame shall have a separate semi-enclosed “keyed” track, extruded from 6005A-T61 or 6105-T5 aluminum alloy, weighing not less than 2.9 lb/lf (4.2kg/m). The track member is to be located on only one side of the top primary. Welds to be placed alternately along the top and side of the track at 9" (229mm) centers with welds being a minimum of 2" (51mm).

4. Cantilever Slide Gate Welds: All welds on the gate frame shall conform to Welding Procedure Specification and Procedure Qualification Record to insure conformance to the AWS D1.2 Structural Welding Code. All individual welders shall be certified to AWS D1.2 welding code. See 1.02 D.

5. Cantilever Slide Gate Mounting: The gate frame is to be supported from the track by two (2) swivel type, self-aligning, 4-wheeled, sealed lubricant, ball-bearing truck assemblies. The bottom of each support post shall have a bracket equipped with a pair of 3” (76mm) UHMW guide wheels Wheel cover protectors shall be included with bottom guides to comply with UL325. Gap protectors shall be provided and installed, compliant with ASTM F 2200-05.

6. Cantilever Slide Diagonal Bracing: Diagonal "X" bracing of 3/16" or 1/4” diameter stainless or galvanized steel cable shall be installed throughout the entire gate frame**.**

G. Hardware: All hardware shall be galvanized per ASTM A153/153M. Hinges shall permit 180 degree inward gate opening.

H. Barbed Wire: Barbed wire shall consist of commercial quality, 12-1/2 gauge, two-strand line wire with 4-point barbs at 5 inch spacing. Coating shall consist of a minimum of 0.80 ounces of zinc per square foot of wire surface conforming to ASTM A-121.

I. Barbed Wire Extension Arms: Pressed steel, galvanized, fitted with clips or slots for attaching three strands of barbed wire. Arms shall be set outward on a 45 degree angle and be capable of supporting a 250 Lbs load applied to the outer barbed wire connecting point without causing permanent deflection.

J. Padlocks: Keyed alike for all gates, provided 4 keys for each padlock required.

2.02 CONCRETE MIX

A. ASTM C 94 Portland Cement concrete with maximum 3/4" aggregate having a minimum compressive strength of 4,000 PSI at 28 days. Conform to Division 3 specification requirements.

PART 3 EXECUTION

3.01 PREPARATION

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for adjustments during installation where taking field measurements before fabrication might delay work.

3.02 INSTALLATION

A. General:

1. The installed fence shall conform to the alignment and finished grade indicated on the drawings, the manufacturer's instructions and ASTM F567.

2. The Contractor shall fill, cut, or grade where necessary to produce a smooth and uniform ground surface so the bottom of the fence fabric is not more than 2-inch clearance above the finished ground line. All posts shall be plumb true to line and grade and installed in concrete footings. Unless otherwise shown on the drawings or required, posts shall be spaced 10 feet apart.

2. Concrete footings for corner and line posts shall be a minimum 36 inches deep or as shown on the drawings. Concrete footings for gate posts shall be a minimum of 60 inches deep or as shown on the drawings. Concrete footings shall be circular in horizontal section, with the diameter not less than 4 times the post O.D. for posts up to 4 inches in diameter and not less than 3 times the O.D. for posts greater than 4 inches in diameter. Concrete footings shall be of a uniform thickness around the post and shall extend above the finish ground surface and must be crowned approximately one inch. Concrete for footings shall conform to Division 03 Concrete Specification. Each footing shall be cured for at least 72 hours before further work is done on the post.

3. Top rails and bottom tension wires shall be installed before the fence fabric. Top rails shall be securely connected to gate and terminal posts. Tension wires shall be installed approximately 6 inches above the finished grade and shall be attached to each post and securely anchored at terminal and gate posts.

4. Fabric shall be attached to the top rail and bottom tension wire at 24 inches centers and to the line posts at 15-inch centers. Barbed wire shall be fastened to each extension arm by internal clips or external fabric ties. Stretcher bars shall be provided at each gate and terminal post. Each stretcher bar shall be threaded through the fabric and anchored to the post at 15-inch centers. All fabric shall be stretched taut before it is attached to line posts or tension wire.

5. Each gate and terminal post shall be braced by a horizontal pipe brace and an adjustable truss extending to an adjacent line post. Corner posts shall be braced in both directions.

B. Gates.

1. Swing Gates

a. Gates shall be swing type, hinged to swing 180 degrees from closed to open, complete with frames, latches, stops, keepers, hinges, fabric, braces, padlocks, and three strands of barbed wire. Gate leaves shall have intermediate members and diagonal truss rods required for rigid construction and shall be free from sag or twist. Gates shall be fitted with vertical extension arms or shall have frame end members extended to carry barbed wire. Joints between frame members shall be made by welding or by means of heavy fittings and shall be rigid and watertight. Gate fabric shall be the same as fence fabric and shall be attached to frame ends by stretcher bars, bolt hooks, or other mechanical means.

b. Hinges shall be heavy pattern with large bearing surfaces and shall not twist or turn under the action of the gate. Latches shall be plunger bar type, full gate height, and arranged to engage the gate stop, except single gates less than 8 feet wide may be provided with a forked latch. Latches shall be arranged for padlocking with the padlock accessible from both sides of the gate. Stops shall consist of a roadway plate with anchor set in concrete and arranged to engage the plunger. Keepers shall consist of mechanical devices for securing and supporting the free end of the gates when in full open position.

c. Gates shall be installed so that they cannot be removed without disassembly of the hardware. Hardware attachment bolts shall be peened so that removal will be difficult.

2. Cantilever Slide Gates

a. Gates shall be heavy duty cantilever slide type, complete with frames, latches, stops, track, guides ,hangers, trucks, fabric, braces, padlocks, and three strands of barbed wire. Gate shall have intermediate members and diagonal truss rods required for rigid construction and shall be free from sag or twist. Gates shall be fitted with vertical extension arms or shall have frame end members extended to carry barbed wire. Joints between frame members shall be made by welding or by means of heavy fittings and shall be rigid and watertight. Gate fabric shall be the same as fence fabric and shall be attached to frame ends by stretcher bars, bolt hooks, or other mechanical means.

b. Gates shall be installed so that they cannot be removed without disassembly of the hardware. Hardware attachment bolts shall be peened so that removal will be difficult.

c. Gate track system shall be keyed to interlock into gate frame member (providing 200% additional strength when compared to weld only keyless systems). When interlocked with and welded to the "keyed" frame top member, gate track forms a composite structure.

d. Gate shall have a minimum counterbalance length of 50% opening width which provides a 36% increase in lateral resistance (when compared to ASTM minimum of 40% counterbalance). If gate is ever to be automated, counterbalance section shall be filled with fabric or other specified material.

e. To provide superior structural integrity, intermediate vertical members shall be used - with spacing between verticals to be less than 50% of the gate frame height.

f. Entire gate frame (including counterbalance section) shall include 2 adjustable stainless or galvanized steel cables (minimum 3/16”) per bay to allow complete gate frame adjustment (maintaining strongest structural square and level orientation).

g. Gate truck assemblies shall be tested for continuous duty and shall have precision ground and hardened components. Bearings shall be pre-lubricated and contain shock resistant outer races and captured seals.

h. Gate truck assemblies shall be supported by a minimum 5/8” plated steel bolt with self aligning capability, rated to support a 2,000 # reaction load.

i. Hanger brackets shall be hot dipped galvanized steel with a minimum 3/8” thickness that is also gusseted for additional strength.

j. Gate top track and supporting hangar bracket assemblies shall be certified by a licensed professional engineer to withstand a 2,000 lb. vertical reaction load without exceeding allowable stresses.

k. The complete system shall be adjusted to assure it is performing properly. The system shall be operated for a sufficient period of time to determine that the system is in proper working order.

END OF SECTION

SECTION 329110

LANDSCAPE WORK

PART 1 - GENERAL

1.01 SUMMARY

A. Extent of landscape development work includes all areas disturbed during construction.

B. Subgrade Elevations: Excavation, filling and grading required to establish elevations shown on drawings are not specified in this section. Refer to earthwork sections.

1.02 SUBMITTALS:

A. Provide the following Certifications:

1. Submit certificates of inspection as required by governmental authorities. Submit manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements.

2. Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.

B. Submit proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

C. Submit typewritten instructions, 2 copies to the Owner and 1 copy to the Project Engineer, recommending procedures to be established by Owner for maintenance of landscape work for one full year. Submit prior to expiration of required maintenance period.

1.03 QUALITY ASSURANCE

A. Subcontract landscape work to a single firm specializing in landscape work.

B. Source Quality Control will include:

1. Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.

2. Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

C. Before delivery of topsoil, furnish Engineer with written statement giving location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown during past 2 years.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

1.05 JOB CONDITIONS

A. Removal of trees and shrubs shall be only as directed by the project Engineer.

B. Proceed with and complete landscape work as rapidly as portions of site become available, working with seasonal limitations for each kind of landscape work required.

C. Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required.

D. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Engineer before planting.

E. Plant or install materials during normal planting seasons for each type of landscape work required. Correlate planting with specified maintenance periods to provide maintenance from date of substantial completion.

F. All planting shall occur after final grades are established, unless otherwise acceptable to Engineer.

1.06 SPECIAL PROJECT WARRANTY

A. Warranty vegetated areas through specified maintenance period and until final acceptance.

1.07 CLEANING UP

A. The Contractor shall at all times keep the premises free from the accumulation of waste materials or rubbish caused by employees or work and, at the completion of the work, shall remove all rubbish, tools, and surplus materials from the premises, leaving the area in a neat and clean condition.

1.08 COORDINATION

A. Coordinate all vegetation operations occurring on farmed ground with property owner.

B. Coordinate all vegetation operations with general contractor.

PART 2 - PRODUCTS

2.01 TOPSOIL

A. Topsoil will be stockpiled for re-use in landscape work. If quantity of stockpiled topsoil is insufficient, provide additional topsoil as required to complete landscape work.

B. Provide new topsoil which is fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 2" in any dimension, and other extraneous or toxic matter harmful to plant growth.

1. Obtain topsoil from local sources or from areas having similar soil characteristics to that found at project site. Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than 4"; do not obtain from bogs or marshes.

2.02 SOIL AMENDMENTS

A. Soil amendments shall be added to the soil based upon results of soil testing and the recommendations of a state certified soil testing laboratory.

B. Fertilizer:

1. All fertilizer shall conform to applicable State Fertilizer Laws, uniform in composition, dry and free-flowing, delivered to the site in its original, unopened containers with each container bearing the manufacturer's guaranteed analysis.

2. Any fertilizer that becomes caked or otherwise damaged, making it unsuitable for use, will not be accepted.

3. Fertilizer for seeded areas shall be a complete fertilizer containing 8% nitrogen (1/2 organic, 1/2 inorganic), 32% phosphoric acid and 16% potash, or as recommended by soil testing laboratory.

2.03 MULCH

1. Mulch for seeded areas shall be cereal straw from current year's crop free of noxious weed seed.

2. At Contractor's option, seeded area may be hydro-mulched in lieu of straw mulching with a wood fiber mulch product.

2.04 SEEDED AREA

A. Grass seed shall be fresh, clean seed of the current year's crop complying with tolerances for purity and germination established by the United States Department of Agriculture.

B. Seed shall be labeled in accordance with the latest U.S. Department of Agriculture rules and regulations under the Federal Seed Act, and shall be approved. Wet, moldy, or otherwise damaged seed will not be acceptable. The pure live grass seed mix to be used shall be as follows (weed seed shall not exceed 0.5 percent by weight of the total of pure live seed and other material in the mixture):

2.05 Kinds of Seeds	**Pounds Per Acre**
K-31 Fescue (Festuca elatior var. arund Inacae)	25
Domestic Ryegrass (Lolium pernne and L. Multiflorum)	10
Orchard Grass (Dactylis glomerata)	10
Total Pounds Pure Live Seed Per Acre	45

A. Seeding shall be accomplished in the first of the following two periods after completion of earthwork:

March 1st to June 1st
August 15th to October 1st

2.06 WATER

A. Water will be furnished by the Owner and will be suitable for irrigation and free from ingredients harmful to plant life.

B. Hoses and any other watering equipment required for the work shall be furnished by the Contractor.

PART 3 - EXECUTION

3.01 VEGETATION REMOVAL

A. Every consideration shall be given to preservation of natural vegetation whenever possible.

B. Contractor shall coordinate all vegetation removal with the project Engineer prior to demolition.

C. Typically, all vegetation within the permanent easement may be removed. Vegetation within

the temporary construction easement may be removed if under 8" caliper (as measured on trunk 6" from ground) and not flagged.

D. All trees 8" and greater and all flagged trees and shrubs shall not be disturbed in any manner.

3.02 RE-VEGETATION

A. In the event flagged vegetation and trees 8" or greater are disturbed, Contractor shall replace the vegetation with same variety at Contractor's expense.

B. Trees shall be planted at a rate of a minimum of two trees replaced for each tree greater than eight inches diameter - at breast height removed, and three trees for each tree greater than twelve inches diameter removed. Replacement trees shall be at least four feet in height, excluding the root system.

C. Provide trees, shrubs and plants of quantity, size, genus, species and variety indicated and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock." Provide healthy, vigorous stock, grown in recognized nursery in accordance with good horticultural practice and free of disease, insects, eggs, larvae and defects such as knots, sun-scale, injuries, abrasions, or disfigurement.

D. Label each tree with securely attached waterproof tag bearing legible designation of botanical and common name.

E. The Engineer may inspect trees either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size and quality. Engineer retains right to further inspect trees and shrubs for size and condition of balls and root system, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from project site.

3.03 SOIL TESTS

A. Obtaining Samples:

1. After backfill and finish grading are completed and prior to seed bed preparation, Contractor shall obtain representative soil samples of disturbed areas to be revegetated.

2. The method of soil sampling shall conform to guidelines of the soil testing laboratory.

3. A maximum of 50 soil samples and tests shall be taken and performed.

4. The number and location of soil samples shall be at the direction of the project Engineer.

B. Testing Laboratory:

1. Contractor shall deliver to a State approved testing laboratory the soil samples in accordance with that testing laboratory's guidelines.

2. Testing laboratory shall perform standard testing procedures on properly obtained soil samples to determine the existing condition of the soil.

3. Soil test report shall provide soil treatment recommendations for fertilizer (nitrogen, phosphorous and potassium), limestone and any other soil amendment necessary for proper germination and growth of seed (Reference Part 2 - Products, 2.04 Seeded Area).

3.04 PREPARATION

A. Preparation for Planting Seeded Areas:

1. Loosen subgrade of seeded areas to a minimum depth of 4". Remove stones over 1-1/2" in any dimension, sticks, roots, rubbish and other extraneous matter. Limit preparation to areas which will be planted promptly after preparation.

2. Spread top soil to minimum depth of 4" as required to meet lines, grades and elevations shown, after light rolling and natural settlement.

3. Apply one-half the total amount of fertilizer as recommended by the soil testing laboratory and incorporate into the top 2" of all seeded areas.

4. Fine grade seeding areas to smooth, even surfaces with loose, uniformly fine texture. Roll, rake and drag seed areas, remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.

5. Restore seeded areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

3.05 PLANTING SEEDED AREAS

A. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.

B. Sow seed using a spreader or seeding machine. Do not seed when wind velocity exceeds 5 mi. per hr. Distribute seed evenly over entire area by sowing equal quantity in 2 directions at right angles to each other.

C. Apply one-half of the fertilizer over the entire seeded area.

D. Rake seed lightly into top 1/8" of soil, roll lightly, and water with a fine spray.

E. Apply straw mulch at a rate of two tons per acre. The entire mulched area shall be coursed by a mechanical slicer to secure the straw mulch to the soil. Mulch shall be a cereal straw from oats, rye, or other approved grain crop. Wheat straw shall not be used.

F. At the Contractor's option, seeded area may be hydro-mulched, in lieu of straw mulching, with Excel Fibermulch as manufactured by American Excelsior Co., or approved equal, at a rate of 1400 pounds per acre.

3.06 PLANTING PROCEDURES

A. Plant trees and shrubs as per the following requirements:

1. Set balled and burlapped (B&B) stock in center of pit with top of ball at same elevation as adjacent finished grades. Remove burlap from sides of balls; retain on bottoms. When set, place additional backfill around base and sides of ball, and work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately 2/3 full, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill.

2. Dish top of backfill to allow for mulching.

3. Mulch pits and planted areas. Provide not less than following thickness of mulch and work into top of backfill and finish level with finish grades. Provide 4" thickness of mulch.

4. Apply anti-desiccant using power spray to provide an adequate film over trunks, branches, stems, twigs and foliage. If deciduous shrubs are moved in full leaf, spray with anti-desiccant at nursery before moving and again 2 weeks after planting.

5. Wrap tree trunks of 2" caliper and larger. Start at ground and cover trunk to height of first branches and securely attach. Inspect tree trunks for injury, improper pruning and insect infestation and take corrective measures before wrapping.

6. Guy and stake trees immediately after planting.

3.07 MAINTENANCE

A. Begin maintenance immediately after planting.

B. Maintain seeded areas for not less than the period stated below, and longer as required to establish an acceptable cover.

1. Seeded areas, not less than 60 days after substantial completion. If seeded in fall and not given full 60 days of maintenance, or if not considered acceptable at that time, continue maintenance the following spring until acceptable lawn is established.

2. Maintain trees, shrubs and other plants until final acceptance but in no case less than 60 days after substantial completion of planting.

C. Maintain seeded areas by watering, fertilizing, weeding, mowing, trimming, and other operations as required to establish a smooth, acceptable surface, free of eroded or bare areas.

D. Maintain trees, shrubs and other plants by pruning, cultivating and weeding as required for healthy growth. Restore planting saucers. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required. Restore or replace damaged wrappings. Spray as required to keep trees and shrubs free of insects and disease.

3.08 CLEANUP AND PROTECTION

A. During landscape work, keep pavements clean and work area in an orderly condition.

B. Protect landscape work and materials from damage due to landscape operations, operations by other contractors, trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.

3.09 INSPECTION AND ACCEPTANCE

A. When landscape work is completed, including maintenance, Engineer will, upon request, make an inspection to determine acceptability.

B. Landscape work may be inspected for acceptance in parts agreeable to Engineer, provided work offered for inspection is complete, including maintenance.

C. When inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until reinspected by Engineer and found to be acceptable.

END OF SECTION

SECTION 334000

STORM DRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Storm sewers and drainage structures outside of the building.

B. Related Sections:
1. Division 33 Section “Subdrainage”.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements:

1. All materials and work within the right-of-way or easement of any local government or other agency having jurisdiction over storm drainage, shall meet the requirements of such agency.

1.3 SUBMITTALS

A. Each item in submittal must state that the item meets or exceeds the specified standards referenced herein. If multiple sizes or types are included in the submittal, clearly indicate which are to be used, and where, if applicable.

B. Product Data:

1. Sewer pipe, fittings and joint materials.
2. Frames and grates.
3. Steps.
4. Cleanouts.
5. Flared end sections.

C. Shop Drawings: Reinforced concrete manholes, inlets, boxes, and any other structures, including steps, sealing materials and any other required appurtenances.
D. Test Reports: Submit results for all testing and inspections to Architect/Engineer.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Unless otherwise indicated, pipe sizes refer to the nominal inside diameter.

B. Unless otherwise indicated, the following materials shall be used as described below.

1. Reinforced concrete pipe (RCP):

2. High density polyethylene (HDPE) pipe and fittings:

    a. ASTM D3350 and AASHTO M294 Type S, corrugated with smooth interior wall.
    b. Silt-tight joints ASTM D3212 with ASTM F477 gaskets.
    c. Application: Storm sewer 12” to 36” where sewer has a minimum cover of 3 feet from top of pipe to top of finished grade.

3. High performance polypropylene (HP)

    a. ASTM F2881 and AASHTO M330, corrugated with smooth interior wall.
    b. Watertight joints according to ASTM D3212 with ASTM F477 gaskets.
    c. Application: Storm sewer 12” to 36” for use in gravity-flow drainage applications.

4. Polyvinyl chloride (PVC) pipe and fittings:

    a. SDR 35 ASTM D1784, ASTM D3034.
    b. Compression type bell and spigot joints ASTM D3212 with ASTM F477 gaskets.
    c. Application: Storm sewer 12” and smaller which runs directly from building. Do not use in between storm structures or for culverts.

5. Ductile iron (DI) pipe and fittings:

    a. Pipe: AWWA C151, pressure class 350.
    b. Fittings: AWWA C110, standard pattern or AWWA C153 compact pattern.
    c. Joints: bell and spigot with push-on joints and gaskets.
    d. Gaskets: AWWA C111, rubber.
    e. Interior lining: epoxy coating (do not use cement mortar lining).
    f. Polyethylene encasement: AWWA C105 tube or sheet, Linear Low Density (LLD, minimum 8 mil) or High Density Cross Laminated (HDCL, minimum 4 mil) with 2” polyethylene tape (minimum 12 mil).
    g. Application: Sewers 6” and larger. Required when crossing water lines with less than 18” vertical or 10’ horizontal clearance.

C. Flared End Sections:

1. Precast reinforced concrete for RCP piping.
2. Metal end sections for HDPE.

2.2 EXTERIOR CLEANOUTS

A. General:

1. Unless otherwise indicated, cleanouts shall be the same diameter as the sewer they serve for pipe sizes up to 8”, pipes greater than 8” shall use an 8” cleanout.
2. Unless otherwise indicated, riser pipes and cleanout bodies shall be the same material as the sewer they serve.
3. Each cleanout shall have an exterior housing to prevent transfer of load to the cleanout.
4. Medium duty housings may be used in non-vehicular areas, all others shall be heavy duty.
5. Exterior housing:

    a. ASME A112.36.2M gray iron with round, secured, scoriae and gray iron cover.
    b. Refer to Part 3 for concrete anchorage.

6. Cast iron cleanouts:

    a. Gray iron ferrule with tapered-thread, brass closure plug, ASME A112.36.2M.
    b. Riser pipe and fittings: cast iron soil pipe, ASTM A74.
    c. Ferrule connection may be inside caulk, spigot or no-hub; however, connection must be water and air-tight.

7. Plastic cleanouts:

    a. PVC body with PVC tapered-thread plug.
    b. Riser pipe and fittings: SDR 35, ASTM D3034.

2.3 MANHOLES AND CATCH BASINS

A. General:

1. Precast concrete per ASTM C478, C890, C913, AASHTP M199 and MoDOT 1033.
2. Manhole base shall be minimum 8” thick. To prevent flotation, increase thickness of precast sections or add concrete to base section as required.
3. Steps: Polypropylene encased steel per ASTM D4101, meeting OSHA requirements. Steps shall be 14 inches wide, manufactured by M.A. Industries or approved equal.
4. Castings: All frames and castings shall be heavy duty and constructed of gray iron free from blowholes, porosity, hard spots, shrinkage distortion, etc. They shall be smooth and clean.
5. Adjusting rings: Precast concrete, interlocking with ½ butyl rubber base or extrudable preformed gasket material. Bricks, blocks or other means are not acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Piping:

1. Cleanouts and manholes shall be installed in sewer where shown on the Drawings and as required by applicable Codes and/or field conditions.
2. Install manholes and cleanouts at all changes in direction. Blind turns or gradual deflection of pipe is not permitted.
3. The maximum distance between manholes is 400’.
4. Verify existing and proposed grades, connections and pipe sizes before installing any pipe. Notify Architect/Engineer of any conflicts with Drawings or Specifications.
5. Pipe installation shall proceed upgrade with spigot ends of bell and spigot pipe pointing into direction of flow.
6. Each pipe shall be laid true to line and grade and in such a manner as to form a close concentric joint with adjoining pipe and to prevent sudden offset in the flow line.
7. During backfilling, install detectable warning tape. See Division 33 Section “Common Work Results for Utilities” for warning tape requirements.
8. Pipe trenches shall be excavated parallel to the specified pipe, slope and grade.
9. The bottom of the pipe shall be supported by a minimum 6" thick layer of #8 crushed stone. The #8 crushed stone shall extend 6" on each side of the pipe and 12" above the top of the pipe unless indicated otherwise.
10. The remaining backfill in lawn and non-pavement areas shall be suitable fill material approved by the soils testing laboratory.

11. Pipes under and within 5' of pavements, slabs, sidewalks and other hard surfaces shall be backfilled with compacted granular fill.
12. All backfilling and compaction shall be in accordance with Division 31 Section ”Earthwork"
13. Any breaks or defects in pipe must be immediately repaired. Any pipe which has been disturbed after being laid must be taken up, joints cleaned and properly relaid.
14. Interior of all pipe shall be cleaned of all dirt and superfluous materials as the work progresses. After pipe installation, install erosion control measures as shown on Drawings and as necessary to prevent sediment or other materials from entering or building up in pipe.
15. Water and sewer minimum clearances:

    a. Where minimum 18” vertical or 10’ horizontal separation cannot be provided between sewers and water lines, the sewer shall be ductile iron, refer to Part 2.
    b. At crossings, extend ductile iron sewer pipe a minimum of 10 feet on both sides of the water line.
    c. Do not install water and sewer lines in the same trench under any circumstances.

B. Manholes and Catch Basins:

1. Set solid lid castings flush with grade in pavement areas and 1” above grade in other areas. Set inlet castings at elevation grades per Drawings.
2. Install 2 to 4 precast adjusting rings for an overall 6” to 12” adjustment height.
3. Grade to drain into inlet castings positively and adequately.
4. Install steps from 12” below top to 12” above bottom at 16” on center.
5. Bench bottom of structures per Drawings.

C. Cleanouts:

1. Install piping so cleanouts open in direction of flow in sewer pipe.
2. Set cleanout covers flush with grade.
3. In areas other than concrete walks and concrete pavements, install concrete anchor pad.
4. Unless otherwise indicated, pad dimensions are 12” height with a diameter of the cleanout housing diameter + 12”, to provide a 6” ring around the cleanout frame. Place on properly compacted subgrade and stone per Division 31 Section “Earthwork” and Division 32 Section “Site Concrete”.

END OF SECTION 334000

SECTION 334600

SUBDRAINAGE

PART I - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Subsurface drains for yard areas.
2. Subsurface drains for pavement areas.
3. Retaining wall foundation drains.
4. Building foundation perimeter drains.
5. Underslab subdrainage systems.

B. Related Sections:

1. Division 31 Section “Earthwork”.
2. Division 33 Section “Storm Drainage”.

1.2 SUBMITTALS

A. Each item in submittal must state that the item meets or exceeds the specified standards referenced herein. If multiple sizes or types are included in the submittal, clearly indicate which is to be used, and where, if applicable.

B. Product Data:

1. Subsurface drainage pipe, tubing, fittings and joint materials.
2. Cleanouts.
3. Geotextile fabric materials.
4. Pumps for underslab drainage systems.

C. Coordination Drawings:

1. For underslab drainage systems, prepare drawings showing horizontal and vertical relationship to all other utilities, plumbing, foundations or other work affected by or in vicinity of proposed underslab drainage.

D. Testing and inspection reports.

1.3 DELIVERY, STORAGE AND HANDLING

A. Protect all materials from UV exposure at all times

B. Store materials off the ground and protect from moisture, sediment and other deleterious conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:

1. Unless otherwise indicated, pipe sizes refer to the nominal inside diameter.
2. Unless otherwise indicated, the following materials shall be used as described below.

B. Perforated Pipe and Fittings:

1. Polyethylene (single wall):

a. AASHTO M252, Type CP, standard band couplings.
b. Application: Lawn and pavement areas only.

2. Polyethylene (double wall):

a. AASHTO M252, Type SP, smooth interior wall, standard band couplings.
b. Application: Foundation and underslab drainage systems.

C. Non-Perforated Pipe and Fittings:

1. Polyvinyl chloride (PVC):

a. SDR 35 ASTM D1784, ASTM D3034.
b. Compression type bell and spigot joints ASTM D3212, ASTM F477 gaskets.
c. Application: Headers for underslab drainage systems or as indicated on the Drawings.

2. High density polyethylene (HDPE):

a. ASTM D3350 and AASHTO M294 Type S, corrugated with smooth interior wall.
b. Silt-tight joints ASTM D3212, ASTM F477 gaskets.
c. Application: Headers for underslab drainage systems or as indicated on the Drawings.

D. Special Couplings: Join pipe and fittings of different materials and dimensions with appropriate couplings made for each application.

E. Soil Separator Geotextile Fabric:

1. Refer to Division 31 Section “Earthwork”.
2. Perforated pipe with pre-installed geotextile fabric (i.e. filter socks) is not acceptable.
3. The geotextile fabric shall not be wrapped directly around subsurface piping. Place a minimum 6” of washed #8 stone between the drain and the geotextile unless indicated otherwise. Refer to Drawings for more information and typical details.

F. Interior Cleanouts:

1. General: J.R. Smith 4021. Nickel bronze frame and cover and bronze, countersunk tapered-thread plug. Spigot, no hub or “Speedi-Set” connection.
2. Riser and connection fittings: ASTM A74, cast iron soil pipe and fittings.
3. Carpeted floors: J.R. Smith 4021-Y.

4. Other floors: Cleanout and cover to be compatible with flooring material.

G. Exterior Cleanouts:

1. Unless otherwise indicated, cleanouts shall be the same diameter as the sewer they serve for pipe sizes up to 8", pipes greater than 8" shall use an 8" cleanout.
2. Unless otherwise indicated, riser pipes and cleanout bodies shall be the same material as the sewer they serve.
3. Each cleanout shall have an exterior housing to prevent transfer of load to the cleanout.
4. Medium duty housings may be used in non-vehicular areas, all others shall be heavy duty.
5. Exterior housing:

    a. ASME A112.36.2M gray iron with round, secured, scoriated, gray iron cover.
    b. Refer to Part 3 for concrete anchorage.

6. Cast iron cleanouts:

    a. Gray iron ferrule with tapered-thread, brass closure plug, ASME A112.36.2M.
    b. Riser pipe and fittings: cast iron soil pipe, ASTM A74.
    c. Ferrule connection may be inside caulk, spigot or no-hub; however, connection must be water and air-tight.

7. Plastic cleanouts:

    a. PVC body with PVC tapered-thread plug.
    b. Riser pipe and fittings: SDR 35, ASTM D3034.

H. Soil Materials: Refer to Division 31 Section "Earthwork".

PART 3 - EXECUTION

3.1 GENERAL

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earthwork."

B. Refer to Drawings for typical earthwork and subdrainage details.

C. Preparation:

1. Verify waterproofing is installed, where applicable, before beginning work.
2. Examine surfaces and areas for suitable conditions where subdrains will be installed and correct unsatisfactory conditions prior to installation.
3. Prior to placement of the geotextile fabric, prepare the subgrade to a smooth condition free of large rocks, debris or other materials that may damage or compromise the function or properties of the fabric.

D. General:

1. The minimum overlap for geotextile fabric is 18" in any direction unless indicated otherwise.
2. If the fabric is torn, punctured or otherwise damaged during installation, install new fabric that is large enough to extend at least 18" beyond the damaged area in all directions.

3. Once the fabric has been installed, cover immediately. Do not leave exposed to UV radiation, rain, sediment or other sources of damage or disturbance.

3.2 YARD AND PAVEMENT INSTALLATIONS

A. Minimum cover is 24” from top of drain pipe to top of finished grade unless indicated otherwise.

B. See Drawings for trenching and bedding details.

3.3 RETAINING WALLS AND BUILDING FOUNDATIONS

A. Impervious Fill:

1. After concrete footings have been cured and the forms removed, place impervious fill material on subgrade adjacent to bottom of footing and over top of drainage fill at top of wall backfill.
2. Place and compact impervious fill to dimensions indicated, but not less than 12 inches (150 mm) deep and width of drainage fill.

B. Drainage Fill:

1. Before installing drainage fill, lay geotextile fabric on bottom and sides of footing, unless otherwise shown on Drawings.
2. Place supporting layer of drainage fill over compacted subgrade to compacted depth of not less than 4 inches, unless otherwise shown on Drawings.
3. After installing drainage piping, add drainage fill to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
4. After satisfactory testing, cover piping to width of at least 6 inches (150 mm) on side away from footing and above top of pipe to within 12 inches (300 mm) of finish grade.
5. After installing drainage fill and pipe, wrap top of drainage fill with flat-style geotextile fabric, wrap lap edges at least 4 inches.

C. Fill to Grade:

1. Place impervious material over compacted drainage fill to within 12” of finished grade.
2. Place material in loose-depth layers not exceeding 6 inches (150 mm) and compact per specifications.
3. Refer to Drawings for elevations, ensure impervious fill and final grade slope away from building.

3.4 UNDERSLAB DRAINAGE SYSTEMS

A. General:

1. Excavate for underslab drainage system after footings have been installed and subgrade is brought to appropriate grade.
2. Include horizontal distance of at least 6 inches between drainage pipe and trench walls.
3. Grade bottom of trench excavations to required slope and compact to firm, solid bed for drainage system.

B. Drainage Fill:

1. Before installing drainage fill, lay geotextile fabric over subbase and along trench walls, overlap sides per manufacturer and supplier requirements and recommendations.
2. Place supporting layer of drainage fill over compacted subgrade to compacted depth of not less than 4 inches.
3. After installing drainage piping, add drainage fill to top of pipe to perform tests.
4. After satisfactory testing, cover piping with drainage fill to elevation of bottom of slab and compact drainage material.
5. After installing drainage fill and piping, wrap edges of drainage fill with flat-style soil separator fabric turned up at the perimeter.

3.5 PIPING INSTALLATION

A. General:

1. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert.
2. Bed piping with full bearing in filtering material.
3. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
4. Foundation Drainage System: Install piping pitched down in direction of flow, as indicated on the Drawings and with a minimum cover of 36 inches, unless otherwise noted.
5. Underslab Drainage System: Install piping pitched down in direction of flow, as indicated on the drawings.
6. Install perforated pipe with perforations down.
7. Use increases, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

B. See Drawings for installation details.

3.6 CLEANOUT INSTALLATION

A. General:

1. Install cleanouts and riser extensions from subdrainage piping to grade or slab.
2. Locate cleanouts at beginning of piping run and at changes in direction.
3. Install fittings so cleanouts open in direction of flow in piping.
4. Ensure cleanouts are installed properly to prevent load transfer to riser pipe.

B. Interior:

1. Adjust location of cleanouts to make accessible and avoid conflict with walls, housekeeping pads, equipment and similar items. Contact Architect/Engineer if any areas of question exist or if further direction is needed.
2. Set cleanout frames and covers flush with new floor elevation.
3. Verify type of flooring with architectural, structural and interior finish plans and ensure proper cleanout cover and elevation are provided per the type of flooring.

C. Exterior:

1. Install piping so cleanouts open in direction of flow in sewer pipe.
2. Set cleanout covers flush with grade.
3. In areas other than concrete walks and concrete pavements, install concrete anchor pad.

4. Unless otherwise indicated, pad dimensions are 12” height with a diameter of the cleanout housing diameter + 12”, to provide a 6” ring around the cleanout frame.
5. Place pad on properly compacted subgrade and stone per Division 31 Section “Earthwork” and Division 32 Section “Site Concrete”.

3.7 CONNECTIONS

A. Piping installation requirements are specified in Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where indicated and required, connect low elevations of foundation and underslab drainage to stormwater sump pumps.

3.8 FIELD QUALITY CONTROL

A. Testing: After installing drainage fill to top of pipe, test drain piping with water to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.9 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 334600