MISSISSIPPI MILITARY DEPARTMENT
State of Mississippi
1410 Riverside Drive
Jackson, Mississippi 39202-1271

VIRGIL GLEN REED
REGISTERED PROFESSIONAL ENGINEER
#11536
STATE OF MISSISSIPPI
09-27-2022

DOUGLAS M. WIMBERLY
LICENSED PROFESSIONAL ENGINEER AND SURVEYOR
PE-11733
PS-3044
STATE OF MISSISSIPPI
9/27/22

INVITATION TO BID AND TECHNICAL SPECIFICATIONS FOR:

WATER WELL FILTRATION SYSTEM
CAMP SHELBY JOINT FORCES TRAINING CENTER
CAMP SHELBY, MS
P.N. 28210057

JANSON D. BOYLES
Major General, Mississippi National Guard
The Adjutant General of Mississippi

Mississippi Army National Guard

Set of

Updated July 2020

PROJECT IDENTIFICATION

PROJECT: WATER WELL FITRATION SYSTEM, CSJFTC, CAMP SHELBY, MS

DATE: SEPTEMBER 2022

OWNER: MISSISSIPPI MILITARY DEPARTMENT
JANSON D. BOYLES
MAJOR GENERAL, MISSISSIPPI NATIONAL GUARD
THE ADJUTANT GENERAL OF MISSISSIPPI

OWNER'S REPRESENTATIVE: CURTIS BODDY, JR
MISSISSIPPI MILITARY DEPARTMENT
ATTN: NGMS-SRC
1410 RIVERSIDE DRIVE
JACKSON, MISSISSIPPI 39202-1271
(601) 313-6209

ARCHITECT: NEEL-SCHAFFER
707 WATTS AVENUE, SUITE C
PASCAGOULA, MS 39567
228-696-2649

INDEX

PROJECT: WATER WELL FILTRATION SYSTEM, CSJFTC, CAMP SHELBY, MS

(SEE NEXT SHEET(s) FOR THE REMAINDER OF THE TECH SPECS)

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TECHNICAL SPECIFICATIONS (Continued):

INDEX

TECHNICAL SPECIFICATIONS (Continued):

SECTION 00 11 13

LEGAL NOTICE
ADVERTISEMENT FOR BIDS
NOTICE TO CONTRACTORS

Sealed bids will be received, publicly opened and read in the office of the Adjutant General, 1410 Riverside Drive, Jackson, Mississippi, 39202-1271. Electronic Bids may be received via MAGIC portal or Physical Receipt. Prospective bidders are encouraged to monitor the Mississippi Department of Finance and Administration website for updates and future bidding opportunities.

UNTIL: 1:30 PM January 26, 2023

FOR: Water Well Filtration System, CSJFTC, Camp Shelby, MS

Plans and specifications may be obtained from NEEL-SCHAFFERPLANS.COM. Bid documents are non-refundable and must be purchased through the website. Plan holders are required to register and order bid documents from the website and must have a valid email address for registration. Contact Plan House Printing, 1A Churchill Street, Hattiesburg, MS 39402, 601-336-6378 for questions regarding website registration and online orders. Cost of bid documents is $100 per copy.

A pre-bid conference will be conducted 10AM January 18, 2023, at 1001 West Lee Ave, Building 6600 DPW Conference Room.

ALL PROSPECTIVE BIDDERS ARE ENCOURAGED TO ATTEND.

Bidders shall be advised that in accordance with the Mississippi Code, the Military Department has Thirty (30) calendar days to deliver a warrant to the vendor from the date an application for payment is determined to be due and payable under the terms and conditions of the contract.

The Adjutant General reserves the right to reject any and/or all bids and to waive informalities. Award of contract is subject to availability of funds. Bids will be held open for 60 days from bid date.

PUBLISH: December 20 & 27, 2022

SECTION 00 20 00

INSTRUCTION TO BIDDERS

1. PROJECT IDENTIFICATION

The construction contemplated in the following specifications and the attached or accompanying documents including plans prepared as essential parts hereof include furnishing all plant, labor, tools equipment, materials, fixtures, accessories and other things necessary for construction of project as specified herein and as shown on the drawings. The State of Mississippi, represented by the Adjutant General of said State, shall be hereinafter referred to as the Director, State Purchasing and Contracting and/or Contracting Officer. Wherever the term "Owner" is used, it shall refer to the State of Mississippi.

2. BID SECURITY

Each bid must be accompanied by certified check, cashier's check, of the bidder, or a bidder's bond equal to 5% of the total amount of the base bid. Certified checks must be issued by a bank located within the State of Mississippi. If bid is submitted electronically, the physical Certified check or Cashier's check must be placed in the hands of the MS Military Department's state personnel directly serving the procurement activity prior to the date and time set for in the advertisement.

The successful bidder, upon failure or refusal to execute and deliver the contract and bond required within ten (10) days after he/she has been notified of award of the contract to him/her, shall forfeit to the Director, State Purchasing and Contracting and/or Contracting Officer, as liquidated damages not as penalty, for such failure or refusal, the security deposited with his/her bond.

3. SITE EXAMINATION

Each bidder must inform himself/herself fully of the conditions relating to construction and labor under which the work is to be performed by visiting each site and familiarizing himself/herself with the problem's peculiar to the various items of work. Failure to visit the site will in no way relieve the successful Bidder from furnishing any materials or performing any work required to complete work in accordance with Plans, Specifications or other contract documents without additional cost to the Owner.

4. APPROVAL

The Adjutant General of the State of Mississippi shall, and does, have the right to approve any and all material and equipment used in the construction of the projects involved and to make selection thereof.

5. PERFORMANCE BONDS

The Contractor shall give a Performance Bond and Payment Bond in the amount equal to 100% of the contract price in a surety company authorized to do business in the State of Mississippi as surety

thereon. OPTIONAL: If contract price is under $25,000, contractor may accept one/final payment in lieu of Performance Bond ONLY.

If, at any time after execution and approval of this contract and performance bond required by the contract documents, the Owner shall deem any of the sureties upon such bond to be unsatisfactory, or if for any reason, such bond shall cease to be adequate security for the Owner the Contractor shall, within five (5) days after notice of the Owner to do so, furnish a new and additional bond in form and sum signed by such parties as shall be satisfactory to the owner. No further payment shall be deemed to be due nor shall any further payment be made to the Contractor until such new bonds shall be paid for the Contractor, only bonding and surety companies that are approved in "Federal Register" 570, Surety Company Acceptable on Federal Bonds, will be acceptable to this office as underwriters.

6. EXECUTION OF BIDS

Each bid must be signed in writing by any individual authorized to enter into a binding agreement for the Business making the bid proposal. Any bid not so signed may be rejected for informality. All prices must be printed in ink or typewritten. No erasures permitted. Errors may be crossed out and corrections printed in ink or typewritten adjacent and must be initialed in ink by person signing bid.

Should the bidder be a partnership, bid should be so signed as to show the various members making up the partnership. Should it be a company non-corporate, owner may be individual or group, this should also be made clear.

Failure to complete any and/or all bid items as required will render same irregular to the probable extent of causing rejection.

All bids must be submitted by one of the following:

Preferred Method: in a sealed envelope and addressed as shown on the bid specifications, Directions for Mailing Bids-DMB - Section 00 21 13 -1/1. Bids must be placed in the hands of the state personnel directly serving the procurement activity prior to the hour of the date mentioned in the advertisement. Bidder submitting bid, whether hand delivered or mailed, is responsible for ensuring that the sealed bid is delivered by the required time and the bidder assumes all risk of delivery. The time of receipt shall be determined by the time clock of the Director, State Purchasing and Contracting and/or Contracting Officer or authorized representative directly serving the procurement activity for the Mississippi Military Department. Bids received after the hour and date specified will be rejected.

Bidder hand delivering his/her bid is encouraged to **arrive 45 minutes early** to preclude any delays due to heightened security at our facility.

Bidder mailing his /her bid must ensure that the mailing envelope is marked same as described in the Direction Mailing Bids-DMB Section 00 21 13 -1/1.

Second Method: Electronically via MAGIC Portal. Bidder will ensure that the opening page will be either the COR Number or Bid Does Not Exceed $50,000.00 Only, the pages to follow will be the Bid Form, ect. . Bids must be electronically completed by the required date and time set for in the advertisement for bids and the bidder assumes all risk of electronic delivery. The site for MS Suppliers (Vendors) is http://www.dfa.ms.gov/dfa-offices/mmrs/mississippi-suppliers-vendors/ at the bottom it will have Self service, supplier training etc.

Bidder may modify the bid PRIOR to the scheduled closing time indicated in the Advertisement of Bids on the outside of the sealed envelope containing the bid. A facsimile will not be acceptable.

If the agency is closed for any reason, including but not limited to: acts of God, strikes, lockouts, riots, acts of war, epidemics, governmental regulations superimposed after the fact, fire, earthquakes, floods, or other natural disasters, (the "Force Majeure Events"), which closure prevents the opening of bids at the advertised date and time, all bids received shall be publicly opened and read aloud on the next business day that the agency shall be open and at the previously advertised time. The new date and time of the bid opening, as determined in accordance with this paragraph, shall not be advertised, and all Contractors, upon submission of a bid proposal, shall be deemed to have knowledge of and shall have agreed to the provisions of this paragraph. Bids shall be received by the agency until the new date and time of the bid opening as set forth herein.

The agency shall not be held responsible for the receipt of any bids for which the delivery was attempted and failed due to the closure of the agency as a result of a Force Majeure Event. Each Contractor shall be required to ensure the delivery and receipt of its bid by the agency prior to the new date and time of the bid opening.

7. FORMS

For the purpose of uniformity and equity in all proposals, and clearly indicating alternate propositions as called for, bidders will be required to use the bid form incorporated herein. Where prices are stated, they must be expressed both in figures and written words in the spaces provided for that purpose. In case of difference in the figures and the written price, the latter will be considered binding. No amendments, alterations, insertions, provisions, or other additions made by the bidder for the purpose of changing the intent of expression of the forms provided, will be allowed. Also, any changes may render the bid irregular and thereby cause its possible rejection. Loose copies of the proposal form shall be furnished to all bidders upon request.

Contractors shall hold their bids open for acceptance for a period of sixty (60) days from the date of the bid opening. The successful bidder further agrees that upon notification of an award of the

contract, the successful bidder shall furnish the State of Mississippi a Performance Bond, Standard Form 25 and a Payment Bond, Standard Form 25A or equivalent Form from the bidders Bonding Company with good and sufficient surety. Bonds will be in the amount of 100% and in accordance with the Base Bid and/or combination of Bid Items as accepted by the Director, State Purchasing and Contracting and/or Contracting Officer.

8. TIME TO COMPLETE WORK

Bidder to whom contract is awarded must agree to commence the work within ten (10) calendar days after receipt of written notice to proceed and complete the work ready in its entirety within the time stated in Bid Form. This time will include the receipt of all Close Out Documents and final pay request to Director, State Purchasing and Contracting and/or Contracting Officer. If Substantial Completion is necessary and approved, it must be determined prior to the final completion date. Delays through no fault of the Contractor will be taken into consideration by the Director, State Purchasing and Contracting and/or Contracting Officer.

9. INTERPRETATION OF THE CONTRACT DOCUMENTS

It shall be incumbent upon all bidders to understand the provisions of the specifications and to obtain clarification prior to the time and date set for the bid opening. Such clarification will **only** be in form of a response to a written request and received not less than six (6) working days prior to the bid opening. No clarification will be offered as a response to a telephone request.

If any person contemplating submitting a bid for the proposed contract is in doubt as to the true meaning of any part of plans, specifications, or other contract documents, they should contact the Architect listed on page POI-1/1.

Any interpretations of the proposed documents will be made only by addendum duly issued and a copy of such addendum will be mailed or delivered to each person receiving a set of such documents. The Owner will not be responsible for any other explanations of the proposed documents.

Addenda modifying the specifications may be issued if time permits. No addendum will be issued within a period of two working days prior to the time and date set for the bid opening. Should it become necessary to issue an addendum within the two-day period to the bid opening, the bid date will be reset giving bidders ample time to answer the addendum. When replying to a bid request on which an addendum has been issued, the bidder shall attach a copy of the addendum with the bid which will indicate the acknowledgement of receipt of that addendum and that the bid is being offered in compliance therewith. **Failure to attach a copy of the addendum signature page may result in the bid being rejected as not being in accordance with the revised specifications**.

10. DISQUALIFICATION OF BIDDER: A Bidder may be disqualified for any of the following reasons:

a. Failure to comply with the bid requirements.
b. Bidder is in arrears on existing Contracts with the Owner or another state agency.
c. Bidder is, or anticipates being, in litigation or arbitration with the Owner or another state agency.
d. Bidder has defaulted on a previous Contract.

11. CERTIFICATION OF RESPONSIBILITY (COR)

a. The Mississippi State Board of Contractors is responsible for issuing Certificates of Responsibility to Contractors. To be awarded a Contract for public work, Sections 31-3-15 and 31-3-21 of the **Mississippi Code 1972 Annotated** requires a Contractor to have a current Certificate of Responsibility at bid time and during the entire length of the job. The Certificate of Responsibility number issued becomes a significant item in all public bidding.

b. **Bid Under $50,000:** If a Bidder submits a bid not exceeding $50,000, no Certificate of Responsibility number is required; however, a notation stating the bid does not exceed $50,000 must appear on the face of the envelope, or a Certificate of Responsibility number. SEE Directions for Mailing Bids, section 00 21 13, page DMB-1/1 for example.

c. **Bid Over $50,000:** Each Bidder submitting a bid in excess of $50,000 must show its Certificate of Responsibility number on the bid and on the face of the envelope containing the bid. SEE Directions for Mailing Bids, section 00 21 13, page DMB-1/1 for example.

d. **Joint Venture Bid:** When multiple Contractors submit a joint venture bid in excess of $50,000, a *joint venture* Certificate of Responsibility number must be shown on the bid and on the face of the envelope containing the bid. If the Multiple-Contractor joint venture has no *joint venture* Certificate of Responsibility number, each of the Contractors participating in the bid must indicate their individual Certificate of Responsibility numbers on the bid and on the face of the envelope.

12. BID SECURITY-BIDDING REOUIREMENTS

All bids shall be accompanied by a Bid Security in the sum of five percent (5%) of the contract price. Bid Security shall be a cashier's or certified check or a duly executed copy of Bid Bond, using the Mississippi Military Department's Standard Form 24 or equivalent Form from the bidders Bonding Company. Contractors bidding using the Standard Form 24 will be furnished a copy from the Mississippi Military Department, State Purchasing and Contracting Division. (Example shown in Contract Forms Section, page BB-1-2).

13. CONTRACT BOND

Prior to award of contract, the Contractor will be expected to execute a Performance Bond, Standard Form 25 and a Payment Bond, Standard Form 25-A or equivalent Form from the bidders Bonding Company. When executed, this document will be bound here with final Contract Documents. (Example shown in Contract Forms Section, pages PaB l-2 & PeB l-2).

14. NONRESIDENT CONTRACTOR

When a Nonresident Contractor submits a bid for a public project, he/she shall attach thereto one of the following:

a. A copy of his/her resident state's current law pertaining to such state's treatment of Nonresident Contractors. As used in this section, the term "Resident Contractors" includes a nonresident person, firm or corporation that has been qualified to do business in this state and has maintained a permanent full-time office in the State of Mississippi for two (2) years prior to submission of the bid and the subsidiaries and affiliates of such a person, firm or corporation.

b. A statement indicating the State of (Name of the State) has no resident contractor preference law. Any bid submitted by a nonresident contractor which does not include either A or B of Paragraph 14 on page ITB Section 00 20 00 5/7 shall be rejected and not considered for award.

15. PROTEST

Any protest MUST be delivered, in writing, to the Owner within forty-eight (48) hours after the bid opening.

16. CONTRACT AWARD

The contract award will be made on the basis of the lowest and the best overall Base Bid and/or any combination of Bid Items as selected and accepted by the Director, State Purchasing and Contracting and/or Contracting Officer. The Director, State Purchasing and Contracting and/or Contracting Officer reserve the right to reject any and/or all bids and to adjust the contract price within funding on the basis of the quoted bid prices.

17. METHOD OF PAYMENT

Payments shall be made, and remittance information provided electronically as directed by the State of Mississippi Department of Finance and Administration (DFA). These payments shall be deposited into the bank account of the Contractor’s choice. The State of Mississippi DFA may, at its sole discretion, require the Contractor to submit invoices and supporting documentation electronically at any time during the term of this contract. Contractor understands and agrees that the State is exempt from the payment of taxes. All payments shall be in the United States currency.

Contractor shall be advised that in accordance with the Mississippi Code, the Military Department has thirty (30) calendar days to deliver a warrant to the vendor from the date the invoice is due and payable. Due and payable shall be at the time pay request has been received by the Director, State Purchasing and Contracting and/or Contract Officer responsible for the project along with inspection report confirming work has been completed in accordance with plans, specifications and bid documents.

18. E-VERIFY PROGRAM

Contractor shall be advised that prior to Execution of the contract, **Contractor will be required to issue a certification letter to the MMD certifying E-Verify has been completed** and provide the 6-digit Company ID# issued by the Department of Homeland Security to include any Subcontractors Company IDS#'s. The Contractor agrees to comply with the Mississippi Employment Protection Act, Miss, Code Ann. 8 71-1-57, and will register and participate in the status verification system for all newly hired employees, effective for all public contracts executed after 1 Jul 08. The term "employee" as used herein means any person or entity that is hired to perform work within the State of Mississippi and to whom the Contractor is required by Federal or Mississippi law to issue a United States Internal Revenue Service Form W-2 or Form 1099.

As used herein, "status verification system" means the electronic verification of work authorization program of the Illegal Immigration Reform and Immigration Responsibility Act of 1996 that is operated by the United States Department of Homeland Security, also known as the E-Verify Program or any other successor verification system replacing the E-Verify Program. The Contractor agrees to maintain records of such compliance, and upon request of the State, to provide a copy of each such verification to the State. The Contractor agrees that any person assigned to perform services hereunder meets the employment eligibility requirements of all immigration laws of the United States and the State of Mississippi. The Contractor understands and agrees that any breach of these warranties may subject the Contractor to the following: (a) termination of this contract and ineligibility for any state of public contract in Mississippi for up to three years, with notice of such cancellation/termination being made public, or (b) the loss of any license, permit, certification or other document granted to the Contractor by an agency, department or government entity for the right to do business in Mississippi for up to one year, or (c) both, as well as any other penalties authorized by law. In the event of such cancellation/termination, the Contractor will also be liable for any additional cost incurred by the State due to the contract cancellation or loss of license or permit.

(END OF SECTION)

SECTION 00 21 13

DIRECTION FOR MAILING BIDS

ANY BID NOT MARKED ACCORDINGLY WILL BE DISQUALIFIED

ALL BIDS WILL BE PLACED IN SEALED ENVELOPE AND MARKED AS FOLLOWS:

IF BID DOES NOT EXCEED $50,000

NAME/ADDRESS OF CONTRACTOR

THE ADJUTANT GENERAL
STATE OF MISSISSIPPI
ATTN: NGMS-SRC
1410 RIVERSIDE DRIVE
JACKSON, MS 39202-1271

"BID" (Write in Title of Project as listed on specifications)

"ENCLOSED BID DOES NOT EXCEED $50,000"

IF BID DOES EXCEED $50,000

NAME/ADDRESS OF CONTRACTOR

THE ADJUTANT GENERAL
STATE OF MISSISSIPPI
ATTN: NGMS-SRC
1410 RIVERSIDE DRIVE
JACKSON, MS 39202-1271

"BID" (Write in Title of Project as listed on specifications)

"CERTIFICATE OF RESPONSIBILITY NUMBER_____

SECTION 00 40 00

BID FORM

SUBMITTED BY: _____ DATE:_____
(Name of Firm)

TO: The Adjutant General
State of Mississippi
ATTN: NGMS-SRC
1410 Riverside Drive
Jackson, MS 39202-1271

RE: WATER WELL FILTRATION SYSTEM
CSJFTC, CAMP SHELBY, MS

Gentlemen:

In compliance with your advertisement for bids, the undersigned, having become thoroughly familiar with the terms and conditions of the proposed Contract Documents and with local conditions affecting the performance and costs of the work at the site in all particulars, hereby proposes and agrees to fully perform the work within the time stated and in strict accordance with proposed Contract Documents, including furnishing any and all plant, labor, and materials, and to do work required to construct and complete said work in accordance with Contract Documents, for the following sum of money:

BASE BID: All labor, materials, services and equipment necessary for the completion of the work as indicated on the plans and specifications and other contract documents for the sum of:

_____ DOLLARS AND _____ CENTS
(Words) (Words)

($_____).
(Figures)

1. I understand that the Owner reserves the right to reject this bid and to waive informalities, but that this bid shall remain open and not be withdrawn for a period of 60 days from the date prescribed for its opening.

2. The Bidder further agrees that if awarded the contract, he/she will furnish and deliver to the Owner the *Performance Bond, Labor and Material Payment Bond, Certificate of Insurance Coverage and specified contract forms, all within ten (10) days after Notification of Acceptance of this bid. Bidder further agrees to commence work within ten (10) calendar days of the effective date of the written Notice-to-Proceed and to complete the project on or before 306 calendar days after the effective date of the Notice to Proceed. Completion will include receipt of all Close Out Documents and Final Payment received in the office of NGMS-SRC. In the case of failure on the part of the contractor to complete the work within the time fixed in the contract or any extension thereof, the contractor shall pay to the State as liquidated damages, not as penalty, the sum of $ 1,507.41 per calendar day.

   - Or ONE PAYMENT option (Page ITB Section 00 20 00 - 6/7)

3. Notice of Acceptance, or request for additional information may be addressed to the undersigned at the address set forth below.

4. Security (Bid Bond, GSA Standard Form 24), as required by the Invitation is enclosed, and is to become the property of the Owner in the event the Contract Agreement and associated forms are not executed within the prescribed time as liquidated damages, not as penalty, for the delay and additional expense caused thereby. However, Bid Security will be returned to bidder upon contract award.

5. I agree to complete all work, to include the submission of ALL Close Out Documents and Final Pay Request in the number of consecutive calendar days stated above.

Signed: _____ _____

Title: _____ _____

_____
(Name/Address of Firm Bidding)

_____
(Phone Number of Firm Bidding)

CONTRACTOR'S CERTIFICATE OF RESPONSIBILITY NUMBER _____

The Corporation (if applicable) is chartered under the laws of the State of_____ and the names, title and business addressed of the executive are as follows:

NAMES:	ADDRESSES:
_____ President	_____ Address
_____ Secretary	_____ Address
_____ Treasurer	_____ Address

TO BE FILLED IN IF A PARTNERSHIP:

Our partnership is composed of the following individuals:

NAMES	ADDRESSES
_____	_____
_____	_____
_____	_____
_____	_____

RECEIPT OF THE FOLLOWING ADDENDA IS ACKNOWLEDGED:

ADDENDUM No.	DATED	ADDENDUM No.	DATED	ADDENDUM No.	DATED
_____	_____	_____	_____	_____	_____

END OF PROPOSAL

SECTION 00 43 00

SCOPE OF WORK & DESCRIPTION OF BID ITEMS

PART I - SCOPE OF WORK:

1.01 General Description: Install a complete pressure filtration system, soda ash, and chlorination system as detailed on the project plans.

PART II - DESCRIPTION OF BID ITEMS:

2.01 Base Bid: Work included in the base bid is further described as follows:

1. Supply and install all erosion control measures as shown on the plans.
2. Construct backwash basin complete with riprap slope and discharge channel connecting to existing riprapped basin.
3. Construct filter slab and provide and install three (3) pressure greensand filters complete will all piping, valves, media, internals, and fittings as shown on the plans and per the manufacturer's requirements.
4. Construct chlorination building and provide and install all chlorination equipment as shown on the plans and per the manufacturer's requirements.
5. Supply and install soda ash system as shown on the plans and per the manufacturer's requirements.
6. Supply and install all yard piping as shown on the plans to provide for a complete and functioning water plant.
7. Supply and install all electrical controls, wiring, conduit, lights, and other appurtenances as shown on the plans.

PART III – GENERAL:

3.01 - The Owner reserves the right to accept any/or all Bid Items and to make award based upon the lowest and best overall Base Bid and/or any combination of the Bid Items in order to provide the Owner flexibility to award the contract within funding available.

3.02 - Unit Prices shall be used in determining additions to or deductions from the contract amount when authorized changes are directed in the work as shown or specified in the original contract drawings and documents. They will apply only when such changes involve materials, specifications, methods, and designs of the same as those required in like work shown and/or specified. They will not be applied to changes requiring use of materials, specifications, or design of different character from those approved for general use under the contract as originally drawn. Unit Prices shall include the furnishing of all labor and materials, complete in place, unless otherwise noted.

3.03 - Immediately after award of the contract, or as soon thereafter as the Owner has made decision on which, if any, alternates will be selected, thoroughly and clearly advise all necessary personnel and suppliers as to the nature and extent of alternates selected by the Owner. Use all means necessary to alert those personnel and suppliers involved as to all changes in the work caused by the Owner's selection or rejection of alternates.

SECTION 00 52 00

CONTRACT FORMS - OWNER-CONTRACTOR AGREEMENT

The Owner-Contractor Agreement Form for this project will be in the form of State of Mississippi Military Department Construction Contract with Federal and State Clauses, to be executed on behalf of the State of Mississippi Military Department and the Contractor to be awarded the contract. An example of this contract is shown at Pages GC Section 00 70 00 6/33 thru GC Section 00 70 00 33/33 of this Specification Document and has been incorporated and made part of the General Conditions Section of same.

(END OF SECTION)

SECTION 00 65 00

CONDITIONS OF THE CONTRACT - CLOSE-OUT DOCUMENTS

1. The following documents, as a minimum, must be delivered to the Director, State Purchasing and Contracting and/or Contracting Officer prior to final payment and release of any and/or all retainages. The owner, through the Director, State Purchasing and Contracting and/or Contracting Officer, reserves the right to increase or decrease the type, substance and number of documents required for proper close out. Contact the A&E if you need to obtain copies of the AIA Documents as they are American Institution of Architects (AIA) official documents.

a. APPLICATION OF PAYMENT: AIA Document G-702 & G-703 (Continuation sheet).

b. CERTIFICATE OF SUBSTANTIAL COMPLETION: AIA Document G-704.

c. CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS: AIA Documents G-706 and G-706A: The Contractor shall furnish these documents complete with attached notarized statement on letterhead as follows:

"WE HEREBY CERTIFY THAT ALL BILLS FOR LABOR AND MATERIALS INCORPORATED INTO THE PROJECT UNDER OUR CONTRACT NUMBER HAVE BEEN PAID AND THAT THE OWNER IS RELEASED FROM ANY AND ALL CLAIMS AND/OR DAMAGES UNDER THIS CONTRACT."

d. CONSENT OF SURETY COMPANY TO FINAL PAYMENT: AIA Document G-707. To be completed in full by the bonding company.

e. CONTRACTOR’S NOTARIZED STATEMENT: Notarized statement from the Contractor on letterhead that project has been completed in accordance with all Contract Documents.

f. CONTRACTOR’S NOTARIZED STATEMENT OF GUARANTEE/S: Reference page GW Section 00 54 36 1/2 of specifications. Statement will be worded as follows:

"WE HEREBY GUARANTEE ALL WORK PERFORMED BY US ON THE PROJECT CONTRACT NUMBER, TO BE FREE FROM DEFECTIVE MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR, OR SUCH LONGER PERIOD OF TIME AS MAY BE STIPULATED IN THE CONTRACT DOCUMENTS."

The Contractor will secure guarantees from any and all subcontractors covering work performed by them and deliver same to the owner.

g. OPERATING AND MAINTENANCE MANUALS: All manufacturer's operating instructions and maintenance manuals will be compiled in a tabbed and labeled 3-ring binder and delivered to the owner in three (3) sets. Contractor will also provide 3 each compact disc's (CD's) containing Operation and Maintenance Manuals in ADOBE.PDF.

h. FINAL INSPECTION REPORT: Statement from the Contracting Officer's Representative or the A&E, whichever is applicable, that all punch list items have been completed, final cleaning has been accomplished and the project is ready for close out.

i. AS BUILT DRAWINGS: The Contractor shall furnish the Director, State Purchasing and Contracting and/or Contracting Officer two (2) complete sets of "As Built Drawings", signed by the Contractor, depicting the actual construction and all changes incorporated therein. Contractor shall also provide one (1) set to A&E for conversion to electronic As Builts.

j. DD FORM 1354: The Contractor shall furnish the Director, State Purchasing and Contracting and/or Contracting Officer two (2) completed sets of the Department of Defense Form 1354 with COST block completed. (SEE FORM behind page SC Section 00 73 01 - 3/4). In COST block actual cost will be reflected and if any unit of measurement is changed so state, (i.e., Building Square Footage is 1200 on the original DD 1354, but was changed during construction, you should mark through 1200 and add correct measurement).

(END OF SECTION)

SECTION 00 65 36

CONDITIONS OF THE CONTRACT - GUARANTEES & WARRANTIES

1. Except as otherwise specified, all work shall be guaranteed by the Contractor, and through him each Subcontractor, against defects resulting from the use of inferior materials, equipment or workmanship for a period of one (1) year from the date of substantial completion. NOTE: See Section 00 73 03, 2007 Supplementary Conditions, Paragraph 9.8 through 9.10 for conditions of Substantial Completion, Partial Occupancy or Use and Final Inspection. A year end warranty inspection will be conducted prior to the one-year end time frame. If any items need correcting, they will be corrected in a timely manner. Once completed, we will send in writing a completion letter of year end warranty items.

2. If, within any guarantee period, repairs or changes are required in connection with guaranteed work which, in the Owner's opinion, are rendered necessary as the result of the use of materials, equipment or workmanship which is inferior, defective or not in accordance with terms of the contract, the Contractor shall promptly, upon receipt of owner's notice in writing, and without expense to the owner, perform the following:

a. Place in satisfactory condition, in every particular, all such guaranteed work and correct all defects therein.

b. Make good all damage to the buildings, site, equipment or building contents which, in the owner's opinion, is the result of the use of materials, equipment or workmanship which is inferior, defective or not in accordance with the terms of the contract.

c. Make good any work or materials, or the equipment and contents of building or site disturbed in fulfilling such guarantee.

3. In any case where fulfilling the requirements of the contract, or any guarantee embraced in or required thereby, the Contractor disturbs any work guaranteed under another's contract, he/she shall restore such disturbed work to a condition satisfactory to the Owner and guarantee such restored work to the same extent as if it was guaranteed under such other contract.

4. If the Contractor, after notice, fails to proceed promptly to comply with terms of the guarantee, the owner may have the defects corrected and the Contractor and his/her surety shall be liable for all expense incurred thereby.

5. All special guarantees applicable to definite parts of the work that may be stipulated in the Specifications, and/or the Contract Documents, shall be subject to the terms herein during the first year of the life of such special guarantees.

6. All guarantees, and warranties shall be obtained in the owner's name and evidence thereof shall be promptly delivered to the Director, State Purchasing and Contracting and/or Contracting Officer for transfer to the Owner.

(END OF SECTION)

SECTION 00 70 00

CONDITIONS OF THE CONTRACT - GENERAL CONDITIONS

1. The General Conditions of the contract for the construction of buildings, The American Institute Document, A201 - 2017, Articles 1 through 15, Section 00 73 03 is a part of these contract documents, copy of which can be obtained by the A&E. In the case of a conflict, the Special Conditions, General Conditions, and the owner-Contractor Agreement, as contained herein, shall take precedence over aforementioned AIA Document.

2. INSPECTION

All work will be conducted under the general direction of the Director, State Purchasing and Contracting and/or Contracting Officer and is subject to inspection by his/her appointed inspectors to ensure strict compliance with the terms of the contract. No inspector is authorized to change any provisions of the specifications without written authorization of the Director, State Purchasing and Contracting and/or Contracting Officer, nor shall the presence or absence of an inspector relieve the Contractor from any requirements of the contract. (See GC Section 00 70 00 - 17/33 – 18/33, Paragraph 16 for additional inspection conditions).

3. ACCIDENT PREVENTION

In order to provide safety controls for protection to the life and health of employees and other persons, for prevention of damage of property, materials, supplies and equipment, and for avoidance of work interruptions in the performance of this contract, the Contractor shall comply with all pertinent provisions of Corp of Engineers Manual EM 385-1-1, dated 3 November 2003, entitled General Safety Requirements, as amended and will also take or cause to be taken, such additional measures as the Director, State Purchasing and Contracting and/or Contracting Officer may determine to be reasonably necessary for the purpose. The Contractor will maintain an accurate record of, and will report to the Director, State Purchasing and Contracting and/or Contracting Officer in the manner and on the forms prescribed by the Director, State Purchasing and Contracting and/or Contracting Officer, exposed data and all accidents resulting in death, traumatic injury, occupational disease, and damage to property, materials, supplies and equipment incident to work performed under this contract.

4. USE AND POSSESSION PRIOR TO COMPLETION

The State shall have the right to take possession of or use any completed or partially completed part of the work. Such possession or use shall not be deemed an acceptance of any work not completed in accordance with the contract. While the State is in such possession, the contractor, notwithstanding

the provision of the clause of this contract entitled PERMITS AND RESPONSIBILITY FOR WORK, SHALL BE RELIEVED OF THE RESPONSIBILITY FOR LOSS OR DAMAGES TO THE WORK OTHER THAN THAT RESULTING FROM THE CONTRACTOR'S FAULT OR NEGLIGENCE.

If such prior possession or use by the State delays the progress of the work or causes additional expense to the contractor, an equitable adjustment in the contract price or the time of completion will be made, and the contract shall be modified in writing.

5. PROGRESS CHARTS AND REQUIREMENTS FOR OVERTIME WORK

a. The Contractor shall, within such time as determined by the Director, State Purchasing and Contracting and/or Contracting Officer after the date of the commencement of work, prepare and submit to the Director, State Purchasing and Contracting and/or Contracting Officer for approval, a practicable schedule, showing the order in which the Contractor proposes to carry on the work, the date on which he/she will start the several salient features, and the contemplated dates for completing the same. The schedule shall be in the form of a progress chart, of suitable scale, to indicate proportionally, the percentages of work scheduled for completion at any time. The Contractor shall enter on the chart the actual progress at such intervals as directed by the Director, State Purchasing and Contracting and/or Contracting Officer and shall immediately deliver to the Director, State Purchasing and Contracting and/or Contracting Officer such copies as directed. If the Contractor fails to submit a progress schedule within the time prescribed by the Director, State Purchasing and Contracting and/or Contracting Officer, the Director, State Purchasing and Contracting and/or Contracting Officer may withhold approval of progress payment estimates until such time as the Contractor submits the required progress schedule.

b. If, in the opinion of the Director, State Purchasing and Contracting and/or Contracting Officer, the Contractor falls behind in the progress schedule, the Contractor shall take such steps as may be necessary to improve his/her progress and the Director, State Purchasing and Contracting and/or Contracting Officer may require him/her to increase the number of shifts, or overtime operations, days of work, or the amount of construction plant, or all of them, and to submit for approval such supplementary schedule or schedules as may be deemed necessary to demonstrate the manner in which the agreed rate of progress will be regained, all without additional cost to the State.

c. Failure of the Contractor to comply with the requirements of the Director, State Purchasing and Contracting and/or Contracting Officer under this provision shall be grounds for determination of the Director, State Purchasing and Contracting and/or Contracting Officer that the Contractor is not prosecuting the work with such diligence as will ensure the completion within the time specified. Upon such determination, the Director, State Purchasing and Contracting and/or Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part thereof.

6. DEFINITIONS

a. Wherever in the specifications or upon drawings, the words "directed", "required", "ordered", "designated", "prescribed", or words of like import are used, it shall be understood that the "direction", "requirement", "order", "designation" or "prescription" of the Director, State Purchasing and Contracting

and/or Contracting Officer is intended and similarly the words "approved by", "acceptable", "satisfactory" or like words, mean "approved by", "acceptable to" or "satisfactory to" the Director, State Purchasing and Contracting and/or Contracting Officer, unless otherwise stated.

b. Where "as shown", "as indicated", "as detailed" or words of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word "provided", as used herein, shall be understood to mean "Provided complete in place", that is "furnished and installed".

c. The term "State" shall mean the Mississippi Military Department, the State of Mississippi, Commonwealth, or Territory, which is the party to this Contract.

d. The term "Owner" shall mean the Mississippi Military Department, MSARNG, on behalf of the State of Mississippi.

7. TIME EXTENSIONS

The construction completion number of days required for this Contract as stated on the bid form includes normal anticipated inclement weather as computed from historical weather records for this area, approved holidays and Mississippi Military Department non-work days. No time extensions will be granted for weather unless it can be documented as exceeding normal/mean weather delays as calculated for the local construction area. Additional time other than normal anticipated weather, materials delays, and any unusual conditions that may delay the completion of this contract will be considered for a time extension on a case by case basis. Contractors must submit their time extension request meeting the criteria for review and recommendation, in writing through the Architect/Engineer or Project Manager and Director, State Purchasing and Contracting and/or Contracting Officer.

8. CONSTRUCTION AND DEMOLITION DEBRIS REPORT

The Mississippi Military Department is required to submit to National Guard Bureau a report of offsite removal of solid waste, recyclable materials, etc. for each job site. The Contractor must complete this report and submit with your pay application at the monthly construction meeting. See General Conditions, Section 00 70 00 - 5/32 for an example of the form to be used.

9. ENVIRONMENTAL ISSUES-EROSION CONTROL REMEDIATION

Failure to comply with Erosion Control measures specified by the plans and specifications or in the event of an accident or incident caused by an act of nature, equipment failure, or human negligence that allows silt or contaminants to enter waters of the United States will be contained immediately and repaired within 48 hours. Failure to comply will result in the Mississippi Military Department mobilizing a third-party Contractor to mitigate the non-compliance and back charging the Contractor for actual expenses. In the event the Contractor chooses to forego payment, for the failure to comply, the appropriate bonding company will be notified. There will be no exceptions to this remediation.

C&D Debris Report

PROJECT NAME/NUMBER: _____

PAY APP NUMBER: _____

LOCATION: _____

DATE: _____

(choose only "1" unit of measure and enter *NUMERIC* value) TONS	LBS	YARDS	* % LANDFILL DISPOSAL (0%-100%)	* % RECYCLED/ REUSED (0%-100%)	
					ASPHALT
					BRICK
					CONCRETE
					STONE
					CRUSHED STONE/BASE
					LAND SOIL, LEAD-TAINTED
					LAND SOIL, PETROLEUM TAINTED
					SUBSOIL
					TOPSOIL
					VEGETATION/TIMBER
					ALUMINUM
					COPPER
					MIXED METAL
					STEEL
					BRASS
					CEILING TILE
					COMPOSITION ROOF

(choose only "1" unit of measure and enter *NUMERIC* value) TONS	LBS	YARDS	* % LANDFILL DISPOSAL (0%-100%)	* % RECYCLED/ REUSED (0%-100%)	
					DOORS/WINDOWS/STAIRS/CABINETS
					GLASS
					GYPSUM/PLASTER
					INSULATION
					PAPER
					PLASTIC
					SIDING
					FINISHED WOOD
					STRUCTURAL WOOD
					TREATED WOOD
					SOLID WASTE (trash)
					OTHER: _____
					OTHER: _____
					OTHER: _____
					OTHER: _____
					OTHER: _____

* Scrap disposal method may be partially by **LANDFILL DISPOSAL** and partially **RECYCLED/REUSED**. Please indicate by **%**.

_____
Project Manager

C&D Debris Report

PROJECT NAME/NUMBER: REPAIR ROOF / PN: 12345678

PAY APP NUMBER: 6

LOCATION: CAMP SHELBY BLDG 300

DATE: 10/10/20

(choose only "1" unit of measure and enter NUMERIC value) TONS	LBS	YARDS	* % LANDFILL DISPOSAL (0%-100%)	* % RECYCLED/ REUSED (0%-100%)	
					ASPHALT
					BRICK
		3	60 %	40%	CONCRETE
					STONE
					CRUSHED STONE/BASE
					LAND SOIL, LEAD-TAINTED
					LAND SOIL, PETROLEUM TAINTED
					SUBSOIL
					TOPSOIL
					VEGETATION/TIMBER
3				100%	ALUMINUM
					COPPER
					MIXED METAL
					STEEL
					BRASS
	600		100%		CEILING TILE
					COMPOSITION ROOF

(choose only "1" unit of measure and enter NUMERIC value) TONS	LBS	YARDS	* % LANDFILL DISPOSAL (0%-100%)	* % RECYCLED/ REUSED (0%-100%)	
					DOORS/WINDOWS/STAIRS/CABINETS
					GLASS
2.5			100%		GYPSUM/PLASTER
					INSULATION
					PAPER
					PLASTIC
					SIDING
					FINISHED WOOD
					STRUCTURAL WOOD
					TREATED WOOD
					SOLID WASTE (trash)
	1,000		75%	25%	OTHER: HVAC Duct & Units
	150		100%		OTHER: Ceramic Tile
		84sf	100%		OTHER: Asbestos VCT
					OTHER:
					OTHER:

* Scrap disposal method may be partially by **LANDFILL DISPOSAL** and partially **RECYCLED/REUSED**. Please indicate by **%**.

G Washington
Project Manager

CONTRACT NUMBER _____

STATE OF MISSISSIPPI MILITARY DEPARTMENT
CONSTRUCTION CONTRACT
WITH
FEDERAL AND STATE CLAUSES

CONTRACTOR AND ADDRESS:

CONTRACT FOR:

AMOUNT:

PLACE:

OWNER: MISSISSIPPI MILITARY DEPARTMENT
JANSON D. BOYLES
MAJOR GENERAL, MISSISSIPPI NATIONAL GUARD
THE ADJUTANT GENERAL OF MISSISSIPPI

APPROPRIATION DATA: Fund _____

AGO USE ONLY
REVISED JULY 2020

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CONTRACT FOR CONSTRUCTION

I. THIS CONTRACT, entered into this _____ day of _____, 20 ___ , by THE STATE OF MISSISSIPPI (hereinafter called the State), represented by The Adjutant General or designee thereof, executing this contract, with (name of contractor):

*a corporation organized and existing under the laws of the STATE OF MISSISSIPPI

*a professional limited liability company

*a professional limited liability corporation

*a limited liability corporation

*a partnership consisting of

*an individual trading as

of the city of _____ in the state of _____, hereinafter called the Contractor, provides that the parties hereto do mutually agree as follows:

II. STATEMENT OF WORK: All labor, materials, services and equipment necessary to _____ in strict accordance with all contract provisions, bid form, plans, specifications, schedules and drawings, all of which are made a part hereof for the consideration of: _____Dollars and _____ Cents, ($). (Payment of this sum is in accordance with General Provision, para 10, Payments to Contractor.)

III. COMMENCEMENT, PROSECUTION AND COMPLETION OF WORK - The Contractor will be required to commence work under this contract within **10** days after the date of receipt of written notice to proceed, to prosecute work diligently, and to complete the entire work no later than _____ calendar days after notice to proceed. The time stated for completion shall include final cleanup of the premises and submission of all Close Out Documents as required in the specifications, section 00 65 00. The number of days for completion as stated above includes normal holidays and normal anticipated inclement weather as computed from historical weather records for this area. No time extensions will be granted for weather unless they can be documented as exceeding normal/mean weather delays as calculated for the local construction area. Additional time other than normal anticipated weather, material delays, and any unusual conditions that may delay the completion of this contract will be considered for a time extension on a case-by-case basis.

*Delete all lines which do not apply

GENERAL PROVISIONS

1. RELATIONSHIP OF THE FEDERAL GOVERNMENT - This contract is funded in part by the Federal Government. The Federal Government is not a party to this contract. As a condition to receiving and expending Federal funds, there are certain rights of Federal inspection, Federal approval of contract changes and modifications, and Federal approval of settlements or dispute actions that the Federal Government will exercise prior to authorization of Federal funds. Therefore, no inspection or acceptance, change, modification, settlement, dispute claim payment, or dispute action will be considered binding until the required Federal approval is obtained. The Chief, National Guard Bureau, or his/her designated representative, is the approval authority. This paragraph does not abrogate any rights conferred on the Federal Government by law or other clause required due to the use of Federal funding.

2. SPECIFICATIONS AND DRAWINGS - The Contractor shall keep on the work site a copy of the drawings and specifications and shall always give the Director, State Purchasing and Contracting and/or Contracting Officer access thereto. Anything mentioned in the specifications and not shown on the drawings or shown on the drawings and not mentioned in the specifications shall be of like effect as if shown or mentioned in both. In the case of differences between drawings and specifications, the specifications shall govern. In any case of difference in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the Director, State Purchasing and Contracting and/or Contracting Officer who shall promptly decide in writing. Any adjustment by the Contractor without this determination shall be at his/her own risk and expense. The Director, State Purchasing and Contracting and/or Contracting Officer shall furnish from time to time such detail drawings and other information, as he/she may consider necessary, unless otherwise provided.

3. SITE INVESTIGATION - The Contractor acknowledges that he/she has investigated and satisfied himself/herself as to the conditions affecting the work, including but not restricted to those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, river stages, tides or similar physical conditions at the site, the conformation and conditions of the ground, the character of equipment and facilities needed preliminary to and during prosecution of the work. The Contractor further acknowledges that he/she has satisfied himself/herself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the State, as well as from information presented by the drawings and specifications made a part of this contract. Any failure by the Contractor to acquaint himself/herself with the available information will not relieve him/her from responsibility for estimating properly the difficulty or cost of successfully performing the work. The State assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the State.

4. CHANGES AND EXTRAS - The Director, State Purchasing and Contracting and/or Contracting Officer may at any time, in writing, and without notice to the sureties, order extras or make changes in the drawings and/or specifications of this Contract, providing such extras or changes are within the general scope hereof. If any such extra or change causes an increase or decrease in the amount due under this contract, or in the time required for its performance, an equitable adjustment shall be made, and the contract shall be modified in writing. Federal funding support for any change or extra is subject to prior approval by the Chief, National Guard Bureau, or his duly authorized representative. Any claim of the Contractor for adjustment under this Clause must be asserted in writing, within 30 days after the date of receipt by the Contractor of the notification of extra or change: Provided, however, that the Director, State Purchasing and Contracting and/or Contracting Officer, if he/she decides that the facts justify such action, may receive and act upon any such claim asserted at any time prior to the date of final settlement of the contract. If the parties fail to agree upon the adjustment to be made, the dispute shall be determined as provided in Clause 9 hereof entitled DISPUTES. Nothing provided in this Clause, however, shall excuse the Contractor from proceeding with the prosecution of the work as changed. Except as otherwise herein provided, no charge for any extra work or material will be allowed.

5. CHANGED CONDITIONS – The Contractor shall promptly, and before such conditions are disturbed, notify the Director, State Purchasing and Contracting and/or Contracting Officer in writing of: (1) subsurface or latent physical conditions at the site differing materially from those indicated in this contract, or (2) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in this contract. The Director, State Purchasing and Contracting and/or Contracting Officer shall promptly investigate the conditions, and if he/she finds that such conditions do so materially differ and cause an increase or decrease in the cost of (or the time required for), performance of this contract, an equitable adjustment shall be made, and the contract modified in writing. Federal funding support to any change or extra is subject to prior approval by the Chief, National Guard Bureau, or his duly authorized representative. Any claim of the Contractor for adjustment hereunder shall not be allowed unless he/she has given notice as above required: Provided, that the Director, State Purchasing and Contracting and/or Contracting Officer may, if he/she determines the facts so justify, consider and adjust any such claim asserted before the date of final settlement of the contract. If the parties fail to agree upon the adjustment to be made, the dispute shall be determined as provided in Clause 9 hereof entitled DISPUTES.

6. MODIFICATION PROPOSALS-PRICE BREAKDOWN - The Contractor, in connection with any proposal he/she makes for a contract modification, shall furnish an itemized price breakdown, as required by the Director, State Purchasing and Contracting and/or Contracting Officer. Unless otherwise directed, the breakdown shall be in sufficient detail to permit an analysis of all material, labor, equipment, subcontract, and overhead costs, as well as profit, and shall cover all work involved in the modification, whether such work was deleted, added, or changed. Any amount claimed for subcontracts shall be supported by a similar price breakdown. In addition, if the proposal includes a time extension, a justification therefore shall also be furnished. The proposal, together with the price breakdown and time extension justification, shall be furnished by the date specified by the Director, State Purchasing and Contracting and/or Contracting Officer.

7. TERMINATION FOR DEFAULT-DAMAGES OR DELAY-TIME EXTENSIONS

a. If the Contractor refuses or fails to prosecute the work, or any separable part thereof, with such diligence as will insure its completion within the time specified in this contract, or any extension thereof, or fails to complete said work within such time, the State may, by written notice to the Contractor, notify the Contractor of delay or non-performance and if not cured in 10 calendar days or any longer time specified in writing by the State, terminate his/her right to proceed with the work or such part of the work as to which there has been delay. In such event the State may take over the work and prosecute the same to completion, by contract or otherwise, and the Contractor and his/her sureties shall be liable to the State for any excess cost occasioned the State thereby, and for liquidated damages for delay, as fixed in the contract documents or accompanying papers, until such reasonable time as may be required for the final by such delay. If the Contractor's right to proceed is so terminated, the State may take possession of and utilize in completing the work such materials, appliances, and plant as may be on the site of the work and necessary, therefore.

b. If the State does not terminate the right of the Contractor to proceed, as provided in subparagraph (a) hereof, the Contractor shall continue the work, in which event he/she and his/her sureties shall be liable to the State, in the amount set forth in the contract documents or accompanying papers, for the fixed, agreed, liquidated damages for each calendar day of delay until the work is completed or accepted; or if liquidated damages are not so fixed, any actual damages occasioned by such delay.

c. The right of the Contractor to proceed shall not be terminated, as provided in subparagraph (a) hereof, nor the Contractor charged with liquidated or actual damages, as provided in subparagraph (b), because of any delays in the completion of the work due to causes beyond his/her control which could not reasonably have been anticipated and were without his/her fault or negligence, including, but not restricted to, acts of God, acts of the public enemy, acts of the Government or of the State (either in its sovereign or contractual capacity), acts of another Contractor in the performance of a contract with the State, quarantine restrictions, strikes, freight embargoes, or unusually severe weather; or, delays of Subcontractors or suppliers due to such unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and such Subcontractors or suppliers at any tier: Provided, that the Contractor shall, within 10 days after the beginning of any such delay, unless the Director, State Purchasing and Contracting and/or Contracting Officer shall grant a further period of time prior to the date of final settlement of the contract, notify the Director, State Purchasing and Contracting and/or Contracting Officer in writing of the causes of delay. The Director, State Purchasing and Contracting and/or Contracting Officer shall ascertain the facts and the extent of the delay and extend the time for completing the work when in his/her judgment the findings of fact justify such an extension, and his/her findings of fact thereon shall be final and conclusive on the parties hereto, subject only to appeal as provided in the DISPUTES Clause hereon.

8. TERMINATION FOR CONVENIENCE OF THE GOVERNMENT

a. The State may terminate this Contract at any time and for any cause by a notice in writing from the Director, State Purchasing and Contracting and/or Contracting Officer to the Contractor. Upon receipt of such notice, the Contractor shall, unless the notice directs otherwise, immediately discontinue all work. The Contractor shall also terminate outstanding orders and Subcontractor as they relate to the terminated work. The Contractor shall settle the liabilities and claims arising out of the termination of Subcontractors and orders connected with the terminated work.

b. If the contract is terminated for the convenience of the State, payment to the Contractor will be made promptly for this proportion of the services required under the contract which the work actually performed bears to the total work required which under the contract, less any payments previously made.

9. DISPUTES - Except as otherwise specifically provided in this contract, and except as otherwise specifically provided by the State procedure for arbitration or other State procedure established by State law, any dispute concerning a question of fact arising under this contract which is not disposed of by mutual agreement shall be decided, within 30 calendar days, by the Director, State Purchasing and Contracting and/or Contracting Officer, who shall reduce his/her decision to writing and send by registered mail, return receipt requested, a copy thereof to the Contractor at his/her address shown herein. Within seven (7) days after the date of receipt of such copy, the Contractor may appeal in writing to The Adjutant General, whose written decision thereon, or that of his/her designated representative or representatives, shall, unless determined by a court of competent jurisdiction to have been fraudulent or capricious or arbitrary or so grossly erroneous as necessarily to imply bad faith, or not supported by substantial evidence, be final and conclusive: Provided, that if no such appeal is taken the decision of the Director, State Purchasing and Contracting and/or Contracting Officer shall be final and conclusive. The Adjutant General may designate an individual or individuals other than the Director, State Purchasing and Contracting and/or Contracting Officer, or a board, as his/her authorized representative to determine appeals under this clause. In connection with any appeal proceeding under this Clause, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of his/her appeal. Pending final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of the contract and in accordance with the Director, State Purchasing and Contracting and/or Contracting Officer's decision. Any sum or sums allowed to the Contractor under the provisions of this clause or under the State arbitration proceedings or under other State procedure shall be paid subject to approval by the Chief, National Guard Bureau, for the Government's share of the cost of the articles or work herein disputed as deemed to be within the contemplation of this contract.

10. PAYMENTS TO CONTRACTORS

a. Unless otherwise provided in the Contract Documents, partial payments will be made, no more than on a monthly basis, upon estimated percentage of work completed and approved by the Director, State Purchasing and Contracting and/or Contracting Officer. Materials delivered on the site and preparatory work done may be taken in consideration. Payment for stored materials will not be paid unless it is stored properly and Director, State Purchasing and Contracting and/or Contracting Officer has received inspection report of said materials stored.

b. In making such partial payments there shall be retained 5 percent on the estimated amount of work completed and approved until final completion and acceptance of all work covered by the contract. In accordance with MS Code of 1972 annotated, Section 31-5-33, contracts that total an amount of $250,000.00 or greater, at any time after 50 percent of the work has been completed, and the Director, State Purchasing and Contracting and/or Contracting Officer finds that satisfactory progress is being made and project is on schedule, may return to the Contractor 50 percent of the retainage held to date. However, future retainage shall be withheld at a rate of two and one half (2 ½ %) percent until final completion and acceptance of all work covered by the contract, to include the receipt of all Close-Out Documents as indicated in Section 00 65 00 of the contract documents.

c. Payment shall be made, and remittance information provided electronically as directed by the State of Mississippi Department of Finance and Administration (DFA). These payments shall be deposited in the bank account of the Contractor's choice. The State of Mississippi DFA may, at its sole discretion, require the Contractor to submit invoices and supporting documentation electronically at any time during the term of this contract. Contractor understands and agrees that the State is exempt from the payment of taxes. All payments shall be in the United Stated currency.

d. Invoices will be submitted in accordance with instructions given at the Pre-Construction Conference.

e. The Contractor shall be advised that in accordance with the Mississippi Code, the Mississippi Military Department has 30 calendar days to deliver a warrant to the vendor from the date the invoice is due and payable. Due and payable shall mean, when the Director, State Purchasing and Contracting and/or Contracting Officer received invoice certified by A&E and/or Project Manager that the work has been accomplished.

f. All material and work covered by partial payments made shall thereupon become the sole property of the State, but this provision shall not be construed as relieving the Contractor from the sole responsibility for all materials and work upon which payments have been made or the restoration of any damaged work, nor as a waiver of the right of the State to require the fulfillment of all of the terms of the contract.

g. Upon completion and acceptance of all work required hereunder, and after the Contractor has furnished the State with all Close-Out Documents, to include, a release of all claims against the State arising under and by virtue of this contract, other than such claims, if any, as may be specifically excepted by the Contractor from the operation of the release, in stated amounts to be set forth therein, the amount due the Contractor under this contract will be paid as stated above in para 10-e. If the Contractor's claim to amounts payable under the contract has been assigned under the Assignment of Claims Act of 1940, as amended (41 U.S.C.15), a release may also be required of the assignee at the option of the Director, State Purchasing and Contracting and/or Contracting Officer.

11. MATERIAL AND WORKMANSHIP - Unless otherwise specifically provided for in the Contract Documents, all equipment, materials, and articles incorporated in the work covered by this contract are to be new and of the most suitable grade of their respective kinds for the purpose intended, and all workmanship shall be first class. Where equipment, materials, or articles are referred to in the Contract Documents as "equal to" any standard, the Director, State Purchasing and Contracting and/or Contracting Officer shall decide the question of equality. The Contractor shall furnish to the Director, State Purchasing and Contracting and/or Contracting Officer for approval the name of the manufacturer of machinery, mechanical and other equipment which he/she contemplates incorporating in the work, together with their performance capacities and other pertinent information. When required by the Contract Documents, or when called for by the Director, State Purchasing and Contracting and/or Contracting Officer, the Contractor shall furnish to the Director, State Purchasing and Contracting and/or Contracting Officer for approval full information concerning the materials or articles which he/she contemplates incorporating in the work. Samples of materials shall be submitted for approval when so directed. Machinery, equipment, materials, and articles installed or used without such approval shall be at the risk of subsequent rejection. The Director, State Purchasing and Contracting and/or Contracting Officer may in writing require the Contractor to remove from the work site such employee as the Director, State Purchasing and Contracting and/or Contracting Officer deems incompetent, careless, insubordinate, or otherwise objectionable, or whose continued employment on the work site is deemed by the Director, State Purchasing and Contracting and/or Contracting Officer to be contrary to the public interest.

12. HAZARDOUS WASTE MATERIALS – The Contractor is responsible for the removal and disposal of any hazardous waste materials encountered in the performance of the Contract requirements. Hazardous Containing Materials [HCM] include, but are not limited to, Asbestos and Lead Paint and should be identified and removed as a part of the Contract. The absence of details does not relieve the Contractor from the responsibility of removal and disposal; but a Change Order could be executed in the absence of identified HCM in the documents.

13. CONTRACT DRAWINGS AND SPECIFICATIONS

a. Omissions from the drawings or specifications or the miss-description of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the Contractor from performing such omitted or miss-described details of the work but they shall be performed as if fully correctly set forth and described in the drawings and specifications.

b. The Contractor shall check all drawings furnished him/her immediately upon their receipt and shall promptly notify the Director, State Purchasing and Contracting and/or Contracting Officer of any discrepancies. Figures marked on drawings shall in general be followed in preference to scale measurements. Large scale drawings shall in general govern small scale drawings. The Contractor shall compare all drawings and verify the figures before laying out the work and will be responsible for any errors which might have been avoided thereby.

14. RIGHTS IN SHOP DRAWINGS - Shop drawings for construction means drawings, submitted to the State by the Construction Contractor, Subcontractor of any lower tier subcontractor pursuant to a Construction Contract, showing in detail (1) the proposed fabrication and assembly of structural elements and (2) the installation i.e., form, fit, and attachment details of materials or equipment. The State may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

15. OPERATIONS AND STORAGE AREAS

a. All operations of the Contractor (including storage of materials) upon state premises shall be confined to areas authorized or approved by the Director, State Purchasing and Contracting and/or Contracting Officer. The Contractor shall hold and save the State, its officers and agents, free and harmless from liability of any nature occasioned by his/her operations.

b. Temporary building (s) (storage sheds, offices, etc.) may be erected by the Contractor only with the approval of the Director, State Purchasing and Contracting and/or Contracting Officer, and shall be built with labor and materials furnished by the Contractor without expense to the State. Such temporary buildings and utilities shall remain the property of the Contractor and shall be removed by him/her at his/her expense upon the completion of the work. With the written consent of the Director, State Purchasing and Contracting and/or Contracting Officer, such buildings and utilities may be abandoned and need not be removed.

c. The Contractor shall, under regulations prescribed by the Director, State Purchasing and Contracting and/or Contracting Officer, use only established roadways or construct and use such temporary roadways as may be authorized by the Director, State Purchasing and Contracting and/or Contracting Officer. Where materials are transported in the prosecution of the manufacturer of the vehicle or prescribed by any federal, state or local law or regulation. When it is necessary to cross curbing's or sidewalks, protection against damage shall be provided by the Contractor and any damaged roads, curbing's, or sidewalks shall be repaired by, or at the expense of, the Contractor.

16. ENVIRONMENTAL ISSUES-EROSION CONTROL REMEDIATION - Failure to comply with erosion control measures specified by the Contract Documents or in the event of an accident or incident caused by an act of nature, equipment failure, or human negligence that allows silt or contaminants to enter waters of the United States will be contained immediately and repaired within 48 hours. Failure to comply will result in the Mississippi Military Department mobilizing a third-party Contractor to mitigate the non-compliance and back charging the Contractor for actual expenses. In the event the Contractor chooses to forego payment, for the failure to comply, the appropriate bonding company will be notified. There will be no exceptions to this remediation.

17. INSPECTION

a. Except as otherwise provided in subparagraph (d) hereof, all material and workmanship (if not otherwise designated by the Contract Documents) shall be subject to inspection, examination, and testing by representatives of the Director, State Purchasing and Contracting and/or Contracting Officer at any and all times during manufacture and/or construction (and at any and all places where such manufacture and/or construction are carried on). The State shall have the right to reject defective material and workmanship or require its correction. Rejected workmanship shall be satisfactorily corrected and rejected material shall be satisfactorily replaced with proper material without charge therefore, and the Contractor shall promptly segregate and remove the rejected material from the premises. If the Contractor fails to proceed at once with the replacement of rejected material and/or the correction of defective workmanship, the State may, by contract or otherwise, replace such material and/or correct such workmanship and charge the cost thereof to the Contractor; or the State may terminate the right of the Contractor to proceed as provided in Clause 7 of this contract, the Contractor and surety being liable for any damage to the same extent as provided in said Clause 7 for terminations thereunder.

b. The Contractor shall furnish promptly, without additional charge, all reasonable facilities, labor and materials necessary for the safe and convenient inspections and tests that may be required by the Director, State Purchasing and Contracting and/or Contracting Officer. All inspections and tests by the State shall be performed in such manner as not unnecessarily to delay the work, special, full size, and performance tests shall be as described in the Contract Documents. The Contractor shall be charged with any additional cost associated with the inspection, request by the Director, State Purchasing and Contracting and/or Contracting Officer, when material and workmanship is not ready at the time of inspection.

c. Should it be considered necessary or advisable by the State, or by the representatives of the Chief, National Guard Bureau, at any time before final acceptance of entire work to make an examination of work already completed, by removing or tearing out same, the Contractor shall on request promptly furnish all necessary facilities, labor and material. If such work is found to be defective or nonconforming in any material respect due to fault of the Contractor or his/her Subcontractors, he/she shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, an equitable adjustment shall be made in the contract price to compensate the Contractor for the additional reconstruction; and, if completion of work has been delayed thereby, he/she shall, in addition, be granted a suitable extension of time. Federal funding support of the cost for examination and replacement of satisfactorily completed work that requires removal or that is damaged due to inspection requirements is subject to prior approval by the Chief, National Guard Bureau, or his/her duly authorized representative.

d. Inspection of material and finished articles to be incorporated in the work site shall be made at the place of production, manufacture, or shipment, whenever the quantity justifies it, unless otherwise stated in the Contract Documents; and such inspection and acceptance shall be in writing, and unless otherwise stated in the Contract Documents, shall be final, except as regards latent defects, departures

from specific requirements of the contract and the specifications and drawings made a part thereof, damage or loss in transit, fraud, or such gross mistakes as amount to fraud. Subject to the requirement contained in the preceding sentence, the inspection of material and workmanship for final acceptance as a whole or in part, shall be made at the site. Nothing contained in this paragraph (d) shall in any way restrict the State's rights under any warranty or guarantee.

18. INSPECTORS - The work will be conducted under the general direction of the Director, State Purchasing and Contracting and/or Contracting Officer and is subject to inspection by his/her appointed inspectors to ensure strict compliance with the terms of the contract. No inspector is authorized to change any provision of the Contract Documents without written authorization of the Director, State Purchasing and Contracting and/or Contracting Officer, nor shall the presence or absence of an inspector relieve the Contractor from any requirements of the contract.

19. CLEANING UP - The Contractor shall at all times keep the construction area, including storage areas used by him/her free from accumulations of waste material or rubbish and prior to completion of the work remove any rubbish from the premises and all tools, scaffolding, equipment and materials not the property of the State. Upon completion of the construction, the Contractor shall leave the work and premises in a clean, neat and workmanlike condition satisfactory to the Director, State Purchasing and Contracting and/or Contracting Officer.

20. SUPERINTENDENCE BY CONTRACTOR - The Contractor shall have a competent superintendent or foreman, satisfactory to the Director, State Purchasing and Contracting and/or Contracting Officer, on the work site at all times while work is underway, with authority to act for him/her.

21. PERMITS AND RESPONSIBILITY FOR WORK - The Contractor shall, without additional expense to the State, obtain any and all licenses and permits required for the prosecution of the work. The Contractor will pay all charges related to the connection of utility services to existing systems. He/She shall be responsible for all damages to persons or properties that occur as a result of his/her fault or negligence in connection with the prosecution of the work. He/She shall take proper safety and health precautions to protect the work, the workers, the public, and the property of others. He/She shall also be responsible for all materials delivered and work performed until completion and final acceptance, except for any completed unit thereof which theretofore may have been finally accepted.

22. OTHER CONTRACTS - The State may undertake or award other contracts for additional work, and the Contractor shall fully cooperate with such other Contractors and State Employees and carefully fit his/her own work to such additional work as may be directed by the Director, State Purchasing and Contracting and/or Contracting Officer. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other Contractor or by State employees.

23. E-VERIFY PROGRAM - Contractor shall be advised that prior to Execution of the contract, Contractor will be required to issue a certification letter to the MMD certifying E-Verify has been completed and provide the 6-digit Company ID# issued by the Department of Homeland Security to

include any Subcontractors Company IDS#'s. The Contractor agrees to comply with the Mississippi Employment Protection Act, Miss, Code Ann. 8 71-1-57, and will register and participate in the status verification system for all newly hired employees, effective for all public contracts executed after 1 Jul 08. The term "employee" as used herein means any person or entity that is hired to perform work within the State of Mississippi and to whom the Contractor is required by Federal or Mississippi law to issue a United States Internal Revenue Service Form W-2 or Form 1099. As used herein, "status verification system" means the electronic verification of work authorization program of the Illegal Immigration Reform and Immigration Responsibility Act of 1996 that is operated by the United States Department of Homeland Security, also known as the E-Verify Program or any other successor verification system replacing the E-Verify Program. The Contractor agrees to maintain records of such compliance, and upon request of the State, to provide a copy of each such verification to the State. The Contractor agrees that any person assigned to perform services hereunder meets the employment eligibility requirements of all immigration laws of the United States and the State of Mississippi. The Contractor understands and agrees that any breach of these warranties may subject the Contractor to the following: (a) termination of this contract and ineligibility for any state of public contract in Mississippi for up to three years, with notice of such cancellation/termination being made public, or (b) the loss of any license, permit, certification or other document granted to the Contractor by an agency, department or government entity for the right to do business in Mississippi for up to one year, or (c) both, as well as any other penalties authorized by law. In the event of such cancellation/termination, the Contractor will also be liable for any additional cost incurred by the State due to the contract cancellation or loss of license or permit.

24. ADDITIONAL BOND SECURITY - If any surety upon any bond furnished in connection with this contract becomes unacceptable to the State, or if any such surety shall fail to furnish reports as to his/her financial condition from time to time as requested by the State, the Contractor shall promptly furnish such additional security as may be required from time to time to protect the interests of the State or of persons supplying labor or materials in the prosecution of the work contemplated by the contract.

25. COVENANT AGAINST CONTINGENT FEES - The Contractor warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business. For breach or violation of this warranty the State shall have the right to annul this contract without liability or in its discretion to deduct from the contract price or consideration the full amount of such commission, percentage, brokerage, or contingent fee.

26. OFFICIALS TO BENEFIT - No member of or delegate to Congress, or resident commissioner or State official or employee shall be admitted to any share or part of this contract, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

27. CONVICT LABOR - In connection with the performance of work under this contract, the Contractor agrees not to employ any person undergoing sentence of imprisonment, as provided by Public Law 89-176, September 10, 1965 (18 USC 4082 (c) (2)) and executive order 11755, December 29, 1973.

28. NONDISCRIMINATION IN EMPLOYMENT - In connection with the performance of work under this contract, the Contractor agrees not to discriminate as follows; and further agrees to insert the foregoing provision in all subcontracts hereunder except subcontracts for standard commercial supplies or for raw materials.

a. On the basis of race, color, or national origin, as provided in Clause 34-Equal Opportunity (Federally Assisted Construction).

b. On the basis of handicap, in Section 504 of the Rehabilitation Act of 1973 (29 U.S.C.§ 794) as implemented by Department of Justice Regulations at 28 CFR part 41 and DOD Regulations at 32 CFR Par 56; and,

c. On the basis of Age, in the Age Discrimination Act of 1975 (42 U.S.C. §6101 et seq.) as implemented by Department of Health and Human Services Regulations at 45 CFR Part 90.

29. GRATUITIES

a. The State may, by written notice to the Contractor, terminate the right of the Contractor to proceed under this contract if it is found, after notice and hearing, by the Secretary or Governor or the duly authorized representative of either, that gratuities (in the form of entertainment, gifts, or otherwise) were offered or given by the Contractor, or any agent or representative of the Contractor, to any officer or employee of the State with a view toward securing a contract or securing favorable treatment with respect to the awarding or amending, or the making of any determinations with respect to the performance, of such contract: Provided, that the existence of the facts upon which the Secretary or Governor or the duly authorized representative of either makes such findings shall be in issue and may be reviewed in any competent court.

b. In the event this contract is terminated as provided in paragraph (a) hereof, the State shall be entitled (1) to pursue the same remedies against the Contractor as it could pursue in the event of a breach of contract by the Contractor, and (2) as a penalty in addition to any other damages to which it may be entitled by law, to exemplary damages in an amount (as determined by the Secretary or Governor or the duly authorized representative of either) which shall not be less than 3 nor more than 10 times the costs incurred by the Contractor in providing any such gratuities to any such officer or employee.

c. The rights and remedies of the State provided in the Clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.

30. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT-OVERTIME COMPENSATION (40 U.S.C. 327-333) - This contract is subject to the Contract Work Hours and Safety Standards Act and to the applicable rules, regulations, and interpretations of the Secretary of Labor.

a. The Contractor shall not require or permit any laborer or mechanics including apprentices, trainees, watchmen, and guards in any workweek in which he/she is employed on any work site under this contract to work in excess of forty (40) hours in such workweek on work subject to the provisions of the Contract Work Hours and Safety Standards Act unless such laborer or mechanic, including apprentices, trainees, watchmen, and guards, receives compensation at a rate not less than one and one-half times (1 ½) his basic rate of pay for all such hours worked in excess of forty (40) hours in such workweek.

b. In the event of any violation of the provisions of paragraph (a), the Contractor shall be liable to any affected employee for any amounts due, and to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including an apprentice, trainee, watchmen, or guard, employed in violation of the provisions of paragraph (a) in the sum of **$10** for each calendar day on which such employee was required or permitted to be employed on such work in excess of the standard workweek of forty (40) hours without payment of the overtime wages required by paragraph (a).

31. COPELAND ("ANTI-KICKBACK") ACT-NONREBATE OF WAGES - The regulations of the Secretary of Labor applicable to Contractors and Subcontractors (29 CFR, Part 3), made pursuant to the Copeland Act, as amended (40 U.S.C. 276c) and to aide in the enforcement of the Anti-Kickback Act (18 U.S.C. 874) are made a part of this contract by reference. The Contractor will comply with these regulations and any amendments or modifications thereof and the Prime Contractor will be responsible for the submission of affidavits required of Subcontractors thereunder. The foregoing shall apply except as the Secretary of Labor may specifically provide for reasonable limitations, variations, tolerances and exemptions.

32. WITHHOLDINGS OF FUNDS

a. The Director, State Purchasing and Contracting and/or Contracting Officer may withhold or cause to be withheld from the State Prime Contractor so much of the accrued payments or advances as may be considered necessary (i) to pay laborers and mechanics, including apprentices, trainees, watchmen, and guards, employed by the Contractor or any Subcontractor on the work the full amount of wages required by the contract, and (ii) to satisfy any liability of the Contractor and any Subcontractor for liquidated damages under paragraph (b) of the Clause entitled CONTRACT WORK HOURS AND SAFETY STANDARDS ACT-OVERTIME COMPENSATION.

b. If the Contractor or any Subcontractor fails to pay any laborer, mechanic, apprentice, trainee, watchman, or guard employed or working on the site of the work, all or part of the wages required by the contract, the Director, State Purchasing and Contracting and/or Contracting Officer may, after written notice to the State Prime Contractor, take such action as may be necessary to cause suspension of any further payments or advances until such violations have ceased.

33. DEBARMENT AND SUSPENSION

a. The Contractor shall not make any award or permit any award (sub-grant or contract) at any tier to any party which is debarred or suspended or is otherwise excluded from or ineligible for participation in federal assistance programs under Executive Order 12549 "Debarment and Suspension".

b. The Final Rule, Government-Wide Debarment and Suspension (Non-procurement), issued by the Office of Management Budget and the Department of Defense (32 CFR Part 25) to implement provisions of Executive Order 12549 "Debarment and Suspension", is incorporated by reference and the Contractor covenants and agrees to comply with provisions thereof, including amendments to the Final Rule that may hereafter be issued.

34. LOBBYING

a. The Contractor covenants and agrees that it will not expend any funds appropriated by Congress to pay any person for influencing or attempting to influence an officer or employee of any agency or a member of Congress in connection with any of the following covered Federal actions: The awarding of any Federal Contract; the making of any Federal Grant; the making of any Federal Loan; the entering into of any cooperative agreement; and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. The Final Rule, New Restrictions on Lobbying, issued by the Office of Management and Budget and the Department of Defense (32 CFR Part 28) to implement provisions of Section 319 of public law 101-121 (31 U.S.C. 1352) is incorporated by reference and the Contractor agrees to comply with provisions thereof, including amendments to the Interim Final Rule that may hereafter be issued.

35. EOUAL OPPORTUNITY (FEDERALLY ASSISTED CONSTRUCTION) - If, during any twelve (12) month period (including the 12 months preceding the award of this contract), the Contractor has been or is awarded Federal contracts or federally assisted contracts and/or subcontracts which have an aggregate value in excess of $10,000, the Contractor shall comply with (a) through (g) below. Upon request, the Contractor shall provide information necessary to determine the applicability of this Clause. The applicant hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the Regulations of the Secretary of Labor at (41 CFR Chapter 60), which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan, insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the following Equal opportunity Clause:

During the performance of this contract, the Contractor agrees as follows:

(a) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include but not be limited to the

following: Employment, upgrading, demotion, or transfer, recruitment, or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for trading, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(b) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

(c) The Contractor will notify all parties to this contract of his/her commitments under this Equal Opportunity Clause and shall post copies of this notice in conspicuous places available to employees and applicants to be employed.

(d) The Contractor will comply with all provisions of Executive order 11246 of September 24, 1965, as amended by Executive order 11375 of October 13, 1967, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) The Contractor will furnish all information and reports required by Executive order 11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his/her books, records and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations or orders, this contract may be canceled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or Federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, as amended by Executive order 11375 of October 13, 1967, or by rule, regulation or order of the Secretary of Labor, or as otherwise provided by law.

(g) The Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by rules, regulations or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, as amended by Executive order 11375 of October 13, 1967, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States. The applicant further agrees that it

agrees that it will be bound by the above Equal Opportunity Clause with respect to its own employment practices when it participates in Federally assisted construction work: Provided, that if the applicant so participating is a State or local government, the above Equal Opportunity Clause is not applicable to any agency, instrumentality, or sub-division of such government which does not participate in work on or under the contract. The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of Contractors and Subcontractors with the Equal Opportunity Clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance. The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, with a Contractor debarred from, or who has not demonstrated eligibility for, Government contracts and Federally assisted construction contracts pursuant to the Executive order and will carry out such sanctions and penalties for violation of the Equal Opportunity Clause as may be imposed upon Contractors and Subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all the following actions: cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee), refrain from extending any further assistance to the applicant under the program with respect to which the failure or refusal occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

36. PROTECTION OF EXISTING VEGETATION, STRUCTURES, UTILITIES, AND IMPROVEMENTS

a. The Contractor will preserve and protect all existing vegetation such as trees, shrubs, and grass on or adjacent to the site of work which is not to be removed and which does not unreasonably interfere with construction work. Care will be taken in removing trees authorized for removal to avoid damage to vegetation to remain in place. Any limbs or branches of trees broken during such operations or by the careless operation of equipment, or by workmen, shall be trimmed with a clean cut and painted with an approved tree pruning compound as directed by the Director, State Purchasing and Contracting and/or Contracting Officer.

b. The Contractor will protect from damage all existing improvements or utilities at or near the site of the work, the location of which is made known to him, and will repair or restore any damage to such facilities resulting from failure to comply with the requirements of this contract or the failure to exercise reasonable care in the performance of the work. If the Contractor fails or refuses to repair any such damage promptly, the Director, State Purchasing and Contracting and/or Contracting Officer may have the necessary work performed and charge the cost thereof to the Contractor.

37. CERTIFICATION OF NONSEGREGATED FACILITIES - Applicable to contracts, subcontracts, and to agreements with applicants who are themselves performing Federally assisted construction contracts, exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause. By the submission of this bid, the bidder, offeror, applicant, or subcontractor certifies that he/she does not maintain or provide for his/her employees any segregated facilities at any of his/her establishments, and that he/she does not permit his/her employees to perform their services at any location, under his/her control, where segregated facilities are maintained. He/She certifies further that he/she will not maintain or provide for his/her employees any segregated facilities at any of his/her establishments, and that he/she will not permit his/her employees to perform their services at any location, under his/her control, where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion or national origin, because of habit, local custom or otherwise. He/She further agrees that (except where he/she has obtained identical certifications from proposed subcontractors for specific time periods) he/she will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity Clause; that he/she will retain such certifications in his/her files; and that he/she will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods): NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES. A Certification of Nonsegregated Facilities must be submitted prior to award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity Clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

38. CLEAN AIR AND WATER - (Applicable only if the contract exceeds $100,000, or the Director, State Purchasing and Contracting and/or Contracting Officer has determined that orders under an indefinite quantity contract in any one year will exceed $100,000, or facility to be used has been the subject of a conviction under the Clean Air Act (42 U.*S. C.* 1857c-8 (c) (1)) or the Federal Water Pollution Control Act (33 U.S.C. 1319(c)) and is listed by EPA, or the contract is not otherwise exempt).

a. The Contractor agrees as follows:

(i) to comply with all the requirements of section 114 of the Clean Air Act, as amended (42 U.S.C. 1857, et seq., as amended by Public Law 91-604) and section 308 of the Federal Water Pollution Control Act (33 U.S.C. 1251, as amended by Public Law 92-500), respectively, relating to inspection, monitoring, entry, reports, and information, as well as other requirements specified in section 114 and

section 308 of the Air Act and the Water Act, respectively, and all regulations and guidelines issued thereunder before the award of this contract.

(ii) that no portion of the work required by this prime contract will be performed in a facility listed on the Environmental Protection Agency List of Violating Facilities on the date this contract was awarded unless and until the EPA eliminates the name of such facility or facilities from such listing.

(iii) to use his/her best efforts to comply with clean air standards and clean water standards at the facilities in which the contract is being performed; and

(iv) to insert the substance of the provisions of this Clause in any nonexempt subcontract, including this paragraph (iv).

b. The terms used in this Clause have the following meanings.

(i) The term "Air Act" means the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Public Law 91-604).

(ii) The term "Water Act" means the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Public Law 92-500).

(iii) The term "clean air standards" means any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, or other requirements which are contained in, issued under, or otherwise adopted pursuant to the Air Act or Executive Order 11738, an applicable implementation plan as described in section 110(d) of the Clean Air Act (42) U.S.C. 1857c-5(d), an approved implementation procedure or plan under section 111(c) or section 111(d), respectively, of the Air Act (42 U.S.C. 1857c-6)(c) or (d), or an approved implementation procedure under section 112(d) of the Air Act (42 U.S.C. 1857c-7(d)).

(iv) The term "Clean Water Standards" means any enforceable limitation, control, requirement which is contained in a permit Protection Agency or authorized by section a local government condition, prohibition, standard or other promulgated pursuant to the Water Act or issued to a discharger by the Environmental by a state under an approved program, as 402 of the Water Act (33 U.S.C. 1342), or by to ensure compliance with pretreatment regulations as required by section 307 of the Water Act (33 U.S.C. 1317).

(v) The term "Compliance" means compliance with clean air or water standards. Compliance shall also mean compliance with a schedule or plan ordered or approved by a court of competent jurisdiction, the Environmental Protection Agency or an Air Water Pollution Control Agency in accordance with the requirement of the Air Act or Water Act and regulations issued pursuant thereto.

(vi) The term "Facility" means any building, plant, installation, structure, mine, vessel or other floating craft, location, or site of operations, owned, leased, or supervised by a Contractor, Subcontractor, to be utilized in the performance of a contract or subcontract. Where a location or site of operations contains or includes more than one building, plant, installation, or structure, the entire location or site shall be deemed to be facility except where the Director, Office of Federal Activities, Environmental Protection Agency, determines that independent facilities are collocated in one geographical area.

(vii) The term "Nonexempt Contract or Subcontract" means a contract or subcontract of more than $100,000 which is not otherwise exempted pursuant to the EPA regulations implementing the Air Act and Water Act (40 CFR 15.5), as further implemented in ASPR 1-2302.4 or in FPR 1-1.2302.4 (whichever is applicable) and the procedures of the Department awarding the contract.

39. AUDIT BY DEPARTMENT OF DEFENSE - Insert the following clause in all contracts (except those entered by formal advertising which are not expected to exceed $100,000).

a. General. The Director, State Purchasing and Contracting and/or Contracting Officer or his representatives shall have the audit and inspection rights described in the applicable paragraphs (b), (c) and (d) below.

b. Examination of Costs. If this is a cost reimbursement type, incentive, time and materials, labor hour, or price re-determinable contract, or any combination thereof, the Contractor shall maintain, and the Director, State Purchasing and Contracting and/or Contracting Officer or his/her representatives shall have the right to examine books, records, documents, and other evidence and accounting procedures and practices, sufficient to reflect properly all direct and indirect costs of whatever nature claim to have been incurred and anticipated to be incurred for the performance of this contract. Such right of examination shall include inspection at all reasonable times of the Contractor's plants, or such parts, thereof as may be engaged in the performance of this contract.

c. Cost or Pricing Data. If the Contractor submitted cost or pricing data in connection with the pricing of this contract or any change or modification thereto, unless such pricing was based on adequate price completion, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation, the Director, State Purchasing and Contracting and/or Contracting Officer or his/her representatives who are employees of the State shall have the right to examine all books, records, documents and other data of the Contractor related to the negotiation, pricing or performance of such contract, change or modification, for the purpose of evaluating the accuracy, completeness and currency of the cost or pricing data submitted. Additionally, in the case of pricing any change or modification exceeding $100,000 to formally advertised contracts, the Comptroller General of the United States or his/her representatives who are employees of the State shall have such rights. The right of examination shall extend to all documents necessary to permit adequate evaluation of the cost or pricing data submitted, along with the computations and projections used therein.

d. Reports. If the Contractor is required to furnish Contractor Cost Data Reports (CCDR), Contract Fund Status Reports (CFSR), or Cost Performance Reports (CPR) the Director, State Purchasing and Contracting and/or Contracting Officer or his/her representatives shall have the right to examine books, records, other documents, and supporting materials, for the purpose of evaluating (i) the effectiveness of the Contractor's policies and procedures to produce data compatible with the objectives of these reports, and (ii) the data reported.

e. Availability. The materials described in (b), (c) and (d) above shall be made available at the office of the Contractor, at all reasonable times, for inspection, audit, or reproduction, until the expiration of three (3) years from the date of final payment under this contract or such lesser time specified in Appendix M Of the Defense Acquisition Regulation and for such longer period, if any, as is required by applicable statute, or by other clauses of this contract, or by (1) and (2) below:

(1) If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for a period of three (3) years from the date of any resulting final settlement.

(2) Records which relate to appeals under the DISPUTES Clause of this contract, or litigation, or the settlement of claims arising out of the performance of this contract, shall be made available until such appeals, litigation, or claims have been disposed of.

f. The Contractor shall insert a clause containing all the provisions of this clause, including this paragraph (f), in all subcontracts exceeding $10,000 hereunder, except altered as necessary for proper identifications of the contracting parties and the Director, State Purchasing and Contracting and/or Contracting Officer under the State prime contract.

40. SUBCONTRACTS-TERMINATION – The Contractor agrees to insert the following clauses of this contract physically in all subcontracts:

Paragraph: 14, 16, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 42 and 46. The term “Contractor” as used in such clauses in any subcontract shall be deemed to refer to the Subcontractor except in the phrase “Prime Contractor”.

Subcontracts are between the Contractor and the Sub. It is the sole responsibility of the Contractor to meet the terms of each subcontract and to settle any dispute that may arise.

The Contractor further agrees that a breach of any of the requirements of the clauses for the subcontract may be grounds for termination.

41. SUBCONTRACTOR COST OR PRICING DATA-PRICE ADJUSTMENTS - Insert the following clause in all contracts, both formally advertised and negotiated, which exceed $100,000:

a. Paragraphs (b) and (c) of this Clause shall become operative with respect to any modification made pursuant to one or more provisions of this contract which involves aggregate increases and/or decreases in costs plus applicable profits expected to exceed $100,000. The requirements of this Clause shall be limited to such modifications.

b. The Contractor shall require Subcontractors hereunder to submit cost or pricing data under the following circumstances: (i) prior to the award of any subcontract the amount of which is expected to exceed $100,000 when entered into; (ii) prior to the pricing of any subcontract modification which involves aggregate increases and/or decreases in costs plus applicable profits expected to exceed $100,000; except where the price is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation.

c. The Contractor shall require Subcontractors to certify that to the best of their knowledge and belief the cost and pricing data submitted under (b) above is accurate, complete, and current as of the date of agreement on the negotiated price of the subcontract or subcontract change or modification.

d. The Contractor shall insert the substance of this Clause including this paragraph (d) in each subcontract which exceeds $100,000.

42. BUY AMERICAN ACT

a. Agreement. In accordance with the Buy American Act (41 U.S.C. lOa-10d), the Contractor agrees that only domestic construction material will be used (by the Contractor, Subcontractors, materialmen, and supplies) in the performance of this contract, except for nondomestic construction material listed in the "Nondomestic Construction Materials" Clause, if any, of this contract.

b. Domestic Construction Material. "Construction Material" means any article, material, or supply brought to the construction site for incorporation in the building or work. An unmanufactured construction material is a "Domestic Construction Material" if it has been mined or produced in the United States. A manufactured construction material is a "Domestic Construction Material" if it has been manufactured in the United States and if the cost of its components which have been mined, produced, or manufactured in the United States exceed 50 percent of the cost of all its components. "Component" means any article, material, or supply directly incorporated in a construction material.

c. Domestic Component. A component shall be considered to have been "mined, produced, or manufactured in the United States" (regardless of its source in fact) if the article, material, or supply in which it is incorporated was manufactured in the United States and the component is of a class or kind determined by the Government to be not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality.

43. SUBJECT TO MILITARY CONSTRUCTION COOPERATIVE AGREEMENT
This contract is subject to all terms and conditions in agreement No. DAHA _____ dated _____ between the United States of America and the State of Mississippi, attached hereto and made a part hereof.

44. DEFINITIONS - As used throughout this contract, the following terms shall have the meaning set forth below:

a. Except for the original signing of this contract, and except as otherwise stated herein, the term "Director, State Purchasing and Contracting and/or Contracting Officer" as used herein, shall mean The Adjutant General of Mississippi duly authorized representative.

b. The term "Government" means the United States and any Department head thereof.

c. The term "State" means the Mississippi Military Department, the State of Mississippi, Commonwealth, or Territory, which is the party to this contract.

d. The term "Governor" means the Governor of the state or his/her duly appointed representative (other than the Director, State Purchasing and Contracting and/or Contracting Officer).

e. The term "USPFO" means the United States Property and Fiscal Officer assigned to the State.

f. The "Contract Documents" means plans, specifications, bid form, contract, schedules, drawings and any other contract documents approved during the term of this contract.

45. APPROVAL - This contract and any subsequent terminations, modifications, or change orders (including those resulting from disputes and settlements of disputes) shall be subject to the written approval of The Adjutant General and/or Chief, National Guard Bureau, or his/her duly authorized representative, and shall not be binding until so approved.

46. DRUG-FREE WORKPLACE

a. The Contractor covenants and agrees that it will comply with provisions of the Drug-Free Workplace Act of 1988 (Public Law 100-690, Title V, Subtitle D; 41 U.S.C. 701 et. seq.) and will maintain a drug-free workplace.

b. The Final Rule, Government-Wide Requirements for Drug-Free Workplace (Grants), issued by the Office of Management and Budget and the Department of Defense (32 CFR Part 28, subpart f) to implement provisions of the Drug-Free Workplace Act of 1988, is incorporated by reference and the Contractor covenants and agrees to comply with provisions thereof, including amendments to the Final Rule that may hereafter be issued.

47. LIQUIDATED DAMAGES - In case of failure on the part of the Contractor to complete the work within the time fixed in the contract or any extensions thereof, the Contractor shall pay to the State as liquidated damages, pursuant to the Clause of this contract entitled TERMINATION FOR DEFAULT-DAMAGES OR DELAY-TIME EXTENSIONS, the sum of $ _____ for each day of delay.

(BLANK)

IV. SIGNATURES:

_____
(Contractor)

WITNESSES:

BY: _____
(Signature)

_____

_____
(Date)

_____
(Name, typed)

Note: If the Contractor is a corporation, Witnesses are not required, but the annexed Certificate must be completed

_____
(Title)

Type or print names under all signatures

_____
(Address)

_____
(Phone No.)

_____
(Email Address)

STATE OF MISSISSIPPI

BY:_____
Janson D. Boyles
Major General, Mississippi National Guard
The Adjutant General of Mississippi

_____
(Date)

IN WITNESS WHEREOF, the parties hereto have executed this contract on the Notice to Proceed date of _____ day of _____ , 20 ___.

CERTIFICATE OF CORPORATE AUTHORITY

I, _____, certify that I am the _____ of the Corporation named as Contractor herein; that _____ who signed this contract on behalf of the Contractor, was then the _____ of said Corporation; that said contract duly signed for and in behalf of said Corporation by authority of its governing body and is within the scope of its corporate powers.

_____
(Signature)
(Corporate Seal)

Note: The Contractor, if a corporation, should cause the above certificate to be executed under its corporate seal, provided that the same officer shall not execute both the contract and the certificate.

Note: In the event that the Contractor is not a corporation, this certificate may be omitted from the contract.

SECTION 00 73 01

CONDITIONS OF THE CONTRACT - SPECIAL CONDITIONS

1. CONFLICTS

In case of conflict these Special Conditions and the Owner Contractor Agreement contained herein, shall take precedence, and prevail over the General Conditions and 2017 SUPPLEMENTARY CONDITIONS SECTION 00 73 03.

2. MEASUREMENTS AND DIMENSIONS

Before ordering any materials or performing any work, the Contractor shall check and verify all dimensions of shop drawings and be responsible for their correctness. Any materials ordered without the prior approval of the Director, State Purchasing and Contracting and/or Contracting Officer shall be at the risk of the Contractor and subject to rejection and replacement at no expense to the owner.

3. PERMITS, TAXES AND ORDINANCES

The Contractor shall be responsible for obtaining all required permits, give legal notices, pay any and all taxes and/or assessments levied in connection with this contract. Building regulations and ordinances of the local municipality or county shall be strictly adhered to and the Contractor shall be responsible for all knowledge thereof.

4. UTILITIES

The Director, State Purchasing and Contracting and/or Contracting Officer shall make all possible arrangements to allow the use of government facilities in connection with water and electrical power used during the construction period. The Contractor will be required to make all connections to existing service lines made available by the Director, State Purchasing and Contracting and/or Contracting Officer. The Contractor is expected to practice all applicable conservation measures and restrict utility usage to that associated with completion of the contract. Should, in the opinion of the Director, State Purchasing and Contracting and/or Contracting Officer, utility usage become excessive, the Director, State Purchasing and Contracting and/or Contracting Officer may terminate any previous arrangements for same.

5. FABRICATION YARD

The Owner shall make available to the Contractor, a site adjacent to the construction project for use as a fabrication yard. The interior arrangement, preparation for work, security and returning the area to its original state, is the responsibility of the Contractor.

6. SANITARY FACILITIES

The Director, State Purchasing and Contracting and/or Contracting Officer will make all possible arrangements for the use of government facilities, where available.

7. TAXPAYER IDENTIFICATION NUMBER

Form W-9, Payer's Request for Tax Identification Number and Certification, shall be completed by any Non-Incorporated Contractors. This document indicates the taxpayer Identification Number, which is the nine (9) digit number (000-00-0000) for individuals or the nine (9) digit (00-0000000) employer identification number. A completed Form W-9 must be furnished to the Director, State Purchasing and Contracting and/or Contracting Officer prior to issuance of the Notice-to Proceed.

MAGIC Supplier Self-Service Reference Guide

Supplier Registration

All suppliers/vendor/contractor must be registered to do business with the State of Mississippi. As a supplier/vendor/contractor, you may register at any point in time. To determine whether you are a registered supplier (converted vendor) in MAGIC, go to the MAGIC Vendor Information page and follow the steps below:

- Enter the first five characters of your Vendor Name or your 11 digit SAAS Vendor Number.
- Click Submit.

If you are a converted vendor, you will see your MAGIC Vendor Number, SAAS Vendor Number, Vendor Name, City, State, and Zip displayed. If your vendor information does not exist in MAGIC, you will see "The query you submitted returned no records."

Converted vendors need to submit an email via mash@dfa.ms.gov to request a MAGIC User ID and Password. Enter "Vendor ID Request" as the email Subject, and include the following information in your email:

- MAGIC Vendor Number
- Vendor Name
- Contact Name
- Contact Email Address
- Contact Phone Number

If you are not a registered supplier/vendor/contractor and you wish to do business with the State of Mississippi, click here to register State of Mississippi Supplier Registration. If you attempt to complete the registration process and you are already a converted vendor in MAGIC, you will receive a duplicate error message. Please call the MMRS Call Center at 601-359-1343, Option 2 for assistance in locating your vendor information.

Please see or call Contracting Officer for new Supplier Registration sheet if you are not already registered in MAGIC. This process should be done if you are submitting a bid.

The Supplier Registration link is also located on the Mississippi Management & Reporting System website at http://www.mmrs.state.ms.us/vendors/index.shtml. It is important that the supplier must submit W-9 Form after registering.

8. Progress Payments to Contractor

Partial progress payment will be processed by the state on a monthly basis and payment made within Thirty (30) calendar days after approved by the Director, State Purchasing and Contracting and/or Contracting Officer as prescribed in Title §31-7-303 of the Mississippi Code.

Contractors shall submit monthly certification through the project Architect/Engineer/Project Manager to the Director, State Purchasing and Contracting and/or Contracting Officer indicating payments to Subcontractors have been made in accordance with Title 31-5-27 of the Mississippi Code.

9. Asbestos Containing Products/Materials

Products and materials containing asbestos will not be used or incorporated into any phase, process, finished or installed product covered by the work specifications. To ensure compliance with this requirement, a Material Safety Data Sheet (MSDS) must be attached to all Material Submittals disclosing the content of ingredients.

10. Department of Defense (DD) Form 1354 & Installed Building Equipment List (IBE) Special Records & Submission

At the time of pre-construction conference, the Contractor shall furnish the Director, State Purchasing and Contracting and/or Contracting Officer two (2) sets of the Department of Defense Form 1354 with the preliminary cost for each item filled in. These costs will be based on the Contractor's bid (SEE FORM behind SC Section 00 73 01 - 3/4). Within ten working days of Substantial Completion, the Contractor will furnish the Director, State Purchasing and Contracting and/or Contracting Officer two (2) copies of the DD Form 1354, and the attached Installed Building Equipment (IBE) list with actual costs to date filled in and any changes of measurement noted, (i.e. building square footage is 1200 on the original DD 1354, but was changed during construction; you should mark through 1200 and add correct measurement). If there are no changes to costs or measurements, this is the final 1354 necessary. However, if there are any changes to costs or measurements prior to contract completion, the Contractor will provide two additional sets with changes noted.

TRANSFER AND ACCEPTANCE OF DoD REAL PROPERTY

Form Approved
OMB No. 0704-0188

PAGE OF PAGES

The public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Department of Defense, Washington Headquarters Services, Executive Services Directorate, Information Management Division, 4800 Mark Center Drive, Alexandria,VA 22350-3100 (0704-0188). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if itdoes not display a currently valid OMB control number.

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE ABOVE ORGANIZATION.

1. FROM *(Organization Name)*	2. DATE PREPARED *(YYYYMMDD)*	3. PROJECT/JOB NUMBER	4. SERIAL NUMBER	8. TRANSACTION DETAILS a. METHOD *(X all that apply)* ☐ ACQUISITION BY CONSTRUCTION ☐ TRANSFER BETWEEN SERVICES ☐ CAPITAL IMPROVEMENT ☐ INVENTORY ADJUSTMENT b. WHEN/EVENT *(X one)* ☒ TOTAL ASSET PLACED-IN-SERVICE ☐ PARTIAL ASSET PLACED-IN-SERVICE
5. TO *(Organization - Installation Code and Name)*	6. RPSUID/SITENAME/ INSTCODE/INSTNAME	7. CONTRACT NUMBER(S)	7a. PLACED-IN-SERVICE DATE *(YYYYMMDD)*	c. TYPE *(X one)* ☐ DRAFT ☒ FINAL ☐ INTERIM

9. ITEM NO.	10a. FACILITY NO.	10b. RPUID	11. CATEGORY CODE	12. CATCODE DESCRIPTION	13. TYPE CODE	14. SUST. CODE	AREA 15. PRIMARY UM	AREA 16. PRIMARY UM QUANTITY	OTHER 17. SECONDARY UM	OTHER 18. SECONDARY UM QUANTITY	19. COST	20. FUND SOURCE	21. FUND ORG	22. INTER-EST CODE	23. ITEM REMARKS

24. STATEMENT OF COMPLETION. The facilities listed hereon are in accordance with maps, drawings, and specifications and change orders approved by the authorized representative of the using agency except for the deficiencies listed on the reverse side.	25a. ACCEPTED BY *(Typed Name and Signature)*	b. DATE SIGNED *(YYYYMMDD)*
a. TRANSFERRED BY *(Typed Name and Signature)*	b. DATE SIGNED *(YYYYMMDD)*	
c. TITLE *(Area Engr./Base Engr./DPW/Construction Agent)*	c. TITLE *(DPW/RPAO)*	26. PROPERTY VOUCHER NUMBER

DD FORM 1354, AUG 2013 PREVIOUS EDITION MAY BE USED. Adobe Designer 9.0

27. CONSTRUCTION DEFICIENCIES *(Attach blank sheet for continuations)*	28. PROJECT REMARKS *(Attach blank sheet for continuations)*

INSTRUCTIONS

GENERAL. This form has been designed and issued for use in connection with the transfer of military real property between the military departments and to or from other government agencies. It supersedes ENG Forms 290 and 290B (formerly used by the Army and Air Force) and NAVDOCKS Form 2317 (formerly used by the Navy).

Existing instructions issued by the military departments relative to the preparation of DD Form 1354 are applicable to this revised form to the extent that the various items and columns on the superseded forms have been retained. The military departments may promulgate additional instructions, as appropriate.

For detailed instructions on how to fill out this form, please refer to Unified Facilities Criteria (UFC) 1-300-08, dated 16 April 2009 or later.

SPECIFIC DATA ITEMS.

1. From. Name of the transferring agency.

2. Date Prepared. Date of actual preparation. Enter all dates in YYYYMMDD format (Example: March 31, 2010 = 20100331).

3. Project/Job Number. Project number on a DD Form 1391 or Individual Job Order Number.

4. Serial Number. Sequential serial number assigned by the preparing organization (e.g., 2010-0001).

5. To. Name and address of the receiving installation, activity, and Service of the Real Property Accountable Officer (RPAO).

6. RPSUID/SITENAME/INSTCODE/INSTNAME. Site Unique Identifier and name or installation code and name where the constructed facility is located.

7. Contract Number(s). Contract number(s) for this project.

7a. Placed-In-Service Date. RPA Placed In Service Date. This is the date the asset is actually placed-in-service.

8. Transaction Details.
a. Method of Transaction. Mark (X) as many boxes as apply.
b. When/Event. When or event causing preparation of DD Form 1354. X only one box.
c. Type. Draft, interim, or final DD Form 1354. X only one box.

9. Item Number. Use a separate item number for each facility, no item number for additional usages.

10a. Facility Number. Assigned in accordance with the Installation/Base Master Numbering Plan.

10b. RPUID. Identified in Real Property Inventory.

11. Category Code. The category code describes the facility usage.

12. Catcode Description. The category code name which describes the facility usage.

13. Type. Type of construction: P for Permanent; S for Semi- permanent; T for Temporary.

14. Sustainability Code. Reports whether or not an asset meets the sustainability guidelines set forth in Section 2(g) of Executive Order 13514. Valid values are: 1 (asset meets the guidelines); 2 (asset does not meet the guidelines); 3 (asset not evaluated); 4 (asset not subject to guidelines).

15. Area: UM 1. Area unit of measure; use the unit of measure associated with the category code selected in 11.

16. Total Quantity UM 1. The total area for the measure identified in Item 15. Use negative numbers for demolition.

17. Other: UM 2. Unit of Measure 2 is the capacity or other measurement unit (e.g., LF, MB, EA, etc.).

18. Total Quantity UM 2. The total capacity/other for the measure identified in Item 17.

19. Cost. Cost for each facility; for capital improvements to existing facilities, show amount of increase only. If there is no increase for the capital improvement, enter N/A.

20. Fund Source. Enter the Fund Source Code for this item.

21. Funding Organization. Enter the code for the organization responsible for acquiring this facility.

22. Interest Code. Enter the code that reflects government interest or ownership in the facility.

23. Item Remarks. Remarks pertaining only to the item number identified in Item 9; show cost sharing.

24. Statement of Completion. Typed name, signature, title, and date of signature by the responsible transferring individual or agent.

25. Accepted By. Typed name, signature, title, and date of signature by the RPAO or accepting official.

26. Property Voucher Number. Next sequential number assigned by the RPAO in voucher register.

27. Construction Deficiencies. List construction deficiencies in project during contractor turnover inspection.

28. Project Remarks. Project level remarks and continuation of blocks.

DD FORM 1354 (BACK), AUG 2013

SECTION 00 73 02

CONDITIONS OF THE CONTRACT - SPECIAL INSTRUCTIONS

1. SUBCONTRACTORS

The Prime Contractor, on or before the date of being awarded the Prime Contract, will submit to the Director, State Purchasing and Contracting and/or Contracting Officer a list of all subcontracts which sets forth the amount, name, address, and scope of work contemplated for each subcontract. For any subcontract that exceeds $50,000.00, the Subcontractor is required to have a current Certification of Responsibility Number, as issued, and licensed by the Mississippi State Board of Contractors, and the number will also be furnished on the list, as applicable.

2. LIMITATIONS

Any and all types of alcoholic beverages and controlled substances are strictly forbidden from the job site. The Contractor shall be responsible for the knowledge of, and adherence to, any and all Federal, State and local laws and regulations pertaining to the same.

3. PRE-CONSTRUCTION CONFERENCE

The Director, State Purchasing and Contracting and/or Contracting Officer, will conduct a meeting at a time and place designated by the Director, State Purchasing and Contracting and/or Contracting Officer, prior to the Contractor starting work on the project. It is desirable that in addition to the Contractor, the foreman/supervisor and any prime subcontractors for the project attend this meeting. The exact time, date and place of the meeting will be arranged after issuance of the contract.

4. PRODUCTS AND/OR MATERIAL SUBSTITUTION

Prior to the Pre-Construction Conference the Contractor will submit, for approval, any anticipated changes to the products or materials specified. All submittals must address all specification data, company name and supplier of the product or material that the Contractor wishes to substitute. At the Pre-Construction Conference the Contractor will be given approval/disapproval for the use of alternate items as submitted. Substitutions submitted after the Pre-Construction Conference may not be taken into consideration at the discretion of the Director, State Purchasing and Contracting and/or Contracting Officer.

5. AS BUILT DRAWINGS

Occasionally, during construction, modifications and changes may occur due to site conditions, unforeseen circumstances or problems encountered. This may result in a modification of the construction as originally depicted on the drawings. Upon completion of the project, the Contractor will furnish the Director, State Purchasing and Contracting and/or Contracting Officer two (2) complete sets of “As Built Drawings”, signed by the Contractor, depicting the actual construction and all changes incorporated therein. Contractor shall also provide one (1) set to A&E for conversion to electronic As Built’s.

SECTION 00 73 02

6. INSURANCE

SEE 2017 SUPPLEMENTARY CONDITIONS SECTION 00 73 03, Article 11

7. ARCHITECT/ENGINEER/CONSULTANT

If Project does not specify an A&E/Consultant the Contracting Officer Representative will perform the duties thereof, along with the Director, State Purchasing and Contracting and/or Contracting Officer.

8. MINORITY TRACKING/PARTICIPATION OF SUBCONTRACTORS

The document on next page (SI Section 00 73 02 – 3/4 and 4/4) will serve as a tracking instrument for minority participation in publicly funded construction projects managed by the Owner. This document will aid the Owner in its commitment to encourage minority participation during the bidding process. Your conscientious effort and commitment to help establish good business relations with minority subcontractors, is greatly appreciated.

Contractor will be required to submit to the Owner within seven days from the Notice to Proceed, a completed form, if none, put NONE on the form.

(BLANK)

MISSISSIPPI MILITARY DEPARTMENT

Minority Tracking or Participation Form

Any responses will be deemed public information and may be incorporated into reporting information compiled by the Owner in the following manner: Contractors that listed minority participation, Contractors that did not list minority participation and Contractors that submitted an incomplete (partially filled-out or blank) form.

Section 00 43 00: SCOPE OF WORK
1.01 General Description of work covered by Contract Documents
Section 00 73 02, paragraph 8, page, SI Section 00 73 02 – 2/3

The Prime General Contractor will submit to the Owner within seven (7) days from the Notice to Proceed, a completed *Minority Tracking Form* outlining the use of minority subcontractors that will be used on the project.

Minority - A person who is a citizen or lawful permanent resident of the United States and who is the following: **African American, Hispanic American, Asian American, American Indian or Female**

Project Name, Location and Number: _____

General Contractor: (Name) _____

Check the Following Appropriate Box

☐ **There are NO minority participants included in this bid proposal.**

☐ **There are minority participants included in this bid proposal.** The minority participants may be defined as: Subcontractor(s) or Supplier(s).

List minority participants and their discipline/responsibility per the above or per Construction Specification Institution (CSI) sixteen (16) divisions.

Name: _____

Division: _____

Amount $ _____

Name: _____

Division: _____

Amount $ _____

Page 2 of 2 (Submit if necessary)
Minority Participation Form

Name: _____

Division: _____

Amount $ _____

Name: _____

Division: _____

Amount $ _____

Name: _____

Division: _____

Amount $ _____

Name: _____

Division: _____

Amount $ _____

Name: _____

Division: _____

Amount $ _____

Name: _____

Division: _____

Amount $ _____

Name: _____

Division: _____

Amount $ _____

2017 SUPPLEMENTARY CONDITIONS
AIA Document A201 - 2017
SECTION 00 73 03

PART 1 – GENERAL

1.01 **DESCRIPTION**

A. **Owner:** These supplements are necessary because the Owner is an agency, of the State of Mississippi and occupies a different position from that of the usual Owner.

B. **Document:** The following supplements modify, change, delete from, or add to the General Conditions of the Contract, AIA Document A201-2017. When any portion of the General Conditions is modified, changed, deleted from, or added to, by these Supplementary Conditions, the unaltered portions of that Article, Paragraph, Subparagraph, or Clause shall remain in full force and effect.

C. **Architect/Engineer/Consultant:** If Project does not specify an A&E/Consultant, the Contracting Officer Representative (COR) will perform the duties thereof, along with the Director, State Purchasing and Contracting and/or the Contracting Officer (DPC/CO).

Article 1
GENERAL PROVISIONS

1.1 **BASIC DEFINITIONS**

1.1.1 **The Contract Documents**: Delete the last sentence of this Subparagraph and substitute the following sentence:

The Contract Documents include the Advertisement for Bids, Instructions to Bidders, Proposal Form, sample forms, schedules and all portions of addenda issued prior to execution of the Contract.

1.1.9 Add a new Subparagraph as follows:

COMMISSIONING AUTHORITY PROFESSIONAL
A professional independent of the project engineer or architect retained by the owner who manages a quality focused process for enhancing the delivery of the project. The process focuses upon verifying and documenting that the facility and all its systems are planned, designed, installed, tested, operated, and maintained to meet the Owner's project requirements.

1.5 **OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE**

1.5.1 Add a new sentence at the end of this Subparagraph:

This Paragraph in no way supersedes the Owner's document rights set forth in the Agreement Between the Owner and the Professional.

1.5.3 Add a new Subparagraph as follows:

Transparency. In accordance with the Mississippi Accountability and Transparency Act of 2008, §27-104-151, et seq., of the Mississippi Code of 1972, as Amended, the American Accountability and Transparency Act of 200 (P.L.111-5), where applicable, and §31-13 of the Mississippi Code of 1972, as amended, where applicable, a fully Executed copy of the Contract shall be posted by the MS Military Department in the State Accounting System (MAGIC) to meet requirements. This will allow the contract to be posted to the following website: https://www.transparency.mississippi.gov

Article 2
OWNER

2.1 **GENERAL**

2.1.1 Change this Subparagraph to read as follows:

The Owner, as used in these Documents, refers to the Mississippi Military Department, acting for and on behalf of the State of Mississippi and for the benefit of the Agency for which the Work under this Contract is being performed. The Owner's representative, who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization, is the Director, State Purchasing and Contracting and/or the Contracting Officer (DPC/CO) who is the designee of the individual who signed the Construction Contract. Except as otherwise provided in Subparagraph 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized designee. The Construction Manager as referred in the AIA documents shall mean the Contracting Officer's Representative (COR) to the Owner's representative who shall have authority to take any or all action with respect to verify that the contractor perform the technical requirements of the contract in accordance with the contract terms of the contract; Perform or cause to be performed, inspections necessary to ensure performance meets the contract specifications and verify that contractor corrects all deficiencies; Maintains liaison and direct communications with the contractor but is not empowered to award, agree to, or sign any contract or modifications thereto, or in any way obligate the payment of money by the State or U.S. Government.

Article 3
CONTRACTOR

3.3 **SUPERVISION AND CONSTRUCTION PROCEDURES**

3.3.1 Add a new sentence at the end of this Subparagraph:

If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner and Architect shall be responsible for any resulting loss or damage.

3.4 **LABOR AND MATERIALS**

3.4.4 Add the Subparagraph as follows:

Employee Status Verification System *If applicable, the Contractor represents and warrants that it will ensure its compliance with the Mississippi Employment Protection Act, Section 71-11-1, et seq. of the Mississippi Code Annotated (Supp 2008) and will register and participate in the status verification system for all newly hired employees. The term "employee" as used herein means any person that is hired to perform work within the State of Mississippi. As used herein, "status verification system" means the Illegal Immigration Reform and Immigration Responsibility Act of 1996 that is operated by the United States Department of Homeland Security, also known as the E-Verify Program, or any other successor electronic verification system replacing the E-Verify Program. The Contractor agrees to maintain records of such compliance and, upon request of the State and approval of the Social Security Administration or Department of Homeland Security, where required, to provide a copy of each such verification to the State. The Contractor further represents and warrants that any person assigned to perform services hereunder meets the employment eligibility requirements of all immigration laws of the State of Mississippi. The Contractor understands and agrees that any breach of these warranties may subject the Contractor to the following: (a) termination of this Agreement and ineligibility for any state or public contract in Mississippi for up to three (3) years, with notice of such cancellation/termination being made public, or (b) the loss of any license, permit, certification or other document granted to the Contractor by an agency, department or governmental entity for the right to do business in Mississippi for up to one (1) year, or (c) both. In the event of such cancellation/termination, the Contractor would also be liable for any additional costs incurred by the State due to the contract cancellation or loss of license or permit.*

3.4.5 Add a new Subparagraph as follows:

In providing labor for the proper execution and completion of the Work, the Contractor shall comply with the provisions of Section 31-5-17 and Section 31-5-19 of the Mississippi Code of 1972, Annotated.

3.4.6 Add a new Subparagraph as follows:

In providing materials for the proper execution and completion of the Work, the Contractor shall comply with the provisions of Section 31-5-23 of the Mississippi Code of 1972, Annotated.

3.9 **SUPERINTENDENT**

3.9.2 Change the second line in this Subparagraph to read as follows:

The DPC/CO shall, within a reasonable time, notify the Contractor in writing of any objection to the proposed superintendent.

3.15 **CLEANING UP**

3.15.2 Change this Subparagraph to read as follows:

If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

3.16 **ACCESS TO WORK**

Change this Paragraph to read as follows:

The Contractor shall provide the Owner, Contracting Officer Representative, Architect, Commissioning Authority Professional, and their authorized representatives access to the Work in preparation and progress wherever located.

3.18 **INDEMNIFICATION**

3.18.3 Modify the Subparagraph as follows:

Indemnification *To the fullest extent allowed by law, Contractor shall indemnify, defend, save and hold harmless, protect, and exonerate the State of Mississippi Military Department, its officers, employees, and representatives from and against all claims, demands, liabilities, suits, actions, damages, losses, and costs of every kind and nature whatsoever, including, without limitation, court costs, investigative fees and expenses, and attorneys' fees, arising out of or caused by Contractor's and/or its partners, principals, agents, employees, and/or subcontractors in the performance of or failure to perform this Agreement. In the State's sole discretion, Contractor may be allowed to control the defense of any such claim, suit, etc. In the event Contractor defends said claim, suit, etc., Contractor shall use legal counsel acceptable to the State; Contractor shall be solely liable for all reasonable costs and/or expenses associated with such defense and the State shall be entitled to participate in said defense. Contractor shall not settle any claim, suit, etc., without the State's concurrence, which the State shall not unreasonably withhold.*

Article 4
ARCHITECT

4.1 **GENERAL**

4.1.2 Change this Paragraph to read as follows:

The Owner shall have a Contracting Officer's Representative (COR) whom is an employee of the Mississippi Military Department. See Article 2, paragraph 2.1.1 for a definition of COR

4.2 **ADMINISTRATION OF THE CONTRACT**

4.2.1 Change the first line of this Subparagraph to read as follows:

The Architect will provide administration of the Contract as directed by the DPC/CO, and will be the Owner's representative, along with the COR, (1) during construction, (2) until the final payment is due and (3) with the Owner's concurrence, during the one-year period for correction of Work described in Section 12.2.

4.2.3 Change this Paragraph to read as follows:

The Contracting Officer Representative (COR) shall visit the work site at any time during the construction period. He/She will determine in general, if the work observed is being performed in accordance with the Contract Documents. COR will work with the Architect/Engineer to keep Contracting Officer informed and to provide reports to the Contracting Officer.

4.2.4 Delete this Subparagraph in its entirety.

4.2.15 Add a new Subparagraph as follows:

The COR will work with the Architect and the DPC/CO in conducting inspections to determine the dates of Substantial Completion and the date of final completion. The DPC/CO will issue Certificates of Substantial Completion once approved pursuant to Section 9.8. Architect in conjunction with the COR will receive and forward to the Owner written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10. The Architect will forward to the COR a final application and Certificate for Payment upon the Contractor's compliance with the requirements of the Contract Documents.

Article 5
SUBCONTRACTORS

5.2 **AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK**

5.2.1 Change the first sentence of this Subparagraph to read as follows:

Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, prior to award of the Contract by the Owner, shall furnish in writing to the Owner through the Professional, the names, disciplines, and COR #'s of Sub-Contractors over Fifty Thousand Dollars ($50,000.00) (as well as entities who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. Such list shall also include any Mechanical, Plumbing, or Electrical Sub-Contractor listed on Proposal Form regardless of amount.

Article 6
CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

No supplementary conditions.

Article 7
CHANGES IN THE WORK

7.1.2 Delete This Subparagraph in its entirety.

7.2 **CHANGE ORDERS**

7.2.2 Add a new Subparagraph as follows:

The maximum cost included in a Change Order for profit and overhead is limited to twenty percent (20%) of the total of the actual cost for materials, labor and subcontracts. Profit and overhead include: all taxes, fees, permits, insurance, bond, job superintendent, job and home office expense. All Subcontractors shall acquiesce to the same requirements when participating in a Change Order.

7.3 **CONSTRUCTION CHANGE DIRECTIVES**

7.3.1 Change the first sentence of this Subparagraph to read as follows:

A Construction Change Directive is a written order prepared by the DPC/CO after coordination with the Contracting Officers Representative and/or Architect, then is signed by the Owner, directing a change in the work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both.

7.3.9 Delete this Subparagraph in its entirety.

7.3.10 Change this Subparagraph to read as follows:

When the Owner and the Contractor agree with a determination made by the DPC/CO, Contracting Officers Representative and/or the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach an agreement upon the adjustments, such agreement shall be effective immediately and the DPC/CO, with the assistance of the Contracting Officers Representative and/or the Architect shall prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

7.4 **Minor Changes in the Work**

Change This Subparagraph as follows:

Replace the word "Architect" with the words "COR and/or Architect".

Article 8
TIME

8.1 **DEFINITIONS**

8.1.1 Change This Subparagraph to read as follows;

Unless otherwise provided, Contract Time has been calculated to include calendar days for the receipt of Final Application of Payment and all Close Out Documents. Additional calendar days may be added based on authorized adjustments allotted in the Contract Documents to complete all terms of the contract.

8.1.2 Change this Subparagraph to read as follows:

The date of commencement of the Work is the date established in the Notice to Proceed.

8.1.3 Change this Subparagraph to read as follows;

The date of Substantial Completion is the date certified by the DPC/CO, along with the COR and the Architect in accordance with Section 9.8.

8.2 **PROGRESS AND COMPLETION**

8.2.3 Change this Subparagraph to read as follows;

The Contractor shall proceed expeditiously with adequate forces and shall achieve Completion within the Contract Time

8.3 **DELAYS AND EXTENSIONS OF TIME**

8.3.1 Change this Subparagraph to read as follows:

If the Contractor is delayed at any time in the commencement or progress of the Work by any act of neglect of the Owner or the Architect, or by any employee of either, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or any causes beyond the Contractor's control, or by any other causes which the DPC/CO along with the COR and the Architect determines may justify the delay, then the Contract Time may be extended by Change Order for such reasonable time as the DPC/CO may determine. Any claim for loss or any delay occasioned by any separate Contractor, or Subcontractor, shall be settled between the Contractor and such other separate Contractor, or Subcontractors.

Article 9
PAYMENTS AND COMPLETION

9.2 **SCHEDULE OF VALUES**

Change this Paragraph to read as follows:

Where the Contract is based on a stipulated sum, the Contractor shall submit through the Architect, the COR to the DPC/CO, at least 10 days before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the work and prepared in such form and supported by such data to substantiate its accuracy as the DPC/CO may require. This schedule, unless objected to by the Architect or Owner, shall be used as a basis for reviewing the Contractor's Applications for Payment.

9.3 **APPLICATIONS FOR PAYMENT**

9.3.1 Add a new sentence to the end of this Subparagraph:

The form of Application for Payment will be AIA Document G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet, or a computer-generated form containing similar data will be used for all Pay Requests submissions. The date established for each progress payment to be submitted will be at the Monthly Construction meeting determined at the Pre-Construction Conference.

9.3.1.1 Delete this Subparagraph in its entirety.

9.3.1.3 Add a new Clause to Subparagraph 9.3.1 as follows:

On any contract as described herein, of which the total amount is Two Hundred Fifty Thousand Dollars ($250,000.00) or greater, or on any contract with a subcontractor, regardless of amount, five percent (5%) shall be retained until the work is at least fifty percent (50%) complete, on schedule and satisfactory in the Owner's, COR and architect's/engineer's opinion, at which time fifty percent (50%) of the retainage held to date shall be returned, subject to consent of surety, to the prime contractor for distribution to the appropriate subcontractors and suppliers; provided, however, that future retainage shall be withheld at the rate of two and one-half percent (2 1/2%). When submitting request for reduction in retainage, the Contractor will include, with the application, a Consent of Surety to Reduction which is AIA Form G707A, and a Power of Attorney.

9.3.1.4 Add a new Clause to Subparagraph 9.3.1 as follows:

The Contractor must submit each month with this Application for Payment a separate letter stating that he is

requesting an extension of time or that he had no need for an extension for that period of time. No payment on a monthly application will be considered due and payable until the letter is received. Complete justification such as weather reports or other pertinent correspondence must be included for each day's request for extension. A Contractor's letter, or statement, will not be considered as adequate justification. The receipt of this request and data by the Owner will not be considered as Owner approval in any way.

9.3.2.1 Add a new Clause to Subparagraph 9.3.2 as follows:

Payment on materials stored at some location other than the building site, may be approved by the Architect and the Owner after the Contractor has submitted the following items:

- *.1 An acceptable Lease Agreement between the General Contractor and the owner of the land, or building, where the materials are stored covering the specific area where the materials are located.*
- *.2 Consent of Surety, or other acceptable Bond, to cover the materials stored off-site.*
- *.3 All Perils Insurance coverage for the full value of the materials stored off-site.*
- *.4 A Bill of Sale from the Manufacturer to the General Contractor for the stored materials.*
- *.5 A complete list and inventory of materials manufactured, stored and delivered to the storage site and of materials removed from the storage site and delivered to the job site.*
- *.6 A review by the Architect of the materials stored off-site prior to release of payment.*
- *.7 Guarantee no storage costs, additional delivery fees, or subsequent costs to the Owner.*

9.4 CERTIFICATES FOR PAYMENT

9.4.1 Change this Subparagraph to read as follows:

The A&E will have 5 calendar days from receipt of the Certificate for Payment from the Contractor to review/certify the amount the A&E determines is due the Contractor and submit to the COR. If the Amount due certified by the A&E is different from the amount the Contractor requested or is determined to be withheld in whole, the A&E will provide, in writing, the reasons for withholding the certification in whole or in part and submit to the COR. The COR will have 3 calendar days to review/approve and attach an inspection report to and submit to the DPC/CO. If the request is certified by A&E to be withheld in whole, the COR will forward A&E's documentation for withholding in whole, along with COR concurrence and submit to the DPC/CO. In the aforementioned timeframe.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

9.5.1 Change this Subparagraph to read as follows:

The A&E, COR and the DPC/CO may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner as required by Section 9.4.1. If in the A&E, and COR cannot agree on a revised amount or withholding in whole all documentation will be submitted to the DPC/CO for final determination. The A&E or the DPC/CO may also withhold a Certificate for Payment because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a Certificate for Payment for Payment previously issued, to such extent as may be necessary in the COR, Architect's or the DPC/CO's opinion to protect the Owner from loss for which theContractor is responsible, including loss resulting from the acts and omissions because of the following:

- ***.1** defective Work not remedied;*
- ***.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;*
- ***.3** failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;*
- ***.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;*
- ***.5** damage to the Owner or a separate contractor;*

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

9.6 **PROGRESS PAYMENTS**

9.6.1 Change the first line of this Subparagraph to read as follows:

After the Architect and COR have reviewed the Certificate for Payment and has certified that payment should be made will forward to the DPC/CO for the processing of Payment. This will be the Date that is considered due and payable. The DPC/CO will process in the manner and within the time provided in the Contract Documents.

9.6.2 Change the first line of this Subparagraph to read as follows:

The Contractor shall pay each Subcontractor, in accordance with Section 31-5-27 of the Mississippi Code 1972, Annotated, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work.

9.6.3 Change this Subparagraph to read as follows:

The DPC/CO will, on request, in writing, furnish to the Subcontractor, a copy of the Payment and Performance Bond if there is a dispute between payments. The Contractor is responsible to the Subcontractor for payment not the Owner as the contract is between the Contractor and the Subcontractor. The DPC/CO may, if practical, give the Subcontractor information regarding percentages of completion or amounts applied for by the Contractor.

9.6.9 Add a new Subparagraph as follows:

The amount retained by the Contractor from each payment to each Subcontractor and material supplier will not exceed the percentage retained by the Owner from the Contractor.

9.6.9.1 Add a new Clause to Subparagraph 9.6.8 as follows:

The Contractors shall submit monthly certification, in accordance with Section 31-5-25 of the Mississippi Code 1972, Annotated, on Owner's "Affidavit Certifying Payment to All Subcontractors" form, to the project engineer or architect indicating payments to subcontractors on prior payment request. (Attached as Exhibit "A" at the end of this Section 00 73 03, herein)

9.7 **FAILURE OF PAYMENT**

Change this Paragraph to read as follows:

The Contractor and the Owner shall be subject to the remedies as prescribed in Section 31-5-25 of the Mississippi Code 1972, Annotated.

9.8 **SUBSTANTIAL COMPLETION**

9.8.1 Add the following sentence to the end this Subparagraph to read as follows:

Commissioning requirements must be complete except for thermographs of electrical systems, trend log monitoring, seasonal testing, near-warranty end activities and verification of training sessions.

9.8.3 Change the first Sentence of this Subparagraph to read as follows;

Upon receipt of the list, the Architect, assisted by the COR and the DPC/CO, will make an inspection to determine whether the Work or designated portion thereof is substantially complete.

Change the last Sentence of this Subparagraph to read as follows;

In such case, the Contractor shall then submit a request for another inspection by the Architect, assisted by the COR and the DPC/CO, to determine Substantial Completion.

9.8.4 Change the first line this Subparagraph to read as follows:

When the Work or designated portion thereof is substantially complete and affirmed by the Owner, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate and forward through the COR to the DPC/CO for execution thereof.

9.9 **PARTIAL OCCUPANCY OR USE**

9.9.1 Delete first sentence of this Subparagraph

Change third sentence of this Subparagraph to read as follows:

When the Contractor considers a portion substantially complete, the Contractor, Architect and the COR shall jointly prepare a list to the DPC/CO for agreement/non-agreement. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Contractor and the DPC/CO.

9.10 **FINAL COMPLETION AND FINAL PAYMENT**

9.10.1 Change this Subparagraph to read as follows:

When, in the opinion of the Contractor, the Work is ready for final inspection and acceptance by the Owner, the Contractor shall make such notice to the Architect in writing and copy the COR and DPC/CO.

1. *Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance by the Owner, the Architect along with the COR and the DPPC/CO will promptly inspect the Work. The Architect will compile a list of deficiencies. If, in the Architect, COR and DPC/CO's judgment, the Work is not ready for inspection, the inspection will cease and another inspection will be scheduled.*

2. *Once the Architect along with the COR has made inspection and all deficiencies listed by the Architect have been corrected and the Architect along with the COR determines the Work is ready for final inspection, the Architect along with the COR will call for final inspection of the Project with the DPC/CO for the purpose of determining whether the Work is acceptable the Contract Documents.*

3. *The final inspection shall be conducted in the presence of the Owner and a list of defects or discrepancies, if any, will be compiled into a punch list furnished to all parties.*

4. *Once corrections of all punch list items have been confirmed by the Architect and/or COR, the Architect will provide a letter recommending final acceptance of the Work to the Owner.*

9.10.2 Change this Subparagraph to read as follows:

Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the

DPC/CO, through the Architect and COR all documents as called for in the specifications, Section 00 65 00, CONDITIONS OF THE CONTRACT-CLOSE-OUT DOCUMENTS.

9.11 **LIQUIDATED DAMAGES**

9.11.1 Add a new Paragraph as follows:

Time being of the essence and a matter of material consideration thereof, a reasonable estimate in advance is established to cover losses incurred by the Owner if the project is not 100% completed on the date set forth in the Contract Documents. The Contractor and his Surety will be liable for and will pay the Owner the sums stipulated in Paragraph 46 of the Contract Agreement Between the Owner and the Contractor as fixed and agreed as liquidated damages for each calendar day of delay until the work is 100% completed unless circumstances dictate otherwise in the discretion of the Owner.

Article 10
PROTECTION OF PERSONS AND PROPERTY

10.2 **SAFETY OF PERSONS AND PROPERTY**

10.2.5 Change this Subparagraph to read as follows:

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 Clauses 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-Subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible for Clauses 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Paragraph 3.18.

Article 11
INSURANCE AND BONDS

11.1 **CONTRACTOR'S LIABILITY INSURANCE**

11.1.1 Add this sentence to the end of this Subparagraph:

Certificate of insurance acceptable to the Owner shall be submitted to the DPC/CO prior to issuance of the Notice-To-Proceed and thereafter upon renewal or replacement of each required policy of insurance.

11.1.5 Add a new Subparagraph as follows:

The Contractor's limits of liability shall be written for not less than the following:

.1 GENERAL LIABILITY:
Commercial General Liability
(Including XCU if project is over $500,000.00)
General Aggregate ..... $1,000,000.00 Aggregate
Products & Completed Operations ..... $1,000,000.00 Aggregate
Personal & Advertising Injury ..... $ 500,000.00 Per Occurrence
Bodily Injury & Property Damage ..... $1,000,000.00 Per Occurrence

Fire Damage Liability.....$ 50,000.00 Per Occurrence
Medical Expense .....$ 5,000.00 Per Person

.2 OWNERS & CONTRACTORS PROTECTIVE LIABILITY:
Bodily Injury & Property Damage .....$1,000,000.00 Aggregate
Bodily Injury & Property Damage .....$ 500,000.00 Per Occurrence

.3 AUTOMOBILE LIABILITY:
(Owned, Non-owned & Hired Vehicles)
Contractor Insurance Option Number 1:
Bodily Injury & Property Damage .....$ 500,000.00 Per Occurrence
(Combined Single Limit)
Contractor Insurance Option Number 2:
Bodily Injury.....$ 250,000.00 Per Person
Bodily Injury.....$ 500,000.00 Per Accident
Property Damage.....$ 100,000.00 Per Occurrence

.4 EXCESS LIABILITY:
(Umbrella on projects over $500,000)
Bodily Injury & Property Damage .....$ 1,000,000.00 Aggregate
(Combined Single Limit)

.5 WORKERS' COMPENSATION:
(As required by Statute)
EMPLOYERS' LIABILITY:
Accident .....$ 100,000.00 Per Occurrence
Disease .....$ 500,000.00 Policy Limit
Disease .....$ 100,000.00 Per Employee

.6 PROPERTY INSURANCE:
Builder's Risk.....$Equal to Value of Work
or
Installation Floater .....$Equal to Value of Work

***NOTE**: Builder's Risk Insurance will NOT be required when project is demolition ONLY. It will be required for all other projects including paving…*

11.1.6 Add a new Subparagraph as follows:

If the coverages are provided on a claims-made basis, the policy date or retroactive date shall predate the Contract; the termination date, or the policy, or applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment.

11.2 **OWNER'S LIABILITY INSURANCE**

Delete this Paragraph in its entirety and substitute the following:

*The Contractor shall purchase and maintain such insurance as will protect the Owner from his contingent liability to others for damages because of bodily injury, including death, and property damage, which may arise from operations under this Contract and other liability for damages which the Contractor is required to insure under any provision of this Contract. Certificate of this insurance will be filed with the Owner and will be the same limits set forth in 11.1.*5.*

Article 12
UNCOVERING AND CORRECTION OF WORK

12.1.1 Change the first line in this Subparagraph to read as follows:

……contrary to *the Architect, COR and the DPC/CO ……*

12.1.2 Change this Subparagraph to read as follows:

If a portion of the Work has been covered which the Architect, COR and DPC/CO has not specifically requested to observe prior to its being covered, the Architect, COR and DPC/CO may request to see such Work and it shall be uncovered by the Contractor. If such work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's and/or Architects expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense.

12.2 **CORRECTION OF WORK**

12.2.1 **BEFORE OR AFTER SUBSTANTIAL COMPLETION**

Revise the names in this Subparagraph to read as follows:

After Architect, add "COR and DPC and/or CO".

Article 13
MISCELLANEOUS PROVISIONS

13.1 **GOVERNING LAW**

Change this Paragraph to read as follows:

The Contract shall be governed by the laws of the State of Mississippi.

13.3 **RIGHTS AND REMEDIES**

13.3.2 Revise the names in this Subparagraph to read as follows:

"*Architect, COR and DPC and/or CO or Contractor"*

13.4 **TESTS AND INSPECTIONS**

13.4.1 Change the third line of this Subparagraph by adding "*and Commissioning Authority Professional*" after each instance of the word "*Architect*".

13.4.3 Change this Subparagraph by inserting "*and the Commissioning Authority Professional's*" after the word "*Architect*".

13.4.4 Change the last line of this Subparagraph to read as follows:

Documents, be secured by the Contractor and promptly delivered to the Architect or COR for review.

13.4.5 Change this Subparagraph by adding "*and/or the Commissioning Authority Professional*" after each instance of the word "*Architect*".

13.5 **INTEREST**

Delete this Paragraph in its entirety.

13.6 Add this Paragraph title and contents to read as follows:

13.6 **COMMENCEMENT OF STATUTORY LIMITATION PERIOD**

13.6.1 *The Owner and Contractor shall commence all claims and causes of action within the time period specified by applicable state law.*

Article 14
TERMINATION OR SUSPENSION OF THE CONTRACT

Delete this Article in its entirety.

Article 15
CLAIMS AND DISPUTES

Delete this Article in its entirety.

(BLANK)

AFFIDAVIT CERTIFYING PAYMENT TO ALL SUBCONTRACTORS

I acknowledge that, pursuant to Miss. Code Ann. §31-5-25 and H.B. 1562, Laws of 2002, that I am required to submit monthly certification indicating payments to subcontractors on prior payment requests. I, the undersigned Contractor, do hereby certify that I have paid the following amounts to subcontractors for Work which has been performed and incorporated into previous Applications for Payment which were issued, and payment received from the Owner on the project listed below. I understand that this document must be submitted on a monthly basis after the submittal, approval and payment of Application for Payment #1. I understand that the Owner reserves the right to require me, the undersigned, to provide verification of payment and/or additional information.

Section 00 73 03 SUPPLEMENTARY CONDITIONS
Article 9.6 Progress Payments
Article 9.6.8.1
Pursuant to Code §31-5-25 and HB1562, Laws of 2002
. . .Contractors shall submit monthly certification to the project engineer or architect indicating payments to subcontractors on prior payment request. . . .

Project Name and Number: _____

Using Agency: _____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Affidavit Certifying Payment Form

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

Subcontractor: _____Amount: $_____

(Attach additional list of subcontractors and amounts, if necessary)

Contractor Name and Title: _____

Contractor Certificate of Responsibility Number: _____

Contractor Signature: _____Date: _____

STATE OF MISSISSIPPI

COUNTY OF _____

SWORN TO AND SUBSCRIBED BEFORE ME, the undersigned notary public, this the _____ day of _____, 20_____.

_____

NOTARY PUBLIC

My Commission Expires:

_____

BID BOND *(See instructions on reverse)*	DATE BOND EXECUTED *(Must not be later than bid opening date)*	OMB NO.:9000-0045

Public reporting burden for this collection of information is estimated to average 25 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the FAR Secretariat (MVR), Federal Acquisition Policy Division, GSA, Washington, DC 20405.

PRINCIPAL *(Legal name and business address)*	TYPE OF ORGANIZATION *("X" one)* ☐ INDIVIDUAL ☐ PARTNERSHIP ☐ JOINT VENTURE ☐ CORPORATION STATE OF INCORPORATION

SURETY(IES) *(Name and business address)*

PENAL SUM OF BOND					BID IDENTIFICATION	
PERCENT OF BID PRICE	AMOUNT NOT TO EXCEED				BID DATE	INVITATION NO.
	MILLION(S)	THOUSAND(S)	HUNDRED(S)	CENTS	FOR *(Construction, Supplies, or Services)*	

OBLIGATION:

We, the Principal and Surety(ies) are firmly bound to the United States of America (hereinafter called the Government) in the above penal sum. For payment of the penal sum, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally. However, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us. For all other purposes, each Surety binds itself, jointly and severally with the Principal, for the payment of the sum shown opposite the name of the Surety. If no limit of liability is indicated, the limit of liability is the full amount of the penal sum.

CONDITIONS:

The Principal has submitted the bid identified above.

THEREFORE:

The above obligation is void if the Principal - (a) upon acceptance by the Government of the bid identified above, within the period specified therein for acceptance (sixty (60) days if no period is specified), executes the further contractual documents and gives the bond(s) required by the terms of the bid as accepted within the time specified (ten (1 0) days if no period is specified) after receipt of the forms by the principal; or (b) in the event of failure to execute such further contractual documents and give such bonds, pays the Government for any cost of procuring the work which exceeds the amount of the bid.

Each Surety executing this instrument agrees that its obligation is not impaired by any extension(s) of the time for acceptance of the bid that the Principal may grant to the Government. Notice to the surety(ies) of extension(s) are waived. However, waiver of the notice applies only to extensions aggregating not more than sixty (60) calendar days in addition to the period originally allowed for acceptance of the bid.

WITNESS:

The Principal and Surety(ies) executed this bond and affixed their seals on the above date.

PRINCIPAL

SIGNATURE(S)	1. (Seal	2. (Seal	3. (Seal	Corporate Seal
NAME(S) & TITLE(S) (Typed)	1.	2.	3.	

INDIVIDUAL SURETY(IES)

SIGNATURE(S)	1. (Seal	2. (Seal
NAME(S) (Typed)	1.	2.

CORPORATE SURETY (IES)

SURETY A	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE	1.	2.		
	NAME(S) & TITLE(S) (Typed)	1.	2.		

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STANDARD FORM 24 (REV. 10-98)
Prescribed by GSA - FAR (48 CFR) 53.228(a)

SURETY B	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATUR	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY C	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT M	Corporate Seal
	SIGNATURE	1.	2.		
	NAME(S) & TITLE(S) *(Typ9d)*	1.	2.		
SURETY D	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATUR	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY E	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY F	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATUR	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY G	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		

INSTRUCTIONS

1. This form is authorized for use when a bid guaranty is required. Any deviation from this form will require the written approval of the Administrator of General Services.

2. Insert the full legal name and business address of the Principal in the space designated "Principal" on the face of the form. An authorized person shall sign the bond. Any person signing in a representative capacity (e.g., an attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.

3. The bond may express penal sum as a percentage of the bid price. In these cases, the bond may state a maximum dollar limitation (e.g., 20% of the bid price but the amount not to exceed _____ dollars).

4. (a) Corporations executing the bond as sureties must appear on the Department of the Treasury's list of approved sureties and must act within the limitation listed therein. Where more than one corporate surety is involved, their names and addresses shall appear in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)." In the space designed "SURETY(IES)" on the face of the form, insert only the letter identification of the sureties.

(b) Where individual sureties are involved, a completed Affidavit of Individual surety (Standard Form 28), for each individual surety, shall accompany the bond. The Government may require the surety to furnish additional substantiating information concerning its financial capability.

5. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Corporate Seal"; and shall affix an adhesive seal if executed in Maine, New Hampshire, or any other jurisdiction requiring adhesive seals.

6. Type the name and title of each person signing this bond in the space provided.

7. In its application to negotiated contracts, the terms "bid" and "bidder" shall include "proposal". and " offeror."

PERFORMANCE BOND (See instructions on reverse)	DATE BOND EXECUTED *(Must be same or later than date of contract)*	OMB No.: 9000-0045

Public reporting burden for this collection of information is estimated to average 25 minutes per response, including the time for reviewing nstructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimateor any other aspect of this collection of information, including suggestions for reducing this burden, to the FAR Secretariat (MVR), Federal Acquisition Policy Division, GSA, Washington, DC 20405

PRINCIPAL *(Legal name and business address)*	TYPE OF ORGANIZATION *("X" one)* ☐ INDIVIDUAL ☐ PARTNERSHIP ☐ JOINT VENTURE ☐ CORPORATION STATE OF INCORPORATION
SURETY(IES) *(Name(s) and business address(es)*	PENAL SUM OF BOND MILLION(S) | THOUSAND(S) | HUNDRED(S) | CENTS CONTRACT DATE | CONTRACT NO.

OBLIGATION:

We, the Principal and Surety(ies), are firmly bound to the United States of America (hereinafter called the Government) in the above penal sum. For payment of the penal sum, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally. However, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us. For all other purposes, each Surety binds itself, jointly and severally with the Principal, for the payment of the sum shown opposite the name of the Surety. If no limit of liability is indicated, the limit of liability is the full amount of the penal sum.

CONDITIONS:

The Principal has entered into the contract identified above.

THEREFORE:

The above obligation is void if the Principal -

(a)(1) Performs and fulfills all the undertakings, covenants, terms, conditions, and agreements of the contract during the original term of the contract and any extensions thereof that are granted by the Government, with or without notice to the Surety(ies), and during the life of any guaranty required under the contract, and (2) performs and fulfills all the undertakings, covenants, terms conditions, and agreements of any and all duly authorized modifications of the contract that hereafter are made. Notice of those modifications to the Suretyfles) are waived.

(b) Pays to the Government the full amount of the taxes imposed by the Government, if the said contract is subject to the Miller Act, (40 U.S.C. 270a-270e), which are collected, deducted, or withheld from wages paid by the Principal in carrying out the construction contract with respect to which bond is furnished.

WITNESS:

The Principal and Surety(ies) executed this performance bond and affixed their seals on the above date.

PRINCIPAL

SIGNATURE(S)	1 (Seal)	2. (Seal)	3. (Seal)	Corporate Seal
NAME(S) & TITLE(S) *(Typed)*	1.	2.	3.	

INDIVIDUAL SURETY(IES)

SIGNATURE(S)	1. (Seal)	2. (Seal)
NAME(S) *(Typed)*	1.	2.

CORPORATE SURETY(IES)

SURETY A	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
	SIGNATURE	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		

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STANDARD FORM 25 (REV. 5-96)
Presribed by GSA - FAR (48 CFR) 53.228(b)
USAPA V1.00

CORPORATE SURETY(IES) *(Continued)*

NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	*Corporate Seal*
SIGNATURE	*1.*	2.		
NAME(S) & TITLE(S) *fTyped)*	1.	2.		
NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	*Corporate Seal*
SIGNATURE	*1.*	2.		
NAME(S) & TITLE(S) *(Typed)*	1.	2.		
NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	*Corporate Seal*
SIGNATURE	*1.*	2.		
NAME(S) & TITLE(S) *(Typed)*	1.	2.		
NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
SIGNATURE	*1.*	2.		
NAME(S) & TITLEiS) *(Typed)*	1.	2.		
NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
SIGNATURE	1.	2.		
NAME(S) & TITLE(S) *(Typed)*	1.	2.		
NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
SIGNATURE	1.	2.		
NAME(S) & TITLE(S) *(Typed)*	1.	2.		

BOND PREMIUM ▶	RATE PER THOUSAND ($)	TOTAL ($)

INSTRUCTIONS

1. This form is authorized for use in connection with Government contracts. Any deviation from this form will require the written approval of the Administrator of General Services.

2. Insert the full legal name and business address of the Principal in the space designated "Principal" on the face of the form. An authorized person shall sign the bond. Any person signing in a representative capacity (e.g., an attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.

3. (a) Corporations executing the bond as sureties must appear on the Department of the Treasury's list of approved sureties and must act within the limitation listed therein. Where more than one corporate surety is involved, their names and addresses shall appear in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)." In the space designated "SURETY(IES)" on the face of the form, insert only the letter identification of the sureties.

(b) Where individual sureties are involved, a completed Affidavit of Individual Surety (Standard Form 28) for each individual surety, shall accompany the bond. The Government may require the surety to furnish additional substantiating information concerning their financial capability.

4. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Corporate Seal", and shall affix an adhesive seal if executed in Maine, New Hampshire, or any other jurisdiction requiring adhesive seals.

5. Type the name and title of each person signing this bond in the space provided.

STANDARD FORM 25 (REV. 5-96) **BACK**
USAPA V1.00

PAYMENT BOND *(See* **instructions on** *reverse)*	Date Bond Executed *(Must be same or later than date of contract)*	**OMB NO.:9000-0045**

PRINCIPAL *(Legal name and business address)*	TYPE OF ORGANIZATION ("X" *one)* ☐ INDIVIDUAL ☐ PARTNERSHIP ☐ JOINT VENTURE ☐ CORPORATION STATE OF INCORPORATION			
SURETY(IES) *(Name(s) and business address(es)*	PENAL SUM OF BOND			
	MILLION(S)	THOUSAND(S)	HUNDRED(S)	CENTS
	CONTRACT DATE	CONTRACT NO.		

OBLIGATION:

We, the Principal and Surety(ies), are firmly bound to the United States of America (hereinafter called the Government) in the above penal sum. For payment of the penal sum, we bind ourselves, our heirs, executors, administrators, and successors, jointly severally. However, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us. For all other purposes, each Surety binds itself, jointly and severally with the Principal, for the payment of the sum shown opposite the name of the Surety. If no limit of liability is indicated, the limit of liability is the full amount of the penal sum.

CONDITIONS:

The above obligation is void if the Principal promptly makes payment to all persons having a direct relationship with the Principal or a subcontractor of the Principal for furnishing labor, material or both in the prosecution of the work provided for in the contract identified above, and any authorized modifications of the contract that subsequently are made. Notice of those modifications to the Surety(ies) are waived.

WITNESS:

The Principal and Surety(ies) executed this payment bond and affixed their seals on the above date.

PRINCIPAL

SIGNATURE(S)	1 (Seal)	2. (Seal	3. (Seal	Corporate Seal
NAME(S) & TITLE(S) *(Typed)*	1 .	2.	3.	

INDIVIDUAL SURETY(IES)

SIGNATURE(S)	1 . (Seal	2. (Seal)
NAME(S) *(Typed)*	1 .	2.

CORPORATE SURETY(IES)

SURETY A	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
	SIGNATURE	1 .	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		

Corporate Surety(IES) *(Continued)*					
SURETY B	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
	SIGNATURE	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY C	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
	SIGNATUR	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY D	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
	SIGNATUR	1.	2.		
	NAME(S) & TITLE(S) *fTyped)*	1.	2.		
SURETY E	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
	SIGNATURE	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY IF	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
	SIGNATURE	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY G	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
	SIGNATURE	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		

INSTRUCTIONS

1. This form, for the protection of persons supplying labor and material, is used when a payment bond is required under the Act of August 24, 1935, 49 Stat. 793 (40 U.S.C. 270a-270e). Any deviation from this form will require the written approval of the Administrator of General Services.

2. Insert the full legal name and business address of the Principal in the space designated "Principal" on the face of the form. An authorized person shall sign the bond. Any person signing in a representative capacity (e.g., an attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.

3. (a) Corporations executing the bond as sureties must appear on the Department of the Treasury's list of approved sureties and must act within the limitation listed therein. Where more than one corporate surety is involved, their names and addresses shall appear in the spaces (Surety A, Surety B, etc.) headed **"CORPORATE SURETY(IES)."** In the space designated "SURETWES)" on the face of the form, insert only the letter identification of the sureties.

(b) Where individual sureties are involved, a completed Affidavit of Individual Surety (Standard Form 28) for each individual surety, shall accompany the bond. The Government may require the surety to furnish additional substantiating information concerning their financial capability.

4. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Corporate Seal", and shall affix an adhesive seal if executed in Maine, New Hampshire, or any other jurisdiction requiring adhesive seals.

5. Type the name and title of each person signing this bond in the space provided.

DIVISON 01
PROCUREMENT, CONTRACTING AND GENERAL REQUIREMENTS

Any modifications other than minor, shall be subject to approval by the Director, State Purchasing and Contracting and/or the Contracting Officer, and be included by addendum only. The technical specification shall be written so as not to exclude comparable equipment of domestic manufacture. Products shall generally be specified in one of five (5) methods.

1. Specification by reference standards or technical performance requirements only. Contractor shall have the option to select any product meeting product standards by any Manufacture. The Owner along with the Project Manager and A&E shall identify critical performance and/or technical details necessary to meet project requirements, but shall not do so in a hyper-technical manner so as to place unnecessary or inconsequential restrictions on providers of otherwise comparable equipment, Further, when utilizing specifications of this nature, The Owner along with the Project Manager and A&E are expected to be certain that such specifications can reasonably be met by more than one product.

2. Specifications by naming a minimum of two (2) or three (3) products or manufactures or equal to. Contractor shall have the option to select any product and Manufacture named. Additionally, Contractor may always submit any product and Manufacturer meeting all product standards as an equal.

3. Specifications by "basis of design". Contractor may select any equivalent product meeting specified reference standards or technical performance requirements as represented by the named products and/or manufactures. The Owner along with the Project Manager and A&E shall identify critical performance and/or technical details necessary to meet project requirements, but shall not do so in a hyper-technical manner so as to place unnecessary to inconsequential restrictions on providers of otherwise comparable equipment, Further, when utilizing specifications of this nature, The Owner along with the Project Manager and A&E are expected to be certain that such specifications can reasonably be met by more than one product.

4. Specification as "brand specific**". Must be approved prior to bidding project by the Director, State Purchasing and Contracting Division**. Project Manager along with A&E will furnish justification to the Director, State Purchasing and Contracting and/or the Contracting Officer, including the following:

a. Description of the product for which approval is being sought
b. Explanation of why the product is the only one that can meet project requirements
c. Estimate of cost for such product
d. Estimate of cost for overall procurement
e. Availability of the product to bidders and/or subcontractors

5. Specification as "sole source". **Must be approved prior to bidding project by the Director, State Purchasing and Contracting Division**. The Project Manager along with the A&E shall furnish written justification for review and approval from the Director, State Purchasing and Contracting and/or the Contract Officer, including the following:

a. Description of the product for which approval is being sought
b. Explanation of why the product is the only one that can meet project requirements
c. Explanation of why the source is the only person or entity that can provide the required product
d. Explanation of why the amount to be expended for the product is reasonable
e. The efforts expended to obtain the best possible price for the product

6. Products proposed to be procured via sole source shall be advertised in the same manner provided in Section 31-7-13(c), Mississippi Code, Annotated. Such advertisement shall be directed to the Director, State Purchasing and Contracting and/or Contracting Officer who shall publish for a minimum of fourteen (14) days the terms of the proposed sole source procurement including the above items as well as procedures for any person or entity that objects and proposes that the product published is not sole

source and can be provided by another person or entity. If no objection is received, the Owner will obtain approval from the Department of Finance and Administration, Office of Purchasing and Travel, Bureau of Buildings (DFA/OPT/BOB).

7. Where sole source procurement is objected to, the DFA/OPT/BOB will follow the following steps:

a. If DFA/OPT/BOB determines after review that the product in the proposed sole source request can be provided by another person or entity, the sole source request will be terminated, and such product be procured in a competitive procurement process.

b. If DFA/OPT/BOB determines after review that there is only one (1) source for the required product, then the Owner may appeal to the DFA/OPT/BOB. The Owner shall have the burden of proving that the product is only provided by one (1) source. If appeal is successful, the Owner will proceed with procurement and document compliance.

c. If DFA/OPT/BOB has any reasonable doubt as to whether the product can only be provided by one (1) source, the Owner will procure the product in a competitive procurement process.

SUBSTITUTIONS AND PRODUCT OPTIONS
SECTION 01630

1.01 **DESCRIPTION**

A. Scope: To set forth the procedure and conditions for substitutions and to give the product options available to the Contractor.

1.02 **PRODUCTS LIST**

A. Within thirty (30) days after the Contract has been signed, the Contractor will submit to the Professional two (2) copies of a complete list of all product proposed for installation.

B. Tabulate the list by Specification sections.

C. For products specified under reference standards, include with listing of each product:

1. Name and address of Manufacturer
2. Trade name
3. Model or catalog designation
4. Manufacturer's data
5. Performance and test data
6. Reference standards

1.03 **CONTRACTOR'S OPTIONS**

A. For products specified by reference standards, technical performance requirements and named consequential respects:

1. Contractor shall select any product that meets all the specified reference standards, technical performance requirements and named consequential respects by any manufacture.

B. For products specified by naming only one (1) product and/or Manufacturer as a "basis of design", an equivalent product will always be accepted if it is equal in all consequential respects.

C. For products specified by naming only one (1) product and Manufacturer and stating no substitution will be accepted:

1. There is no option and no substitutions will be allowed.

2. This option for substitution must have written approval by the Owner **before bidding** to be considered.

1.04 **SUBSTITUTIONS**

A. A product or construction method that varies from a product or construction method specified in one or more consequential characteristics, reference standards, or technical performance requirements shall be considered a substitution.

B. Owner will not consider request for substitutions during bidding.

C. Within thirty (30) days after the contract has been signed, the Owner will consider formal request from the Contractor thru the professional and/or project manager for substitution of products or construction methods in place of those specified. Contractor will submit two (2) copies of the request for the substitutions to the professional and/or project manager and owner for review. Contractor will include in the request:

1. Narrative summarizing characteristics, reference standards or technical performance requirements that product varies from how the proposed product or construction method will meet or exceed project requirements.

2. Substitution Product Information:

a. Product identification including manufacturer's name and address

b. Manufacturer's literature, product description, performance and test data and reference standards.

c. Samples

d. Name and address of similar projects on which products was used and date of installation.

3. For construction methods:

a. Detailed description of proposed method.

b. Drawings illustrating methods.

4. Data relating to any delays to the construction schedule if any will result from proposed substitution.

5. Accurate cost data on proposed substitution if any project cost increases are anticipated or any cost savings are being offered for proposed substitution.

D. In making a request for substitution, the contractor represents:

1. Proposed product or method, has been investigated and determined that it is equal or superior in all respects to that specified.

2. The same or better guarantee and/or warranty will be provided for substitutions product or method specified.

3. Installation of accepted substitutions will be coordinated into the work, making such changes required of work to be complete in all respects at no additional cost to the Owner.

4. All claims for additional cost related to substitution, including any delays to the construction schedule, which consequently become apparent will be waived.

5. Unless specifically identified on substitution submittal and such delay is specifically agreed to by Change Order to the Contact, substitution will not cause any delay to the construction schedule.

E. Substitutions will not be considered if:

1. Indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with this section.

2. Acceptance will require substantial revision of contract documents unless compensation for such additional professional cost are paid by Contractor at no additional cost to the Owner.

3. In the Owner's opinion, the product or material is not equal.

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 Scope of Work

A. Lump Sum Contract Basis: Payment of the lump sum established in the Bidding and Contract Documents for the Water Well Filtration System, shall be full compensation for furnishing and/or installing all labor, materials, equipment and incidentals required to complete the construction of the facilities and supporting systems, complete as specified and indicated on the drawings.

B. Schedule of Values: The schedule of unit prices submitted in accordance with Section 01026 are subject to approval and acceptance by the OWNER. If acceptable, the unit prices will be used as the basis for adjustment of the contract price in the event that the Scope of Work is expanded or reduced.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

**** END OF SECTION ****

SECTION 01026

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 Requirements Included

A. Submit to the ENGINEER a Preliminary Schedule of Values.

B. Upon request of the ENGINEER, support the values with data which will substantiate their correctness.

C. The final Schedule of Values shall be used as the basis for the CONTRACTOR'S Applications for Payment as well as to make unit cost adjustments to items of work which vary significantly (more than a 10% increase or decrease in quantity of work) from what is depicted on the plans.

1.02 Organizational Form and Content of Schedule of Values

A. The schedule of component parts and work items shall be grouped by Specification Sections, as applicable, as outlined in the Table of Contents.

B. Type schedule on 8-1/2 inch x 11 inch or 8-1/2 inch x 14 inch white paper. CONTRACTOR'S standard forms and automated printout will be considered for approval by the ENGINEER upon CONTRACTOR'S request. Identify schedule with:
   1. Title of Contract and location.
   2. ENGINEER and Contract numbers.
   3. Name and Address of CONTRACTOR.
   4. Contract designation.
   5. Date of submission.

C. Schedule shall list the installed value of the component parts of the Work in sufficient detail (labor, materials, equipment and other costs) to serve as a basis for computing values for progress payments during construction.

D. Identify each line item with the number and title of the respective major section of the specifications.

E. For each major line item list sub-values of major products or operations under the item.

F. For the various portions of the Work:
   1. Each item shall include a directly proportional amount of the CONTRACTOR'S overhead and profit.
   2. For items on which progress payments will be requested for stored materials, break down the value into the cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials upon request by the ENGINEER.

G. The sum of all component parts and work items listed in the Schedule of Values shall equal the total contract sum.

H. CONTRACTOR may include items for bond, insurance, temporary facilities and job mobilization. Bonds and insurance may be claimed on the first application for payment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

**** END OF SECTION ****

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.01 Requirements Included

A. CONTRACTOR shall comply with the General Conditions.

B. Submit revised progress schedules monthly.

C. Schedules shall be coordinated with ENGINEER'S Construction Sequencing Report and any variances shall be reported.

1.02 Form of Schedules

A. Prepare schedules in the form of a horizontal bar chart.
   1. Provide separate horizontal bar for each trade or operation.
   2. Horizontal time scale: Identify the first work day of each week.
   3. Scale and spacing: To allow for notations and future revisions.
   4. Minimum sheet size: 8½ inches by 11 inches.

B. Format of listings: The table of contents of this Contract Document.

C. Identification of listings: By component parts and work items listed in the Schedule of Values required under Section 01026.

1.03 Content of Schedules

A. Construction Progress Schedule:
   1. Show the complete sequence of construction by activity.
   2. Show the dates for the beginning, and completion of, each major element of construction.
   3. Show projected percentage of completion for each item, as of the first day of each month.

B. Submittals Schedule for Shop Drawings, Product Data and Samples. Show:
   1. The dates for CONTRACTOR'S submittals.
   2. The dates approved submittals will be required from the ENGINEER.

1.04 Progress Revisions

A. Indicate progress of each activity to date of submission.

B. Show changes occurring since previous submission of schedule:
   1. Major changes in scope.
   2. Activities modified since previous submission.

3. Revised projections of progress and completion.
4. Other identifiable changes.

C. Provide a narrative report as needed to define:
1. Problem areas, anticipated delays, and the impact on the schedule.
2. Corrective action recommended, and its effect.

1.05 Submissions

A. Submit initial schedules in accordance with the General Conditions.
1. ENGINEER will review schedules and return review copy within 10 days after receipt.
2. If required, CONTRACTOR shall resubmit within 7 days after return of review copy.

B. Submit revised progress schedules with each application for payment.

C. Submit the number of opaque reproductions which the CONTRACTOR requires, plus five copies which will be retained by the ENGINEER.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

**** END OF SECTION ****

SECTION 01340

SHOP DRAWINGS, PROJECT DATA, AND SAMPLES

PART 1 - GENERAL

1.01 Requirements Included

A. The CONTRACTOR shall submit to the ENGINEER for review and exception, if any, such working drawings, shop drawings, test reports and data on materials and equipment (hereinafter in this article called data), and material samples (hereinafter in this article called samples) as are required for the proper control of work, including but not limited to those working drawings, shop drawings, data and samples for materials and equipment specified elsewhere in the Specifications and in the Contract Drawings.

B. Within thirty (30) calendar days after the Effective Date of the Agreement, the CONTRACTOR shall submit to the ENGINEER a complete list of preliminary data on items for which Shop Drawings are to be submitted. Included in this list shall be the names of all proposed manufacturers furnishing specified items. Review of this list by the ENGINEER shall in no way relieve the CONTRACTOR from submitting complete shop drawings, data, and samples in accordance with the Specifications. This procedure is required in order to expedite final review of Shop Drawings.

C. The CONTRACTOR is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting. This log should include the following items:
1. Submittal Description and Number assigned.
2. Date to ENGINEER.
3. Date returned to CONTRACTOR (from ENGINEER).
4. Status of Submittal (No exceptions taken, returned for confirmation or resubmittal, rejected).
5. Date of Resubmittal and Return (as applicable).
6. Date material released (for fabrication).
7. Projected date of fabrication.
8. Projected date of delivery to site.
9. Status of O&M manuals submittal.

1.02 Contractor's Responsibility

A. It is the duty of the CONTRACTOR to check all drawings, data and samples prepared by or for him before submitting them to the ENGINEER for review. Each and every copy of the Drawings and data shall bear CONTRACTOR'S stamp showing that they have been so checked. Shop drawings submitted to the ENGINEER without the CONTRACTOR'S stamp or evidence that the CONTRACTOR has not performed the required review will be returned to the CONTRACTOR for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the Contract Documents.

B. Determine and verify:
   1. Field measurements.
   2. Field construction criteria.
   3. Catalog numbers and similar data.
   4. Conformance with Specifications and indicate all variances from the Specifications.

C. The CONTRACTOR shall furnish the ENGINEER a schedule of Shop Drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment. This schedule shall indicate those that are critical to the progress schedule.

D. The CONTRACTOR shall not begin any of the work covered by a drawing, data, or a sample returned for correction until a revision or correction thereof has been reviewed and returned to him by the ENGINEER with no exceptions taken.

E. The CONTRACTOR shall submit to the ENGINEER all drawings and schedules sufficiently in advance of construction requirements to provide no less than twenty-one (21) calendar days for checking and appropriate action from the time the ENGINEER receives them.

F. The CONTRACTOR shall submit seven (7) copies of shop drawings and descriptive or product data submittals to the ENGINEER for his use. The CONTRACTOR shall submit extra sets as required for his subcontractors, his suppliers, and his own use. The ENGINEER will review the blueprints and return 3 copies of the marked-up submittal with appropriate review comments.

G. The CONTRACTOR shall be responsible for and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of work prior to the completion of the review by ENGINEER of the necessary Shop Drawings.

1.03 Engineer's Review of Shop Drawings

A. The ENGINEER'S review of drawings, data and samples submitted by the CONTRACTOR will cover only general conformity to the Specifications, external connections, and dimensions which affect the installation.

B. The review of drawings and schedules will be general, and shall not be construed:
   1. as permitting any departure from the Contract requirements;
   2. as relieving the CONTRACTOR of responsibility for any errors, including details, dimensions, omissions and materials;
   3. as approving departures from details furnished by the ENGINEER, except as otherwise provided herein.

C. Resubmittals will be handled in the same manner as first submittals. The CONTRACTOR shall direct specific attention to revisions other than the corrections requested by the ENGINEER on previous submissions by written details or markings on the resubmitted Shop Drawings. The CONTRACTOR shall make any corrections required by the ENGINEER.

D. The ENGINEER will review a submittal/resubmittal a maximum of three (3) times after which cost of review will be borne by the CONTRACTOR. The cost of engineering shall be equal to the ENGINEER'S charges to the OWNER under the terms of the ENGINEER'S agreement with the OWNER.

E. When the Shop Drawings have been completed to the satisfaction of the ENGINEER, the CONTRACTOR shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions or approval from the ENGINEER.

F. No partial submittals will be reviewed. Submittals not complete will be returned to the CONTRACTOR, and will be considered "NOT APPROVED" until resubmitted.

1.04 Procedure

A. Submittal of Shop Drawings shall be made to the ENGINEER'S office in a sealed envelope, addressed with sufficient postage for sending by first class priority mail to: Neel-Schaffer, Inc., P. O. Box 22625, Jackson, MS 39225-2625.

B. A "Contractor's Transmittal" form shall accompany each submission. If data for more than one Section of the Specifications is submitted, a separate transmittal form shall accompany the data submitted for each Section.

C. All transmittal forms shall be sent to Neel-Schaffer, Inc. in triplicate.

D. At the beginning of each letter of transmittal and each letter of inquiry, provide a reference heading indicating the following:

1. City's Name _____
2. Project Name _____
3. Contract No. _____
4. Transmittal No. _____
5. Section No. _____

E. If Shop Drawing submittals show variation from the requirements of the Contract Documents, the CONTRACTOR shall make specific mention of such variation in his letter of transmittal.

F. All shop Drawings submitted for approval shall have a title block with complete identifying information satisfactory to ENGINEER.

G. All Shop Drawings submitted shall bear the stamp of approval and signature of the CONTRACTOR as evidence that they have been reviewed by the CONTRACTOR. Submittals without this stamp of approval will not be reviewed by the ENGINEER and will be returned to the CONTRACTOR. The stamp shall contain the following minimum information:

Project Name: _____

CONTRACTOR'S NAME: _____

Date: _____

----------Reference----------

Item: _____

Specifications: _____

Section: _____

Page No.: _____

Para. No.: _____

Drawing No.: _____ of _____

Location: _____

Submittal No.: _____

Approved by: _____

H. A submittal number shall be assigned to each submittal by the CONTRACTOR as follows:

$$\frac{93 - 2}{\textit{Contract No.}} - \frac{XXX}{\textit{Consecutive Ref. No.}} - \frac{XX}{\textit{Review No.}}$$

Consecutive Reference No. — shall be a consecutive number of the submittals by the CONTRACTOR. For example, the first submittal shall be 001 and the one hundred and tenth shall be 110.

Review No. — is the number of times the submittal has been submitted for review, i.e., the first time is -01.

Example: The first submittal from the CONTRACTOR shall be 93-2-001-01.

I. The CONTRACTOR shall initially submit to the ENGINEER a minimum of seven copies of all submittals. CONTRACTOR shall restrict his submittals to the following sizes only:

1. 8-1/2-inch by 11-inch.
2. 8-1/2-inch by 14-inch.
3. 24-inch by 36-inch.

J. After the ENGINEER completes his review, the Shop Drawings will be marked with one of the following notations:

1. No Exceptions Taken.
2. Make Corrections Noted.
3. Make Corrections Noted-Resubmit.
4. Revise and Resubmit.

5. Rejected.
6. Submit Specified Item.

K. If a submittal is acceptable, it will be marked "No Exception Taken" or "Make Corrections Noted". Three copies of the submittal will be returned to the CONTRACTOR.

L. Upon return of a submittal marked "No Exception Taken" or "Make Corrections Noted", the CONTRACTOR may order, ship or fabricate the materials included on the submittal, provided it is in accordance with the corrections indicated.

M. If a Shop Drawing action is "Make Corrections Noted" but has extensive corrections or corrections affecting other drawings or Work, the ENGINEER may require that the CONTRACTOR make the corrections indicated thereon and resubmit the Shop Drawings for record purposes. In this case, the submittal will be marked "Make Corrections Noted-Resubmit".

N. If a submittal is unacceptable, two copies will be returned to the CONTRACTOR with one of the following notations:
1. "Revise and Resubmit"
2. "Rejected"

O. Upon return of a submittal marked "Revise and Resubmit", the CONTRACTOR shall make the corrections indicated and repeat the initial approval procedure. The "Rejected" notation is used to indicate material or equipment that is not acceptable. Upon return of a submittal so marked, the CONTRACTOR shall repeat the initial approval procedure utilizing acceptable material or equipment.

P. Submittals lacking adequate details or information to allow the ENGINEER to determine whether or not the submittal meets the intent of the Contract specifications shall be marked "Submit Specified Item" and returned without further comment.

Q. Shop Drawings or other submittals not bearing the ENGINEER'S "No Exception Taken", "Make Corrections Noted" or "Make Corrections Noted-Resubmit" notations shall not be issued to Subcontractors nor utilized for construction purposes. No Work shall be performed or equipment installed without a drawing or submittal bearing one of these notations.

R. In the event the CONTRACTOR obtains the ENGINEER'S approval for the use of equipment other than that which is shown or specified, the CONTRACTOR shall, at his own expense and using methods approved by the ENGINEER, make all changes to the Work, including structures, piping, electrical, equipment and controls, that may be necessary to accommodate this equipment.

1.05 Shop Drawings

A. Shop Drawings shall be submitted well in advance of the need for the material or equipment for construction and with ample allowance for time required to make delivery

of material or equipment after data covering such is approved. The CONTRACTOR shall assume the risk for all materials or equipment which are fabricated or delivered

prior to the approval of Shop Drawings. No materials or equipment shall be incorporated into the Work nor will such be included in periodic progress payments until approval thereof has been obtained in the specified manner.

B. The ENGINEER will review and process all submittals promptly, but a reasonable time should be allowed for this, for the Shop Drawings being revised and resubmitted, and for time required to return the approved Shop Drawings to the CONTRACTOR. The CONTRACTOR should allow a minimum of 45 days for each submittal review and/or response in preparation of his construction schedules. A minimum of two submittals should be anticipated for major products and equipment items.

C. It is the CONTRACTOR'S responsibility to review submittals made by his suppliers and subcontractors before transmitting them to the ENGINEER to assure proper coordination of the Work and to determine that each submittal is in accordance with his desires and that there is sufficient information about materials and equipment for the ENGINEER to determine compliance with the Drawings and Specifications. Incomplete or inadequate submittals will be returned for revision without review.

D. Approval of Shop Drawings shall not relieve the CONTRACTOR from the responsibility of furnishing materials and equipment of proper dimension, size, quality, quantity, and all performance characteristics to efficiently perform the requirements and intent of the Contract Documents. The CONTRACTOR is responsible for dimensions which shall be confirmed and correlated at the job site. The CONTRACTOR is also responsible for information that pertains solely to the fabrication process or to the technique of construction and for the coordination of the Work of all trades.

E. Data on materials and equipment include, without limitation, materials and equipment lists, catalog data sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material as required. Materials and equipment lists shall give for each item thereon the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish and all other pertinent data.

F. The CONTRACTOR shall provide a list including the equipment name, address and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained for all mechanical and electrical equipment furnished.

G. All manufacturers or equipment suppliers who proposed to furnish equipment or products shall submit an installation list to the ENGINEER along with the required shop drawings. The installation list shall include at least five installations where identical equipment has been installed and has been in operation for a period of at least one (1) year.

H. Only the ENGINEER will utilize the color "red" in marking Shop Drawing submittals.

I. Before final payment is made, the CONTRACTOR shall furnish to ENGINEER five (5) sets of record shop drawings all clearly revised, complete and up to date showing the

permanent construction as actually made for all reinforcing and structural steel, miscellaneous metals, process and mechanical equipment, yard piping, electrical system and instrumentation system. The CONTRACTOR shall submit one set of three (3) mil thick polyester film reproducibles for blueprinting purposes for all submittal data or drawings on sheets larger than 11-inches by 17-inches.

1.06 Working Drawings

A. Working drawings shall be considered to mean the CONTRACTOR'S plans for temporary structures.

B. Copies of working drawings as noted in subparagraph 1.02, shall be submitted to the ENGINEER where required by the Contract Documents or requested by the ENGINEER, and shall be submitted at least thirty (30) calendar days (unless otherwise specified by the ENGINEER) in advance of their being required for work.

C. Working drawings shall be signed by a registered Professional Engineer, currently licensed to practice in the State of Mississippi. The ENGINEER will not review working drawings but shall use them as information to monitor the work performed by the CONTRACTOR.

1.07 Samples

A. The CONTRACTOR shall furnish for the review of the ENGINEER samples required by the Contract Documents or requested by the ENGINEER. Samples shall be delivered to the ENGINEER as specified or directed and the CONTRACTOR shall prepay all shipping charges. Materials or equipment for which samples are required shall not be used in work until reviewed by the ENGINEER.

B. Samples shall be of sufficient size and quantity to clearly illustrate:
   1. Functional characteristics of the product, with integrally related parts and attachment devices.
   2. Full range of color, texture and pattern.

C. Each sample shall have a label indicating:
   1. Name of Project.
   2. Name of CONTRACTOR and Subcontractor.
   3. Material or Equipment Represented.
   4. Place of Origin.
   5. Name of Producer and Brand (if any).
   6. Location in Project.
   (Samples of finished materials shall have additional marking that will identify them under the finished schedules.)

D. The CONTRACTOR shall prepare a transmittal letter in triplicate for each shipment of samples containing the information required in subparagraph 1.07B above. He shall enclose a copy of this letter with the shipment and send a copy of this letter to the ENGINEER under separate cover and the remaining copy shall be for the

CONTRACTOR'S records. Review of a sample shall be only for the characteristics or use named and shall not be construed to change or modify any Contract requirements.

E. Reviewed samples not destroyed in testing shall be sent to the ENGINEER or stored at the site of the work. Reviewed samples of the hardware in good condition will be marked for identification and may be used in the work. Materials and equipment incorporated in work shall match the reviewed samples. Samples which failed testing or were rejected will be returned to the CONTRACTOR at his expense, if so requested at time of submission.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

**** END OF SECTION ****

SECTION 01710

CLEANING

PART 1 - GENERAL

1.01 Requirements Included

Cleaning shall include daily "policing" of the work and surrounding areas to clear general debris, waste paper, wood scraps, broken concrete, and other objectionable material along with the final cleanup of site(s) required for project acceptance. **DAILY CLEANUP IS REQUIRED.**

1.02 Disposal Requirements

Conduct cleaning and disposal operations to comply with codes, ordinances, regulations of Forrest County and the Office of Pollution Control.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 During Construction

A. Execute daily cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.

B. Provide on-site containers for the collection of waste materials, debris and rubbish. All waste materials including containers, food debris and other miscellaneous materials must be disposed of daily in on-site containers.

C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site. Burning shall not be permitted.

3.02 Final Cleaning

A. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces. Clean, wash and mop interiors of all buildings. Wash exteriors of all buildings, tanks and pavement.

B. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

C. Clean, wax and polish resilient and hard-surfaces floors.

D. Clean surfaces of equipment; remove excess lubrication.

E. Clean plumbing fixtures to a sanitary condition.

F. Clean permanent filters of ventilating equipment and replace disposable filter; in addition, clean ducts, blowers and coils.

G. Clean light fixtures and lamps.

H. Prior to final completion, CONTRACTOR shall conduct an inspection of sight-exposed interior and exterior surfaces and all work areas to verify that the entire Work is clean.

*** * END OF SECTION * ***

SECTION 02010

CONSTRUCTION STAKING

PART 1 - GENERAL

1.01 Requirements Included

A. The CONTRACTOR shall provide and pay for field engineering services for:
   1. Survey work required in layout and execution of work.
   2. Civil, structural, or other professional engineering services specified or required to execute the CONTRACTOR's construction method.

B. The method of field staking for the construction of the work shall be at the option of the CONTRACTOR. The OWNER shall provide the engineering surveys to establish reference points which in his judgment are necessary to enable the CONTRACTOR to proceed with his work.

C. The accuracy of any method of staking shall be the responsibility of the CONTRACTOR. All engineering for vertical and horizontal control shall be the responsibility of the CONTRACTOR.

D. The CONTRACTOR shall be held responsible for the preservation of all stakes and marks. If any stakes or marks are carelessly or willfully disturbed by the CONTRACTOR, the CONTRACTOR shall not proceed with any work until he has reestablished such points, marks, lines and elevations as may be necessary for the prosecution of the work.

E. The CONTRACTOR shall retain the services of a competent surveyor registered in the State of Mississippi to lay out the work and maintain a survey during construction. The CONTRACTOR shall be solely responsible for proper location of the work.

1.02 Survey Reference Points

Locate and protect control points prior to starting site work, and preserver all permanent reference points during construction.

A. Make no changes or relocations without prior written notice to the ENGINEER.

B. Report to the ENGINEER when any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations.

C. Require surveyor to replace control points which may be lost or destroyed. Establish replacements based on original survey control.

1.03 Project Survey Requirements

A. Establish temporary benchmarks as needed, referenced to data established by survey control points. Record locations, with horizontal and vertical data, on Record Drawings.

B. Establish lines and levels, and locate and lay out, by instrumentation and similar appropriate means:
   1. Site improvements, including utility slopes and invert elevations.
   2. Batter boards for structures.
   3. Controlling lines and levels required for mechanical and electrical trades.

C. From time to time, verify layouts by same methods.

D. Establish all lines and grades prior to construction of pipe work for all sewer lines at 100-foot increments.

1.04 Records

A. Maintain a complete, accurate log of all control and survey work as it progresses.

B. At contract closeout, submit a survey of installation of structures, site topography, and pipelines at the same scale as the ENGINEER's drawings indicating elevations and pipe stationing at 100-foot increments and at all valve and fitting locations.

1.05 Submittals

A. On request of the ENGINEER, submit documentation to verify accuracy of field engineering work.

B. Submit drawings showing locations of all pipes and structures constructed. This drawing shall be included with the record drawings.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

****END OF SECTION****

SECTION 02100

CLEARING AND GRUBBING

PART 1 — GENERAL

1.01 DESCRIPTION

A. Scope: The Contractor shall furnish all labor, materials, equipment, and incidentals required to perform all clearing and grubbing as specified.

B. Related Work Specified Elsewhere:
Section 02200, Earthwork, Excavation, and Backfill

1.02 QUALITY ASSURANCE

Codes and Standards: State and local laws and code requirements shall govern the hauling and disposal of trees, shrubs, stumps, roots, rubbish, debris and other matter.

1.03 JOB CONDITIONS

A. Protection:
1. Streets, roads, adjacent property and other works and structures shall be protected throughout the entire project. The Contractor shall return to original condition, satisfactory to the Engineer, damaged facilities caused by the Contractor's operations, at the Contractor's expense.
2. Trees, shrubs and grassed areas which are to remain shall be protected by fences, barricades, wrapping or other methods as shown, specified or approved by the Engineer. Equipment, stockpiles, etc. shall not be permitted within tree branch spread. Trees shall not be removed without approval of the Engineer unless shown or specified.

B. Salvageable Items: Unless specified elsewhere carefully remove items to be salvaged and store on the premises in an approved location, all in accordance with the recommendations of specialists recognized in the Work involved.

1.04 GUARANTEE

The Contractor shall guarantee that Work performed under this Section will not permanently damage trees, shrubs, turf or plants designated to remain, or other adjacent work or facilities. If damage resulting from the Contractor's operations appears during the period up to 12 months after completion of the project the Contractor shall replace damaged items at no expense to Owner.

PART 2 — PRODUCTS (NOT USED)

PART 3 — EXECUTION

3.01 CLEARING AND GRUBBING

A. Limits of clearing shall be all areas within the Property Line, easement, and Right-of-Way except as otherwise shown. Damage outside these limits caused by the Contractor's operations shall be corrected at the Contractor's expense.

B. Except as noted below, the Contractor shall remove from the site and satisfactorily dispose of all trees, shrubs, stumps, roots, brush, masonry, rubbish, scrap, debris, pavement, curbs, fences and miscellaneous other structures not covered under other Sections as shown, specified or otherwise required to permit construction of the new Work.

C. Trees, stumps and other cleared and grubbed material may not be disposed on site.

D. Burning of trees, stumps and other cleared and grubbed material on site will not be allowed.

E. All burning off the site shall be in complete accordance with rules and regulations of local authorities having jurisdiction.

F. Trees and shrubs shall be trimmed to avoid removal or damage. Trimmed or damaged trees shall be treated and repaired by persons with experience in this specialty who are approved by the Engineer. Trees and shrubs intended to remain which are damaged beyond repair or removed, shall be replaced by the Contractor.

G. The Contractor shall control air pollution caused by dust and dirt, and comply with governing regulations.

3.02 TOPSOIL REMOVAL

A. Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4"and shall be capable of supporting vegetation. Topsoil shall be substantially free of subsoil, clay lumps, stones, and other objects over 2" in diameter, and without weeds, roots, and other objectionable material.

B. The Contractor shall strip topsoil which is satisfactory to whatever depths are encountered, and in such a manner as to prevent intermingling with the underlying subsoil or other objectionable material. Heavy growths of grass shall be removed from areas before stripping.

C. Topsoil shall be stockpiled in storage piles in areas where approved by the Engineer. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent windblown dust. Topsoil in excess of quantity required shall remain property of the Owner.

*** * END OF SECTION * ***

SECTION 02200

EARTHWORK, EXCAVATION, AND BACKFILL

PART 1 — GENERAL

1.01 DESCRIPTION

A. Scope:
1. The Contractor shall furnish all labor, materials, equipment and incidentals required to perform all excavating, backfilling, grading, and disposing of earth materials required to complete the work shown on the Drawings and specified herein. The work shall include, but not be limited to excavation, backfilling, filling, grading, compacting and disposing of earth materials for the purpose of constructing conduits, pipelines, roads, ditches, grading, and other facilities required to complete the Work.
2. All necessary preparation of subgrade for trenches, slabs, pavements, or other facilities required to complete the Work in every respect is included.
3. All temporary means needed to prevent discharge of sediment to water courses because of dewatering systems or erosion are included.
4. No classification of excavated materials will be made. Excavation includes all materials regardless of type, character, composition, moisture, or condition thereof.

B. Related Work Specified Elsewhere:
1. Section 02100, Clearing and Grubbing
2. Section 02140, Dewatering
3. Section 15052, Buried Piping Installation

1.02 QUALITY ASSURANCE

A. Tests:
1. The Contractor shall retain the services of a qualified testing laboratory to make tests and determine acceptability of the soil as listed below.
2. The Contractor shall give full cooperation to the testing lab personnel so that the required soil tests can be taken in an efficient and timely manner.
3. Required Tests:
   a. Select Fill and Backfill Samples:
      (1) Gradation, ASTM D 422
      (2) Liquid Limit, ASTM D 423
      (3) Plastic Limit and Plasticity Index, ASTM D 424
   b. Compacted Select Fill and Backfill: Compaction, ASTM D 698

B. Permits and Regulations:
1. The Contractor shall obtain all necessary permits for work in roads, rights-of-way, railroads, etc.
2. The Contractor shall obtain permits as required by local, state and federal agencies for discharging water from excavations to rivers and streams.

3. The Contractor shall perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

C. Reference Standards: The Contractor shall comply with applicable provisions and recommendations of the following except as otherwise shown or specified.
1. ASTM A 36, Structural Steel.
2. ASTM A 328, Steel Sheet Piling
3. ASTM D 422, Particle-Size Analysis of Soils
4. ASTM D 423, Liquid Limit of Soils
5. ASTM D 424, Plastic Limit and Plasticity Index of Soils
6. ASTM D 448, Standard Sizes of Aggregate for Road and Bridge Construction
7. ASTM D 698, Moisture-Density Relations of Soils, Using 5.5 lb (2.5 kg) Rammer and 12 inch (304.8 mm) Drop
8. ASTM D 1556, Density of Soil in Place by the Sand-Cone Method
9. ASTM D 2487, Classification of Soils for Engineering Purposes
10. ASTM D 2922, Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

1.03 SUBMITTALS

The CONTRACTOR shall submit samples of all general and select backfill and fill, and pipe bedding materials required.

1.04 JOB CONDITIONS

Subsurface Information:

A. Test borings and other exploratory operations may be made by Contractor at no cost to Owner.

B. Existing Structures and Utilities:
1. Shown on the Drawings are certain surface and underground structures adjacent to the Work. This information has been obtained from existing records. It is not guaranteed to be correct or complete and is shown for the convenience of the Contractor. Contractor shall explore ahead of the required excavation to determine the exact location of all structures. All structures shall be supported and protected from injury by the Contractor. If they are broken or injured, they shall be restored immediately by the Contractor at his expense.
2. The Contractor shall locate existing underground utilities in the areas of Work. If utilities are to remain in place, the Contractor shall provide adequate means of protection during earthwork operations. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Engineer immediately for directions as to procedure. Cooperate with the Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
3. Do not interrupt existing utilities serving facilities occupied and used by the Owner or others, except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided.
4. If it is determined that existing utilities are to be relocated by the Owner, the Contractor shall be responsible for the coordination of the relocation. Contractor

shall notify utility owner in sufficient time to avoid delays to the Contractor's schedule.

C. Use of Explosives: Not permitted on the job site.

D. Protection of Property:
   1. Barricade open excavations occurring as part of this Work and post with warning lights.
   2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
   3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

1.05 POLLUTION CONTROL

A. The Contractor shall take all necessary precautions and measures to control, minimize, and remedy the generation of objectional dust or materials/spoils spillage. Such measures shall include but not be limited to water spraying of aggregate stockpiles, tarpaulin-covered truck beds, minimizing of mud tracking by haul vehicle tires, and maintenance/cleaning of access roads, entry areas, and connecting roadways. No separate payment will be made for control of dust and materials/spoils spillage.

B. The Contractor shall clean adjacent structures and improvements of all dust, dirt, and debris caused by operations as directed by the Owner's Representative. Areas shall be returned to conditions existing prior to the start of work.

C. The Contractor shall provide stone roadways on site and for exiting the site when necessary to prevent tracking of mud and debris onto roadways.

D. Dust Control: Conduct all operations and maintain the area of activities, including sweeping sprinkling of roadways, so as to minimize creation and dispersion of dust. Use calcium chloride to control serious or prolonged dust problems.

PART 2 — PRODUCTS

2.01 SOIL MATERIALS

A. Select Backfill and Fill Material
   1. Select Backfill of trenches material shall be Class II, or III as classified by ASTM D2321.
      a. Class II shall be coarse-grained soils borderline clean to with fines. (e.g. GW-GC, SP-SM)
      b. Class III shall be coarse grained soils with fines. (e.g. GM, GC, SM & SC)
   2. Select Fill: Class V, Group C per the Mississippi Standard Specifications for Road and Bridge Construction, 2004 edition, unless otherwise noted on drawings.

B. General Backfill and Fill Material: Provide approved soil materials for backfill and fill that meet the following requirements.

1. Free of clay, rock or gravel larger than 6" in any dimensions, debris, waste, frozen materials, vegetable and other deleterious matter.
2. Fill shall consist of any non-organic soil, free of debris and capable of being placed and compacted to the specified densities.
3. Unsuitable soil material shall include soils which contain: vegetative matter, sod, roots, rubbish, highly clay soils of the CH and MH descriptions, borderline soils of SH-CH descriptions, and organic soils.

C. Flowable Backfill: Flowable Backfill shall be used only as directed by the Engineer and shall be made from a cement mixture of cement (ASTM C150, Type II), sand (ASTM C33), Fly Ash (ASTM C613, Class C) and water. The compressive strength of the flowable backfill shall not exceed 500psi. When flowable backfill is used to abandon a structure within the roadway a penetration resistance test (ASTM 403) will be required to assess the setting and early strength development of the backfill.

D. Pipe Bedding:
Select bedding material used around and under flexible and rigid pipes shall be crushed limestone or Class IB as classified by ASTM D2321, conforming to the gradation set out below:

Sieve Size	**% Passing by Weight**
1 ½”	100%
No. 4	≤ 50%
No. 200	< 5%

In addition, should ground water be encountered in the trench, the Class IB material shall be provided as a filter material in accordance with Section XI.8 of ASTM D2321 and shall have the following gradation requirements:

1. D15/d85 < 5 where D15 is the sieve opening size passing 15% by weight of the coarser material (bedding) and d85 is the sieve opening size passing 85% by weight of the finer material.
2. D50/d50 < 25 where D50 is the sieve opening size passing 50% by weight of the coarser material (bedding) and d50 is the sieve opening size passing 50% by weight of the finer material.
3. If the finer material is a medium to highly plastic clay without sand or silt partings (CL or CH) then the following criteria may be used in lieu of the above:

   D15 < 0.02, where D14 is the sieve opening size passing 15% by weight of the coarser material.

PART 3 — EXECUTION

3.01 INSPECTION

The Contractor will examine the areas and conditions under which excavating, filling, and grading are to be performed and notify the Engineer of conditions the Contractor may find that are detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

3.02 SITE PREPARATION

A. Clear all areas to be occupied by permanent construction of all trees, brush, roots, stumps, logs, wood, and other materials and debris in accordance with Section 02100. Subgrades for fills shall be cleaned and stripped of vegetation, sod, topsoil, and organic matter.

B. Lay out and maintain grade stakes as required. Reference layout work to base lines, property lines, easement and/or right-of-way as indicated.

C. Where new grades tie into existing grades, verify existing grades. If existing conditions are at variance with the Drawings, notify the Engineer before proceeding with the Work and make adjustments only as directed by the Engineer.

D. The Engineer shall approve all fill materials. The Contractor shall remove from site any Contractor supplied material found unsuitable by Owner at no additional cost to the Owner.

3.03 TEST PITS

A. Where ordered by the Engineer, the Contractor shall excavate and backfill, in advance of construction, test pits to determine conditions or location of existing facilities.

B. The Contractor shall perform all work required in connection with excavating, stockpiling, maintaining, sheeting, shoring, backfilling and replacing pavement for the test pits.

C. Test pits made by the Contractor for his own use at his option shall not be a pay item.

3.04 EXCAVATION

A. General:
   1. Scope: Perform all excavation required to complete the Work as shown and specified.
   2. Excavated Materials: Earth, sand, clay, gravel, hardpan, boulders not requiring drilling or jackhammering to remove, decomposed rock, pavements, sediment, rubbish and all other materials within the excavation limits.
   3. Excavation shall be carried to the contours and dimensions indicated on plans and typical sections in the Drawings. Excavations shall be kept free from water while construction therein is in progress. All excavated material which is unsatisfactory for backfill or site grading shall be removed from the site. In the event it is necessary to excavate unsuitable material in addition to that specified or indicated, the Owner

shall be notified and a negotiated adjustment in the contract price made, in accordance with the Contract, prior to excavations. Excavations carried below the depths indicated, without specific directions, shall, except as otherwise specified, be backfilled to the proper grade with suitable material and compacted as specified hereinafter; all at the Contractor's expense.

4. In excavations below the water table, it shall also be the Contractor's responsibility to provide adequate dewatering of excavations at no extra cost to the Owner.

B. Structures and Pipelines:
Excavations: Open excavations shall be shored and braced where necessary. All open excavation shall comply with current OSHA requirements.

C. Dewatering:
1. Placement Below Groundwater Table: Use well points, cofferdams or other acceptable methods to permit construction of said structure or pipeline under dry conditions.
2. Structural Excavations and Pipelines: Maintain dry conditions until concrete for foundations has reached sufficient strength to withstand earth and hydrostatic loads and until the pipelines are properly jointed, tested, and backfilled.
3. Water Level: Maintain water level below trench bottom at all times.
4. Under no conditions shall water be permitted to stand in the bottom of an excavation for more than 24 hours.
5. The use of sanitary sewers for disposal of water from dewatering operations is prohibited.
6. See Section 02140 for additional requirements.

D. Footings:
1. Consider the elevation of the bottom of footings shown are approximate and the Engineer may order such changes in dimensions and elevations as may be required to secure a satisfactory footing.
2. Hand trim all structure excavations to permit the placing of full widths and lengths of footings on horizontal beds. Rounded and undercut edges will not be permitted.
3. When excavations are made below the required grades, without the written order of the Engineer, backfill with compacted gravel or concrete as directed by the Engineer at the expense of the Contractor.

E. Pumping: Pump excavations in such a manner to prevent the carrying away of unsolidified concrete materials and to prevent damage to the existing subgrade.

F. Size of Excavations: Extend excavation sufficiently on each side of structures, footings, and all other similar items, to permit setting of forms, installation of sheeting, the safe sloping of banks, and all other similar activities.

G. Subgrades:
1. Subgrade Requirements for Fill Areas, Roadways, Structures and Trench Bottoms:
   a. Strong, dense, and thoroughly compacted and consolidated

b. Free from mud, muck and other soft or unsuitable materials
c. Remain firm and intact under all construction operations
d. The Contractor shall excavate to the lines and grades shown on plans and typical sections in the Drawings

2. All subgrades shall be proof-rolled with a loaded dump truck or other suitable equipment approved by the ENGINEER. Any area that "pumps" is considered a soft subgrade and shall be corrected as specified in paragraph 3.04.G.3.
3. Soft Subgrades: Subgrades which are otherwise solid, but which become soft or mucky on top due to construction operations, shall be removed and replaced or processed to establish a stable surface or overlay with geotextile fabric prior to placement of crushed stone or gravel. Soft area shall be proof-rolled after corrective action has been taken. Geotextile fabric shall be manufactured by one of the following: 1.) Marifi 600x by Marifi, Inc; 2.) Typar Style 3601 by Dupont Co.; or 3.) equal. Install fabric per manufacturer's recommendations.
4. Use "Mud-Mat" for subgrades as shown on the drawings.
5. All submerged roots, stumps, or other perishable matter encountered in the preparation of the subgrade shall be completely removed down to natural undisturbed soil and backfilled in controlled compacted lifts with fill material.
6. After the subgrade has been prepared as specified above, it shall be maintained in such condition so as to drain. If damaged by the Contractor's subsequent operations, the subgrade shall be scarified and recompacted. Subsequent courses shall not be placed until the subgrade has been approved by the Engineer.
7. Finished Elevation of Stabilized Subgrades: Do not place finished elevation of stabilized subgrades above subgrade elevations shown on the Drawings.

H. Pipe Trench Excavation and Preparation:

1. Trenches shall be excavated so that pipes can be laid straight at uniform grade, without dips or humps, between the terminal elevations indicated on the drawing. Pressure Sewer Force Mains shall be installed as to alleviate high points along the pipe alignment except where shown on the drawings.
2. The Contractor shall not open more trench in advance of culvert or pipeline laying than is necessary to expedite the Work nor shall unfilled trench be more than can be properly backfilled at the end of each workday. Furthermore, the maximum length of trench left open shall not exceed 100′.
3. Except where jacking and boring or directional drilling is indicated on the drawings, is specified, or is permitted by the Engineer, all trench excavation shall be open cut from the surface.
4. Alignment, Grade, and Minimum Cover: The Alignment and grade or elevation of each pipeline shall be as indicated on the Contract Drawings. Vertical and horizontal alignment of pipes and the maximum joint deflection used in connection therewith, shall be in conformity with requirements of the section covering installation of pipe. Where culvert or pipeline grade or elevation are not definitely fixed by the Contract Drawings, trenches shall be excavated to a depth sufficient to provide a minimum depth of backfill cover over the top of the pipe of 36″.
5. Minimum Trench Width. Trenches shall be excavated to a width which will provide adequate working space and sidewall clearances for proper culvert installation, jointing, and embedment. Minimum trench widths from the bottom of the trench to an elevation 12″ above the top of the installed culvert shall be as shown on the plans. Trench width shall be minimized to the greatest extent practical but shall conform to

the following:

a. Sufficient to provide room for installing, joining and inspecting piping, but in no case wider at top of pipe than barrel O.D. plus three feet.
b. Enlargements at pipe joints may be made if required and approved by the Engineer.
c. Sufficient to allow thorough compaction of the pipe bedding materials.
d. Excavating equipment which requires the trench to be excavated to excessive width shall not be used.

6. Mechanical Excavation. The use of mechanical equipment will not be permitted in locations where its operation would cause damage to trees, buildings, culverts, or other existing property, utilities, or structures above or below ground. In all such locations, manual excavating methods shall be used.
7. Mechanical equipment used for trench excavation shall be of a type, design, and construction, and shall be so operated that the rough trench excavation bottom elevation can be controlled, that uniform trench widths and vertical sidewalls are obtained at least from an elevation one foot above the top of the installed culvert or pipeline to the bottom of the trench, and the trench alignment is such that culvert or pipeline when accurately laid to specified alignment will be centered in the trench with adequate clearance between the culvert and sidewalls of the trench. Undercutting the trench sidewall to obtain clearance will not be permitted.
8. Cutting Surface Construction. Cuts in asphalt and concrete pavement and base pavements shall be no larger than necessary to provide adequate working space for proper installation of culvert or pipeline and appurtenances. Pavement and base pavement over trenches excavated for culvert lines shall be removed so that a shoulder not less than 6″ in width at any point is left between the cut edge of the pavement and top edge of the trench. Trench width at the bottom shall not be greater than at the top and no undercutting shall be permitted. Pavement cuts shall be made to and between straight or accurately marked curved lines which, unless otherwise required, shall be parallel to the centerline of the trench.
9. Pavement removed for connections to existing lines or structures shall not be of greater extent than necessary for the installation.
10. Where the trench parallels the length of walks and trench location is all or partially under the walk, the entire walk shall be removed and replaced. Where the trench crosses drives, walks, curbs, and other surface construction, the surface construction shall be removed and replaced between existing joints or between saw cuts as specified for pavement.
11. Excavation Below Pipe Subgrade. Only as directed by the Engineer, pipe trenches shall be excavated below the underside of the pipe to provide for the installation of pipe embedment material.
12. Artificial Foundations in Trenches. Whenever unsuitable or unstable soil conditions are encountered, trenches shall be excavated below grade and the trench bottom shall be brought to grade with additional embedment material. All timber, concrete, or other foundations made necessary by unstable soil shall be installed as indicated on the drawings or directed by the Engineer.
13. Bell Holes. Bell holes shall provide adequate clearance for tools and methods used in installing pipe. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or embedment material when the pipe is jointed.
14. Excavation to Remove Stumps, etc. If any stumps, roots logs or other hard solid masses of matter are encountered at or near the authorized subgrade within the

trench area, such stumps, or other material shall be cut or removed to a further depth of 2′ feet, unless otherwise authorized by the Engineer. The Contractor shall fill this excavated space with embedment material as specified herein elsewhere. No additional compensation shall be made for this work.

15. When so required by the Engineer, the Contractor shall probe 2′ below the established bottom of the trench and if any stumps, roots logs, etc., are discovered by this probing, the Contractor shall cut them out just as if they had been visible in the trench.

I. Material Storage:
   1. Stockpile satisfactory excavated materials in approved areas, until required for backfill or fill.
   2. Place, grade and shape stockpiles for proper drainage.
   3. Locate and retain soil materials away from edge of excavation.
   4. Dispose of excess soil and waste materials as specified hereinafter.

J. Unsuitable Material: Where the existing material beneath the subgrade or trench is considered unsuitable by the Engineer, remove and replace it with select fill, backfill or bedding material.

3.05 UNAUTHORIZED EXCAVATION

A. Limits: All excavation outside the lines and grades shown on the Drawings.

B. Responsibility: All unauthorized excavation together with the removal and disposal of the associated materials is at the Contractor's expense.

C. Backfill and compact the unauthorized excavation with select backfill and at the Contractor's expense.

3.06 DRAINAGE AND DEWATERING

A. General:
   1. Prevent surface and subsurface water from flowing into excavations and from flooding adjacent areas.
   2. Remove water from excavation as fast as it collects.
   3. Maintain the ground water level below the bottom of the excavation to provide a stable surface for construction operations, a stable subgrade for the permanent work, and to prevent damage to the Work during all stages of construction.
   4. Provide and maintain pumps, sumps, suction and discharge lines and other dewatering system components necessary to convey water away from excavations.
   5. Obtain the Engineer's approval before shutting down dewatering system for any reason.
   6. Comply with requirements of Section 02140.

B. Standby Requirements for Dewatering: Provide standby equipment to ensure continuity of dewatering operations.

C. Disposal of Water Removed by Dewatering System:
   1. Dispose of all water removed from the excavation in such a manner as not to endanger public health, property, or any portion of the Work under construction or completed.
   2. Dispose of water in such a manner as to cause no inconvenience to the Owner, Engineer, or others involved in work about the site.
   3. Convey water from the construction site in a closed conduit. Do not use trench excavations as temporary drainage ditches.

3.07 EXCAVATION IN THE VICINTY OF TREES

Except where trees are shown on the Drawings to be removed, trees shall be protected from injury during construction operations. No tree roots over 2″ in diameter shall be cut. Trees shall be supported during excavation as necessary.

3.08 GENERAL AND SELECT BACKFILL

A. General: Furnish, place and compact all backfill required for excavations and trenches as required to provide the finished grades shown and as described herein.

B. Restrictions:
   1. Backfill excavations as promptly as Work permits, but not until completion of the following:
      a. Reviewed by Engineer of construction below finish grade including dampproofing, waterproofing, and perimeter insulation, where applicable.
      b. Inspection, testing, approval, and recording of locations of underground utilities.
      c. Removal of concrete formwork.
      d. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
      e. Removal of trash and debris.
      f. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
   2. Make subgrade surface level, dry, firm and subject to the Engineer's approval.

C. Placement:
   1. Keep excavation dry during backfilling operations. At no time shall water be permitted to stand in the bottom of an excavation for more than 24 hours.
   2. Do not place or compact backfill in a frozen condition or on top of frozen material.
   3. Do not place backfill material when free water is standing on the surface of the area where the backfill is to be placed.
   4. Bring up backfill evenly on all sides around structures and piping.
   5. It is intended that the elevations, lines, grades and typical sections (after settlement and compaction during construction) shall be those shown on the Drawings.
   6. Select Backfill shall be used in trenches under roadways and under structures unless

otherwise shown on the plans. General Backfill shall be used for all other excavations unless otherwise noted on the plans.

D. Rock Excavation:
1. Where pipe is laid in rock excavation, provide a minimum of 4" of sand under pipes smaller than 4" and a minimum of 6" of crushed stone or gravel under piping 4" and larger.
2. After laying pipe, place the balance of the backfill as described herein.

E. Moisture:
1. In general, the Contractor shall maintain the moisture content of the backfill within the range of 3 percentage points below to 2 percentage points above the optimum moisture content for compaction as determined by laboratory tests.
2. The Contractor shall perform all necessary work to adjust the water content of the material to within the range necessary to permit the compaction specified.
3. The Contractor shall not place backfill material when free water is standing on the surface of the area where the backfill is to be placed.
4. No compaction of backfill will be permitted with free water on any portion of the backfill to be compacted.

F. Unacceptable Material:
1. Remove backfill containing organic materials or other unacceptable material and replace with approved material.
2. Do not place backfill containing lumps, pockets or concentrations of silt or clay, rubble, debris, wood or other organic matter.

G. Equipment:
1. Compact backfill and fill with equipment suitable for the type of material placed and which is capable of providing the densities required.
2. Select compaction equipment and submit it and proposed procedure to the Engineer for approval.
3. All backfill and fill within 3' horizontally from structural walls shall be compacted to the specified density using hand-operated mechanical tampers.

H. Coverage:
1. Compact backfill and fill by at least two coverages of all portions of the surface of each lift by compaction equipment.
2. One coverage is defined as the condition obtained when all portions of the surface of the backfill and material have been subjected to the direct contact of the compactor.

I. Compaction:
1. Minimum Standard Proctor Density for Select Backfill: 95% of maximum density obtained in the laboratory in accordance with ASTM D 698 Method C including Note 2. The top 12" of select backfill shall be compacted to 100% Standard Proctor.
2. Minimum Standard Proctor Density for General Backfill: Compact to a density of not less than that of the surrounding soil unless otherwise noted on the plans.
3. If the field and laboratory tests indicate unsatisfactory compaction, provide the additional compaction necessary to obtain the specified degree of compaction.
4. Loose Lift heights shall not exceed 8" in depth and all lifts shall be compacted

before the next lift is placed. Spread all lifts in a manner to provide uniform thickness after placing.

J. Inadequate Compaction:
1. If the specified densities are not obtained because of improper control of placement or compaction procedures, or because of inadequate or improperly functioning compaction equipment, perform whatever work is required to provide the required densities.
2. This work includes complete removal of unacceptable backfill areas and replacement and re-compaction until acceptable backfill is provided.

K. Settlement:
1. Repair any settlement that occurs, at Contractor's expense.
2. Make all repairs and replacements necessary within 30 days after notice from the Engineer or Owner.

L. Pipe Trenches:
1. Place select backfill in pipe trenches which are below structures, other pipes, roadway areas, or as shown on the drawings in loose lifts not exceeding six (6) inches in depth and thoroughly compacted before the next layer is placed.
2. Place all general backfill in other pipe trenches in horizontal loose lifts of eight (8) inches and compact as required.
3. Mix and spread in a manner to assure uniform lift thickness after placing.
4. Repair any settlement that occurs within 30 days of notification by the Engineer or Owner of settlement. All settlement shall be repaired at no cost to the Owner.

3.09 GENERAL AND SELECT FILL

A. General: Furnish, place and compact all fill required to provide the finished grades shown and as described herein.

B. Restrictions:
1. Prior to placement of fill, the existing ground shall be excavated to remove vegetative matter and then disk to provide proper bond.
2. Removal of trash and debris.
3. Make subgrade surface level, dry, firm and subject to the Engineer's approval.
4. Do not place fill material when free water is standing on the surface of the area where the backfill or fill is to be placed.
5. Do not place fill in a frozen condition or on top of frozen material.

C. Placement:
1. It is intended that the elevations, lines, grades and typical sections (after settlement and compaction during construction) shall be those shown on the Drawings.
2. Select fill shall be used for subgrade below all structures, buildings, roads, driveways, sidewalks, and curb and gutter.
3. General fill shall be used as fill in all other places, unless otherwise noted on the Plans.

D. Rock Excavation

1. Where pipe is laid in rock excavation, provide a minimum of 4" of sand under pipes smaller than 4" and a minimum of 6" of crushed stone or gravel under piping 4" and larger.
2. After laying pipe, place the balance of the backfill as described herein.

E. Moisture:
1. In general, the Contractor shall maintain the moisture content of the backfill within the range of 3 percentage points below to 2 percentage points above the optimum moisture content for compaction as determined by laboratory tests.
2. The Contractor shall perform all necessary work to adjust the water content of the material to within the range necessary to permit the compaction specified.
3. The Contractor shall not place backfill material when free water is standing on the surface of the area where the backfill is to be placed.
4. No compaction of backfill will be permitted with free water on any portion of the backfill to be compacted.

F. Unacceptable Material:
1. Remove fill containing organic materials or other unacceptable material and replace with approved material.
2. Do not place fill containing lumps, pockets or concentrations of silt or clay, rubble, debris, wood or other organic matter.

G. Equipment:
1. Compact fill with equipment suitable for the type of material placed and which is capable of providing the densities required.
2. Select compaction equipment and submit it and proposed procedure to the Engineer for approval.
3. All fill within one foot horizontally from structural walls shall be compacted to the specified density using hand-operated mechanical tampers.
4. Vibratory rollers or vibratory plate compactors are suitable for compaction of structural fill.

H. Coverage:
1. Compact backfill and fill by at least two coverages of all portions of the surface of each lift by compaction equipment.
2. One coverage is defined as the condition obtained when all portions of the surface of the backfill and material have been subjected to the direct contact of the compactor.

I. Compaction:
1. Minimum Standard Proctor Density for Select Fill: 95% of maximum density obtained in the laboratory in accordance with ASTM D 698 Method C including Note 2. The top 12" of select backfill shall be compacted to 100% Standard Proctor.
2. Minimum Standard Proctor Density for General Fill: 85% of the maximum density obtained in the laboratory in accordance with ASTM D 698 Method C including Note 2 or to a density of not less than that of the surrounding soil which ever is greater.
3. If the field and laboratory tests indicate unsatisfactory compaction, provide the additional compaction necessary to obtain the specified degree of compaction.
4. Loose lifts of select fill shall not exceed 6" depth.

5. Loose lifts of general fill shall not exceed 9" depth.
6. All lifts shall be compacted before the next lift is placed. Spread all lifts in a manner to provide uniform thickness after placing.

J. Inadequate Compaction:
1. If the specified densities are not obtained because of improper control of placement or compaction procedures, or because of inadequate or improperly functioning compaction equipment, perform whatever work is required to provide the required densities.
2. This work includes complete removal of unacceptable backfill areas and replacement and re-compaction until acceptable backfill is provided.

K. Settlement:
1. Repair any settlement that occurs, at Contractor's expense.
2. Make all repairs and replacements necessary within 30 days after notice from the Engineer or Owner.

3.10 BEDDING

A. Locations: Provide select bedding in the following locations:
1. Support below and around piping and foundations.
2. Where shown on Drawings or directed by the Engineer.

B. Restrictions:
1. Make subgrade surface level, dry, firm and subject to the Engineer's approval.
2. Do not place bedding if any water is on the surface of area to receive bedding.
3. Do not place or compact bedding in a frozen condition or on top of frozen material.

C. Thickness of Lifts:
1. Place select bedding in horizontal loose lifts of 6" maximum thickness.
2. Mix and spread in a manner to assure uniform lift thickness after placing.
3. Compact each layer of bedding before placement of the next lift.

D. Unacceptable Material:
1. Do not place bedding containing lumps, pockets or concentrations of silt or clay, rubble, debris, wood or other organic matter.
2. Remove and dispose of bedding containing unacceptable material.

E. Moisture:
1. In general, the Contractor shall maintain the moisture content of the backfill within the range of 3 percentage points below to 2 percentage points above the optimum moisture content for compaction as determined by laboratory tests.
2. The Contractor shall perform all necessary work to adjust the water content of the material to within the range necessary to permit the compaction specified.
3. The Contractor shall not place backfill material when free water is standing on the surface of the area where the backfill is to be placed.
4. No compaction of backfill will be permitted with free water on any portion of the backfill to be compacted.

F. Equipment:
1. Perform compaction of bedding with equipment suitable for the type of bedding material being placed.
2. Select equipment which is capable of providing the densities required and submit the equipment to the Engineer for review.
3. Vibratory rollers or vibratory plate compactors are suitable for compaction of structural bedding.
4. All bedding within one foot horizontally from structural walls shall be compacted to the specified density using hand-operated mechanical tampers.

G. Coverage:
1. Compact each layer of bedding material by at least two complete coverages of all portions of the surface of each lift using suitable compaction equipment.
2. One coverage is defined as the condition reached when all portions of the bedding lift have been subjected to the direct contact of the compacting surface of the compactor.

H. Compaction:
1. Minimum Standard Proctor Density for Select Bedding: 95% of the maximum density obtained in the laboratory in accordance with ASTM D 698 Method C including Note 2.
2. If the field and laboratory tests indicate unsatisfactory compaction, provide the additional compaction necessary to obtain the specified degree of compaction.

I. Inadequate Compaction:
1. If the specified densities are not obtained because of improper control of placement or compaction procedures, or because of inadequate or improperly functioning compaction equipment, perform whatever work is required to provide the required densities.
2. This work includes complete removal of unacceptable bedding areas and replacement and re-compaction until acceptable bedding is provided.

J. Settlement:
1. Repair any settlement that occurs, at Contractor's expense.
2. Make all repairs and replacement necessary within 30 days after notice from the Engineer or Owner.

3.11 GRADING

A. General:
1. Uniformly grade areas within limits of grading under this Section, including adjacent transition areas.
2. Smooth subgrade surfaces within specified tolerances.
3. Compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Compaction: After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

C. Limits: Maximum vertical deviation from grades shown on plans.
   1. Under pavements, structures, and foundations ± 1/4"
   2. General site grading areas ± 2"
   3. No vertical deviation will be accepted that ponds water.

3.12 DISPOSAL OF EXCAVATED MATERIALS

Excess or Unsuitable Material:

A. Haul away from the project site all material removed from the excavations which does not conform to the requirements for fill or backfill or is in excess of that required for backfill.

B. Dispose of excess or unsuitable material in compliance with municipal, county, state, federal or other applicable regulations at no additional cost to the Owner.

3.13 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction:
   1. Testing lab will inspect and approve subgrades and fill layers before further construction work is performed thereon.
   2. Tests of subgrades, backfill and fill layers shall be taken as follows:
      a. General and Select Fill: One field density for every 5,000 square feet of material installed in open areas for each of the last four layers of material placed.
      b. General and Select Backfill and Bedding Around Structural Excavation: A minimum of one test per layer per 5,000 square feet of material installed shall be taken from excavated area.
      c. Pipeline Installation, Roadway and Driveway Crossings: Two field densities at each of the top 4 layers of material used for each crossing. Placement of test will be as directed by Engineer.
      d. Pipeline Installation, Running in Roadways: Two field densities at different depths for every 200' of pipe installed and test top 4 layers of material used every 200’ of pipe installed. Placement of test will be as directed by Engineer.
      e. Pipeline Installation, Open Cut Beyond limits of Pavement: Two field densities at different depths for every 200’ of pipe installed. Placement of test will be as directed by Engineer.
      f. Under Pavement/Roadways: 3 test per 100 linear feet of Road/Pavement. Test centerline and back of curbs at each location. Test top 4 layers of material installed.

B. Unsuitable Compaction: If, based on reports of testing lab and inspection, subgrade, backfills or fills which have been placed are below specified density, Contractor shall provide additional compaction and testing at no additional expense to the Owner.

**** END OF SECTION ****

SECTION 02222

EXCAVATION, BACKFILLING AND COMPACTING FOR UTILITIES

PART 1 C GENERAL

1.01 Section Includes

A. Excavating trenches for the installation of utilities

B. Backfilling trench with bedding material as specified and indicated and finishing filling trench with suitable material to proposed subgrade.

C. Compacting backfill materials in an acceptable manner

D. Borings and casings under roads

1.02 Related Sections

A. Section 02200 C Earthwork

B. Section 02227 C Aggregate Materials

C. Section 02605 C Sewer Structures

D. Section 02660 C Water Distribution Systems

E. Section 02687 C Site Gas Lines

F. Section 02720 C Storm Sewer Systems

G. Section 02730 C Sanitary Sewer Systems

H. Geotechnical report (if available) for boring locations and findings of subsurface materials and conditions

I. Construction Drawings

1.03 Reference Standards

A. American society for testing and materials (ASTM) Latest Edition

D 422	Method for Particle Size Analysis
D 698	Test for Moisture-Density Relations of Soils Using 5.5-lb. (2.5 Kg) Rammer and 12-inch (304.8mm) Drop (Standard Proctor)
D 1556	Test for Density of soil in Place by the Sand Cone Method
D 1557	Test for Moisture-Density Relations of Soils Using 10-lb. (4.5 Kg) Rammer and 18-inch (457 mm) Drop (Modified Proctor)

D 1559	Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
D 2216	Laboratory Determination of Moisture Content of Soil
D 2487	Classification of Soils for Engineering Purposes
D 2922	Tests for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 3017	Test for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 4318	Test for Plastic Limit, Liquid Limit, & Plasticity Index of Soils
C 25	Chemical Analysis of Limestone, Quicklime and Hydrated Lime.
C 110	Physical Testing for Quicklime and Hydrated Lime, Wet Sieve Method
C 618	Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
C 977	Quicklime and Hydrated Lime for Soil Stabilization

B. American Association of State Highway and Transportation Officials (AASHTO) latest edition

T 88	Mechanical Analysis of Soils

1.04 Quality Assurance

Independent testing laboratory selected and paid by owner, shall be retained to perform construction testing on backfilling operations as specified in Section 02200 and as stated herein.

1.05 Submittals

A. Shop Drawings or details pertaining to Site Utilities are not required unless use of materials, methods, equipment, or procedures contrary to Drawings or these specifications are proposed. Do not perform work until required shop drawings have been accepted by Owner.

B. The Contractor shall contact all utility companies and determine if additional easements will be required to complete the project. Contractor shall provide written confirmation of the status of <u>all</u> easements to the Owner at the time of the preconstruction conference or no later than 90 days prior to the project possession date.

C. Submit a sample of each type of offsite fill material that is to be used in backfilling in an air-tight, 10 lb container for the testing laboratory or submit a gradation and certification of the aggregate material that is to be used to the testing laboratory for review.

1.06 Project Record Documents

Accurately record actual locations of all subsurface utilities, structures and obstructions encountered.

PART 2 C PRODUCTS

2.01 Materials

A. Bedding Material: Processed sand and gravel free from clay lumps, organic, or other deleterious material, and complying with following gradation requirements:

U.S. Sieve Size	Percent Passing (by weight)
1 Inch	100
3/4 Inch	90-100
3/8 Inch	20-55
No. 4	0-10
No. 8	0-5

B. Backfill material from site as specified in Section 02200 and approved by the owner or owner's representative.

C. Backfill material from offsite as specified in Section 02200 and approved by the owner or owner's representative.

D. Acceptive Stabilization Fabrics and Geogrids
1. Mirafi 500X or 600X
2. Phillips 66 Supac 6WS
3. Dupont Typar 3401 and 3601
4. Trevira S1114 and S1120
5. Tensar SS-1 and SS-2
6. Exxon GTF-200 or 350

E. Filter/Drainage Fabrics
1. Mirafi 140 NS
2. Phillips 66 Supac 4NP
3. Dupont Typar 3341

PART 3 C EXECUTION

3.01 Preparation

A. Set all lines, elevations, and grades for utility and drainage system work and control system for duration of work, including careful maintenance of bench marks, property corners, monuments, or other reference points.

B. Maintain in operating condition existing utilities, activities utilities, and drainage systems encountered in utility installation. Repair any surface or subsurface improvements shown on Drawings.

C. Verify location, size, elevation, and other pertinent data required to make connections to existing utilities and drainage systems as indicated on Drawings. Contractor shall comply with local codes and regulations.

D. Over-excavate and properly prepare areas of subgrade that are not capable of supporting the proposed systems. These areas are to be stabilized by using acceptable backfill materials placed and compacted as specified, filter fabrics and/or additional bedding material.

E. Install dewatering systems that will be required to construct the proposed utilities in a manner that is described herein.

3.02 Excavation

A. The local utility companies shall be contacted before excavation shall begin. Dig trench at proper width and depth for laying pipe, conduit, or cable. Cut trench banks practically and remove stones as necessary to avoid point-bearing. Over excavate wet or unstable soil, if encountered, from trench bottom as necessary to provide suitable base for continuous and uniform bedding.

B. All trench excavation side walls greater than 5 feet in depth shall be sloped, shored, sheeted, braced or otherwise supported by means of the sufficient strength to protect the workmen within them in accordance with the applicable rules and regulations established for construction by the Department of Labor, Occupational Safety and Health Administration (OSHA), and by local ordinances. Lateral travel distance to an exit ladder or steps shall not be greater than 25 feet in trenches 4 feet or deeper.

C. Perform excavation as indicated for specified depths. During excavation, stockpile materials suitable for backfilling in orderly manner far enough from bank of trench to avoid overloading, slides, or cave-ins.

D. Remove excavated materials not required or not suitable for backfill or embankments and waste as specified. Any structures discovered during excavation(s) shall be disposed of as specified.

E. Prevent surface water from flowing into trenches or other excavations by temporary grading or other methods, as required. Remove accumulated water in trenches or other excavations by pumping or other acceptable methods.

F. Open cut excavation with trenching machine or backhoe. Where machines other than ladder or wheel-type trenching machines are used, do not use clods for backfill. Dispose of unsuitable material and provide other suitable material at no additional cost to Owner.

G. Accurately grade trench bottom to provide uniform bearing and support for each section of pipe on bedding material at every point along entire length, except where necessary to excavate for bell holes, proper sealing of pipe joints, or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Dig no deeper, longer, or wider than needed to make joint connection properly.

H. Trench width requirements below the top of the pipe shall not be less than 12" nor more than 18" wider than outside surface of any pipe or conduit that is not to be installed to designated elevations and grades. All other trench width requirements for pipe, conduit, or cable shall be least practical width that will allow for proper compaction of trench backfill.

I. Trench depth requirements measured from finished grade or paved surface shall meet the following requirements or applicable codes and ordinances:
   1. Water Mains: 36" to top of pipe barrel or 6" below the frost line (established by the local building official), whichever is deeper.
   2. Sanitary Sewer: Elevations and grades as indicated on Drawings.
   3. Storm Sewer: Depths, elevations, and grades as shown on Drawings.
   4. Electrical Conduits: 24" minimum to top of conduit or as required by NEC 300-5, NEC 710-36 codes, or the local utility company requirements, whichever is deeper.
   5. TV Conduits: 18" minimum to top of conduit or as required by the local utility company, whichever is deeper.
   6. Telephone Conduits: 18" minimum to top of conduit, or as required by the local utility company, whichever is deeper.
   7. Gas Mains and Service: 30" minimum to top of pipe, or as required by the local utility company, whichever is deeper.

J. Provide sheeting and bracing, when necessary, in trenches and other excavations where protection of workmen required. Sheeting may be removed after sufficient backfilling to protect against damaging or injurious caving.

3.03 Pipe Bedding

A. Accurately cut trenches for pipe or conduit that is installed to designated elevations and grades to line and grade from 4" below bottom of pipe and to width as specified. Place 4" of bedding material, compact in bottom of trench, and accurately shape to conform to lower portion of pipe barrel. After pipe installation, place select backfill and compact in maximum 6" layers measured loose the top of the trench.

B. Place geotextile fabric as specified on the plans and/or specifications.

3.04 Backfilling

A. Criteria: Trenches shall not be backfilled until required tests are performed and the utility systems comply with and are accepted by applicable governing authorities. Backfill trenches as specified. If improperly backfilled, reopen to depth required to obtain proper compaction. Backfill and compact, as specified, to properly correct condition in an acceptable manner.

B. Backfilling: After pipe or conduit has been installed, bedded, and tested as specified, backfill trench or structure excavation with specified material placed in 8" maximum loose lifts.

C. Backfill trenches to the contours and elevations shown on the plans with unfrozen materials.

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

3.05 Compaction

A. Exercise proper caution when compacting immediately over top of pipes or conduits. Water jetting or flooding is not permitted as method of compaction.

B. Maintain optimum moisture content of fill materials to attain required compaction density.

C. An independent testing laboratory shall perform test at intervals not exceeding 200'-0" of trench for the first and every other eight-inch (8") lift to compacted trench backfill and furnish copies of test results as specified. Compact to minimum density of 95% of optimum density in accordance with ASTM D 698 (or 92% of optimum density in accordance with ASTM D1557).

D. All materials used for backfill shall be tested in with Section 02200.

3.06 Borings and Casings under Roads, Highways and Railroad Crossings (Deleted, Not Applicable)

3.07 Rock Excavation (Deleted, Not Applicable)

****END OF SECTION****

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SECTION 02270

SLOPE PROTECTION AND EROSION CONTROL

PART 1 — GENERAL

1.01 SECTION INCLUDES

A. Installation of temporary erosion and sediment control items prior to clearing or demolition and commencing earthwork.

B. Stabilization of denuded areas.

C. Protection and stabilization of soil stockpiles.

D. Installation of sediment basin and traps, silt barrier fences, and sediment basin risers.

E. Temporary seeding, mulching, and sodding.

F. Excavation and embankment construction activities.

G. Stabilization of construction entrances.

H. Maintenance and removal of all sediment and erosion control measures.

I. Permanent erosion control systems.

J. Slope protection systems.

1.02 RELATED SECTIONS

A. Section 02100 — Clearing and Grubbing

B. Section 02200 — Earthwork, Excavation, and Backfill

C. Section 02221 — Crushed Stone and Gravel

D. Section 02930 — Vegetation

E. Storm Water Pollution Prevention Plan and CNOI Permit for MDEQ

1.03 ENVIRONMENTAL REQUIREMENTS

The Contractor shall protect adjacent properties and water resources from erosion and sediment damage throughout the life of the Contract.

1.04 REGULATORY REQUIREMENTS

A. Comply with all applicable codes and with the requirements of agencies having jurisdiction over the

work in this Section.

B. If the Owner does not already have, Contractor shall bear the responsibility of obtaining the applicable storm water permits from the Mississippi Department of Environmental Quality.

1.05 SUBMITTALS

Submit all products according to Division 01 of the Specifications.

1.06 EXAMINATION

Visually determine that the project is ready for the Work of this section; beginning Work shall indicate acceptance of the conditions.

PART 2 — PRODUCTS

2.01 GENERAL

Erosion and sediment control materials suitable for site conditions shall be in accordance with requirements imposed by the *Mississippi Department of Transportation Standard Specifications for Road and Bridge Construction*, latest edition, Sections 234, 235, and 236.

2.02 MATERIALS

A. Erosion Control Blankets (Ditch Liner):
Curlex blankets by American Excelsior Company or approved equal.

B. Turf Reinforcement Mat (TRM):
Recyclex by American Excelsior Company or approved equal.

C. Mulch: Use one of the following:
1. Wheat or Oat Straw.
2. Wood chips, or bark – produced from on-site grinding of the trees to be cleared and/or off-site supply.
3. Hydromulch.
4. Polyethylene film – 6 mil. black

D. Grass Seed for Temporary Cover: See grass schedule "Seeding Chart" in Mississippi Storm Water Pollution Prevention Plan (SWPPP), Guidance Manual, for Construction Activities.

E. Bales: Air dry, rectangular straw bales.
1. Cross Section: 14" by 18", minimum
2. Bindings: Wire or string, around long dimension

F. Bale Stakes: One of the following, minimum 3' long:
1. Steel U- or T-section, with minimum mass of 1.33 lb per linear foot.
2. Wood, 2" x 2" in cross section.

G. Silt Fence Fabric: Geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
   1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D 4751.
   2. Water Flow Rate: 0.3 gal./Sq.Ft./min., minimum, when tested in accordance with ASTM D 4491.
   3. Ultraviolet Resistance: Retaining at least 70% of tensile strength, when tested in accordance with ASTM D 4355 after 500 hours exposure.
   4. Tensile Strength: 100 lb-ft, minimum, in cross-machine direction; 124 lb-ft, minimum, in machine direction; when tested in accordance with ASTM D 4632.
   5. Elongation: 20%, when tested in accordance with ASTM D 4632.
   6. Tear Strength: 55 lb-ft, minimum, when tested in accordance with ASTM D 4533.

H. Silt Fence Posts: One of the following, minimum 5' long:
   1. Steel U- or T-section, with minimum mass of 1.33 lb per linear foot.
   2. Hardwood, 2" x 2" in cross section.

I. Permanent Grass – See Section 02900.

PART 3 — EXECUTION

3.01 PREPARATION

Deficiencies or changes in the erosion control plan as it is applied to current conditions will be brought to the attention of the Engineer for remedial action.

3.02 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

A. Erosion and Sedimentation control best management practices (BMPs) are required during all ground disturbing activity until permanent measures have been installed.

B. In all cases, if permanent erosion resistant measures have been installed, temporary preventive measures are not required.

C. All preventive measures shall comply with the BMPs as indicated in *Mississippi Storm Water Pollution Prevention Plan (SWPPP), Guidance Manual, for Construction Activities*, latest edition.

D. Construction Entrances: Shall be required where dirt and mud can be tracked on to public roads. Entrance shall be a minimum of 3" diameter and a maximum of 6" diameter aggregates. Entrance shall be a minimum of 12' wide and 50' long with filter fabric beneath aggregates. Aggregates shall be periodically dressed with additional aggregate.

E. Linear Sediment Barriers: Made of silt fences; straw bales; rock; and Earth berms during clearing operations only.
   1. Provide linear sediment barriers:
      a. Along downhill perimeter edge of disturbed areas, including soil stockpiles
      b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas

c. Along the toe of cut slopes and fill slopes
d. Perpendicular Check Dams to flow across the bottom of existing and new drainage channels and swales that traverse disturbed areas or carry runoff from disturbed areas
e. Across the entrances to culverts that receive runoff from disturbed areas

2. Space sediment barriers with the following maximum slope length upslope from barrier:
   a. Slope of Less Than 2%: 100'
   b. Slope Between 2% – 5%: 75'
   c. Slope Between 5% – 10%: 50'
   d. Slope Between 10% – 20%: 25'
   e. Slope Over 20%: 15'

F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.

G. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.

H. Temporary Seeding: Areas where construction activity temporarily ceases for more than 14 calendar days will be stabilized with temporary seeding and mulched within 7 calendar days of last disturbance. Use where temporary vegetated cover shall also be required on Plans or as required by *Mississippi SWPPP, Guidance Manual*.

3.03 INSTALLATION

A. Installation of Erosion Control Measures shall be in accordance with the requirements of *Mississippi Department of Transportation Standard Specifications for Road and Bridge Construction*, latest edition, Sections 234, 235, and 236 and *Mississippi Storm Water Pollution Prevention Plan (SWPPP), Guidance Manual, for Construction Activities*, Latest Edition.

B. Silt Fences:
1. Store and handle fabric in accordance with ASTM D 4873.
2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16" high barriers with minimum 60" long posts spaced at 6 feet maximum, with fabric embedded at least 4" in ground. Install post starting at the center of the lowest point of the fence line to a minimum depth of 12" into ground.
3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 20" high barriers, minimum 60" long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground. Install post starting at the center of the lowest point of the fence line to a minimum depth of 12" into ground.
4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20', use nominal 24" high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground. Install post starting at the center of the lowest point of the fence line to a minimum depth of 12" into ground.
5. Install with top of fabric at nominal height and embedment as specified.
6. Embed bottom of fabric in a trench on the upslope side of fence, with 4", minimum of fabric laid flat on bottom of trench facing upslope; backfill trench and compact.

7. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 6”, with extra post.
8. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.
9. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 16” high with post spacing not more than 4’.
10. Optional: Silt fence installation with vibratory plow may be permitted under certain conditions. Submit written installation specifications to Engineer for approval.

C. Straw Bale Rows:
1. Do not use in areas with slopes greater that 2%.
2. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
3. Install bales so that bindings are not in contact with the ground.
4. Embed bales at least 4” in the ground.
5. Anchor bales with at least two stakes per bale, driven at least 12” inches into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
6. Tightly wedge loose straw into gaps between ends of bales.
7. Place soil excavated for trench against bales on the upslope side of the row, compacted.

D. Mulching Over Large Areas:
1. Dry Straw and Hay: Apply 2 tons per acre; anchor using dull disc harrow or mulch tiller.
2. Wood Waste: Apply 6 tons per acre.
3. Erosion Control Matting: Submit product cut sheets for approval. Comply with product manufacturer's instructions.
4. Hydromulch: Submit written installation specifications for approval. Comply with product manufacturer's instructions.

E. Mulching Over Small and Medium Areas:
1. Dry Straw and Hay: Apply 4” depth.
2. Wood Waste: Apply 3” depth.
3. Pine Needles: Apply 3” depth.
4. Erosion Control Matting: Submit product cut sheets for approval. Comply with product manufacturer's instructions.
5. Hydromulch: Submit written installation specifications for approval. Comply with product manufacturer's instructions.

F. Temporary Seeding:
1. When hydraulic seeder is used, seedbed preparation is not required.
2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 5 pound per 1,000 sq ft.
4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 10 pounds per 1,000 sq ft.
5. Incorporate fertilizer into soil before seeding.

6. Broadcast seed by approved sowing equipment. Sow one half of the seed in one direction, and the remainder sown at right angles to the first sowing. Cover seed uniformly using spiked toothed harrow, cultipacker-type seeder or other approved device to an average depth of ¼".
7. Immediately after seeding, firm up the entire area with a roller not exceeding 150 pounds per foot of roller width. Where seeding is performed with a cultipacker-type seeder or where seed is applied in combination with hydro-mulching, no rolling is required.
8. Immediately after preparing the seeded area, evenly spread an organic mulch of straw by hand or by approved mechanical blowers. See mulching installation above.
9. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
10. Repeat irrigation as required until grass is established.

G. Erosion Control Material:
1. Install and maintain erosion control material meeting the requirements of this specification on the designated areas as shown and specified. Prepare, fertilize and vegetate the area(s) to be covered, as specified, before the erosion material is placed. Immediately following the planting operations, lay the material evenly and smoothly and in contact with the soil throughout. Omit the straw mulch from all seeded areas receiving the erosion control material.
2. For waterways, unroll the material in the direction of waterflow. When two or more strips are required to cover a ditch area, they shall overlap at least 4". In case a strip is to be spliced lengthwise, the ends of the strips shall overlap at least 6" with the upgrade section on top.
3. When using erosion control material on slopes, place the material either horizontally or vertically to the slope with the edges and ends of adjacent strips butted tightly against each other.
4. Staple each strip in three rows (each edge and center with the center row alternately spaced) with staples spaced not more than 4 feet longitudinally. When using two or more strips side by side on slopes, use a common row of staples on the adjoining strips. Staple all end strips at 12" intervals at the end. Firmly embed staples in the underlying soil.

3.04 MAINTENANCE

A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.

B. Repair deficiencies immediately.

C. Silt Fences:
1. Promptly replace fabric that deteriorates unless need for fence has passed.
2. Remove silt deposits that exceed 1/3 of the height of the fence.
3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

D. Straw Bale Rows:
1. Promptly replace bales that fall apart or otherwise deteriorate unless need has passed.
2. Remove silt deposits that exceed one-half of the height of the bales.

3. Repair bale rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

E. Clean out temporary sediment control structures weekly and relocate soil on site.

F. Place sediment in appropriate locations on site; do not remove from site.

3.05 CLEAN UP

A. Remove temporary measures after permanent measures have been installed.

B. Clean out temporary sediment control structures that are to remain as permanent measures.

C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

**** END OF SECTION ****

SECTION 02274

RIPRAP

PART 1 - GENERAL

1.01 Description

A. Scope:
Furnish all labor, materials, equipment and incidentals necessary to place riprap for channel slopes and ditches at locations shown on the Drawings and ordered by the ENGINEER.

B. Related Work Specified Elsewhere:
1. Section 02200, Excavation and Backfill.
2. Section 02221, Crushed Stone, Gravel and Clay Gravel.

1.02 Submittals

A. The CONTRACTOR shall furnish representative samples of riprap to the ENGINEER and shall indicate the source locations. If the source location changes during construction the CONTRACTOR shall resubmit representative samples.

B. Shop Drawings: Submit for approval the Shop Drawings showing the areas to be covered.

PART 2 - PRODUCTS

2.01 Materials

A. Random Riprap:
1. Riprap shall consist of hard, durable angular field or rough unhewn quarry stone as nearly uniform in section as possible. The stone shall be dense, resistant to the action of air, water and suitable for the purpose intended. Size shall be 200 pound as specified in the "*Mississippi Standard Specification For Road and Bridge Construction*", 2004 Edition

2. Recommended Thickness: 18 to 24 inches.
3. Spalls and rock dust that will pass a three inch sieve shall not represent more than five percent by weight.
4. Flat or needle shapes shall not be used unless the thickness of the piece is more than one-third the length.

B. Grouted Riprap:
1. Provide Portland cement mortar grouted riprap in locations as shown on the Drawings.
2. Grout shall consist of one part portland cement and three parts of approved sand thoroughly mixed with water to produce a grout having a thick creamy consistency.
3. Stone shall meet all applicable requirements listed above for random riprap.
4. Consistency of the grout shall be approved by the ENGINEER.

C. Geotextile Fabric:

1. Type V, Non-Woven Geotextile Fabric as specified in Table 714.13.11 of the Mississippi Department of Transportation's Standard Specifications for Road and Bridge Construction.
2. Or equal.

PART 3 - EXECUTION

3.01 Placing

A. Subgrade: The subgrade for riprap bedding shall be prepared to the required lines and grades. When the riprap is below normal stream level the subgrade shall be mucked out to the grade required. All loose material shall be removed.

B. Random Riprap:

1. The minimum total thickness of the riprap layer shall be 18 inches except where otherwise indicated.
2. The stones shall be placed from the bottom of the embankment upward such that the weight of the stone is carried by the underlying material. The larger stones shall be placed in the lower courses.
3. Open joints shall be filled with spalls.
4. Riprap may be placed by equipment; however, care shall be taken in placing to obtain a good gradation of material such that the riprap is firm and solid. Surfaces shall be barred to the required alignment and slopes. Large voids shall be filled by hand placement of stone unless otherwise approved by the ENGINEER.

C. Grouted Riprap:

1. Stones shall be placed as described above for random riprap and grouted with Portland cement mortar.
2. After the stones are in-place, the spaces between them shall be completely filled with grout from bottom to top and the surface swept with a stiff broom.
3. Unless hand mixing is specifically approved by the ENGINEER, grout shall be machine mixed for not less than 1-2 minutes.

**** END OF SECTION ****

SECTION 02930

VEGETATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:
   1. Contractor shall furnish all labor, materials and incidentals required to provide vegetation as specified.
   2. The extent of the vegetation work shall be at all disturbed areas.

B. Coordination: Review installation procedures under other sections and coordinate the installations of items that must be installed with the grass.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02100 — Clearing and Grubbing

1.03 QUALITY ASSURANCE

A. Source Quality Control: The Contractor shall:

   1. General: Ship grass materials with certificates of inspection as required by governmental authorities. Comply with governing regulations of the State of Mississippi and U.S. Department of Agriculture, Circular No. 156 applicable to grass materials.
   2. Analysis and Standards: 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 Analytical Chemists, wherever applicable or as further specified.

B. Reference Standards: The Contractor shall comply with applicable provisions and recommendations of the following, except where otherwise shown or specified:
   1. Association of Official Analytical Chemists, Official Methods of Analysis
   2. American Joint Committee on Horticultural Nomenclature, Standardized Plant Names
   3. ASTM C 602, Agricultural Liming Materials
   4. ASTM D 2487, Classification of Soils for Engineering Purposes
   5. FSO-F-241D, Fertilizer, Mixed, Commercial
   6. FSO-P-166E, Peat Moss; Peat, Humus; and Peat. Reed-sedge
   7. Official Seed Analysts of North America, Standards of Quality

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Seed:
   1. Delivery: Furnish standard seed in unopened manufacturer's standard containers bearing quantity, analysis and name of manufacturer.

2. Storage: Store seed with protection from weather or other conditions, which would damage or impair the effectiveness of the product.

B. Sod:
1. Harvest and Delivery: Harvest from the source and deliver to project site within 24 hours. Deliver only as much sod as can be installed in one day's work.
2. Review: Sod not transplanted within this time period shall be reviewed prior to installation.

C. Mulch:
1. Labeling: Each package of the cellulose fiber shall be marked by the manufacturer to show the air dry weight content.
2. Storage: Store mulch with protection from weather or other conditions, which would damage or impair the effectiveness of the product.

1.05 JOB CONDITIONS

A. By submitting a bid the Contractor affirms that he has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.

B. Plans, specifications, surveys, measurements, other documents and dimensions under which the work is to be performed are believed to be correct; but the Contractor shall have examined them for himself during the Bidding period, as no additional compensation will be made for errors for inaccuracies that may be found therein.

C. Environmental Requirements: The Contractor shall:
1. Proceed with and complete the grass work as rapidly as portions of the site become available, working within the seasonal limitations for each type of grass required.
2. Not spread seed when wind velocity exceeds 5 miles per hour.

D. Scheduling: The Contractor shall plant or install materials only during normal planting seasons. He shall correlate planting with specified maintenance periods to provide maintenance until project is complete.

1.06 ALTERNATIVES

The Contractor shall not make substitutions. If specified grass material is not obtainable, submit to Engineer proof of non-availability and proposal for use of equivalent material.

1.07 GUARANTEE

The Contractor shall guarantee grass through the specified maintenance period, and until final acceptance of the Work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Grass Materials(Seed):

1. Grass Seed Mixture: The Contractor shall provide fresh, clean, new-crop seed complying with the tolerance for purity and germination established by the Official Seed Analysts of North America. He shall provide seed of the grass species, proportions, and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.

2. The "Schedule of Grass Seed Requirements" shall be Seed Mixture Type 1 as shown on the plans. If none is shown there, the following shall be used:

			Application Per Acre	
Name of Grass	Purity	Germination	March 1 to Sept. 15	Sept. 15 to March 1
Common Bermuda Grass	95%	90%	30 lbs (hulled)	20 lbs
Browntop Millet	95%	90%	-	15 lbs

B. Grass Materials (Sod):

Bermuda (Cynodon Dactylon) Sod: Nursery grown, certified, approved sod furnished in supplier's standard size square or
rectangular pads, ½" in. thickness (+1/4" -), excluding growth and thatch.

1. Mowing Height: 3/4" maximum
2. Thatch: ½" uncompressed
3. Inspected and free of diseases, nematodes, pests and pest larvae by an entomologist of the State Department of Agriculture.
4. Free of, quack grass, Johnson grass, poison ivy, nutsedge, nimblewill, Canadian thistle, bindweed, bent grass, wild garlic, ground ivy, perennial sorrel and broom grass.
5. Having not more than five jimsonweed, mustard, lambs' quarter, chickweed, cress or crabgrass per 100 sq. ft.

C. Fertilizers:

1. Commercial Fertilizer: Complete fertilizer of neutral character, with a minimum of 75% nitrogen derived from natural organic sources or urea form; 40-50% of the nitrogen shall be water soluble. Available phosphoric acid derived from superphosphate, bone, or tankage. Potash derived from muriate of potash, containing 60% potash. Uniform in composition, free flowing, and suitable for application with approved equipment.
2. Provide the following types of fertilizers:
   a. Combination Fertilizer: Minimum chemical analysis of nitrogen, phosphorus and potash of 13-13-13.

b. Manufactured Fertilizer: Ammonium nitrate having a minimum chemical analysis of nitrogen, phosphorus and potash of 33-0-0.

D. Mulch: Clean straw bales, chopped and spread. Grass hay bales will not be allowed.

E. Water: Potable

PART 3 - EXECUTION

3.01 INSPECTION

Contractor and his installer shall examine the topsoil, verify the elevations, and depth of topsoil, observe the conditions under which work is to be performed, and notify the Engineer of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.02 SOIL PREPARATION

The Contractor shall:

A. Apply combination fertilizer (13-13-13) by machine; over areas to receive grass at a rate of 350 pounds per acre.

B. Apply commercial fertilizers within 10 days of planting.

C. Thoroughly and evenly incorporate combination fertilizer (13-13-13) with the soil to depth of 3" by disking, or other approved method.
   1. In areas inaccessible to power equipment, use hand tools.
   2. Adjacent to existing trees, adjust depth to avoid disturbing roots.

D. Grade planting areas to smooth, even surface with loose, uniformly fine texture. Remove all stones and extraneous foreign material in excess of 1" diameter. Roll and rake and remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.

E. Moisten prepared planting areas before seeding if soil is dry. Water thoroughly and allow surface moisture to dry before planting. Do not create a muddy soil condition.

F. Restore planting areas to specified condition if eroded or otherwise disturbed after fine grading and prior to seeding.

3.03 INSTALLATION

A. General: The Contractor shall maintain grade stakes until removal is mutually agreed upon by all parties concerned.

B. Seeding: The Contractor shall:
   1. Sow seed using a spreader or seeding machine.
   2. Distribute seed evenly over entire area by sowing equal quantity in two directions at right angles to each other.
   3. Sow not less than the quantity of seed specified.
   4. Cultipacker, or approved similar equipment, may be used to cover the seed and to firm the seed bed in one operation. In areas inaccessible to cultipacker:
      a. Rake the seed lightly into top 1/8" of soil, roll in two directions with a water ballast roller, weighing not less than 100 pounds per linear foot.
      b. Take care during raking that seed is not raked from one spot to another.
   5. Prevent damage or staining of construction or other plantings adjacent to seeded areas.
   6. Prevent foot or vehicular traffic, or the movement of equipment, over the seeded area. Reseed areas damaged as a result of such activity.
   7. Water seeded areas thoroughly with a fine spray.

C. Sod Bed Preparation:
   1. Rolling: Roll amended soil with 200 pound water ballast roller.
   2. Moistening: After all unevenness in the soil surface has been corrected, lightly moisten the soil immediately prior to laying the sod.
   3. Timing: Sod immediately thereafter, provided the sod bed has remained in friable condition.

D. Sodding Operations:
   1. Starter Strip: Lay the first row of sod in a straight line, with subsequent rows parallel to and tightly against each other, with no spaces between strips. Stagger lateral joints. Do not stretch or overlap sod. Butt all joints tightly to eliminate all voids.
   2. Cutting: Use a sharp knife to cut sod to fit curves and paving.
   3. Tamping and Rolling: Thoroughly tamp and roll sod to make contact with sod bed. Roll each entire section of completed sod.
   4. Watering: Thoroughly water sod immediately after installation to wet the underside of the new sod pad and the soil immediately below to a depth of 6 in.
   5. Top-Dress Fertilizer: Apply at the rate of six (6) pounds per 1,000 square feet at 25 days and at 50 days after sodding.
   6. Prevent foot traffic or vehicular traffic, or the movement of equipment, over the sodded areas. Re-sod areas damaged as a result of such activity.

3.04 MAINTENANCE

The Contractor shall:

A. Begin maintenance immediately after planting.

B. Maintain grass until final acceptance of the project.

C. Maintain grass by watering, fertilizing, weeding, mowing, trimming and other operations such as rolling, regrading, and replanting as required to establish smooth, acceptable grass, free of eroded or bare areas.

1. Cutting Height: Mow grass as soon as there is enough top growth to cut with mower set at the specified height for the principal species planted. Repeat mowing as required to maintain specified height. Do not mow when grass is wet. Time initial and subsequent mowings as required to maintain grass at 1 ½" to 2" height. Do not mow lower than 1 ½"
2. Apply manufactured fertilizer eight weeks after germination at a rate of 100 pounds ammonium nitrate per acre.
3. After grass has started, repeatedly reseed all areas greater than 8" square which fail to show a uniform stand of grass for any reason whatsoever until all areas are covered with a satisfactory stand of grass, as determined by the Engineer.

D. Watering: Provide and maintain temporary piping, hoses, and watering equipment as required to convey water from water sources and to keep grass areas uniformly moist as required for proper growth.

**** END OF SECTION ****

SECTION 03100

CONCRETE FORMWORK

PART 1 C GENERAL

1.01 Description

A. Scope: CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install the concrete formwork. The Work also includes providing openings in formwork to accommodate the Work under this and other Sections and building into the formwork all items such as sleeves, anchor bolts, inserts and all other items to be embedded in concrete for which placement is not specifically provided under other Sections.

B. Coordination:
1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the formwork.
2. Notify other contractors in advance of the construction of the formwork to provide the other contractors with sufficient time for the installation of items included in their contracts that must be installed with the formwork.
3. Coordinate formwork specifications herein with the requirements for finished surfaces specified in Section 03300.

1.02 Quality Assurance

A. CONTRACTOR shall examine the substratum and the conditions under which concrete formwork is to be performed, and notify the ENGINEER in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the ENGINEER.

B. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:
1. ACI 301, Specifications for Structural Concrete for Buildings.
2. ACI 347, Recommended Practice for Concrete Formwork.

C. Allowable Tolerances: Construct formwork to provide completed concrete surfaces complying with tolerances specified in ACI 347, Chapter 3.3, except as otherwise specified.

D. All items for permanent or temporary facilities shall be used in accordance with manufacturers instructions.

1.03 Submittals

Shop Drawings: Submit for information purposes copies of manufacturer's data and installation instructions for proprietary materials, including form coatings, manufactured form systems, ties and accessories.

1.04 Product Delivery, Storage and Handling

A. On delivery to job site, place materials in area protected from weather.

B. Store materials above ground on framework or blocking. Cover wood for forms with protective waterproof covering. Provide for adequate air circulation or ventilation.

C. Handle materials to prevent damage.

PART 2 C PRODUCTS

2.01 Form Materials

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

B. Forms for Unexposed Finish Concrete: Form concrete surfaces that will be unexposed in the finished structure with plywood. lumber. metal, or other acceptable material. Provide lumber that is dressed on at least 2 edges and 1 side.

C. Form Ties:
1. Provide factory-fabricated, removable or snapoff metal form ties, designed to prevent form deflection, and to prevent spalling of concrete surfaces upon removal. Materials used for tying forms will be subject to approval of the ENGINEER.
2. Unless otherwise shown, provide ties so that portion remaining within concrete after removal of exterior parts is at least 1 inch from the outer concrete surface. Unless otherwise shown, provide form ties that will leave a hole no larger than 1-inch diameter in the concrete surface.
3. Ties for exterior walls and walls subject to hydrostatic pressure shall have waterstops.
4. Provide wood or plastic cones for ties, where concrete is exposed in the finish structure and in the interior of tanks.
5. Provide stainless steel form ties for planned exposed tie hole locations, where shown on the Drawings. When used, tie break back point shall be at least 1 inch from outer concrete surface.
6. Wire ties are not acceptable.

D. Forms Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds. For concrete surfaces which will be in contact with potable water, the form coating shall be a mineral oil base coating.

2.02 Design of Formwork

A. Design, erect, support, brace and maintain formwork so that it shall safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Carry vertical and lateral loads to ground by formwork system or in-place construction that has attained adequate strength for this purpose. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.

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

C. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof. Provide trussed supports when adequate foundations for shores and struts cannot be secured.

D. Support form facing materials by structural members spaced sufficiently close to prevent significant deflection. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities and within allowable tolerances. For long span members without intermediate supports, provide camber in formwork as required for anticipated deflections resulting from weight and pressure of fresh concrete and construction loads.

E. Design formwork to be readily removable without impact, shock or damage to concrete surfaces and adjacent materials.

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

PART 3 C EXECUTION

3.01 Inspection

Examine conditions under which formwork is to be installed, and notify ENGINEER in writing of unsatisfactory conditions existing. Do not proceed with the Work until unsatisfactory conditions or deficiencies have been corrected in a manner acceptable to ENGINEER.

3.02 Form Construction

A. General: Construct forms complying with ACI 347; to the exact sizes, shapes, lines and dimensions shown as required to obtain accurate alignment, location and grades; to tolerances specified; and to obtain level and plumb work in finish structures. Provide for openings, offsets, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required. Use selected materials to obtain required finishes. Finish shall be as determined by approved mock-up or sample panel, if specified.

B. Fabricate forms for easy removal without damaging concrete surfaces. Provide crush plates or

wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where the slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.

C. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms in locations as inconspicuous as possible, consistent with requirements of the Work. Form intersecting planes of openings to provide true, clean-cut corners, with edge grain of plywood not exposed as form for concrete.

D. Falsework:
   1. Erect falsework and support, brace and maintain it to safely support vertical, lateral and asymmetrical loads applied until such loads can be supported by in-place concrete structures. Construct falsework so that adjustments can be made for take-up and settlement.
   2. Provide wedges, jacks or camber strips to facilitate vertical adjustments. Carefully inspect falsework and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure; make necessary adjustments to produce finished Work of required dimensions.

E. Forms for Exposed Concrete:
   1. Do not use metal cover plates for patching holes or defects in forms.
   2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
   3. Use extra studs, walers and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material that will produce bow.
   4. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.
   5. Form molding shapes, recesses and projections with smooth-finish materials, and install in forms with sealed joints to prevent displacement.

F. Corner Treatment:
   1. Form exposed corners of beams, walls, foundations, bases and columns to produce smooth, solid, unbroken lines, except as otherwise shown. Except as specified below for reentrant or internal corners, exposed corners shall be chamfered.
   2. Form chamfers with 3/4-inch by 3/4-inch strips, unless otherwise shown, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Extend terminal edges to required limit and miter chamfer strips at changes in direction.
   3. Reentrant or internal corners and unexposed, buried corners may be formed either square or chamfered.

G. Joints: See Section 03250 of these Specifications for treatment of joints. Locate as shown and specified.

H. Openings and Built-In Work:
   1. Provide openings in concrete formwork shown or required by other Sections or other contracts. Refer to paragraph 1.01B herein for the requirements of coordination.
   2. Accurately place and securely support items to be built into forms.

I. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is to be placed. Retighten forms immediately after concrete placement as required to eliminate mortar leaks.

3.03 Form Coatings

A. Coat form contact surfaces with a non-staining form-coating compound before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come into contact with surfaces which will be bonded to fresh concrete. Apply in compliance with manufacturer's instructions.

B. 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 Installation of Embedded Items

A. General: Set and build into the formwork, anchorage devices and other embedded items, shown, specified or required by other Sections and other contracts. Refer to paragraph 1.01B herein for the requirements of coordination. Use necessary setting drawings, diagrams, instructions and directions.

B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in the finished slab surface. Provide and secure units to support screeds.

3.05 Field Quality Control

A. Before concrete placement, CONTRACTOR shall check the formwork, including lines, ties, tie cones, and form coatings. He shall make corrections and adjustments to ensure proper size and location of concrete members and stability of forming systems.

B. During concrete placement CONTRACTOR shall check formwork and related supports to ensure that forms are not displaced and that completed Work shall be within specified tolerances.

C. If CONTRACTOR finds that forms are unsatisfactory in any way, either before or during placing of concrete, placement of concrete shall be postponed or stopped until the defects have been corrected, and reviewed by the ENGINEER.

3.06 Removal of Forms

A. Conform to the requirements of ACI 301, Chapter 4 and ACI 347, Chapter 3.6.2.3, except as specified below.

B. Form facing material shall remain in place a minimum of 5 days after concrete placement unless otherwise approved by ENGINEER.

C. Do not remove supporting forms or shoring until the members have acquired sufficient strength to safely support their weight and the load upon them. Results of suitable control tests may be used as evidence that the concrete has attained sufficient strength.

D. The time for removal of all forms will be subject to the ENGINEER'S approval.

3.07 Permanent Shores

A. Provide permanent shores as defined in ACI 347 Chapter 3.7.

B. Reshores will not be permitted.

3.08 Re-use of Forms

A. Clean and repair surfaces of forms to be re-used in the Work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces. Form surfaces shall be subject to the ENGINEER'S approval.

**** END OF SECTION ****

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.01 Related Sections

A. Division 1 Sections

B. Section 03100 - Concrete Formwork.

C. Section 03300 - Cast-in-Place Concrete.

1.02 References

ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.

ACI 301 - Standard Specifications for Structural Concrete.

ACI 315 - Details and Detailing of Concrete Reinforcement.

ACI 318 - Building Code Requirements for Structural Concrete.

ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete Reinforcement.

ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

ASTM A706 - Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.

AWS D12.1 - Recommended Practices for Welding Reinforcing Steel Metal Inserts, and Connections in Reinforced Concrete Construction.

AWS D1.4 - Structural Weld Code - Reinforcing Steel.

CRSI - Manual of Practice, and Documents 63 and 65.

1.03 Submittals

A. Submit shop drawings as follows:

1. Notify Structural Engineer prior to detailing reinforcing steel shop drawings.

2. Indicate size, spacing, location and quantities of reinforcing steel and wire fabric, bending and cutting schedules, splice lengths, stirrup spacing, supporting and spacing devices. Detail reinforcing steel in accordance with ACI 315 and CRSI Standards.

3. Written description of reinforcement without adequate sections, elevations, and details is not acceptable.

4. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.

B. Upon request, submit a certification from each manufacturer or supplier stating that materials meet the requirements of the ASTM and ACI standards referenced.

C. Upon request, submit mill test reports.

D. Submit manufacturer's data for tensile and compressive splicers.

1.04 Quality Assurance: Refer to the Structural Quality Assurance Plan in the Structural Drawings.

1.05 Storage and Protecting: Store reinforcing steel above ground so that it remains clean. Maintain steel surfaces free from materials and coatings that might impair bond.

PART 2 – PRODUCTS

2.01 Materials:

A. Deformed Reinforcing Steel: ASTM A615, refer to Structural Drawings for grade (Grade 60 minimum).

B. Welded Steel Wire Fabric: ASTM A185.

2.02 Accessory Materials

A. Annealed Steel Tie Wire: 16-1/2-gage minimum.

B. Bar Supports: Plastic-tipped steel Class I bar supports conforming to CRSI Specifications. Concrete brick may be used to support reinforcement to obtain proper clearance from earth.

2.03 Splicers

A. Tensile Splicers: Capable of developing 125% of the reinforcing steel ASTM specified minimum yield strength.

B. Compression Splicers: Mechanical type such that the compression stress is transmitted by end bearing held in concentric contact.

2.04 Dowel Adhesive

A. Dowel Adhesive: EPCON System Ceramic 6 Epoxy adhesive supplied by ITW Ramset/Red Head, HIT HY150 injection adhesive supplied by Hilti Fastening Systems, Power-Fast epoxy injection gel supplied by Powers Fastening, Acrylic Tie (AT) supplied by Simpson Strong-Tie, or approved equal.

PART 3 – EXECUTION

3.01 Fabrication

A. Fabricate reinforcing steel in accordance with ACI 318 and CRSI standards.

B. Bend bars cold. Do not heat or flame cut bars. No field bending of bars partially embedded in concrete is permitted, unless specifically approved Structural Engineer and checked by Testing and Inspection Agency for cracks.

C. Weld only as indicated. Perform welding in accordance with AWS D12.1 and or AWS D1.4.

D. Tag reinforcing steel for easy identification.

3.02 Installation

A. Before placing concrete, clean reinforcement of foreign particles and coatings.

B. Place, support, and secure reinforcement against displacement in accordance with ACI 318 and CRSI standards. Do not deviate from alignment or measurement.

C. Place concrete beam reinforcement support parallel to main reinforcement.

D. Locate welded wire reinforcement in the top third of slabs. Overlap mesh one lap plus two inches at side and end joints.

E. Furnish and install dowels or mechanical splices at intersections of walls, columns and piers to permit continuous reinforcement or development lengths at such intersections.

F. Maintain cover and tolerances in accordance with ACI and CRSI Specifications, unless indicated otherwise on Structural Drawings.

3.03 Splices

A. Do not splice reinforcement except as indicated on Structural Drawings.

B. Tension couplers may be used and installed in accordance with manufacturer's recommendations.

*** * END OF SECTION * ***

SECTION 03255

ANCHOR BOLTS, EXPANSION ANCHORS AND CONCRETE INSERTS

PART 1 - GENERAL

1.01 Description

A. Scope:
CONTRACTOR shall furnish all labor, materials, equipment and incidentals as shown, specified and required to furnish and install anchor bolts, expansion anchors and concrete inserts as shown and specified.

B. This Section includes all bolts, anchors and inserts required for the Work but not specified under other Sections.

C. The types of work using the bolts, anchors and inserts include, but are not limited to the following:
1. Rails.
2. Sluice gates.
3. Hangers and brackets.
4. Equipment.
5. Piping.
6. Tanks.
7. Grating and floor plate.
8. Electrical, Plumbing and HVAC Work.
9. Partitions and ceilings.

D. Related Work Specified Elsewhere:
1. Section 05100, Structural Steel.
2. Section 05500, Miscellaneous Metal Fabrications.
3. Section 15140, Hangers, Supports and Restraints.

1.02 Quality Assurance

A. Reference Standards: Comply with the applicable provisions and recommendations of the following, except as otherwise shown or specified.
1. ASTM A 36, Structural Steel.
2. ASTM A 320, Alloy-Steel Bolting Materials for Low-Temperature Service.
3. American Institute of Steel Construction, Structural Steel Detailing.

B. Expansion anchors and inserts shall be UL or FM approved.

1.03 Submittals

A. Samples: Submit for approval the following:
Representative samples of bolts, anchors and inserts as may be requested by the ENGINEER. His review will be for type and finish only. Compliance with all other requirements is exclusive responsibility of CONTRACTOR.

B. Shop Drawings: Submit for approval the following:
1. Setting drawings and templates for location and installation of anchorage devices.
2. Copies of manufacturer's specifications, load tables, dimension diagrams and installation instructions for the devices.

PART 2 - PRODUCTS

2.01 Design Criteria

A. When the size, length or load carrying capacity of an anchor bolt, expansion anchor, or concrete insert is not shown on the Drawings, provide the size, length and capacity required to carry the design load times a minimum safety factor of four.

B. Determine design loads as follows:
1. For equipment anchors, use the design load recommended by the manufacturer and approved by the ENGINEER.
2. For pipe hangers and supports, use one half the total weight of pipe, fittings, valves, accessories and water contained in pipe, between the hanger or support in question and adjacent hangers and supports on both sides.
3. Allowances for vibration are included in the safety factor specified above.

2.02 Materials

A. Anchor Bolts:
1. "J" or "L" type:
   a. Material and thread specifications to comply with ASTM A 36.
   b. Located and accurately set for the intended equipment.
   c. Protect threads and shank from damage through installation of equipment.
   d. Size as required for the intended equipment and according to the manufacturers recommendations.
2. Other types, if shown on Drawings.
3. In buried, exterior or submerged locations, provide stainless steel bolts with material specifications complying with ASTM A320, AISI Type 304. Other AISI types may be used subject to ENGINEER'S approval.

B. Expansion Anchors:
1. Provide zinc plated anchors. Anchors shall be of the size required for the concrete strength specified. Provide stud type (male thread) or flush type (female thread), as required.

2. Product and Manufacturer: Provide anchors by one of the following:
   a. Molly Division of USM Corporation.
   b. Hilti, Incorporated.
   c. Or equal.
3. In buried, exterior, submerged or below grade locations, provide stainless steel anchors complying with ASTM A 320, AISI Type 303. Other AISI types may be used, subject to ENGINEER'S approval.

C. Concrete Inserts:
1. For piping, grating and floor plate, provide malleable iron inserts. Provide those recommended by the manufacturer for the required loading.
2. Finish shall be black.
3. Product and Manufacturer: Provide one of the following inserts:
   a. Figure 282 by ITT Grinnell.
   b. No. 380 by Hohmann and Barnard, In
   c. Or equal.

D. Powdered actuated fasteners and other types of bolts and fasteners not specified herein shall not be used unless approved by ENGINEER.

PART 3 - EXECUTION

3.01 Inspection

Examine conditions under which bolts, anchors, or inserts are to be installed, and notify ENGINEER in writing of unsatisfactory conditions existing. Do not proceed with the Work until unsatisfactory conditions or deficiencies have been corrected in a manner acceptable to ENGINEER.

3.02 Installation

A. Drilling equipment used and installation of expansion anchors shall be in accordance with manufacturer's instructions.

B. Assure that embedded items are protected from damage and are not filled in with concrete.

C. Expansion anchors may be used for hanging or supporting pipe 2 inches diameter and smaller. Expansion anchors shall not be used for larger pipe unless otherwise shown or approved by the ENGINEER.

D. Use concrete inserts for pipe hangers and supports for the pipe size and loading recommended by the insert manufacturer.

E. Unless otherwise shown or approved by ENGINEER conform to following for expansion anchors:
1. Minimum embedment depth in concrete: 5 diameters.
2. Minimum anchor spacing on centers: 10 diameters.

3. Minimum distance to edge of concrete: 5 diameters.
4. Increase dimensions above if required to develop the required anchor load capacity.

3.03 Cleaning

After embedding concrete is placed, remove protection and clean bolts and inserts.

**** END OF SECTION ****

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 Description

A. Scope:
1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install cast-in-place concrete.
2. The Work includes:
   a. Providing concrete consisting of portland cement, fine and coarse aggregate, water, and approved admixtures; combined, mixed, transported, placed, finished and cured.
   b. Providing openings in concrete to accommodate the Work under this and other Sections and building into the concrete all items such as sleeves, frames, anchor bolts, inserts and all other items to be embedded.

B. Coordination: Review installation procedures under other Sections and coordinate the installation of items that must be installed in the concrete.

C. Classes of Concrete:
1. Class "A" concrete shall be steel reinforced and includes the following:
   a. Foundations.
   b. Walls.
   c. Slabs.
   d. Beams.
   e. Girders.
   f. Columns.
2. Class "B" concrete shall be placed without forms or with simple forms, with little or no reinforcing, and includes the following:
   a. Concrete fill.
   b. Equipment bases.
   c. Pipe supports.
   d. Curbs and gutters.
   e. Sidewalks.
   f. Thrust blocks.
   g. Encasement.

D. Related Sections:
1. Section 03100, Concrete Formwork.
2. Section 03200, Concrete Reinforcement.
3. Section 03250, Concrete Accessories.
4. Section 03255, Anchor Bolts, Expansion Anchors, and Concrete Inserts

1.02 Quality Assurance

A. Reference Standards: Comply with the applicable provisions and recommendations of the following, except as otherwise shown or specified.
   1. ACI 301, Specification for Structural Concrete for Buildings, (includes ASTM Standards referred to herein).
   2. ACI 318, Building Code Requirements for Reinforced Concrete.
   3. ACI 304, Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
   4. ACI 311, Recommended Practice for Concrete Inspection.
   5. ACI 211.1, Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete.
   6. ACI 214, Recommended Practice for Evaluation of Compression Test Results of Field Concrete.
   7. ACI 305, Recommended Practice for Hot Weather Concreting.
   8. ACI 306, Recommended Practice for Cold Weather Concreting.
   9. ACI 309, Recommended Practice for Consolidation of Concrete.
   10. AASHTO M 182, Burlap Cloth Made From Jute or Kenaf.

B. Concrete Testing Service:
   1. CONTRACTOR shall employ, at his own expense, a testing laboratory experienced in design and testing of concrete materials and mixes to perform material evaluation tests and to design concrete mixes.
      a. Testing agency shall meet the requirements of ASTM E 329.
      b. Selection of a testing laboratory is subject to the ENGINEER'S approval.
      c. Submit a written description of the proposed concrete testing laboratory giving qualifications of personnel, laboratory facilities and equipment, and other information which may be requested by the ENGINEER.
   2. Materials and installed Work may require testing and retesting, as directed by the ENGINEER, at any time during the progress of the Work. Allow free access to material stockpiles and facilities at all times. Tests not specifically indicated to be done at the OWNER'S expense, including the retesting of rejected materials and installed Work, shall be done at the CONTRACTOR'S expense.

C. Qualifications of Water-Reducing Admixture Manufacturer:
   1. Water-reducing admixtures shall be manufactured under strict quality control in facilities operated under a quality assurance program. CONTRACTOR shall furnish copy of manufacturer's quality assurance handbook to document the existence of the program. Manufacturer shall maintain a concrete testing laboratory which has been approved by the Cement and Concrete Reference Laboratory at the Bureau of Standards, Washington, D.C.
   2. When requested by ENGINEER, provide a qualified concrete technician employed by the admixture manufacturer to assist in proportioning the concrete for optimum use of the admixture. The concrete technician, when requested, shall advise on proper addition of the admixture to the concrete and on adjustment of the concrete mix proportions to meet changing jobsite conditions.

D. Tests for Concrete Materials:
   1. Submit written reports to the ENGINEER, for each material sampled and tested, prior to the start of Work.
   2. Provide the Project identification name and number, date of report, name of CONTRACTOR, name of concrete testing service, source of concrete aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results.
   3. Indicate whether or not material is acceptable for intended use.

1.03 Submittals

A. Samples: Submit samples of materials as specified and as otherwise may be requested by the ENGINEER, including names, sources and descriptions.

B. Shop Drawings: Submit for approval the following:
   1. Manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures and bonding agents.
   2. List of concrete materials and concrete mix designs proposed for use. Include the results of all tests performed to qualify the materials and to establish the mix designs.
   3. The following information, if ready-mixed concrete is used.
      a. Physical capacity of mixing plant.
      b. Trucking facilities available.
      c. Estimated average amount which can be produced and delivered to the site during a normal 8 hour day, excluding the output to other customers.

C. Laboratory Test Reports: Submit copies of laboratory test reports for concrete cylinders, materials and mix design tests. ENGINEER'S review will be for general information only. Production of concrete to comply with specified requirements is the responsibility of the CONTRACTOR.

D. Submit notarized certification of conformance to referenced standards when requested by the ENGINEER.

E. Delivery Tickets: Furnish to ENGINEER copies of all delivery tickets for each load of concrete delivered to the site. Provide items of information as specified in ASTM C 94, Section 15.

1.04 Product Delivery, Storage and Handling

All materials used for concrete must be kept clean and free from all foreign matter during transportation and handling and kept separate until measured and placed in the mixer. Bins or platforms having hard clean surfaces shall be provided for storage. Suitable means shall be taken during hauling, piling and handling to insure that segregation of the coarse and fine aggregate particles does not occur and the grading is not affected.

PART 2 - PRODUCTS

2.01 Concrete Materials

A. Cement:
   1. Portland cement, ASTM C 150, Type II.
   2. All other structures - Portland cement, ASTM C 150, Type I.
   3. Use portland cement made by a well-known acceptable manufacturer and produced by not more than one plant.
   4. Do not use cement which has deteriorated because of improper storage or handling.
   5. If fly ash is used, not more than 20% of the cement may be replaced by fly ash. Fly ash may not be used in concrete slabs to receive a float, trowel, or non-slip finish.

B. Aggregates: ASTM C 33 and as herein specified.
   1. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces.
   2. Fine Aggregate:
      a. Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances.
      b. Dune sand, bank run sand and manufactured sand are not acceptable.
   3. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
      a. Crushed stone, processed from natural rock or stone.
      b. Washed gravel, either natural or crushed. Use of slag and pit or bank run gravel is not permitted.
      c. Coarse Aggregate Size: Size to be ASTM C 33, Nos. 57 or 67, except that No. 467 may be used for footings, foundation mats and walls 16 inches or greater in thickness.

C. Water: Clean, free from injurious amounts of oils, acids, alkaline, organic materials or other substances that may be deleterious to concrete or steel.

2.02 Concrete Admixtures

A. Provide admixtures produced by established reputable manufacturers, and use in compliance with the manufacturer's printed instruction. Do not use admixtures which have not been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by the ENGINEER.

B. Air-Entraining Admixtures: ASTM C 260. Product and Manufacturer: Provide one of the following:
   1. SIKA AER by Sika Chemical Corporation.
   2. MD-VR by Master Builders Company.
   3. Or equal.

C. Water-Reducing Admixture: ASTM C 494, Type A.
   1. Proportion all concrete with non-air entraining, normal setting, water-reducing, aqueous solution of a modification of the salt of polyhydroxylated organic acids. The admixture shall not contain any lignin, nitrates, or chlorides added during manufacture.
   2. Product and Manufacturer: Provide one of the following:
      a. Eucon WR-75 by the Euclid Chemical Company.
      b. Pozzolith by Master Builders Company.
      c. Or equal.

D. Set-Control Admixtures: ASTM C 494, as follows:
   1. Type B, Retarding.
   2. Type C, Accelerating.
   3. Type D, Water-reducing and Retarding.
   4. Type E, Water-reducing and Accelerating.

E. Calcium Chloride: Do not use calcium chloride in concrete, unless otherwise authorized in writing by the ENGINEER. Do not use admixtures containing calcium chloride where concrete is placed against galvanized steel.

2.03 Proportioning and Design of Mixes

A. Prepare design mixes of concrete. Use the same design mix for both classes of concrete. Mixes subject to the following limitations:
   1. Specified 28-day Compressive Strength: 4,000 psi.
   2. Maximum Water-Cement Ratio by Weight: 0.45.
   3.

Coarse Aggregate Number	Minimum Cement Content-Pounds Per Cubic Yard	Percent Air Content
57	564	4 ± 1%

B. Use an independent testing facility acceptable to the ENGINEER for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the Project for concrete required.

C. Comply with ACI 211 and report to the ENGINEER the following data:
   1. Complete identification of aggregate source of supply.
   2. Tests of aggregates for compliance with specified requirements.
   3. Scale weight of each aggregate.
   4. Absorbed water in each aggregate.
   5. Brand, type and composition of cement.
   6. Brand, type and amount of each admixture.
   7. Amounts of water used in trial mixes.
   8. Proportions of each material per cubic yard.
   9. Gross weight and yield per cubic yard of trial mixtures.
   10. Measured slump.

11. Measured air content.
12. Compressive strength developed at 7 days and 28 days, from not less than 3 test cylinders cast for each 7-day and 28-day test, and for each design mix.

D. Submit written reports to the ENGINEER of proposed mix of concrete at least 15 days prior to start of Work. Do not begin concrete production until mixes have been approved by the ENGINEER.

E. Laboratory Trial Batches: When laboratory trial batches are used to select concrete proportions, prepare test specimens and conduct strength tests as specified in ACI 301, Chapter 3 – Proportioning. However, 4,000 psi concrete mixes need not be designed for greater than 4,600 psi regardless of the production facilities standard deviation.

F. Field Experience Method: When field experience methods are used to select concrete proportions, establish proportions as specified in ACI 301, Chapter 3, Method 2.

G. Adjustment to Concrete Mixes: Mix design adjustments may be requested by CONTRACTOR when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to the OWNER and as accepted by ENGINEER. Laboratory test data for revised mix designs and strength results must be submitted to and accepted by ENGINEER before using the revised mixes.

H. Admixtures:
1. Use air-entraining admixture in all concrete, except interior slabs subject to abrasion, unless otherwise shown or specified. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content within the prescribed limits.
2. Use amounts of admixtures as recommended by the manufacturer for climatic conditions prevailing at the time of placing. Adjust quantities and types of admixtures as required to maintain quality control.

I. Slump Limits: Proportion and design mixes to result in concrete slump at the point of placement of not less than 1 inch and not more than 4 inches.

2.04 Epoxy Bonding Agent

A. Provide an epoxy-resin bonding agent, two component, polyamide type.

B. Product and Manufacturer: Provide one of the following:
1. Sikadur Hi-Mod by Sika Chemical Corporation.
2. Epoxtite binder (Code #2385) by A.C. Horn, Incorporated.
3. Or equal.

2.05 Concrete Curing Materials

A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 10 ounces per square yard and complying with AASHTO M 182, Class 3.
   1. Moisture-Retaining Cover: One of the following, complying with ASTM C 172.
   2. Waterproof paper.
   3. Polyethylene film.
   4. White burlap-polyethylene sheet.

2.06 Moisture Barrier

A. Provide moisture barrier cover over prepared base material. Use polyethylene sheet not less than 6 mils thick, lapping at least 9 inches at joints.

B. Material must meet the requirements of ASTM E 154.

PART 3 - EXECUTION

3.01 Inspection

CONTRACTOR and his installer shall examine the substrate and the conditions under which Work is to be performed and notify ENGINEER of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER

3.02 Concrete Mixing

A. General:
   1. Concrete may be produced at batch plants or it may be produced by the ready-mixed process. Batch plants shall comply with the recommendations of ACI 304, and shall have sufficient capacity to produce concrete of the qualities specified, in quantities required to meet the construction schedule. All plant facilities are subject to testing laboratory inspection and acceptance of the ENGINEER.
   2. Mixing:
      a. Mix concrete with an approved rotating type batch machine, except where hand mixing of very small quantities may be permitted.
      b. Remove hardened accumulations of cement and concrete frequently from drum and blades to assure acceptable mixing action.
      c. Replace mixer blades when they have lost 10 percent of their original height.
      d. Use quantities such that a whole number of bags of cement is required, unless otherwise permitted.

B. Ready-Mix Concrete: Comply with the requirements of ASTM C 94, and as herein specified. Proposed changes in mixing procedures, other than herein specified, must be accepted by the ENGINEER before implementation.
   1. Plant equipment and facilities: Conform to National Ready-Mix Concrete Association "Plant and Delivery Equipment Specification".

2. Mix concrete in revolving type truck mixers which are in good condition and which produce thoroughly mixed concrete of the specified consistency and strength.
3. Do not exceed the proper capacity of the mixer.
4. Mix concrete for a minimum of two minutes after arrival at the job site, or as recommended by the mixer manufacturer.
5. Do not allow the drum to mix while in transit.
6. Mix at proper speed until concrete is discharged.
7. Maintain adequate facilities at the job site for continuous delivery of concrete at the required rates.
8. Provide access to the mixing plant for the ENGINEER at all times.

C. Maintain equipment in proper operating condition, with drums cleaned before charging each batch. Schedule rates of delivery in order to prevent delay of placing the concrete after mixing, or holding dry-mixed materials too long in the mixer before the addition of water and admixtures.

3.03 Transporting Concrete

A. Transport and place concrete not more than 45 minutes after water has been added to the dry ingredients.

B. Take care to avoid spilling and separation of the mixture during transportation.

C. Do not place concrete in which the ingredients have been separated.

D. Do not retemper partially set concrete.

E. Use suitable and approved equipment for transporting concrete from mixer to forms.

3.04 Concrete Placement

A. General: Place concrete continuously so that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, submit to the ENGINEER a construction joint plan in accordance with Section 03250 of these Specifications. Deposit concrete as nearly as practical in its final location to avoid segregation due to rehandling or flowing. Do not subject concrete to any procedure which will cause segregation.
1. Screed concrete which is to receive other construction to the proper level to avoid excessive skimming or grouting.
2. Do not use concrete which becomes non-plastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials. Do not use retempered concrete. Remove rejected concrete from the job site and dispose of it in an acceptable location.
3. Do not place concrete until all forms, bracing, reinforcement, and embedded items are in final and secure position.
4. Do not place footings in freezing weather unless adequate precautions are taken against frost action.
5. Do not place footings, piers or pile caps on frozen soil.

6. Unless otherwise approved, place concrete only when ENGINEER is present.

B. Concrete Conveying:

1. Handle concrete from the point of delivery and transfer to the concrete conveying equipment and to the locations of final deposit as rapidly as practical by methods which will prevent segregation and loss of concrete mix materials.
2. Provide mechanical equipment for conveying concrete to ensure a continuous flow of concrete at the delivery end. Provide runways for wheeled concrete conveying equipment from the concrete delivery point to the locations of final deposit. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water, snow, ice and other deleterious materials.
3. Do not use chutes for distributing concrete unless approved in writing by the ENGINEER.
   a. Provide sketches showing methods by which chutes will be employed when requesting such approval.
   b. Design chutes, if permitted, with proper slopes and supports to permit efficient handling of the concrete.
4. Pumping concrete is permitted, however do not use aluminum pipe for conveying.

C. Placing Concrete into Forms:

1. Deposit concrete in forms in horizontal lifts not deeper than 18 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place concrete at such a rate that concrete which is being integrated with fresh concrete is still plastic.
2. Do not permit concrete to free fall within the form from a distance exceeding 4 feet. Use "elephant trunks" to prevent free fall and excessive splashing on forms and reinforcement.
3. Remove temporary spreaders in forms when concrete placing has reached the elevation of such spreaders.
4. Consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with the applicable recommended practices of ACI 309. Vibration of forms and reinforcing will not be permitted, unless otherwise accepted by the ENGINEER.
5. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate the layer of concrete and at least 6 inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.
6. Do not place concrete in beam and slab forms until the concrete previously placed in columns and walls is no longer plastic.
7. Force concrete under pipes, sleeves, openings and inserts from one side until visible from the other side to prevent voids.

D. Placing Concrete Slabs:

1. 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.

2. Consolidate concrete during placing operations using mechanical vibrating equipment, so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Consolidate concrete placed in beams and girders of supported slabs, and against bulkheads of slabs on ground, as specified for formed concrete structures.
4. Bring slab surfaces to the correct level. Smooth the surface, leaving it free of humps or hollows. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces prior to beginning finishing operations.

E. Bonding for Next Concrete Pour: Roughen surfaces of set concrete at all joints, except where bonding is obtained by use of a concrete bonding agent. Construction joints shown on the Drawings are specified in Section 03250 of these Specifications. Clean surfaces of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner to expose bonded aggregate uniformly and to not leave laitance, loose particles of aggregate, or damaged concrete at the surface. Prepare for bonding of fresh concrete to new concrete that has set but is not fully cured, as follows:

1. Thoroughly wet the surface but allow no free standing water.
2. For horizontal surfaces place a 2-inch layer of grout, as specified in Section 03600, over the hardened concrete surface.
3. Place fresh concrete before the mortar has attained its initial set.
4. Bonding of fresh concrete to fully-cured hardened concrete or existing concrete shall be accomplished by using an epoxy-resin bonding agent as specified in Section 03250 of these Specifications.

F. Quality of Concrete Work:

1. Make all concrete solid, compact and smooth, and free of laitance, cracks and cold joints.
2. All concrete for liquid retaining structures, and all concrete in contact with earth, water, or exposed directly to the elements shall be watertight.
3. Cut out and properly replace to the extent ordered by the ENGINEER, or repair to the satisfaction of the ENGINEER, surfaces which contain cracks or voids, are unduly rough, or are in any way defective. Thin patches or plastering will not be acceptable.
4. All leaks through concrete, and cracks, holes or other defective concrete in areas of potential leakage, shall be repaired and made watertight by the CONTRACTOR.
5. Repair, removal, and replacement of defective concrete as ordered by the ENGINEER shall be at no additional cost to the OWNER.

G. Cold Weather Placing:

1. Protect all concrete Work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 306 and as herein specified.
2. When the air temperature has fallen to or may be expected to fall below 40º F, provide adequate means to maintain the temperature, in the area where concrete is being placed, at between 50º F and 70º F for at least seven days after placing. Provide temporary housings or coverings including tarpaulins or plastic film. Maintain the heat and protection, if necessary, to insure that the ambient temperature

does not fall more than 30º F in the 24 hours following the seven-day period. Avoid rapid dry-out of concrete due to overheating, and avoid thermal shock due to sudden cooling or heating.

3. When air temperature has fallen to or is expected to fall below 40º F, uniformly heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 70º F and not more than 89º F at point of placement.
4. Do not use frozen materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Ascertain that forms, reinforcing steel, and adjacent concrete surfaces are entirely free of frost, snow and ice before placing concrete.
5. Do not use salt and other materials containing antifreeze agents or chemical accelerators, or set-control admixtures, unless approved by the ENGINEER, in mix designs.

H. Hot Weather Placing:

1. When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
2. Cool ingredients before mixing to maintain concrete temperature at time of placement below 80º F when the temperature is rising and below 85º F when the temperature is falling. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature provided the water equivalent of the ice is calculated in the total amount of mixing water.
3. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
4. Wet forms thoroughly before placing concrete.
5. Do not place concrete at a temperature so as to cause difficulty from loss of slump, flash set, or cold joints.
6. Do not use set-control admixtures unless approved by the ENGINEER in mix designs.
7. Obtain ENGINEER'S approval of other methods and materials proposed for use.

3.05 Finish of Formed Surfaces

A. Rough Form Finish:

1. Standard rough form finish shall be the concrete surface having the texture imparted by the form material used, with tie holes and defective areas repaired and patched with mortar of 1 part cement to 1 1/2 parts sand and all fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
2. Use rough form finish for the following:
   a. Exterior vertical surfaces up to 1 foot below grade.
   b. Interior exposed vertical surfaces of liquid containers up to 1 foot below liquid level.
   c. Interior and exterior exposed beams and undersides of slabs.
   d. Other areas shown.

B. Smooth Form Finish:

1. Produce smooth form finish by selecting form materials which will impart a smooth, hard, uniform texture. Arrange panels in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas as above with all fins or other projections completely removed and smoothed.
2. Use smooth form finish for surfaces that are to be covered with a coating material. The material may be applied directly to the concrete or may be a covering bonded to the concrete such as waterproofing, dampproofing, painting or other similar system.

C. Smooth Rubbed Finish:

1. Provide smooth rubbed finish to concrete surfaces which have received smooth form finish as follows:
   a. Rubbing of concrete surfaces not later than the day after form removal.
   b. Moistening of concrete surfaces and rubbing with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
2. Except where surfaces have been previously covered as specified above, use smooth rubbed finish for the following:
   a. Interior exposed walls and other vertical surfaces.
   b. Exterior exposed walls and other vertical surfaces down to 1 foot below grade.
   c. Interior and exterior horizontal surfaces, except exterior exposed slabs and steps.
   d. Interior exposed vertical surfaces of liquid containers down to 1 foot below liquid level.
   e. Other areas shown.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike off smooth and finish with a texture matching the adjacent formed surfaces. Continue the final surface treatment of formed surfaces uniformly across the adjacent unformed surfaces, unless otherwise shown.

3.06 Monolithic Slab Finishes

A. Float Finish:

1. After placing concrete slabs, do not work the surface further until ready for floating. Begin floating when the surface water has disappeared or when the concrete has stiffened sufficiently. Use a wood float only. Check and level the surface plane to a tolerance not exceeding 1/4 inch in 10 feet when tested with a 10 foot straightedge placed on the surface at not less than 2 different angles. Cut down high spots and fill all low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat the surface to a uniform, smooth, granular texture.
2. Use float finish for the following:
   a. Interior exposed horizontal surfaces of liquid containers.
   b. Exterior below grade horizontal surfaces.

B. Trowel Finish:

1. After floating, begin the first trowel finish operation using a power-driven trowel.

Begin final troweling when the surface produces a ringing sound as the trowel is moved over the surface.

2. Consolidate the concrete surface by the final hand troweling operation. Finish shall be free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8 inch in 10 feet when tested with a 10 foot straight edge. Grind smooth surface defects which would telegraph through applied floor covering system.
3. Use trowel finish for the following:
   a. Interior exposed slabs unless otherwise shown or specified.
   b. Slabs to receive resilient floor finishes.

C. Non-Slip Broom Finish:
1. Use non-slip broom finish for the following:
   a. Exterior concrete platforms.
   b. Steps.
   c. Ramps.
   d. Horizontal surfaces which will receive a grout or concrete topping.
   e. Elsewhere as shown on the Drawings or in schedules.
2. Immediately after trowel finishing, slightly roughen the concrete surface by brooming in the direction perpendicular to the main traffic route. Use fiber-bristle broom unless otherwise directed. Coordinate the required final finish with the ENGINEER before application.

3.07 Concrete Curing and Protection

A. General:
1. Protect freshly placed concrete from premature drying and excessive cold or hot temperature, and maintain without drying at a relatively constant temperature for the period of time necessary for hydration of the cement and proper hardening of the concrete.
2. Start initial curing after placing and finishing concrete as soon as free moisture has disappeared for the concrete surface. Keep continuously moist for not less than 72 hours.
3. Begin final curing procedures immediately following initial curing and before the concrete has dried. Continue final curing for at least 7 days and in accordance with ACI 301 procedures. For concrete sections over 30 inches thick, continue final curing for an additional 7 days, minimum. Avoid rapid drying at the end of the final curing period.

B. Curing Methods:
1. Perform curing of concrete by moist curing, or by moisture-retaining cover curing. Use curing compound only in cold weather and only when permitted by ENGINEER. For curing, use water that is free of impurities which could etch or discolor exposed, natural concrete surfaces.

2. Provide moisture curing by any of the following methods:
   a. Keeping the surface of the concrete continuously wet by covering with water.
   b. Continuous water-fog spray.
   c. Covering the concrete surface with the specified absorptive cover, thoroughly saturating the cover with water, and keeping the absorptive cover continuously wet with sprinklers or porous hoses. Place absorptive cover so as to provide coverage of the concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.
3. Provide moisture-retaining cover curing as follows:
   a. Cover the concrete surfaces with the specified moisture-retaining cover for curing concrete, placed in the widest practical width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive.
   b. Immediately repair any holes or tears during the curing period using cover material and waterproof tape.

C. Curing Formed Surfaces: Cure formed concrete surfaces, including the undersides of girders, beams, supported slabs and other similar surfaces by moist curing with the forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

D. Curing Unformed Surfaces:
1. Initially cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by using the appropriate method specified above.
2. Final cure unformed surfaces, unless otherwise specified, by utilizing methods specified above, as applicable.

E. Temperature of Concrete During Curing:
1. When the atmospheric temperature is 40°F and below, maintain the concrete temperature between 50°F and 70°F continuously throughout the curing period. When necessary, make arrangement before concrete placing for heating, covering, insulation or housing as required to maintain the specified temperature and moisture conditions continuously for the concrete curing period. Provide cold weather protection complying with the requirements of ACI 306.
2. When the atmospheric temperature is 80°F and above, or during other climatic conditions which will cause too rapid drying of the concrete, make arrangements before the start of concrete placing for the installation of wind breaks or shading, and for fog spraying, wet sprinkling, or moisture-retaining covering. Protect the concrete continuously for the concrete curing period. Provide hot weather protection complying with the requirements of ACI 305, unless otherwise specified.
3. Maintain concrete temperature as uniformly as possible, and protect from rapid atmospheric temperature changes. Avoid temperature changes in concrete which exceed 5°F in any one hour and 50°F in any 24 hour period.

F. Protection from Mechanical Injury: During the curing period, protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration, and from damage caused by rain or flowing water. Protect all finished concrete surfaces from damage by subsequent construction operations.

3.08 Field Quality Control

A. CONTRACTOR shall employ a testing laboratory to perform field quality control testing. ENGINEER will make slump tests and will direct the number of tests and cylinders required. CONTRACTOR shall make standard compression test cylinders and entrained air tests as specified below, under the direct inspection by the ENGINEER. CONTRACTOR shall furnish all necessary assistance required by the ENGINEER. CONTRACTOR shall also furnish all labor, material and equipment required including cones, rods, molds, air tester, thermometer, curing in a heated storage box, and all other incidentals required. Above will be subject to approval by ENGINEER. CONTRACTOR shall furnish all necessary storage, curing, and transportation required by the testing.

B. Quality Control Testing During Construction:

1. Perform sampling and testing for field quality control during the placement of concrete, as follows,
   a. Sampling Fresh Concrete: ASTM C 172.
   b. Slump: ASTM C 143; one test for each concrete load at point of discharge; and one for each set of compressive strength test specimens.
   c. Air Content: ASTM C 231; one for every other concrete load at point of discharge, or when required by an indication of change.
   d. Compressive Strength Tests: ASTM C 39; one set of compression cylinders for each 50 cubic yards or fraction thereof, of each mix design placed in any one day or for each 2,500 square feet of surface area placed; 1 specimen tested at 7 days, and 2 specimens tested at 28 days.
      (1) Adjust mix if test results are unsatisfactory and resubmit for ENGINEER'S approval.
      (2) Concrete which does not meet the strength requirements is subject to rejection and removal from the Work, or to other such corrective measures as directed by the ENGINEER, at the expense of the CONTRACTOR.
   e. Compression Test Specimens: ASTM C 31; make one set of 3 standard cylinders for each compressive strength test, unless otherwise directed. Cast, store and cure specimens as specified in ASTM C 31.
   f. Concrete Temperature: Test hourly when air temperature is 40°F and below, and when 80°F and above; and each time a set of compression test specimens is made.
2. The testing laboratory shall submit certified copies of test results directly to the ENGINEER and the CONTRACTOR within 24 hours after tests are made.

C. Evaluation of Quality Control Tests:

1. Do not use concrete delivered to the final point of placement which has slump or total air content outside the specified values.
2. Compressive strength tests for laboratory-cured cylinders will be considered satisfactory if the averages of all sets of three consecutive compressive strength tests results equal or exceed the 28 day design compressive strength of the type or class of concrete; and, no individual strength test falls below the required compressive strength by more than 500 psi.

a. Where questionable field conditions may exist during placing concrete or immediately thereafter, strength tests of specimens cured under field conditions will be required by the ENGINEER to check the adequacy of curing and protecting of the concrete placed. Specimens shall be molded at the same time and from the same samples as the laboratory cured specimens.

(1) Provide improved means and procedures for protecting concrete when the 28 day compressive strength of field - cured cylinders is less than 85 percent of companion laboratory-cured cylinders.

(2) When laboratory-cured cylinder strengths are appreciably higher than the minimum required compressive strength, field-cured cylinder strengths need not exceed the minimum required compressive strength by more than 500 psi even though the 85 percent criterion is not met.

(3) If individual tests of laboratory-cured specimens produce strengths more than 500 psi below the required minimum compressive strength, or if tests of field-cured cylinders indicate deficiencies in protection and curing, provide additional measures to assure that the load bearing capacity of the structure is not jeopardized. If the likelihood of low-strength concrete is confirmed and computations indicate the load-bearing capacity may have been significantly reduced, tests of cores drilled from the area in question will be required at the CONTRACTOR'S expense.

b. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength and subject to replacement, reconstruction or to other action approved by ENGINEER.

D. Testing Concrete Structure for Strength:

1. When there is evidence that the strength of the in-place concrete does not meet specification requirements, CONTRACTOR shall employ at his expense the services of a concrete testing service to take cores drilled from hardened concrete for compressive strength determination. Tests shall comply with ASTM C 42 and the following:

a. Take at least 3 representative cores from each member or suspect area at locations directed by ENGINEER.

b. Strength of concrete for each series of cores will be considered satisfactory if their average compressive strength is at least 85 percent and no single core is less than 75 percent of the 28 day required compressive strength.

c. Report test results in writing to ENGINEER on the same day those tests are made. Include in test reports the Project identification name and number, date, name of CONTRACTOR, name of concrete testing service, location of test core in the structure, type or class of concrete represented by core sample, nominal maximum size aggregate, design compressive strength, compression breaking strength and type of break (corrected for lengthBdiameter ratio), direction of applied load to core with respect to

horizontal plane of the concrete as placed, and the moisture condition of the core at time of testing.

2. Fill core holes solid with patching mortar, and finish to match adjacent concrete surfaces.
3. Conduct static load test and evaluations complying with ACI 318 if the results of the core tests are unsatisfactory, or if core tests are impractical to obtain, as directed by ENGINEER.

3.09 Miscellaneous Concrete Items

A. Filling-In: Fill-in holes and openings left in concrete structures for the passage of work by other contractors, unless otherwise shown or directed, after the work of other contractors is in-place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide all other miscellaneous concrete filling shown or required to complete the Work.

B. Curbs:
1. Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
2. Exterior curbs shall have rubbed finish for vertical surfaces and a broomed finish for top surfaces.

C. Equipment Bases:
1. Unless specifically shown otherwise, provide concrete bases for all pumps and other equipment. Construct bases to the dimensions shown, or as required to meet manufacturers; requirements and Drawing elevations. Where no specific elevations are shown, bases shall be 6 inches thick and extend 3 inches outside the metal equipment base or supports. Bases to have smooth trowel finish, unless a special finish such as terrazzo, ceramic tile or heavy duty concrete topping is required. In those cases, provide appropriate concrete finish.
2. Include all concrete equipment base work not specifically included under other Sections or other contracts.
3. In general, place bases up to 1 inch below the metal base. Properly shim equipment to grade and fill 1 inch void with nonshrink grout as specified in Section 03600.

3.10 Concrete Repairs

A. Repair of Formed surfaces:
1. Repair exposed-to-view formed concrete surfaces that contain defects which adversely affect the appearance of the finish. Surface defects that require repair include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, and holes left by the rods and bolts; fins and other projections on the surface; and stains and other discolorations that cannot be removed by cleaning.

2. Repair concealed formed concrete surfaces that may contain defects that adversely

affect the durability of the concrete. Surface defects that require repair include cracks in excess of 0.01 inch wide, cracks of any width and other surface deficiencies which penetrate to the reinforcement or completely through non-reinforced sections, honeycomb, rock pockets, holes left by tie rods and bolts, and spalls except minor breakage at corners.

3. Repair structural cracks and cracks in water-holding structures.

B. Method of Repair of Formed Surfaces:

1. Repair and patch defective areas with cement mortar immediately after removal of forms and as directed by ENGINEER.
2. Cut out honeycomb, rock pockets, voids over 1/2-inch diameter, and holes left by tie rods and bolts, down to solid concrete but, in no case, to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Before placing the cement mortars, thoroughly clean, dampen with water and brush-coat the area to be patched with the specified bonding agent.
   a. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, the patching mortar color will match the color of the surrounding concrete. CONTRACTOR shall impart texture to repaired surfaces to match texture of existing adjacent surfaces.
   b. Provide test areas at inconspicuous locations to verify mixture, texture and color match before proceeding with the patching. Compact mortar in place and strike off slightly higher than the surrounding surface.
3. Cracks which require repair shall be pressure grouted using one of the following. Apply in accordance with the manufacturer's directions and recommendations.
   a. Sikadur Hi-Mod L.V. and Gel by Sika Chemical Company.
   b. Euco Epoxy #452 and #452 by The Euclid Chemical Company.
   c. Or equal.
4. Fill holes extending through concrete by means of a plunger-type gun or other suitable device from the least exposed face, using a flush stop held at the exposed face to ensure completely filling.
5. Sandblast exposed-to-view surfaces that require removal of stains, grout accumulations, sealing compounds, and other substances marring the surfaces. Use sand finer than No. 30 and air pressure from 15 to 25 psi.

C. Repair of Unformed Surfaces:

1. Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to the tolerances specified for each surface and finish. Correct low and high areas as herein specified.
2. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having the required slope. Correct high and low areas as herein specified.
3. Repair finish of unformed surfaces that contain defects which adversely affect the durability of the concrete. Surface defects, as such, include crazing, cracks in excess of 0.01-inch wide or which penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.
4. Repair structural cracks and cracks in water-holding structures.

D. Methods of Repair of Unformed Surfaces:

1. Correct high areas in unformed surfaces by grinding, after the concrete has cured sufficiently so that repairs can be made without damage to adjacent areas.
2. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out the low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Use one of the following. Apply in accordance with the manufacturer's directions and recommendations.
   a. Poly-Patch by The Euclid Chemical Company.
   b. Sikatop by Sika Chemical Company.
   c. Or equal.
3. Repair defective areas, except random cracks and single holes not exceeding l-inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts, and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen all concrete surfaces in contact with patching concrete and brush with the specified bonding agent. Place patching concrete before grout takes its initial set. Mix patching concrete of the same materials and proportions to provide concrete of the same type or class as the original adjacent concrete. Place, compact and finish as required to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.
4. Repair isolated random cracks, and single holes not over l-inch diameter, by the dryBpack method. Groove the top of cracks, and cut out holes to sound concrete and clean of dust, dirt and loose particles. Dampen all cleaned concrete surfaces and brush with the specified bonding agent. Place dry-pack before the cement grout takes its initial set. Mix dry-pack, consisting of 1 part portland cement to 2&1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.
5. Assure that surface is acceptable for flooring material to be installed in accordance with manufacturer's recommendations.

E. Other Methods of Repair: Repair methods not specified above may be used if approved by ENGINEER.

*** * END OF SECTION * ***

SECTION 04100

MORTAR AND MASONRY

PART 1 - GENERAL

1.01 Description

Scope:

A. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish all mortar Work.

B. This Section specifies the mortar for masonry materials specified in Section 04200, Unit Masonry.

1.02 Quality Assurance

A. Source Quality Control:
   1. Do not change source or brands of mortar materials during the course of the Work.
   2. Where question of compliance to the requirements of this Section arise the mortar properties specification shall take precedence over the mortar proportion specifications.
   3. Two air-entraining materials shall not be combined in mortar.

B. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
   1. ASTM C 5, Quicklime for Structural Purposes.
   2. ASTM C 91, Masonry Cement.
   3. ASTM C 136, Sieve or Screen Analysis of Fine and Coarse Aggregates.
   4. ASTM C 144, Aggregate for Masonry Mortar.
   5. ASTM C 150, Portland Cement.
   6. ASTM C 207, Hydrated Lime for Masonry Purposes.
   7. ASTM C 270, Mortar for Unit Masonry.
   8. UL, Design Numbers U901 through U908.

1.03 Submittals

Shop Drawings: Submit for approval, copies of manufacturer's specifications and instructions for each manufactured product.

1.04 Product Delivery, Storage and Handling

A. Delivery of Materials: Manufactured materials, such as cement and lime, shall be delivered and stored in their original containers, plainly marked with identification of materials and manufacturer.

B. Storage of Materials:
   1. Store mortar materials off the ground in a dry location and under a properly constructed shelter using tarpaulins, felt paper, or polyethylene sheets.
   2. Protect liquid admixtures from freezing.

PART 2 - PRODUCTS

2.01 Materials

A. Portland Cement: Provide the following for portland cement-lime mortars:
   1. ASTM C 150, Type I.
   2. Use ASTM C 150, Type III, high early strength, for laying masonry when outside temperature is less than 50□ F.
   3. Provide nonstaining portland cement of natural color.
   4. Product and Manufacturer: Provide one of the following:
      a. Speed Portland Cement and Hi-Speed Portland Cement by Louisville Cement Company.
      b. Atlas Type I and Atlas Type III Portland Cement by Lehigh Portland Cement Company.
      c. Or equal.

B. Masonry Cement: Provide the following for masonry cement mortars:
   1. ASTM C 91, Type S; proportioned as specified to comply with ASTM C 270.
   2. Maximum Air Content, ASTM C 91: 18 percent.
   3. Product and Manufacturer: Provide one of the following:
      a. Brixment Type S by Louisville Cement Company.
      b. Atlas Masonry Cement Type S by Lehigh Portland Cement Company.
      c. Or equal.

C. Hydrated Lime: ASTM C 207, Type S, or lime putty ASTM C 5.

D. Sand Aggregates: ASTM C 144.

E. Water: Free from injurious amounts of oils, acids, alkalis, or organic matter, and clean, fresh and potable.

F. Mortar Color: As selected by ENGINEER.

2.02 Mortar Mixes

A. General:
   1. Anti-Freeze Admixture or Agents: Not permitted.
   2. Calcium Chloride: Not permitted.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Table 2. Do not substitute ASTM C91 masonry cement for ASTM C 150 portland cement without an approved Shop Drawing review by ENGINEER. Property Specification:
   1. Average Compressive Strength, ASTM C 270: 1800 pounds per square inch.

2. Minimum Water Retention, ASTM C 270: 75 percent.
3. Maximum Air Content, ASTM C 270: 12 percent for portland cement-lime mortars and 18 percent for masonry cement mortars.

PART 3 - EXECUTION

3.01 Preparation

A. Measurement of Materials:
1. Cement and Hydrated Lime: Batched by the bag.
2. Sand: Batched by volume in suitably calibrated containers, provided proper allowance is made for bulking and consolidation and for weight per cubic foot, of contained moisture.
3. Proportion of volumetric Mixtures: One 94-pound sack of portland cement and one 50-pound sack of hydrated lime constitute nominal one cubic foot.
4. Shovel measurement: Not permitted.

B. Mortar Mixing:
1. Type of Mixer: Machine mix in approved mixer in which the quantity of water is accurately and uniformly controlled.
2. While mixer is in operation add approximately 3/4 the required water, 1/2 the sand, all the cement, then add remainder of sand.
3. Allow batch to mix briefly then add water in small quantities until satisfactory workability is obtained.
4. Mix for not less than five minutes after all materials have been added.
5. Hydrated Lime for Mortar Requiring Lime Content: Use dry-mix method. Turn over together the materials for each batch until the even color of the mixed, dry materials indicates that cementitious material has been thoroughly distributed throughout the mass, then add water to obtain required plasticity.
6. Lime putty if approved for use shall be prepared in accordance with ASTM C 5.
7. The mixer drum shall be completely emptied before recharging the next batch.
8. Limit batch size to avoid retempering. Retempering of mortar shall not be permitted.

3.02 Installation

Refer to Section 04200, Unit Masonry Construction.

**** END OF SECTION ****

SECTION 04200

UNIT MASONRY

PART 1 - GENERAL

1.01 Description

A. Contractor shall furnish and install the following:
   1. Concrete masonry units.
   2. Face Brick.
   3. Accent Brick.

B. Related Sections: Section 04100 — Mortar and Masonry.

1.02 Environmental Requirements

Maintain materials and surrounding air temperature to minimum 50°F prior to, during, and 48 hours after completion of masonry work.

1.03 Submittals

Test panels with project brick and color mortar required for ENGINEER'S approval.

PART 2 - PRODUCTS

2.01 Concrete Masonry Units

A. Concrete masonry units shall be in accordance with the requirements specified herein and the current issues of the following applicable specifications and standards:
   1. Hollow Load-Bearing Units: ASTM C 90.
   2. Solid Load-Bearing Units: ASTM C 145.
   3. Concrete Building Brick: ASTM C 55.
   4. Hollow Nonload-Bearing Units: ASTM C 129.
   5. Calcium Silicate (Sand-Lime) Face Brick: ASTM C 73.
   6. Prefaced Concrete Masonry Units: Federal Specification SS-C-621B.

B. Units specified by weight classification shall have oven-dry concrete weight densities, verified by test reports, as follows:
   Light Weight: Less than 105 pcf.
   Medium Weight: 105 to less than 125 pcf.
   Normal Weight: 125 pcf or more.

C. Aggregates used in the manufacturing of concrete masonry units shall consist of one or more of the following: Expanded clay, shale, or slate lightweight aggregates meeting requirements of ASTM C 331, and sand gravel, or crushed stone normal weight aggregates meeting all but the grading requirements of ASTM C 33.

D. Units which will be exposed to view of painted shall have a uniform appearance and must be approved by the ENGINEER based on a representative sample of at least three units.

E. Lightweight aggregate units shall be normal modular size for 3/8 inch mortar joint. Thickness shall be as indicated on the drawings.

F. Concrete masonry units shall be held on yard storage for a minimum of 28 days before delivery to the job site and maximum moisture content shall be 30% of total absorption.

2.02 Face Brick

Face brick to be Manchester as distributed by the Columbus Brick Company.

2.03 Accent Brick

Accent brick to be Specified Black as distributed by the Columbus Brick Company.

PART 3 - EXECUTION

3.01 Preparation

A. Verify items provided by other Sections of work are properly sized and located. Take special care to coordinate masonry work with requirements of Division 15 of specifications.

B. Establish lines, levels, and coursing. Protect from disturbance.

C. Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent bracing.

3.02 Coursing

A. Place masonry to lines levels indicated.

B. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.

C. Lay brick masonry units in running bond, unless drawings indicate different technique. Course one block unit and one mortar joint to equal 8 inches. Form weathered mortar joints. Lay concrete masonry units in running bond; form tooled concave joints.

D. Review control joint locations and configurations with ENGINEER prior to initiating the work. Control joint locations are indicated on the drawings.

3.03 Placing and Bonding

A. Lay masonry in full bed of mortar, properly jointed with other work. Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.

B. Fully bond intersections and external and internal corners.

C. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.

D. Remove excess mortar.

E. Perform jobsite cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges.

F. Provide 1/4" diameter weeps along bottom edge of all Face Brick Veneer Walls at 32-inches o.c.

3.04 Tolerances

A. Variation from Unit to Adjacent Unit: 1/32 inch maximum.

B. Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

C. Variation from Plumb: 1/4 inch per story noncumulative.

D. Variation from Level Coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet.

E. Variation of Joint Thickness: 1/8 inch in 3 feet.

F. Maximum Variation from Cross Sectional Thickness of Walls: Plus or minus 1/4 inch.

3.05 Reinforcement and Anchorage

A. Install joint reinforcement at 16 inches o.c.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend 16 inches minimum each side of opening.

C. Place joint reinforcement continuous in first joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches. Extend 16 inches minimum each side of opening.

E. Place reinforcing bars supported and secured against displacement. Maintain position within 1/2 inch of true dimension.

3.06 Cutting and Fitting

A. Cut and fit for pipes, conduit and sleeves. Cooperate with other sections of work to provide correct size, shape, and location. Take special care to coordinate work of this section with requirements of Division 15 of these specifications.

B. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

3.07 Cleaning

A. Clean soiled surfaces with a non-acidic solution which will not harm masonry of adjacent materials. Consult masonry manufacturer for acceptable cleaners.

B. Use non-metallic tools in cleaning operations.

3.08 Protection

A. Provide protection without damaging completed work.

B. At day's end, cover unfinished walls to prevent moisture infiltration.

**** END OF SECTION ****

SECTION 06001

CARPENTRY WORK AND MILLWORK

PART 1 - GENERAL

1.01 Description

A. Furnish and install materials related to:
   1. Rough Carpentry.
   2. Roof decking.
   3. Interior and exterior finish carpentry.
   4. Interior millwork and cabinets.
   5. Special wood door construction (Refer to Section 08300).
   6. Miscellaneous carpentry work, blocking and millwork.

B. Provide openings in carpentry to accommodate the Work under this and other Sections and building into the carpentry all items such as sleeves, anchor bolts, inserts and all other items to be embedded in carpentry for which placement is not specifically provided under other Sections.

1.02 References

A. MIL-L-1914-C Lumber and Plywood, Fire Retardant Treated.

B. Federal Specification, TT-W-550, Wood Preservative: Chromated Copper Arsenate Mixture.

C. PS 1 — Construction and Industrial Plywood.

D. PS 20 — American Softwood Lumber Standard.

E. PS 51 — Hardwood and Decorative Plywood.

F. PS 58 — Basic Hardwood.

G. NFPA — National Design Specification for Wood Construction.

H. Quality Standards of Architectural Woodwork Institute (AWI).

I. National Forest Products Association National Design Specification for Wood Construction.

1.03 Quality Assurance

A. Rough Carpentry Lumber: Visible grade stamp, of agency certified by National Forest Products Association (NFPA).

B. Fabricate cabinetwork and site made finish carpentry items in accordance with recommendations of Quality Standards of Architectural Woodwork (AWI).

1.04 Submittals

Submit shop drawings of finish carpentry and millwork items. Indicate location and dimensions. Contractor to verify all field dimensions applicable to finish carpentry items.

1.05 Delivery, Storage and Handling

A. Do not deliver shop fabricated carpentry items until site conditions are adequate to receive the work. Protect items from weather while in transit.

B. Store finish carpentry items indoors, in ventilated areas with a constant, minimum temperature of 60°F, maximum relative humidity of 25 to 55 percent.

1.06 Job Conditions

A. Contractor must examine the substrates and supporting structure and the conditions under which the carpentry work is to be installed, and notify the ENGINEER of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer and the ENGINEER. Initiation of installation work indicates acceptance of substrate and existing conditions.

B. Take special care to size millwork components to insure passage through existing building openings.

1.07 Coordination

A. Refer to Section 10800 for locations of bathroom accessories.

B. Take special care to furnish and install solid wood blocking for secure mounting of millwork.

PART 2 - PRODUCTS

2.01 Rough Carpentry Materials

A. Structural light framing: No. 2 grade.

B. Blocking: Treated blocking required where wood comes into direct contact with concrete and/or brick.

C. Roof Decking: 1/2" exterior plywood.

D. Roof framing: Pre-engineered and prefabricated trusses at 24 inch o.c.
   1. 20 lb./sq.ft. live load plus 10 lb./sq.ft. dead load on top chord.
   2. 15% stress increase (maximum) due to short term loading.

3. Verify locations and loads of mechanical/electrical equipment and increase strength of trusses as required.
4. Modify truss configuration to accommodate equipment.
5. Refer to plans.
6. Note: 2 x 6 top and bottom chords required, see eave detailing of drawings.
7. Provide shop fabricated timber wood trusses Work Shop Drawing signed and stamped with the seal of a Registered Professional Engineer licensed to practice in the State of Mississippi and recognized as an expert in the specialty involved.
8. Metal anchors required for attachment.

E. Entrance alcove at front of building (west elevation) shall have e" exterior gypsum ceiling board.

F. Exterior wood blocking: treated.

G. Exterior wood trim: No. 1 fir.

H. Nails, Spikes and Staples: Galvanized for exterior locations, high humidity locations and treated wood; plain finish for other interior locations; size and type to suit application.

I. Bolts, Nuts, Washers, Lags, Pins and Screws: Medium carbon steel sized to suit application galvanized for exterior locations, high humidity locations and treated wood; plain finish for other interior locations.

J. Fasteners: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to steel. Provide and install all anchors, nails, inserts, blocking, grounds and other carpentry items. Anchor bolts, nuts and washers and other anchors to concrete and masonry to be zinc coated.

2.02 Interior Finish Carpentry

A. Millwork at Rooms 109 & 204 (Refer to drawings):
1. Fabricate items in accordance with recommendations of AWI for custom grade classification.
2. Post formed roll front plastic laminate countertop with back and side splashes.
3. Colors as specified by ENGINEER.

B. Millwork at Room 214/216 (Refer to drawings):
1. Fabricate items in accordance with recommendations of AWI for custom grade classification.
2. Cabinet construction:
   a. Flush overlay design, stained finish.
   b. Door faces, drawer fronts and face frames: ¾" birch plywood.
   c. Shelving face frames and shelves: Birch plywood (Hardwood edge required at shelves).
   d. Adjustable shelves required.
   e. Post-formed plastic laminate top with integral backsplash equal to Formica.
3. Color as specified by OWNER.

2.03 Hardware

A. Cabinet and drawer pulls: 3-½" wire pulls, brushed aluminum finish, equal to Model No. 752 by Colonial Bronze Co.

B. Drawer glides: equal to Blum Meta-Box.

C. Cabinet door hinges: equal to Blum, fully concealed, European style, self-closing.

2.04 Wood Treatment

A. Wood preservative: water-borne salt preservative.
   1. AWPB LP-2, above ground application.
   2. AWPB LP-22, ground contact application.

B. Horizontal wood members with any part to be placed less than 24" from finished grade shall be pressure preservatively treated.

C. All wood nailing blocks and strips for securing flashing of all kinds should be preservatively treated.

2.05 Preparation of Finish Carpentry Items and Cabinetwork for Finishing

A. Sand work smooth and set exposed nails. Apply wood filler in exposed nail indentations and leave ready to receive shop applied finishes. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.

B. Seal and varnish concealed surfaces.

C. Seal internal surfaces of cabinets.

D. Preservative treat surfaces in contact with cementitious materials.

E. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fitments. Verify locations of cutouts from site dimensions. Seal contact surfaces of cutouts.

F. Shop finish all millwork items.

PART 3 - EXECUTION

3.01 Furring and Stripping

A. Erect wood stripping and nailing members true to lines and levels. Do not deviate from true alignment more than 1/4 inch.

B. Space members at 16 inches on center or as indicated on drawings.

C. Construct members of continuous pieces of longest possible lengths.

3.02 Installation of Finish Carpentry Items and Cabinet Work

A. Set and secure cabinetwork items in place rigid, plumb and square.

B. Use purpose designed fixture attachments for mounted components.

C. Use threaded steel concealed joint fasteners to align and secure adjoining cabinet units and counter tops.

D. When necessary to cut and fit on site, make material with ample allowance for cutting. Provide trim for scribing and site cutting.

E. Permanently fix cabinet and counter bases to floor using appropriate angles and anchorages.

F. Counter-sink semi-concealed anchorage devices used to wall mount components and conceal with solid plugs of species to match surrounding wood. Place flush with surrounding surfaces.

G. Install and adjust cabinet hardware to correct operation.

H. Ensure that mechanical and electrical items affecting this section of work are properly placed and complete prior to commencement of installation.

3.03 Application of Hardware

A. Receive, store and be responsible for all finished hardware. Properly tag, index and file all keys in key cabinet or as directed. Apply hardware in accordance with manufacturer's instructions, fit accurately, apply securely and adjust carefully. Use care not to injure work when applying hardware. When necessary, remove and replace doors so they may have bottoms painted.

B. The location of hardware in connection with wood door and metal door bucks shall be as follows unless otherwise shown on the drawings: Center door knobs 38 inches above finished floor; center door pulls 40 inches and push plates 45 inches above finished floor; center cylinder dead locks 52 inches above finished floor; center single push bars 48 inches above finished floor; locate upper edge of top hinges 5 inches below head of frame; locate lower edges of bottom hinges 10 inches above finished floor; space center hinges equal distance between top and bottom hinges.

**** END OF SECTION ****

SECTION 07410

METAL ROOFING AND ACCESSORIES

PART 1 - GENERAL

1.01 Description

Furnish and install prefinished standing seam metal roof complete with mounting accessories and trim on the Chlorination Building.

1.02 Related Work

Section 06001 — Carpentry Work and Millwork.

1.03 Manufacturer's Warranty

Twenty-year coating guarantee.

1.04 Installer Warranty

A. Furnish Owner with a five-year written warranty which covers roof repairs required to maintain roof in watertight condition.

B. The five-year warranty period begins when the building is accepted by the Owner (the date of the Certificate of Substantial Completion).

1.05 Submittals

A. Submit samples of ECI, Ceramcoat EP Standard Colors (twelve colors) for Engineer's use in selecting roof, roof accessories, and color.

B. Submit shop drawings of roof accessory components, including mounting information.

PART 2 - PRODUCTS

2.01 Preformed Metal Roofing

A. 30-pound felt required.

B. Preformed Metal Roofing: ECI, TR Series, Panel Profile No. TR-100, embossed surface, prefinished 26-gauge steel. (Panels to run full length, without joints, from ridge to eave.)

C. Finish: Ceramcoat EP System.

2.02 Continuous Ridge Vent (Low Profile)

A. 15 sq. in. of net free area per lineal foot.

B. Material: Furnished by ECI, embossed surface, prefinished in color to match roof, 26-gauge.

C. Provide submittal.

2.03 Flashings and Ridge Caps

PART 3 - EXECUTION

3.01 Storage of Metal Roofing and Accessories

A. Store materials off the ground and protect with a tarpaulin. Allow for free air circulation between the tarpaulin and the ground.

B. Prolonged storage is not recommended, so if immediate erection is not possible, take extra care to protect the sheets from water marks.

3.02 Inspection

Inspect substrate and supporting structure and the conditions under which the metal roofing and accessories are to be installed. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer and the Engineer. Initiation of installation work indicates acceptance of substrate and existing conditions.

3.03 Handling

Proper handling of all materials is essential. Care should be taken not to bend, twist, scratch, or otherwise damage panels during installation. Traffic on installed materials should be kept to a minimum, and, where practical, protective devices should be used to prevent damage to metal and paint finishes.

3.04 Installation

Install in strict accordance with manufacturer's instructions.

****END OF SECTION****

SECTION 08210

FIBERGLASS FRAMES

PART 1 - GENERAL

1.01 Work Included — Furnish and Install the Following:

Fiberglass frames and accessories. Refer to door/frame schedule for locations and sizes.

1.02 Related Work

A. Section 08200 — Wood doors

B. Section 08220 — Fiberglass doors

C. Section 08700 — Hardware

1.03 Quality Assurance

Coordinate frame preparation with requirements of approved finish hardware schedule.

1.04 Submittals

A. Submit four (4) copies of shop drawings and product data to Architect.

B. Indicate door elevations, internal reinforcement and closure method.

PART 2 - PRODUCTS

2.01 Acceptable Manufacturers

Fiberglass frames: F.R.P. frame systems by Corrim door systems of Fenestra Corporation, or approved equal.

2.02 Manufacturers Recommendations

Installation shall be preformed in strict accordance with manufacturer's recommendations and instructions.

2.03 Fiberglass Frames

A. Materials:
   1. Corner reinforcement:
      a. 4" x 4" x 5-3/8" x ¼" thick pultruded fiberglass angle.
      b. Attached to head bar at factory using stainless steel screws.
      c. Field attached to jambs using stainless steel screws for KD installation.

2. Mortise hinge reinforcement:
   a. 1-½" x 7: x ¼" thick polymer
   b. Attached to frame by means of bonding and stainless steel countersink screws.
3. Surface hinge reinforcement:
   Same as mortise hinge reinforcement.
4. Closer reinforcement:
   Same as mortise hinge reinforcement.
5. Strike reinforcement:
   1-½" x 9" x ¾" thick polymer material. Attached to frame by means of bonding and stainless steel countersunk screws.

B. Anchoring systems:
   Standard anchoring systems are as follows:
   a. T-strap — for masonry construction.
   b. Wire anchor — for masonry construction.

C. Finish:
   1. Gel coat: 15 mil. thick on all exposed surfaces.
   2. Color: As selected by Architect.

PART 3 - EXECUTION

3.01 Storage

A. Stack and store frames properly to protect material from harmful elements and damage while stored at the job site.

B. Upon delivery, touch-up damaged areas of finish. Refer to manufacturer's recommendations.

C. Check all fiberglass frames prior to installation for dents and other unacceptable conditions. Initiation of installation indicates acceptance of materials.

3.02 Adjustment and Cleaning

A. Remove dirt and excess sealants or glazing compound from exposed surfaces.

B. Touch up marred or abraded surface to match original finish. Refer to manufacturer's recommendations.

****END OF SECTION****

SECTION 08220

FIBERGLASS DOORS

PART 1 - GENERAL

1.01 Work Included

Solid core, fiber glass reinforced plastic doors with light.

1.02 Related Work

A. Section 06001 — Carpentry work and millwork.

B. Section 08700 — Hardware.

1.03 Submittals

Indicate door elevations, stile and rail enforcement, core composition, internal blocking for hardware attachment, and cutouts for glazing.

PART 2 - PRODUCTS

2.01 Acceptable Manufacturers

Solid core, fiber glass doors with half light: polymer doors by corrim door systems by Fenestra Corporation, or approved equal.

2.02 Solid Core, Fiber Glass Reinforced Plastic Doors with Light (Materials)

A. Face sheets shall be fiber glass reinforced plastic.
   1. Standard face sheets shall be manufactured using a corrosion-resistant isophthalic polyester resin system with light stabilizing additives. The resin shall be reinforced with fiberglass 40% by weight.
   2. Face sheets shall be 0.070" to .0125" in thickness. Standard being 0.110".
   3. Finish:
      a. Gel coat: 15 mil. thick on all exposed surfaces.
      b. Color: As Selected by Architect.

B. Internal Construction:
   Polyurethane core — a 1-½" thick rigid block of polyurethane shall be laminated to the exterior panels. The "K" factor shall be .14 BTU in./hr./sq.ft. 2-4 lb. density.

C. Windows:
   1. All glass in exterior doors shall be one inch insulated clear safety glass. Tempered in locations required by code.
   2. All glass in interior doors shall be ¼" tempered clear safety glass.

2.03 Hardware Preparations:

A. An approved hardware schedule with all necessary template information shall be provided to the door manufacturer prior to fabrication.

B. Reinforcement Blocks:
   1. Lockset — non-swelling polymer blocks.
   2. Surface mounted hardware — non-swelling polymer blocks.
   3. Through bolted hardware — non-swelling polymer blocks.

C. Mortise hardware:
   1. Full mortise hinges — Non-swelling polymer blocks.
   2. Half mortise hinges — Non-swelling polymer blocks.
   3. Mortise locksets — to suit template provided by CONTRACTOR.
   4. Exit devices — to suit template provided by CONTRACTOR.

D. All doors shall be mortised and reinforced to allow field application of hinges and locks, in accordance with approved hardware SUBCONTRACTOR. Where surface hardware is to be applied, doors shall have reinforcing blocks only; all drilling and tapping shall be by others unless specified by CONTRACTOR.

E. Hinges shall be attached by using wood screws or through bolts.

2.04 Finish

A. Gel coat: 15 mil. thick on all exposed surfaces.

B. Color: As selected by Architect.

2.05 Manufacturer's Note

Polymers by their nature expand in heat and direct sunlight. Temporary bowing may occur. Doors will return to "normal" contour when sun is off them.

PART 3 - EXECUTION

3.01 Storage

A. Stack and store doors properly to protect from harmful elements and damage while stored at the job site.

B. Upon delivery, touch-up damaged areas of finish. Refer to manufacturer's recommendations.

C. Check all doors prior to installation for dents and other unacceptable conditions. Initiation of work indicates acceptance of materials.

3.02 Installation

Hang doors plumb and true, with uniform clearances on all sides.

3.03 Adjustment & Cleaning

A. Remove dirt and excess sealants or glazing compound from exposed surfaces.

B. Touch-up marred or abraded surface to match original surface. Refer to manufacturer's recommendations.

C. Adjust doors for smooth and balanced door movement.

****END OF SECTION****

SECTION 08700

HARDWARE

PART 1 — GENERAL

1.01 Description

A. Hardware for interior and exterior doors.
   1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all finish-hardware Work.
   2. If finish-hardware for any location is not specified, provide finish-hardware equal in design and quality to adjacent finish-hardware for comparable openings.

B. Related Sections:
   1. Door/Frame and Finish-Hardware Schedule.
   2. Section 08100, Steel Doors, Frames and Glazing.
   3. Section 08200, Wood Doors.
   4. Section 08300, Special Wood Doors.
   5. Section 08400, Entrances and Storefronts.

1.02 Quality Assurance

A. Meet requirements and recommendations of applicable portions of standards listed.
   1. American Society for Testing Materials, ASTM.
   2. Commercial Standards, CS.
   3. Southern Standard Building Code, SSBC.
   4. Federal Specifications, FS, TT-S-001657, Sealing Compound.
   5. Americans with Disabilities Act, ADA.
   6. American National Standards Institute.

B. Supplier's Qualifications: Furnish services of an architectural hardware consultant responsible for hardware scheduling, keying, coordinating with other trades, consulting with ENGINEER and owner and on-site inspections to ensure coordination and application.

1.03 Submittals

A. Hardware Schedule: Organize in "hardware set" format. Indicate manufacturer's name, product description, finish and locations of each item with fastenings required. Explain symbols, abbreviations and codes. Submit complete keying schedule.

B. Product data: Submit manufacturer's cut sheets for each item. Indicate compliance with ANSI A117.1-1986, handicapped accessibility standards.

C. Samples: Submit with hardware schedule. Samples will be returned to supplier.

D. Templates: Furnish templates and approved finish-hardware schedule to door and frame manufacturers for use in fabrication.

1.04 Product Delivery

A. Deliver finish-hardware to project site packaged together in sets in accordance with approved hardware schedule.
   1. Where hardware items are furnished by manufacturer in individual boxes, box may be incorporated into repackaging. Mark packages with hardware-set number and door number.
   2. Include manufacturer's installation instructions, fasteners and installation tools.
   3. Identical hardware sets may be packaged together.

B. Inventory hardware when delivered. Provide temporary, clean, dry, locked storage area for hardware until installed.

PART 2 — PRODUCTS

2.01 Keying

A. Cylinders and Keying System:
   1. Provide a greatgrandmaster keying system.
   2. Equip all locks with manufacturer's special 6-pin tumbler cylinder, with construction master key feature, which permits voiding of construction keys without cylinder removal.
   3. Comply with ENGINEER'S instructions for masterkeying and, except as otherwise specified, provide individual change key for each lock which is not designated to be keyed alike with a group of related locks.
   4. Key Material: Provide keys of nickel silver only.
   5. Key Quantity: Furnish 3 keys for each lock and 5 keys for each master and grandmaster system. Provide one extra key blank for each lock.

2.02 Finishes

Generally shall be brushed aluminum.

2.03 Manufacturers

A. Closers: Equal to Yale, 50 Series (interior), 5120 Series (exterior).

B. Hinges: Equal to Hager, BB 1199 4-1/2" x 4-1/2" stainless steel.

C. Locksets: Equal to Russwin 800 Series Lever handles: Heavy duty cylindrical lockset.
   1. Function as per hardware schedule.
   2. Armstrong Design.
   3. Complete with strike.

D. Doorstops: Equal to TRIMCO domes or pedestal stops. Provide wall stops for all interior doors wherever possible. Provide long arms on closers where possible in order to avoid use of floor stops.

E. Kickplates: Equal to TRIMCO 8" high x width of door, minus 2". Smooth finish.

F. Surface Bolts: Equal to Colonial Bronze Surface Bolts No. 908, including strikes.

G. Silencers required at all hollow metal frames.

H. Thresholds and Weatherstripping: Equal to PEMKO
   1. Thresholds: PEMKO 2005SSS.
   2. Weatherstripping: PEMKO 315SSR.
      (Bronze finish at aluminum storefront doors).

I. Exit Devices: Equal to Von Duprin Series 33 with strikes. Bronze finish on aluminum doors, stainless steel typical.

J. Push Plates: Equal to TRIMCO, 3-1/2" x 12".

K. Pulls with Pull Plates: Equal to TRIMCO.
   1. Interior: Plates, 3-1/2" x 16". Model No. 1820.
   2. Panic type entrance doors (exterior and interior): Plate, 3" x 15". Pull, Model No. 1131-2, 10" CTC.

L. Rain Drip:
   1. Provide rain drip for all exterior doors not protected by an overhang.
   2. Metal: Extruded clear anodized aluminum.
   3. Provide projecting leg of 2-1/2".
   4. Equal to R201 DUR by Reese Enterprises Incorporated.

M. Products of other manufacturers similar to that specified herein will be acceptable for use on the project when approved in writing by the ENGINEER. Supporting technical literature, samples, drawings, performance data must be submitted for comparison.

PART 3 — EXECUTION

3.01 Hardware Installation

A. Install finish hardware plumb, level and true to line, in accordance with manufacturer's product data. Locations of hardware, where applicable, in accordance with:
   1. DHI Publication, *Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.*
   2. NWDA Industry Standard I.S.7, *Hardware Locations for Wood Doors.*

B. Install finish hardware to template. Cut and fit substrate to avoid substrate damage and weakening. Cover cut-outs with hardware item. Mortise work in correct locations and size, without gouging, splintering or causing irregularities in finished work.

3.02 Cleaning and Adjusting

A. At time of hardware installation, adjust each hardware item to perform function intended. Lubricate moving parts using lubricant acceptable to manufacturer.

B. Prior to date of Final Completion, readjust and relubricate hardware. Repair or replace defective materials. Clean hardware to remove dust and stains.

C. Instruct Owner's designated personnel in adjustment and maintenance of hardware and finishes during hardware adjustment.

*** * END OF SECTION * ***

SECTION 09900

PAINTING

PART 1 – GENERAL

1.01 Description

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all painting work.
2. The extent of painting is specified.
3. The types of painting Work includes the painting and finishing of all items and surfaces throughout the project included in this Contract. Surface preparation, priming and coats of paint specified are in addition to shop priming and surface treatment specified under other sections of the Work.
4. The term "paint" as used herein means all coating systems materials, which includes pretreatments, primers, emulsions, enamels, stain, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
5. Paint all exposed surfaces whether or not colors are designated in any schedule, except where the natural finish of the material is specifically noted as a surface not to be painted. The term "exposed" as used herein means all items not covered with concrete. Ducts, conduits and other materials with corrosion resistant surfaces which are in chases, above finished ceilings, or other inaccessible areas shall not require field painting. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas.
6. Structural and miscellaneous metals covered with concrete, shall only receive a primer compatible with the covering material.
7. Pipe markers as specified.

B. Coordination:

1. Review installation procedures under other Sections and Coordinate the installation of items that must be field painted in this Section.
2. Notify other contractors in advance of the field painting to provide the other contractors with sufficient time for installation of items included in their work that must be field painted in this Section. Coordinate the painting of areas which would become inaccessible once equipment has been installed.
3. Coordinate the painting of areas that are inaccessible once equipment has been installed.
4. Provide finish coats which are compatible with the prime paints used. Review other Sections of these Specifications in which prime paints are to be provided to ensure compatibility of the total coatings system for the various substrates. CONTRACTOR shall be responsible for the compatibility of all shop primed and field painted items. Furnish information on the characteristics of the finish materials proposed to use, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and reprime as required. Notify ENGINEER in writing of anticipated problems using the coating systems as specified with substrates primed by others.

C. Painting Not Included: The following categories of Work are not included as part of the field-applied finish Work, or are included in other Sections of these Specifications.

1. Shop Priming: Unless otherwise specified, shop priming of structural metal, miscellaneous metal fabrications, other metal items and such fabricated components as shop-fabricated or factory-built heating and ventilating, instrumentation and electrical equipment or accessories shall conform to applicable requirements of Section 09900, Painting but is included under the appropriate Sections of the Specification.
2. Pre-Finished Items:
   a. Items furnished with factory finishes such as baked-on enamel, plastic laminate, alkyd-urea synthetic resin, porcelain, polyvinylfluoride or other similar finishes.
   b. Touchup factory finished items with paint supplied by the item manufacturer. CONTRACTOR shall field paint prefinished items as specified or directed by ENGINEER.
3. Concealed Surfaces:
   a. Nonmetallic wall or ceiling surfaces in concealed from view areas and generally inaccessible areas, such as furred areas, pipe spaces, duct shafts and elevator shafts, as applicable to this project.
   b. Paint all piping, equipment, and other such items within these areas, that do not have galvanized or other corrosion resistant finish as specified.
4. Exterior above-grade non-submerged concrete.
5. Submerged or intermittently submerged concrete unless otherwise specified.
6. Metal surfaces of anodized aluminum, stainless steel, chromium plate and bronze will not require finish painting, unless shown or specified.
7. Operating Parts and Labels:
   a. Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts do not require painting unless otherwise specified.
   b. Do not paint over any code-required labels, such as UL and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.
   c. Remove all paint, coating or splatter inadvertently placed on these surfaces.

1.02 Quality Assurance

A. Applicator Qualifications:

1. Submit the name and experience record of the painting applicator. Include the name of utility or industrial installations painted, responsible officials, architects, or engineers concerned with the project and the approximate contract price.
2. Painting applicators whose submissions indicate that they have not had the experience required to perform the Work will not be approved.

B. Source Quality Control: Obtain all materials from the same manufacturer unless otherwise approved. Obtain materials only from manufacturers who will:
Provide the services of a qualified manufacturer's representative at the project site at the commencement of Work to advise on materials, installation and

1. Finishing techniques.
2. Certify long-term compatibility of all coatings with all substrates, both new and existing.

C. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified:
   1. ANSI A13.1, Scheme for the Identification of Piping Systems.
   2. Great Lakes – Upper Mississippi River Board of State Sanitary Engineers (Ten States Standards), Recommended Standards for Water Works – 1968 Edition, Addendum No. 6, Painting of Water Works Piping for Public Water Supplies.
   3. OSHA 1910.144, Safety Color Code for Marking Physical Hazards.
   4. SSPC Volume 2, Systems and Specifications, Surface Preparation Guide and Paint Application Specifications.

D. Requirements of Regulatory Agencies: Coatings for surfaces in contact with potable water or water being treated for potable use shall not impart any taste or odor to the water or result in any organic or inorganic content in excess of the maximum contaminant level established by applicable laws or regulations. All such coatings shall be approved by the applicable regulatory agency. Revise painting systems specified herein to provide manufacturer's regulatory agency approved coating system where required.

1.03 Submittals

A. Samples: Submit for approval each type of marker specified.

B. Shop Drawings: Submit for approval the following:
   1. Copies of manufacturer's technical information, including paint label analysis and application instructions for each material proposed for use.
   2. Copies of CONTRACTOR'S proposed protection procedures in each area of the Work.
   3. List each material and cross-reference to the specific paint and finish system and application. Identify by manufacturer's catalog number and general classification.
   4. Copies of manufacturer's complete color charts for each coating system.
   5. Pipe Markers: Copies of manufacturer's technical brochure, including color chart and list of standard markers.
   6. Maintenance Manual: Upon completion of the Work, furnish copies of a detailed maintenance manual including the following information:
      a. Product name and number.
      b. Name, address and telephone number of manufacturer and local distributor.
      c. Detailed procedures for routine maintenance and cleaning.
      d. Detailed procedures for light repairs such as dents, scratches and staining.

C. Test Reports: Submit for approval certified laboratory test reports for required performance tests.

1.04 Product Delivery, Storage and Handling

A. Delivery of Materials: Deliver all materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label, and the following information:
   1. Name or title of material.
   2. Manufacturer's stock numbers and date of manufacture.
   3. Manufacturer's name.

4. Contents of volume, for major pigment and vehicle constituents.
5. Thinning instructions where recommended.
6. Application instructions.
7. Color name and number.

B. Storage of Materials:
1. Store only acceptable project materials on project site.
2. Store in a suitable location approved by ENGINEER. Keep area clean and accessible.
3. Restrict storage to paint materials and related equipment.
4. Comply with health and fire regulations including the Occupational Safety and Health Act of 1970.

C. Handling of Materials.
1. Handle materials carefully to prevent inclusion of foreign materials.
2. Do not open containers or mix components until necessary preparatory Work has been completed and application Work will start immediately.

1.05 Job Conditions

A. Existing Conditions:
1. Before painting is started in any area, it shall be broom cleaned and excessive dust shall be removed.
2. After painting operations begin in a given area, broom cleaning will not be allowed; cleaning shall then be done only with commercial vacuum cleaning equipment.

B. Environmental Requirements:
1. Apply water-base paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 55^0F and 90^0F unless otherwise permitted by the paint manufacturer's printed instructions.
2. Apply other paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 65^0F and 95^0F, unless otherwise permitted by the paint manufacturer's printed instructions.
3. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces.
4. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperatures limits specified by the paint manufacturer during application and drying periods.
5. Adequate illumination and ventilation shall be provided in all areas where painting operations are in progress.
6. Install piping markers only after all painting and finish Work has been completed.

C. Protection: Cover or otherwise protect finished work of other trades and surfaces not being painted concurrently or not to be painted.

PART 2 – PRODUCTS

2.01 Material Quality

A. Manufacturer: Provide products of one of the following:
   1. Tnemec Company, Incorporated.
   2. Or equal.

B. Provide manufacturer's best grade of the various types of coatings suitable for use in water treatment plants and pumping stations as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard, best-grade product will not be acceptable.

C. Provide primers produced by the same manufacturer as the finish coats. Use only thinners recommended by the paint manufacturer, and use only to recommended limits.

D. Provide paints, and pipe markers of durable and washable quality. Use materials which will withstand normal washing as required to remove grease, oil, chemicals, etc., without showing discoloration, loss of gloss, staining, or other damage.

2.02 Substitutions

No substitutions shall be considered that decrease the film thickness, the surface preparation or the generic type of coating specified. Approved manufacturers must furnish the same color selection as the manufacturers specified, including accent colors and custom colors in all coating systems.

2.03 Colors and Finishes

A. Surface treatment and finishes, are shown under "Painting Systems" below. All substrates scheduled under "Painting Systems" shall be painted whether or not shown on the Drawings, or in schedules, unless an item is specifically scheduled as not requiring the painting system scheduled below.

B. Color Selection:
   1. A maximum of 20 different colors shall be selected for the project, in addition to color coding of all piping and ducts.
   2. OWNER reserves the right to select non-standard colors for all paint systems specified within the ability of the manufacturer to produce such non-standard colors. Selection of non-standard colors shall not be cause for CONTRACTOR rejecting OWNER'S color selections and CONTRACTOR shall provide such colors at no additional expense to the OWNER.

C. After approval of submittals and prior to beginning Work, ENGINEER will furnish color schedules for surfaces to be painted listed in the painting systems below.

D. Color Coding: In general, and unless otherwise specified, all color coding of piping, ducts and equipment shall comply with applicable standards of ANSI A13.1 and OSHA 1910.144.

E. Use representative colors when preparing samples for ENGINEERS' review.

F. Color Pigments: Pure, non-fading, applicable types to suit the substrates and service indicated.
   1. Lead: Lead content shall not exceed amount permitted by federal, state and local government laws and regulations.
   2. Paints specified for application in contact with potable water shall be approved by the United States Environmental Protection Agency.

G. Submit proposed application techniques to ENGINEER. Submit proof of acceptability, of technique proposed, by the paint manufacturer selected.

2.04 Painting Systems

A. Submerged or Intermittently Submerged Concrete containing wastewater, sludges and other non-potable liquids; including interior coating for all precast manhole sections and reinforced concrete pipe, and all interior surfaces of the pump station wetwell:
   1. Surface Preparation: SSPC-SP 7 Brush-Off Blast Cleaning as specified in 3.02.B.
   2. Product and Manufacturer: Provide one of the following:
      a. Warren Environmental System 100% Solids Epoxy.
      b. Or equal.
   3. Application Thickness:
      a. Minimum damage, 150 mil thickness of 100% solids epoxy monolithic surfacing system.
      b. Damage consists of missing mortar out from between bricks in brick manholes or exposed concrete aggregate in precast concrete manholes, 250 mil thickness of 100% solids epoxy monolithic surfacing system.
      c. New precast manhole, 60 mil thickness of 100% solids epoxy monolithic surfacing system.

B. Submerged or Intermittently Submerged Ferrous Metals; Interior and Exterior:
   1. Surface Preparation: SSPC-SP 10 Near-White Blast Cleaning as specified in 3.02.C.
   2. Product and Manufacturer: Provide the following:
      a. Tnemec:
         (1) Primer: 20-1255 Pota-Pox — 3.0-5.0 dry mils
         (2) Finish: 140-AA90 Potapox Plus — 6.0-8.0 dry mils
      b. Or equal.

C. Ferrous, Non-Ferrous Metals and Fiberglass: Exterior Non-Submerged:
   1. Surface Preparation:
      a. Ferrous Metals: SSPC-SP 5 Commercial Blast Cleaning as specified in 3.02.C.
      b. Non-Ferrous Metal: SSPC-SP 1 Solvent Cleaning as specified in 3.02.E and 3.02.D.
      c. Fiberglass: Sand as specified in 3.02.F.
   2. Product and Manufacturer: Provide the following:
      a. Tnemec:
         (1) Primer:
            (a) Ferrous Metals: 66-1211 Epoxy — 3.0-5.0 dry mils
            (b) Non-Ferrous: None.

(2) Intermediate: 66-Color H.B. Epoxoline 3.0-5.0 dry mils
(3) Finish: 1074 Endura-Shield II 2 coats* 1.5-2.5 dry mils per coat
*Color shall exhibit slight contrast between first and second coats

b. Or equal.

D. Submerged or Intermittently submerged Galvanized Ferrous Metal; Interior and Exterior:
1. Surface Preparation: SSPC-SP 1 Solvent Cleaning, as specified in Section 3.0E.
2. Product and Manufacturer: Provide the following:
a. Tnemec:
(1) Primer: 66-1211 H.B. Epoxoline 3.0-5.0 dry mils
(2) Intermediate: 66 H.B. Epoxoline 3.0-5.0 dry mils
(3) Finish (Exterior only) 1074 Endura-Shield II 2.0-4.0 dry mils
b. Or equal.

E. All Aluminum in Contact with Dissimilar Materials:
1. Surface Preparation:
a. Remove all foreign matter.
b. Scarify all surfaces as specified in 3.0F.
2. Product and Manufacturer: Provide the following:
a. Tnemec: 66 H.B. Epoxoline 2 coats, 2.0-3.0 dry mils per coat
*Color shall exhibit slight contrast between first and second coats
b. Or equal.

F. Steel and Galvanized Steel Pipe; Buried Exterior:
1. Surface Preparation: SSPC-SP 10, Near-White Blast, as specified in Section 3.02.C.
2. Product and Manufacturer: Provide the following:
a. Tnemec:
(1) Shop Primer: 66-1211 Epoxy 3.0-5.0 dry mils
(2) Field Primer or Field Touchup: Surface preparation as specified.
(3) Finish: 46H-413 Tneme-Tar 14.0-16.0 dry mils
b. Or equal.

2.05 Piping Markers

A. Manufacturer: For all interior piping, provide products produced by one of the following:
1. W. H. Bradley Company
2. Seton Name Plate Corporation
3. Or equal

B. General:
1. Piping markers shall be formed from laminated plastic. All printing shall be sealed with a formed butyrate plastic film. Markers for piping up to 6-inch diameter shall be preformed to completely wrap around the pipe requiring no adhesive. Markers for pipes over 6-inch diameter shall be preformed to the contour of the pipe and attached with stainless steel spring fasteners.
2. For pipes under 3/4-inch outside diameter: Provide brass tags, 12-inch diameter, with depressed 1/4-inch high black filled letters above 2-inch high black filled numbers.
3. Each marker shall consist of at least 1 legend descriptive of the function of the pipe, and a directional arrow.

4. The size of lettering and marker shall conform to ANSI A13.1.
5. Location of Markers:
   a. Adjacent to each valve and "T" connection.
   b. At each branch and riser takeoff.
   c. At each pipe passage through a wall, floor and ceiling.
   d. On all horizontal and vertical pipe runs at 25-foot intervals.

C. For all exterior piping, provide stenciled lettering and directional arrow to identify exposed pipe in lieu of laminated plastic. Lettering to be black or white paint conforming with Paragraph 2.04 of this Section.

PART 3 – EXECUTION

3.01 Inspection

A. CONTRACTOR and his applicator shall examine the areas and conditions under which painting Work is to be performed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

3.02 Surface Preparation

A. General:
   1. Perform all preparation and cleaning procedures as specified herein and in strict accordance with the paint manufacturer's instructions for each particular substrate and atmospheric condition.
   2. Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish painted, or provide surface applied protection prior to surface preparation and painting operations. Remove, if necessary, for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, reinstall the removed items by workmen skilled in the trades involved.
   3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease with clean cloths and cleaning solvents prior to mechanical cleaning. Program the cleaning and painting so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.
   4. All surfaces which were not shop painted or which were improperly shop painted, and all abraded or rusted shop painted surfaces, which are to be painted, as determined by ENGINEER, shall be prepared as specified below.

B. Cast-In-Place Concrete and Masonry Surfaces:
   1. Prepare surfaces of cast-in-place concrete and concrete block to be painted by removing all efflorescence, chalk, dust, dirt, grease, oils, with soap and water.

2. Determine the alkalinity and moisture content of the surfaces to be painted by performing appropriate tests. If the surfaces are found to be sufficiently alkaline to cause blistering and burning of the finish paint, correct this condition before application of paint. Provide ENGINEER with suitable testing materials in order to carry out alkalinity and moisture tests.
3. Do not paint over surfaces where the moisture content exceeds 8%, unless otherwise permitted in the manufacturer's printed directions.
4. Concrete and concrete block surfaces that cannot be adequately cleaned by soap and water shall be acid etched. Exceedingly dense concrete may require a second etching.

C. Ferrous Metals:
1. Clean non-submerged ferrous surfaces including structural steel and miscellaneous metal to be shop primed, of all oil, grease, dirt, mill scale and other foreign matter by commercial blast cleaning complying with SSPC-SP 6.
2. Clean submerged ferrous surfaces including structural steel and miscellaneous metal to be shop primed, of all oil, grease, dirt, mill scale and other foreign matter by near white blasting complying with SSPC-SP 10.
3. Clean non submerged, ferrous surfaces that have not been shop coated of all oil, grease, dirt, mill scale and other foreign substances by commercial blasting, complying with SSPC-SP 6.
4. Clean submerged ferrous surfaces that have not been shop-coated or that, in the opinion of ENGINEER, have been improperly shop coated, of all oil, grease, dirt, mill scale and other foreign matter by near white blasting complying with SSPC-SP 10.
5. Treat bare and blasted or pickled clean metal with metal treatment wash coat, prior to priming only if recommended by the paint manufacturer.
6. Touch-up shop-applied paint coats which have damaged or bare areas, with primer recommended by the coating manufacturer after commercial blasting complying with SSPC-SP 6.

D. Non-Ferrous Metal Surfaces: Clean non-ferrous metal surfaces in accordance with the coating system manufacturer's instructions for the type of service, metal substrate, and application required.

E. Galvanized Surfaces:
1. Clean free of oil and surface contaminants with a non-petroleum based solvent, recommended by the coating manufacturer, complying with SSPC-SP 1.
2. Remove shop applied chromic acid treatments on galvanized surfaces to be painted. Galvanized metals which have been given a humid storage stain treatment shall be prepared for painting by sanding or by other techniques as recommended by the paint manufacturer at no additional expense to OWNER.

F. PVC Piping and Fiberglass: Lightly sand and clean all surfaces to be painted.

G. Covering on Pipe: Clean free of oil and surface contaminants as recommended by the coating manufacturer for substrate and application required. Do not cut or damage the insulation in any way.

3.03 Materials Preparation

A. General:

1. Mix and prepare painting materials in strict accordance with the manufacturer's directions.
2. Do not mix coating materials produced by different manufacturers, unless otherwise permitted by the manufacturer's instructions.
3. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.
4. Stir all materials before application to produce a mixture of uniform density, and as required during the application of the materials. Do not stir any film which may form on the surface into the material. Remove the film and, if necessary, strain the material before using.
5. Mixing:
   a. Mix only in containers placed in suitable sized non-ferrous or oxide resistant metal pans to protect concrete floor from splashes or spills which could stain exposed concrete or react with subsequent finish floor material.
   b. Mix and apply paint only in containers bearing accurate product name of material being mixed, or applied.

3.04 Application

A. General:

1. Apply paint by brush, roller, air spray, or airless spray in accordance with the manufacturer's directions and recommendations of Paint Application Specifications No. 1 in SSPC Vol. 2, where applicable. Use brushes best suited for the type of material being applied. Use rollers of carpet, velvet back, or high pile sheeps wool as recommended by the paint manufacturer for material and texture required. Use air spray and airless spray equipment recommended by the paint manufacturer for specific coating system specified. Submit a list of application methods proposed, listing paint systems and location.
2. The paint film thickness required is the same regardless of the application method. Do not apply succeeding coatings until the previous coat has completely dried.
3. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. This is of particular importance regarding intense primary accent colors. Insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a film thickness equivalent to that of flat surfaces.
4. Surfaces not exposed to view do not require color coding but require the same coating system specified for exposed surfaces. "Exposed to view surfaces" is defined as those areas visible when permanent or built-in fixtures convector covers, covers, covers for finned tube radiation, grilles, etc. are in place in areas scheduled to be painted.
5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint as specified, before final installation of equipment.
6. Paint aluminum parts in contact with dissimilar materials as specified with appropriate primer.
7. Omit field primer on metal surfaces which have been shop primed touch-up paint shop prime coats only when approved by ENGINEER.

8. Paint the backs of access panels, and removable or hinged covers to match the exposed surfaces.

B. Electrical Work:
1. Electrical items to be painted include, but are not limited to, the following:
   a. Conduit and fittings
   b. Switchgear, panels, junction boxes, motor control centers, motors and accessories.

C. Minimum Coating Thickness:
1. Apply each material at not less than the manufacturer's recommended spreading rate, and provide total dry film thickness as specified.
2. Apply extra coat if required to obtain specified total dry film thickness.

D. Scheduling Painting:
1. Apply the first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
2. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

E. Prime Coats: Recoat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects caused by insufficient sealing.

F. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage.

G. Transparent (Clear) Finishes:
1. On exposed to view portions, use multiple coats to produce glass-smooth surface film continuity of even matt luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
2. Provide satin finish for final coats, unless otherwise indicated.

H. Brush Application:
1. Brush-out and work all brush coats onto the surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable. Neatly draw all glass and color break lines.
2. Brush-apply all primer or first coats, unless otherwise permitted to use mechanical applicators.

I. Mechanical Applicators:
1. Use mechanical methods for paint application when permitted by governing ordinances, paint manufacturer, and approved by ENGINEER. If permitted, limit to only those surfaces impracticable for brush applications.

2. Limit roller applications, if approved by ENGINEER, to interior wall finishes for second and third coats. Apply each roller coat to provide the equivalent hiding as brush-applied coats.
3. Confine spray application to metal framework, siding, decking, wire mesh and similar surfaces where hand brush work would be inferior and to other surfaces specifically recommended by paint manufacturer.
4. Wherever spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of 2 coats in one pass.

J. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish, or repaint Work not in compliance with specified requirements as required by ENGINEER.

K. Piping Markers: Apply piping markers in accordance with the manufacturer's written instructions in locations herein specified.

L. Testing: The CONTRACTOR shall furnish an "Elcometer" as distributed by Gardner Laboratories, Bethesda, MD, or a "Mikrotest", as distributed by the Nordsen Equipment Company, Amherst, Ohio, to the ENGINEER to check dry mil thickness. The thickness gauge is to come with a carrying case and operating instructions. The CONTRACTOR shall provide a Holiday tester when requested by the ENGINEER.

3.05 Protection

A. Protect work of other trades, whether to be painted or not, from the Work of this Section. Leave all such work undamaged. Correct all damages by cleaning, repairing or replacing, and repainting, as acceptable to ENGINEER.

B. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove all temporary protective wrappings provided for protection of this Contract and other contracts after completion of painting operations.

3.06 Clean-up

A. During the progress of the Work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.

B. Upon completion of painting Work, clean all paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

C. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces as determined by ENGINEER.

3.03 Process Piping Color Schedule

USE	GENERAL COLOR
Waste Lines	
Sewer	Dark Gray
Other	
Outside Steel	Gray
Air Lines	Dark Green
Other Lines	Light Gray

*** * END OF SECTION * ***

SECTION 11240

CHEMICAL FEED EQUIPMENT — GENERAL

PART 1 — GENERAL

1.01 Description

A. Scope: The provisions of this section apply to the equipment specified in Sections 11243 through 11245, inclusive and Section 11270. This section does not apply to Section 11260. Applicable provisions apply to Section 11250.

B. General:
1. Contract Drawings are for purposes of guidance and for showing functional features and required external connections. They do not show all components required to accomplish the desired results nor all components required to interface with the equipment. Provide all miscellaneous parts, equipment and devices necessary to meet the functional requirements.
2. Contract Drawings show a general arrangement of the equipment, supports and foundations. Dimensions of the equipment are not shown, as they may vary with each manufacturer. Dimensions of the equipment foundations and piping arrangements may have to be changed in order to accommodate the equipment furnished.
3. All equipment shall be designed and built for 24-hour continuous service at any and all points within the specified range of operation; without overheating, without excessive vibration or strain and requiring only that degree of maintenance generally accepted as peculiar to the specific type of equipment supplied.

C. Related Work Specified Elsewhere:
1. Section 03300, Cast-in-Place Concrete.
2. Section 03600, Grout.
3. Section 05500, Metal Fabrications and Miscellaneous Metals.
4. Section 09900, Painting
5. Sections 133, Instrumentation and Control
6. Sections 150, Piping.
7. Section 15100, Valves and Apprutances.
8. Division 16, Electrical.

1.02 Quality Assurance

A. Manufacturer's Qualifications:
1. The chemical feed system specified herein shall be the product of one equipment manufacturer.
2. Manufacturer shall supply chemical feed equipment which is essentially duplicate to equipment that he has put in satisfactory operation, for a period of at least 5 years.

3. Manufacturer: Wallace and Tiernan, or equal, for all chemical feed systems except polymer feed equipment. Stranco, or equal, shall be the manufacturer of the polymer feed equipment.

B. System Supplier Qualifications:
1. A system supplier may furnish chemical feed system components meeting the requirements of the specifications
2. System supplier shall be responsible for system coordination and implementation including physical layout of the equipment to provide complete functional and operating chemical feed systems as specified.
3. System supplier shall be responsible for coordinating and furnishing chemical feed system control equipment in accordance with the requirements of the specifications.

C. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown on specified.
1. OSHA, Safety standards concerning personnel protection against machinery and the handling of dangerous chemicals.
2. AISI type 304, Stainless Steel.
3. AISI type 316, Stainless Steel.
4. ASTM D 1785, Polyvinyl Chloride (PVC) Plastic Pipe.
5. Standards of National Electric Manufacturers Association.
6. National Electrical Code.
7. Institute of Electrical and Electronic Engineers.
8. Standards of the Hydraulic Institute.
9. Standards of American National Standards Institute.
10. American Gear Manufacturers Association.
11. Standards of Joint Industrial Council.
12. National Lime Association.

1.03 Submittals

A. Shop Drawings and Product Data:
1. Comply with Section 01340 and the supplemental requirements below.
2. Submit for approval the following:
   a) Each system shall be submitted as a complete submittal including all external connections and internal details.
   b) Complete description in sufficient detail to permit comparison with the technical specifications.
   c) Weights and performance data.
   d) Control panel sizes and details per Sections 133, Instrumentation and Control.
   e) Wiring diagrams and specifications for all electrical equipment.
   f) Affidavits of compliance with referenced standards and codes.
   g) Manufacturer's literature, including:
      (1) Dimensions.
      (2) Materials.
      (3) Size.
      (4) Weight.

(5) Motor information.

h) Confirm that equipment and piping shown is suitable for service conditions specified.

i) Show locations and sizes for all connections to associated equipment and utilities.

B. Operation and Maintenance Data:

1. Operation and Maintenance Manuals: Submit complete installation, operation and maintenance manuals including copies of all approved Shop Drawings as required by Section 01730, Operation and Maintenance Data.

2. Required Operation Data:

a) Complete, detailed operating instructions for each piece of equipment with moving part.

b) Explanations for all safety considerations relating to operations.

c) Recommended spare parts list.

3. Required Maintenance Data:

a) Maintenance data shall include all information and instructions required by plant personnel to keep equipment properly lubricated and adjusted so that it functions economically throughout its full design life.

b) Explanation with illustrations as necessary for each maintenance task.

c) Recommended schedule of maintenance tasks.

d) Lubrication charts and tables of alternate lubricants.

e) Trouble shooting instructions.

f) List of maintenance tools and equipment.

g) Name, address and phone number of manufacturer and manufacturer's local service representative.

C. Guarantee: Comply with requirements of the General Conditions at a minimum.

1.04 Product Delivery, Storage and Handling

A. Delivery of Equipment: All equipment and materials shall be inspected against approved Shop Drawings at time of delivery. Equipment and materials damaged or not meeting requirements of the approved Shop Drawings shall be immediately returned to the manufacturer for replacement or repair.

B. Storage: All equipment and materials after inspection shall be carefully prepared for storage and labeled. Equipment and materials shall be stored in a dry location and protected from harm according to manufacturer's instructions.

C. Handling: Equipment and materials shall on delivery, storage, and installation be handled in an approved manner according to manufacturer's instructions.

PART 2 — PRODUCTS

2.01 Service Conditions

See specific Chemical Equipment Sections.

2.02 Details of Construction

See specific Chemical Equipment Sections.

2.03 Controls

See specific Chemical Equipment Sections.

2.04 Tools, Spare Parts and Maintenance

See specific Chemical Equipment Sections.

2.05 Painting

A. Chemical feed systems shall be furnished factory primed and painted with the manufacturer's best chemically resistant paint system.

B. Color shall be selected by the ENGINEER from the manufacturer's standard colors.

C. Machined, polished, and non-ferrous surfaces shall be coated with a corrosion prevention compound.

D. Field painting for touch up shall be in accordance with Section 09900.

PART 3 — EXECUTION

3.01 General

A. CONTRACTOR shall inspect the area in which the equipment is to be installed and verify that the equipment is ready for installation.

B. Notify the ENGINEER of any discrepancies.

C. Provide all concrete pads, supports and mounting appurtenances required for a workmanlike installation. Mounting hardware shall be stainless steel.

D. CONTRACTOR shall make all necessary field connections required to place chemical feed systems in proper operation in accordance with manufacturer's instructions and recommendations.

3.02 Start-up and Test

A. Conform to the requirements of Section 01100.

B. Manufacturer's representative shall check and approve the installation before operation. He shall field test and calibrate the equipment to assure that the system operates to the OWNER'S satisfaction.

C. CONTRACTOR shall provide the services of a factory-trained operating specialist for a minimum period of eight hours for the instruction of the OWNER'S operating personnel for each chemical equipment system.

D. Demonstrate that the system can perform the following functions:
   1. Accurately meter (and dissolve chemical if applicable) at rates and ranges as specified.
   2. Feed chemical at specified rates into the process stream at application points as indicated on the Drawings.
   3. Respond to feed rate signal.
   4. Activate alarm functions as specified and as shown on the Drawings.
   5. Respond to local controls.

**** END OF SECTION ****

SECTION 11243

SODA ASH FEED SYSTEM

PART 1 — GENERAL

1.01 Description

A. Scope: CONTRACTOR shall furnish all labor, materials, equipment and appurtenances required to provide the soda ash feed system complete and operational with all pumps, mixers, tanks and tubing with accessories as shown and specified.

B. Related Work Specified Elsewhere:
   1. Section 11240, Chemical Feed Equipment — General.

1.02 Quality Assurance

General: Comply with the requirements of Section 11240.

1.03 Submittals

General: Comply with the requirements of Section 11240.

1.04 Product Delivery, Storage and Handling

General: Comply with the requirements of Section 11240.

PART 2 — PRODUCTS

2.01 Service Conditions

The soda ash feed system shall be designed to meet the following requirements:

A. Flow Rates: Maximum 120 gallons per day.

B. Static Discharge Pressure: 100 psig.

C. Pump shall be capable of dry lift, self-priming, and indefinite operation without process fluid.

2.02 Equipment

A. Metering Pump: One required.

   1. The pump shall be powered by 120-volt AC and shall be positive displacement non-hydraulic solenoid driven, diaphragm type pump. Output shall be "hot" rated (at operating temperature) and shall be adjustable while pumps are in operation. Output shall be able to be

adjusted by manual control of the stroke length and stroke rate. Positive flow shall be ensured by a minimum of four ball type check valves. A bleed valve shall be provided for the manual evacuation of entrapped air or vapors and safe relief of pressure in the discharge line. Pump shall be water resistant for outdoor installation. Materials of construction: pump head - gfppl (glass-filled polypropylene), diaphragm - teflon faced, hypalon backed, check valves - seats/o-rings-hypalon, balls - ceramic, and housing - GFPPL, bleed valve - GFPPL. Metering pump shall be Pulsatron Series E Plus, Model LPH6 or approved equal.

2. Pump shall be mounted on a steel base, complete with brackets, supports, fasteners and accessories suitable for wall-mounting as indicated on the Drawings. The pump shall have a name plate giving the manufacturer's model, serial number, rating, range, speed and other pertinent data.

B. Day Tank Mixer:

1. Provide a bracket mounted mechanical mixer attached to a 6" flange conforming to ANSI 150-pound drilling.
2. Lower propeller of mixer shall extend to within 1'-0" off the bottom of day tank.
3. Mixer shaft and mixing vane shall be 304SS.
4. Mixer shall be sized for the soda ash tank volume as shown and specified.
5. Mixer shall be Pulsafeeder 1/3 hp or approved equal.

C. Day Tank:

1. Day tank shall be a 200-gallon volume polypropylene tank with graduations marked on the side of the tank. Nominal dimensions are 36 inches in diameter by 48 inches high.
2. Tank shall be fitted with a removal lid with slots to accommodate the pump suction tubing and the mixer shaft.

D. Tubing:

1. Both suction and discharge tubing shall be UV inhibited, black polyethylene tubing sized to match the pump suction and discharge connections.

E. Test Kit:

1. CONTRACTOR to provide OWNER with a multi-parameter test kit, HACH model CN-39WR for testing Chlorine, Hardness, Iron, and pH.

PART 3 — EXECUTION

3.01 Installation

A. Install tank, pump and mixer as specified herein and as shown on the plans.

3.02 Start-up and Test

A. CONTRACTOR shall provide for inspection of the installation by the equipment manufacturer's representative prior to start-up.

B. CONTRACTOR shall set pump rate per equipment manufacturer's representative recommendations and shall run tests using the provided test kit to determine proper soda ash feed setting to achieve pH > 7.

**** END OF SECTION ****

SECTION 11260

CHLORINATION

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Furnish and install chlorination equipment and appurtenances necessary to complete work shown or specified. The equipment is to be supplied by a single engineer-approved, equipment supplier for installation by this supplier.

1.02 RELATED SECTIONS

A. Refer to Division 16, Electrical.

B. Refer to Division 15, Mechanical.

1.03 REFERENCES

A. The following references apply:
1. American Society of Mechanical Engineers (ASME).
2. American Water Works Association (AWWA).
3. The Chlorine Institute (CI).
4. International Standards Organization (ISO).
5. National Electrical Manufacturers Association (NEMA).
6. Occupational Safety and Health Administration (OSHA).

1.04 SYSTEM DESCRIPTION

Provide one (1) complete manually paced, vacuum operated chlorination systems. The solution fed, automatic switchover systems shall have a maximum capacity of 100 pounds per day (PPD). The residual chlorine levels shall be monitored by an amprometric continuous chlorine monitor. Enhanced safety shall be provided by means of an emergency gas shut off systems coupled to the chlorine gas detectors. The complete chlorination system shall be housed in a separate room in the CMU building.

1.05 SUBMITTALS

A. Submittals shall be as specified in the General Conditions and Section, General Requirements.

B. Submit the following:
1. Sufficient information on each component to show that the equipment meets this specification.
2. Dimensional drawings as required for the installation.
3. Electrical wiring diagrams as required for the installation.
4. Documentation demonstrating that the gas feeder manufacturer is certified to the international quality standards ISO 9001 for design, assembly and manufacture.

1.06 QUALITY ASSURANCE

A. The equipment and material to be furnished under this Contract shall be free from defects. The complete gas feed system shall be by one manufacturer having complete system responsibility for the operation of the system.

B. The gas feed equipment shall be manufactured and tested under ISO certification meeting the following standards: ISO9001, EN ISO9001, ANSI/ASQC9001.

C. All equipment, piping and accessories shall meet Chlorine Institute recommendations.

1.07 DELIVERY, STORAGE AND HANDLING

The Contractor shall be responsible for the delivery, storage and handling of products in accordance with the manufacturer's recommendations.

1.08 WARRANTY REQUIREMENTS

All equipment, unless otherwise stated, shall be warranted by the manufacturer for 12 months from date of start-up not to exceed 18 months from date of shipment.

1.09 SYSTEM STARTUP

The chlorination equipment manufacturer shall furnish the services of a qualified field engineer to check installation, start-up and instruct operating personnel in the proper operation and maintenance of the equipment.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

Denora, Capital Controls, Halogen, Force Flow and Coast Chlorinator.

2.02 EQUIPMENT

A. Provide the following:
1. One (1) Flowmeter panel and spare.
2. One (1) Automatic switchover module.
3. Two (1) Vacuum regulators (and spare)
4. One (1) Ejector/check valve assembly, “O” ring style.
5. Two (2) Liquid chlorine cylinders. (Camp Shelby)
6. One (1) High/Low vacuum monitor.
7. One (1) Water inlet assembly, 1".
8. One (1) Solution diffuser.
9. One (1) Fiberglass enclosure
10. One (1) Electric solenoid valve, 1”.
11. One (1) Dual Cylinder Scales
12. One (1) Residual analyzer.

13. One (1) Gas detector.
14. One (1) Self-contained air mask.
15. One (1) Enclosure for air pack.
16. One (1) Gemini Gas shutoff system, with two (2) Terminator actuators.

2.03 GAS FEEDERS, METER PANELS

A. The single meter panel shall be wall mounted and provided with a chlorine gas flowmeter with dual scale (English/metric) indication. The flowmeter's feed rate capacity shall be 100 PPD/1 kg/h.

B. Each meter panel shall contain a manually adjusted rate valve. The rate valve and seat shall be solid silver. Each gas flowmeter shall have dual scale (English/metric) and be sized for an operating maximum capacity of 100 PPD/1kg/h.

C. The remote meter panel shall be constructed of molded plastic, suitable for wet or dry gas service.

D. The vacuum inlet and outlet shall be 3/8 inch.

E. The following meter panel spare parts shall be provided:
1. One (1) set rate valve O-rings.
2. One (1) set meter gaskets.

F. The meter panel shall be Capital Controls ADVANCE RM100C1 or equal.

2.04 SWITCHOVER, AUTOMATIC

A. The automatic vacuum switchover module shall be wall mounted and operated on a spring-loaded toggle. The module shall be capable of switching from one source to another source at a feed rate of 100 PPD (2 kg/h) chlorine.

B. The automatic vacuum-operated switchover module shall automatically switch the gas supply from an empty source to a full source. The system shall have automatic reset and shall not permit return to the initial gas source until the second gas source is exhausted.

C. The switchover shall be constructed of molded plastic, suitable for wet or dry gas service and all springs shall be of tantalum alloy.

D. The vacuum inlet and outlet shall be 3/8 inch tubing connectors.

E. The automatic switchover module shall be Capital Controls ADVANCE AS100C or equal.

2.05 GAS FEEDERS/VACUUM REGULATORS

A. The vacuum regulator shall feed gas under vacuum from the source to the point of application up to a maximum feed rate of 100 PPD (2 kg/h) chlorine.

B. The vacuum regulator shall mount directly on the cylinder or manifold gas valve by means of a yoke assembly and shall be provided with a gas valve direction indicator and integrated

gas flowmeter. The gas flowmeter shall have dual scale (English/metric) and be sized for an operating maximum capacity of 100 PPD/2 kg/h.

C. The vacuum regulator shall be constructed of molded plastic, suitable for wet or dry gas service and all springs shall be of tantalum alloy. The corrosion-resistant yoke assembly shall have a fusion-bonded epoxy coating and shall be fitted with a field replaceable silver inlet valve and filter assembly.

D. Vacuum shall be controlled by a spring-opposed double diaphragm in the vacuum regulator. Pressure shall be prevented from building in the system by means of a spring-loaded, diaphragm actuated pressure relief valve located in the vacuum regulator. Each regulator shall be equipped with a gravity-actuated loss-of-gas indicator. An integrated switch shall be provided to indicate loss of gas.

E. The vacuum inlet/outlet shall be 3/8 inch.

F. The following vacuum regulator spare parts shall be provided:
1. One (1) set rate valve O-rings.
2. One (1) set meter gaskets.
3. One (1) replacement filter.
4. One (1) insect screen.
5. One (1) multi-purpose wrench.

G. The vacuum regulator shall be Capital Controls ADVANCE VR201C3 or equal.

2.06 EJECTORS/CHECK VALVES

A. The ejector/check valve assembly shall be of the solution feed type and shall create the vacuum necessary to feed chlorine water solution feed type and shall create the vacuum necessary to operate the system.

B. The ejector/check valve assembly shall be a spring-opposed, O-ring seal. The ejector/check valve shall be suitable for 100 PPD/2 kg/h against a maximum back pressure of 60 psig. The springs shall be tantalum alloy.

C. The ejector shall have a 3/8 inch vacuum connection.

D. The following ejector spare parts shall be provided:
1. One (1) set ejector gaskets.

E. The ejector/check valve assembly shall be Capital Controls ADVANCE EJ100C or equal

2.07 LIQUID CHLORINE CYLINDERS

A. The liquid chlorine cylinders shall be a type approved by the Chlorine Institute, Inc.

B. The chlorine cylinders shall have a valve with a fusible metal plug designed to melt at 158 degrees fahrenheit.

C. Two chlorine cylinders (2) full of product shall be provided by Camp Shelby for start up and operating the system.

2.08 HIGH/LOW VACUUM MONITOR

A. The chlorine vacuum shall be monitored with a digital device connected to the vacuum tubing. This device shall have adjustable set points and contact closures for high and low levels.

B. Time delay relays shall be integrated into each adjustable setting.

C. The chlorine monitoring device shall be a VAC-1200 or equal.

2.09 DIFFUSERS

A. The chlorine solution diffuser shall be provided with 1 inch IPS threads. The assembly shall be provided complete with a 1 inch NPT adapter.

B. The solution diffuser assembly shall be Capital Controls BM-111 or equal.

2.10 EJECTOR WATER INLET ASSEMBLIES

A. A pre-assembled 1 inch water inlet assembly shall be provided, consisting of:
   1. Shut-off valve.
   2. Y-strainer.
   3. Pressure gauge, 2 -1/2 inch dial, 0-100 psig.

B. The water inlet assembly shall be manufactured by Capital Controls or equal.

2.11 SCALES, CYLINDER

A. The chlorine gas cylinder scale shall consist of a dual platform weighing base with a weight indicator mounted on support column. The scale shall be of the electronic strain gauge, load cell type equipped with two separate weighing platforms and built-in stops. A bracket on the support column shall be provided for mounting an automatic switchover module.

B. Each platform shall have a gross weight capacity of 0-350 pounds/0-158 kilograms, and a tare weight capacity of 180 pounds/80 kilograms and an independent tare weight adjustment. The scale shall be accurate to 0.5% of the gross weight capacity. The scale shall use one (1) strain gauge per platform to compensate for off-center cylinder placement with no loss of accuracy.

C. An LED indicator shall alternate readings between each platform. Each display shall provide large 3-1/2 digit, LCD characters visible up to 10 feet/3 meters. The display resolution shall be 1 pound/0.1 kilograms and shall be selectable for indication in pounds or kilograms. The electronics shall be housed in a NEMA 4X enclosure.

D. A safety chain shall support two cylinders while in operation. All exposed parts shall be either stainless steel or coated with polyurethane.

E. The scale shall operate from a 120 Vac, 50/60 Hz, 1 phase power supply.

F. The scale shall be Capital Controls ADVANCE 1360B, Force Flow GR150-2 or equal.

2.13 GAS DETECTORS

A. The chlorine gas detector shall consist of a wall mounted receiver and remote sensor. The gas detector shall have a range of 0-10 parts per million (ppm).

B. The receiver shall provide a LED bar graph display. The LED bar graph display shall be color-coded to indicate sensor status, gas concentration and alarm set point. Additional LEDs shall provide for indication of set point alarm, sensor malfunction, power ON and sensor ready. The receiver shall be housed in a NEMA 4X enclosure.

C. The sensor shall be an electrochemical type requiring no chemical addition with a response time of 30 seconds maximum for 80% of full range at 20 degrees C. The sensor shall be wall mounted and housed in a NEMA 4X enclosure.

D. The alarm and malfunction contacts shall be SPDT rated at 10 amps at 240 Vac or 28 Vdc maximum resistive or inductive load. The alarm and malfunction contacts shall be field configurable for manual reset (latching) or automatic reset (non-latching).

E. Communications between the sensor and receiver shall be 3-wire, shielded, 22 gauge cable. The maximum distance between the receiver and sensor shall be 1000 feet/305 meters.

F. The gas detector shall operate from a 120 Vac, 50/60 Hz, 1 phase power supply. The receiver and sensor electronics shall have provisions for protection against radio frequency/electromagnetic interference.

G. Weatherproof visual and audible alarms shall be provided, Capital Controls 12425 or equal.

H. A sensor test kit shall be provided, Capital Controls BM-4709 or equal.

I. The gas detector shall be Capital Controls ADVANCE 1610B or equal.

2.14 RESIDUAL MONITOR

A. The analyzer shall be specifically designed for drinking water applications is able to measure up to three parameters**.** This application will require two: free chlorine and pH. The chlorine analyzer shall be provided with the following features:

1. Range: 0-5 ppm (mg/l) free or total residual chlorine
2. Accuracy: ± 0.2 % of full scale of reading or 0.05 mg/L whichever is greater.
3. Repeatability: 0.05 mg/L
4. Resolution: 0.01 mg/L
5. Sample Flow: sample flow rate setting shall be 1 L/min
6. Sample Inlet Pressure: 3-60 PSI (0.2 - 4 bar)
7. Sample Temperature Range: temperature compensation from 36°F to 122 °F (2 °C to 50°C)
8. Cycle Time: continuous
9. Diagnostics: Self-test diagnostics with alarm indication.

Alarms: Two set point alarms instrument warning alarm and system shutdown alarm. Alarm shall be SPDT dry contact relay output rated at 8A, 230 VAC SPDT alarm relays.

10. Enclosure: IP65, NEMA 4/4X, suitable for outdoor mounting
11. Power requirements: 115 volts, 50/60 Hz.

B. The unit shall employ an amperometric probe and shall be capable of measuring free chlorine without pH buffer when the sample pH is stable.

C. The transmitter/analyzer shall be a Denora Microchem3 with a CL4000 and pH probes.

2.15 SAFETY EQUIPMENT, AIR MASKS AND ACCESSORIES

A. The pressure-demand air mask shall be supplied without a carrying case.

B. The apparatus shall be provided with full vision mask gauge, regulator, shoulder harness, 30-minute air tank, spare 30-minute air tank, and shall be suitable for chlorine gas service. The apparatus shall be NIOSH/MSHA certified.

C. The air mask without carrying case shall be Capital Controls R-2145, MSA, Draeger PRO-Air Series or equal.

D. The wall mounted enclosure for pressure-demand air mask shall be weatherproof and shall be provided with a security sealed gasketed door, ABS construction viewing window, and SCBA mounting brackets.

E. The wall mounted enclosure shall be Econ or equal for breathing apparatus.

2.16 GAS SHUTOFF SYSTEM

A. The contractor shall provide the Gemini System with two terminator actuators.

B. The contractor shall provide a spare gas shutoff system.

C. The Gemini System shall be Model No. 8002.00 as manufactured by Halogen Valve Systems, Inc or approved equal.

2.17 VALVE, ELECTRIC SOLENOID

A. The chlorination system shall be operated and controlled by an electrically operated solenoid valve.

B. The solenoid valve shall have 1 inch NPT connections. The solenoid valve shall be NEMA 4X and shall operate from a 120 Vac, 50/60 Hz, 1 phase power supply.

C. The water solenoid valve shall be Capital Controls R-314 or ASCO 8210G4

PART 3 – EXECUTION

3.01 EXAMINATION AND PREPARATION

A. The Contractor shall inspect all equipment immediately upon receipt.

B. The equipment shall not be installed, if damaged, until repairs have been made in accordance with the manufacturer's written instructions.

3.02 INSTALLATION

A. The Contractor shall install the equipment in accordance with the drawings and manufacturer's recommendations.

3.03 START-UP SERVICES AND TESTING

A. The equipment manufacturer shall furnish the services of a qualified field engineer to provide start-up and testing in accordance with the manufacturer's written instructions.

B. After start-up and testing, the manufacturer's representative shall instruct operating personnel in the proper operation and maintenance of the equipment.

C. The manufacturer's representative shall provide the following minimum service requirements:
   1. One 4-hour days on site for start-up and testing.
   2. One 4-hour days on site for operator training.

END OF SECTION

SECTION 13300

PROCESS INSTRUMENTATION AND CONTROLS – GENERAL PROVISIONS

PART 1 - GENERAL

1.01 Scope of Work

A. Existing SCADA shall be modified to receive chlorine scale weight from Scale 1 and Scale 2. SCADA shall display the scale weights.

B. Existing SCADA shall be modified to activate soda ash feeder and mixer when well is on.

C. Control contractor shall verify operation of well when level of clear well meets preset adjustable level of existing level transducer.

D. Control contractor shall confirm existing SCADA will activate chlorine solenoid when well is on. The existing manual switch shall determine which chlorine solenoid is to be activated.

E. Existing SCADA shall be modified to receive the chlorine analyzer signal and send alarm to HMI when the chlorine residual drops below a low level set point or exceeds a high level set point.

END OF SECTION

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SECTION 13225

PRESSURE FILTERS

PART 1 - GENERAL

1.01 Description

A. Scope: CONTRACTOR shall furnish and install three (3) 10' diameter pressure filters, complete with media and all other internals for removing iron and manganese from the raw water supply. The filters shall be manufactured by Mississippi Filter Co. or approved equal. The manifold piping shall be arranged so that the filter can be backwashed from the system water supply.

PART 2 – PRODUCTS

2.01 Pressure Filters

A. The filters shall be multiple unit, pressure type, diameter as indicated, designed for a flow rate of 3 gallons per minute (gpm)or less per square foot of surface. They shall be designed for a minimum of 135 pounds per square inch of working pressure. The tanks shall each have a 24" manway. Units shall be painted in accordance with the AWWA standard specifications for painting storage tanks. The contractor shall submit shop drawings on the filter, components, paint system, filter media, and valves for approval prior to ordering material.

B. Filter internal equipment shall consist of upper and lower manifolds. Upper manifold, distributor laterals and fittings shall all be steel schedule 40. Lower header manifold system shall all be schedule 80 PVC. The lower header manifold system will be installed in the filter after the concrete has been placed and finished. They will be held in place with structural channel and u-bolts. The installation of the laterals will be by the contractor.

C. Concrete will be placed in the filter bottom by the contractor. The concrete will be finished to a smooth flat surface.

D. Support Legs shall be welded to the sides of the filter for mounting on concrete foundations.

2.02 Filter Media

A. The media shall consist of Greensand Plus media, anthracite and miscellaneous gravel sizes per the contract drawings in the straight height.

B. The Greensand Plus media shall be 18" of straight height and will oxidize and remove

iron, manganese, and hydrogen sulfide from the well water. It shall be shipped in water-proof bags of 1 cubic foot capacity.

C. The anthracite shall be 6" of straight height and no. 1 special anthracite having an effective size of 0.85 to 0.95 mm and a uniformity coefficient of 1.7 maximum. It shall be composed of hard durable grains, as free as commercially possible of extraneous dirt.

D. The gravel shall be as follows:

6"	filter sand
4"	1/8" - 1/4" gravel
4"	1/4" - 1/2" gravel
10"	1/2" - 3/4" gravel

E. All filter media shall be pre-washed prior to bagging and shall be free of clay, loam, organic or other deleterious material.

PART 3 – EXECUTION

3.01 Installation

A. Install filters per manufacturer's requirements and as shown on the project plans.

3.02 Start-Up

A. CONTRACTOR shall provide for manufacturer's representative to inspect installation prior to start-up.

B. CONTRACTOR shall place filters into operation and perform one backwash cycle for each unit under the supervision of the manufacturer's representative. Manufacturer's representative shall provide training to operating personnel at this same time.

3.03 Testing

A. CONTRACTOR shall collect water samples and have analyzed by a Certified Water Quality testing laboratory for iron and manganese concentrations in the raw (pre-filter) and treated (post-filter) water at the following intervals post start-up: 2 hour, 6 hour, 12 hour, 24 hour, 3rd day, 4th day, 5th day, 6th day, and 7th day.

B. CONTRACTOR shall provide results from above testing no later than two weeks after sampling to the OWNER and ENGINEER.

C. If the samples indicate that the filters are not removing the iron and manganese to below concentrations acceptable to the Mississippi Department of Health, the CONTRACTOR shall work with the manufacturer to remedy the situation at no cost to the OWNER.

****END OF SECTION****

SECTION 13300

PROCESS INSTRUMENTATION AND CONTROLS – GENERAL PROVISIONS

PART 1 - GENERAL

1.01 Scope of Work

A. Existing SCADA shall be modified to receive chlorine scale weight from Scale 1 and Scale 2. SCADA shall determine which chlorine solenoid to be activated when well is on.

B. Existing SCADA shall be modified to activate soda ash feeder when well is on.

C. Control contractor shall verify operation of well when level of clear well meets preset adjustable level of existing level transducer.

D. Control contractor shall modify existing SCADA programming to alternate Well 1 and Well 2 and associated service pumps.

END OF SECTION

SECTION 15052

BURIED PIPING INSTALLATION

PART 1 — GENERAL

1.01 DESCRIPTION

A. Scope:
   1. The CONTRACTOR shall furnish all labor, materials, equipment, and incidentals as shown, specified, and required to install all buried piping, fittings, and specials.
   2. The Work includes, but is not limited to, the following:
      a. All types of buried piping unless specifically included under other Sections
      b. Pipe beneath structures
      c. Testing, cleaning, and disinfecting
      d. Installation of all jointing and gasketing materials, specials, couplings, and all other Work required to complete the piping installation
      e. All appurtenances and specials shown, specified or required shall be incorporated into the piping systems. Valves, specials and appurtenances shall be as specified in other Division 15 Sections.

B. Coordination: Review installation procedures under other Sections and coordinate with the Work that is related to this Section.

1.02 SUBMITTALS

A. Shop Drawings: Submit for approval the following:
   1. Size, class and other details of pipe to be used
   2. Information on typical joint and harnessing details

B. Tests: Submit description of proposed testing methods, procedures and apparatus. Submit copies of all test reports.

C. Record Drawings: During progress of the Work, keep an up to date set of drawings showing field modifications. Submit drawings at a scale satisfactory to the ENGINEER that show the actual in-place installation of all piping and appurtenances installed under this Section. The drawings shall show all piping on plans with all reference dimensions and elevations required for complete record drawings of the piping systems. The drawings shall be furnished not later than 30 days after Substantial Completion of the Work.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery, storage and handling of pipe, fittings, and specials shall be in complete compliance with the manufacturer's instructions.

B. Handle all pipe, fittings, and accessories carefully with approved handling devices. Do not drop or roll pipe off trucks. Do not otherwise drop, roll or skid pipe. Materials cracked, gouged, chipped, dented, or otherwise damaged will not be approved.

C. Pipe, fittings, and specials shall be unloaded opposite to or as close to the place where they are to be laid as is practicable to avoid unnecessary handling. Interiors shall be kept free from dirt and foreign matter.

PART 2 — PRODUCTS

2.01 MATERIALS

A. Pipe materials are specified under each applicable pipe material sections of Division 15.
   1. See Section 15076, PVC Pipe
   2. See Section 15078, HDPE Pipe
   3. See Section 15068, Ductile-Iron Pipe
   4. See Section 15064, Reinforced Concrete Pipe

B. Earthwork and Pipe Backfill: See Section 02200, Earthwork, Excavation and Backfill, Select Backfill and Fill and General Backfill and Fill paragraphs.

C. Pipe Marking:
   1. General:
      a. Each piece of pipe or fitting shall be clearly marked with a designation which shall conform with designations shown on the Shop Drawings.
      b. Class designation shall be cast or painted on each piece of pipe or fitting 4" in diameter and larger.
      c. Piping, smaller than 4" diameter shall be clearly marked by manufacturer as to material, type and rating.
   2. Magnetic Underground Warning Tape:
      a. The CONTRACTOR shall place magnetic warning tape approximately 12"–18" below grade in all pressure pipe trenches.
      b. Buried pressure sewer piping warning tape:
         Message: "CAUTION - BURIED PRESSURE SEWER LINE" or "CAUTION – BURIED POTABLE WATER MAIN" as applicable.
      c. Size and Color: 3" wide and green (sewer) or blue (water) background with black lettering as applicable.
   3. Line Marker:
      a. All mains 3-inch diameter and greater in unpaved areas shall be marked every 1000 feet maximum with a cylindrical, 3 ½ inch diameter by 6 foot tall polymeric marker. Line Marker graphics shall read, "Caution Sewer Pipeline" in black letters on a green background or "Caution Water Pipeline" in black letters on a blue background, as applicable, and shall consist of a solvent-based ink that is abrasive and UV resistant. Marker

shall also state the OWNER and OWNER's Contact information.

b. Line Marker shall be manufactured by:

(1) Carsonite International.

(2) Or approved equal.

4. Tracer Wire:

a. 12 AWG Copper

5. Utility Line Marker:

a. General – Pipeline marker to precisely mark the location of underground facilities such as pipelines. . Markers shall incorporate a different frequency and color for water and wastewater facilities for identification. Markers shall be available in passive and active models by the same manufacturer and be read from the same handheld marker locator. Marker shall incorporate a polyethylene shell as to be watertight. Marker contents shall not harm the environment. Marker shall be energized from the signal emitted from the handheld marker locator. Markers shall be blue in color for water and green for sewer. Markers shall be compatible with the OWNER's current or proposed Utility Marking System.

b. Near Ground Markers – Markers shall be designed for installation near the ground surface in materials such as asphalt or concrete pavement, rock, or soil without extensive drilling or digging. Shall be detectable if buried up to two feet deep.

(1) Location – every 50' across any bored crossing but no less than two per crossing equally spaced. At all gate valve boxes installed in transmission system or any other exposed infrastructure within the system.

c. Below Ground Markers - Markers shall be designed for bury below ground, up to five feet deep, and detected from above ground via a handheld marker locator. Marker shall be self leveling if necessary for detection that marker shall be right side up.

(1) Passive

(a) Description – Markers to mark points of special interest in the transmission system.

(b) Location – Maximum Spacing 300 linear feet of continuous transmission main length, directly above the transmission mains. Shall be required along open cut transmission main installation and along directional drill sections that are not below standing water for the duration of the project.

(c) Manufacturer and Model – 3M 1400 Series Ball Markers or equal

(2) Active

(a) Description – Programmable markers to mark points of special interest that require notation of exact system infrastructure in the transmission system. Shall incorporate a unique 10 digit ID number and contain a minimum of 256 bits of memory. Memory shall be capable of containing a minimum of 6 lines of compressed text. Each line shall contain an 8 character subject label and a 13 character description label. Marker

shall be capable of being programmed in the field via the handheld locator.

(b) Location – At all valves, bends, tees, casing ends, creek or waterway crossings and as directed by the Engineer. Marker shall be located one foot north of all valves and directly above all other required items.

(c) Manufacturer and Model – 3M 1400 Series EMS iD Ball Markers or equal

d. Installation – per manufacturer's recommendations

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:

1. Install piping as shown, specified and as recommended by the manufacturer.
2. Request instructions from the ENGINEER before proceeding if there is a conflict between the manufacturer's recommendations and the Drawings or Specifications.
3. Pipe, fittings and accessories that are cracked, damaged or in poor condition or with damaged linings will be rejected.
4. Minimum cover over piping shall be 3' unless otherwise shown or approved by the ENGINEER.
5. Earthwork required is in Division 2 of these specifications.

B. Bedding and Backfill:

1. Select Bedding and Fill Installation: All pipe shall be laid on a compacted layer of select bedding or on a flat bottom trench as shown in the Contract Drawings. Promptly after the pipe is laid, pipe embedment will continue through the Haunching (area from the bottom of the pipe to the springline or ½ pipe diameter) to one foot of cover over the pipe by backfilling and tamping equally and thoroughly along each side of the pipe in such a manner as to avoid displacement of or damage to the pipe. Select bedding will be used for the Final Backfill in all areas under pavement structures. This backfill shall be brought up and tamped equally and thoroughly along each side of the pipe in such a manner as to avoid displacement of or damage to the pipe. No piping shall be laid until the ENGINEER approves the bedding condition. No pipe shall be brought into position until the preceding length has been bedded and secured in its final position.
2. All ledge rocks, boulders, and large stones shall be removed during trench excavation to provide a minimum clearance of 4"–6" below and a minimum clearance of 12" on each side of pipe.
3. Comply with Section 02200.

C. Laying Pipe:

1. Comply with manufacturer's instructions, technical specifications, and details on Contract Drawings.
2. Install all pipe accurately to line and grade shown unless otherwise approved by ENGINEER. Remove and relay pipes that are not laid correctly.

3. Slope piping uniformly between elevations given.
4. Ensure that water level in trench is at least 6" below bottom of pipe. Do not lay pipe in water. Maintain dry trench until jointing and backfilling are complete.
5. Start laying pipe at lowest point and proceed towards the higher elevations, unless otherwise approved by ENGINEER.
6. Place bell and spigot pipe so that bells face the direction of laying, unless otherwise approved by ENGINEER.
7. Excavate around joints in bedding and lay pipe so that only the barrel receives bearing pressure from the trench bottom.
8. Permissible deflections at joints shall not exceed the amount allowed by manufacturer.
9. Take every precaution to ensure that no foreign material enters the piping prior to and during installation.
10. All pipe and fittings shall be carefully examined for cracks, damage, or other defects while suspended above the trench before installation. Defective materials shall be immediately removed from site.
11. Interior of all pipe and fittings shall be inspected and all dirt, gravel, sand, debris or other foreign materials shall be completely removed from the pipe interior before it is moved into the trench.
12. Bell and spigot mating surfaces shall be thoroughly wire brushed and wiped clean and dry immediately before pipe is laid.
13. Every time that pipe laying is not actively in progress, the open ends of pipe shall be closed by a watertight plug.
14. Field cutting pipe, where required, shall be made with a machine specially designed for cutting piping. Cuts shall be carefully done, without damage to pipe or lining, so as to leave a smooth end at right angles to the axis of pipe. Cut ends shall be tapered and sharp edges filed off smooth. Flame cutting will not be allowed.
15. Blocking under piping shall be permitted only when accepted by ENGINEER for special conditions.
16. Touch up protective coatings in a satisfactory manner prior to backfilling.
17. All piping shall be examined by the ENGINEER or ENGINEER's Representative prior to any backfilling operations. The CONTRACTOR shall notify the ENGINEER in advance of any backfilling operation.
18. Water mains shall be laid at least 10' horizontally from any existing or proposed sewer line and where the water main crosses a sewer line, the water main shall be laid above the sewer line to provide a minimum vertical separation of 18" between the outside of the water main and the outside of the sewer line.
19. In addition to Paragraph 3.01.C.18, the CONTRACTOR shall protect water supplies in accordance with Section 28 of the Department of Environmental Quality guidance.

D. Jointing Pipe:
1. Clean completely all jointing surfaces and adjacent areas immediately before mating joint.
2. Lubricate and adjust gaskets as recommended by manufacturer.

3. After gaskets are compressed and before pipe is brought fully home, each gasket shall be carefully checked for proper position around full circumference of the joint.
4. Conform to manufacturer's recommendations pertaining to jointing pipe.

E. Restraints, Supports and Thrust Blocks:
1. Install restrained joints as shown, specified, required, and as recommended by the manufacturer.
2. Provide concrete and steel collars, thrust blocks, and cradles as shown or otherwise approved by ENGINEER.

F. Transitions from One Type of Pipe to Another:
1. Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or when connecting pipe made by different manufacturers.

G. Closures:
1. Provide all closure pieces shown or required to complete the Work.
2. Locate closures in straight runs of pipe.

H. Backfilling:
1. Conform to applicable requirements of the Division 2 Specifications.
2. Backfill by hand and use hand or pneumatic tamping until pipe is covered by at least one foot of backfill.

I. Concrete Pipe Supplementary Requirements:
1. Conform to Paragraph 3.01.C above, unless otherwise specified and in accordance with applicable recommendations of the following:
   a. AWWA Manual M9
   b. Concrete Pipe Handbook
2. Joints: Joints shall be made so that alignment and slope are in accordance with the Drawings. Joints shall be inspected and approved by the ENGINEER before backfilling.

3.02 WORK AFFECTING EXISTING PIPING

A. Location of Existing Piping:
1. Locations of existing piping shown should be considered approximate.
2. The CONTRACTOR is responsible for determining exact location of existing piping to which connections are to be made, or which may become disturbed during earth moving operations, or which may be affected by the work in any way.
3. Conform to applicable requirements of Section 01045, Cutting and Patching.

B. Work on Existing Pipelines:
1. Cut pipes as shown or required with machines specifically designed for this work.
2. Install temporary plugs to keep out all mud, dirt, water and debris.

3. Provide all necessary adapters, fittings, pipe and appurtenances required.

3.03 SEWER FLOW CONTROL

A. General:
1. When the Contractor is performing work on the new sewer pump stations or abandoning the existing sewer pump stations the sewer flows must remain in normal operations at all times.
2. Lines may not be plugged or blocked at any time during construction of the project.

B. Bypass pumping:
1. Bypass pumping will be required when sewer lift stations, manholes or sewer segments are being replaced. The Contractor shall supply the necessary pumps, conduits and other equipment necessary to divert the flow around the section on which work is to be performed. The Contractor will be responsible for furnishing the necessary labor and supervision to set up, operate and maintain the bypass pumping operations on a 24-hour basis and all engines supplied shall be equipped with super silencers. The Contractor shall be responsible for correcting any problems that arise as a result of his bypass pumping operations.

3.04 TESTING OF PIPING

C. General:
1. The CONTRACTOR shall conduct high-pressure hydrostatic leakage test for all filtered water, potable water, and sewer force main piping and deflection test and/or low pressure air test for all gravity sewer piping, as indicated herein. Testing of water pipe shall comply with the requirements of AWWA Standard C600, Section 4.
2. Notify ENGINEER 48 hours in advance of testing.
3. Provide all testing apparatus.
4. Pipelines which fail to hold specified test pressure or which exceed the allowable leakage rate shall be repaired and retested.
5. Test pressures required are at the lowest elevation of the pipeline section being tested unless otherwise specified.
6. Unless otherwise approved, conduct all tests in the presence of the ENGINEER.

D. Hydrostatic Pressure Test:
1. All testing shall meet the requirements of AWWA C600 for PVC pipe and fittings and C605 for ductile iron pipe and fittings, unless otherwise specified herein.
2. After the pipe has been laid and backfilled, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of 1.50 times the projected working pressure of the pipe once infrastructure is operational, unless shown to be different in piping schedule.
3. Each valved section of pipe shall be slowly filled with water and the specified test pressure (based on the elevation of the lowest point of the line or section

under test and corrected to the elevation of the test gauge) shall be applied by means of a pump connected to the pipe in a manner satisfactory to the ENGINEER. The pump, pipe connection, gauges and all necessary apparatus shall be furnished by the CONTRACTOR. The CONTRACTOR shall furnish all necessary assistance for conducting the tests.

4. Before applying the specified test pressure, all air shall be expelled from the pipe. If permanent air vents are not located at all high points, the CONTRACTOR shall install corporation stops at such points, so that the air can be expelled as the line is filled with water. After all air has been expelled, the corporation cocks shall be closed and the test pressure applied.
5. All exposed pipe, fittings, valves, hydrants and joints shall be carefully examined during the test. Any cracked or defective pipe, fittings, valves, or hydrants discovered in consequence of this pressure test shall be removed and replaced by the CONTRACTOR with sound material. The test shall be repeated until satisfactory to the ENGINEER.
6. At the completion of the test and prior to final acceptance of the tested section of pipe the Contractor shall verify that there are no visible leaks.
7. All visible leaks shall be repaired regardless of the amount of leakage.

E. Low Pressure Air Test: UNI-Bell's UNI-B-6.
1. Installed gravity sewer pipe shall be air-tested prior to acceptance.
2. Specified pressure drop of 0.5 psig shall be used to determine the required time the pipe is tested.
3. Sections of installed pipe shall be tested from manhole to manhole.

F. Deflection Test:
1. Two deflection tests shall be performed on all PVC gravity sewer pipe. The first test shall be conducted after the final backfill has been in place at least 30 days and prior to final acceptance. The second deflection test shall be made during the eleventh month of the warranty period.
2. No pipe shall exceed a deflection of 5%.
3. If the deflection test is to be run using a rigid ball or mandrel, it shall have a diameter equal to 95% of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.
4. The mandrel shall be drawn through the pipe by hand. Irregularities or obstructions encountered in the line shall be corrected by the CONTRACTOR.
5. If a section of pipe with excessive deflection is found, the CONTRACTOR shall uncover the pipe for inspection. Damaged pipe will be replaced. If the pipe is undamaged, the CONTRACTOR may reinstall the bedding and backfill and retest the pipe. Retesting shall include mandrel and low-pressure air testing.

G. Infiltration/Exfiltration Test:
1. The CONTRACTOR shall supply needed equipment and personnel to perform the infiltration/exfiltration test on installed gravity sewer pipe 30" and larger.

2. Allowable infiltration/exfiltration shall not exceed 50 gallons per inch of nominal diameter per mile of sewer per day.
3. An exfiltration test shall be performed where the crown of the entire reach of sewer being tested lies less than 5' under the existing water table. Minimum upstream testing head shall be 5' above the existing water table.
4. An infiltration test shall be performed where the crown of the entire reach of sewer being tested lies 5' or more under the existing water table.
5. Sections of installed piping shall be tested from manhole to manhole.
6. The CONTRACTOR shall install a calibrated weir at lower end of section being tested and shall measure leakage for a minimum of 4 hours if infiltration test is performed. Provide bulkhead at upper end of pipe section being tested.
7. The CONTRACTOR shall measure required water to maintain minimum upstream testing head if exfiltration test is performed.

3.05 CLEANING AND DISINFECTION

All piping shall be thoroughly cleaned and flushed in a manner approved by ENGINEER prior to placing in service. Piping 48" diameter and larger shall be inspected from inside and all debris, dirt and foreign matter removed.

Disinfection:

1. Disinfect all filtered water piping and potable water piping.
2. Completely clean interior of all piping and flush piping prior to disinfection with water at a minimum velocity of 2½' per second.
3. Conform to procedures described in AWWA C651 unless otherwise approved by ENGINEER.
4. Water for flushing, testing and chlorination shall be furnished and paid for by the CONTRACTOR. The CONTRACTOR shall provide all temporary piping, hose, valves, appurtenances, and services required.
5. Chlorine will be supplied by the CONTRACTOR.
6. Bacteriologic tests will be sampled by a certified laboratory technician in the presence of the ENGINEER and analyzed by Mississippi State Department of Health Standards by a certified laboratory.
7. Chlorine concentration in the water entering the piping shall be between 50 and 100 parts per million, such that a minimum residual concentration of 25 mg/l will be left after a 24 hour retention period. The operation shall be repeated as necessary to provide complete disinfection. Water being collected for testing shall not have a chlorine residual higher than normally maintained in the water system. No chlorine will be present which is a result of line disinfection.
8. Complete disinfection shall be defined as no coliform present for samples taken on two consecutive days.
9. Sewer force main and gravity sewer do not have to be disinfected.

**** END OF SECTION ****

SECTION 15068

DUCTILE-IRON PIPE

PART 1 - GENERAL

1.01 Description

A. Scope:
1. Furnish all labor, materials, equipment and incidentals required for ductile-iron pipe systems and ductile-iron pipe fittings and specials.
2. The extent of ductile iron piping is shown on the Drawings.

B. Related Work Specified Elsewhere:
1. Division 2, Site Construction.

1.02 Quality Assurance

A. Source Quality Control: Obtain pipe and fittings from no more than one manufacturer.

B. Reference Standards: Comply with the latest editions of the following:
1. AWWA C104 (ANSI A21.4), Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. AWWA C105 (ANSI A21.5), Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids.
3. AWWA C110 (ANSI A21.10), Gray-Iron and Ductile-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids.
4. AWWA C111 (ANSI A21.11), Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
5. AWWA C115 (ANSI A21.15), Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges.
6. AWWA C150 (ANSI A21.50), Thickness Design of Ductile-Iron Pipe.
7. AWWA C151 (ANSI 21.51), Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
8. AWWA C800, Underground Service Line Valves and Fitting.
9. ANSI B16.1, Cast-Iron Pipe Flanges and Flanged Fittings.
10. ANSI B18.2.1, Square and Hex Bolts and Screw Inch Series Including, Hex Cap Screws and Lag Screws.
11. ANSI B18.2.2, Square and Hex Nuts.
12. ASTM A 48, Gray Iron Castings.
13. ASTM A 123, Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
14. ASTM A 307, Carbon Steel Externally Threaded Standard Fasteners.
15. ASTM A 354, Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners.

1.03 Submittals

Shop Drawings and Product Data: Comply with the general requirements of Section 01340. Submit

detailed drawings and data on pipe, fittings, gaskets and appurtenances in conjunction with Shop Drawings required under Sections 15052 and 15054.

1.04 Delivery, Storage and Handling

Refer to Sections 15052 and 15054.

PART 2 - PRODUCTS

2.01 Materials

A. Joints: Comply with Schedules in Section 15052 and 15054. If not specified, use either flanged joints for exposed piping and push-on or mechanical joints for buried piping.

B. Ductile-Iron Pipe and Fittings:
1. Pipe:
a. Flanged:
(1) Standard: AWWA C115 (ANSI A21.15).
(2) Thickness: Pipe shall have a minimum pressure rating of 350 psi.
b. Non-Flanged:
(1) Standard: AWWA C151 (ANSI A21.50).
(2) Thickness: Pipe shall have a minimum pressure rating of 350 psi. Piping with grooved joints shall have adequate wall thickness to maintain the pressure rating specified for fittings and for the associated pipe class specified.
2. Joints:
a. Flanged:
(1) Standard: AWWA C110 (ANSI A21.10).
(2) Gaskets: 1/8-inch thick red rubber, full face.
(3) Bolts and Nuts:
(a) Standard: ANSI B18.2.1 and ANSI B18.2.2, respectively.
(b) Material, Exposed Service: ASTM A307, Grade B, cadmium plated or hot dipped galvanized.
(c) Material, Buried or Submerged Service: Type 304 stainless steel.
b. Mechanical Joint:
(1) Standard: AWWA C111 (ANSI A21.11).
(2) Gaskets: Plain rubber gaskets.
(3) Bolts and Nuts: High strength low alloy steel.
c. Push-On: Comply with AWWA C111 (ANSI A21.11).
d. Restrained: Use system as specified in paragraph C below.
e. Horizontal Directional Drill Installation: shall be a standard push-on joint with a flexible restraining gland. Joint shall allow for additional degree of deflection in pipe joint and restrain each section for HDD and pipe bursting applications. Joint shall be Flex-Ring by American Cast Iron Pipe Company or equal.
3. Fittings:
a. Standard: AWWA C153 (ANSI A21.53). Compact Type.

b. Pressure Rating: 350 psi unless otherwise stated.
c. Material: Ductile iron or cast-iron.
d. Gaskets: Comply with specifications for joints.
e. Bolts and Nuts: Comply with specifications for joints.
f. Restrained Joint Systems: Use fittings with restrained joint system specified in paragraph C below.

4. Coatings and Linings:
   a. Inside Wall of Pipe and Fittings:
      (1) Standard: AWWA C104 (ANSI A21.4).
      (2) Cement-Mortar Lining Thickness: Standard
      (3) Seal Coat: Asphaltic.
   b. Outside Wall of Pipe and Fittings:
      (1) Buried:
         (a) Coating: Bituminous.
         (b) Thickness: 1 mil approximate.
      (2) Exposed: Comply with Section 09900.

C. Restraining Devices:
1. Pipe Bell (Push On Pipe Joint)
   a. DIP: Series 1700 Mega Lug or equal
   b. PVC C900 Pipe: Series 1600 Mega Lug or equal
   c. PVC C905 Pipe: Series 2800 Mega Lug or equal
2. Pipe Fitting (Mechanical Pipe Joint)
   a. DIP: Series 1100 Mega Lug or equal.
   b. PVC C900 Pipe: Series 15PF00 Mega Lug or equal.

D. Restrained Joints:
1. Fast-Grip and Lok-Ring Joint by American Cast Iron Pipe Company.
2. Lok-Tyton and Loc-Tyte Systems by U.S. Pipe.
3. Clow Super Lock.
3. Or equal.

E. Specials:
1. Transition Pieces:
   a. Furnish suitable transition pieces for connections to existing piping.
   b. Expose existing piping to determine material, dimensions and other data required for transition pieces unless details are shown on Drawings.
2. Taps:
   a. Provide taps where shown or required for small pipe connections and other purposes.
   b. Where pipe or fitting wall thickness is inadequate to provide required minimum number of threads, provide a boss or pipe saddle. Provide boss or pipe saddle for all taps over 2 inch size.
3. Pipe Adapters: Provide necessary adapters to join pipe of different types. Comply with specifications for respective joints.

F. Polyethylene Encasement:
1. Provide polyethylene encasement on all buried ductile iron pipe, fittings and accessories.
2. In accordance with AWWA C105 (ANSI A21.5).

3. Thickness: 8 mils
4. Color: Green for sewer and blue for water

G. Pipe Manufacturer: American Cast Iron Pipe Company, U.S. Pipe, or equivalent.

PART 3 - EXECUTION

3.01 Installation

Comply with Sections 15052 and 15054.

*** * END OF SECTION * ***

SECTION 15076

PVC PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:
1. Furnish all labor, materials, equipment and incidentals for PVC pipe systems.
2. The extent of plastic piping is shown on the Contract Drawings.

B. Coordination: Review installation procedures under other Sections and coordinate the Work that must be installed with the materials specified herein and which is related to this Section.

C. Related Work Specified Elsewhere:
1. Section 02200, Earthwork, Excavation & Backfill
2. Division 15, Mechanical

D. Quality Assurance
Reference Standards: Comply with the latest edition of the following:

1. ASTM D 1248, Standard Specification for Polyethylene Plastics Molding and Extrusion Material.
2. ASTM D 1784, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
3. ASTM D 1785 Poly(vinyl chloride) (PVC) plastic pipe, Schedule 40, 80, and 120
4. ASTM D 2241, Polyvinyl Chloride (PVC) Pressure Rated Pipe (SDR PR Series)
5. ASTM D 2467, Socket-Type Poly (vinyl chloride) (PVC) Plastic Pipe and Fittings, Schedule 80
6. ASTM D 2564, Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings, Sch. 80
7. ASTM D 3034, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
8. ASTM F 437, Threaded Chlorinated Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Sch. 80
9. ASTM F 439, Socket-Type Chlorinated Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Sch. 80
10. ASTM F 441, Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe Sch. 40 and 80
11. ASTM F 493, Solvent Cements for Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe and Fittings.
12. ASTM F 679, Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
13. ASTM F 477, Elastomeric Seals (gaskets) for joining Plastic Pipe
14. ANSI B2.1 Pipe Threads

1.03 SUBMITTALS

A. Shop Drawings and Product Data: Comply with the general requirements of contract documents..

B. Submit drawings and manufacturer's data showing details of each piping system to include material composition of pipe and fittings, pressure ratings, nominal size and wall dimensions, fittings and interfacing with equipment and appurtenances in conjunction with the Shop Drawings required under Section 15052.

1.04 DELIVERY, STORAGE AND HANDLING

Refer to Section 15052 and 15054.

PART 2 - PRODUCTS

2.01 GENERAL

All pipes shall be furnished by a pipe manufacturer having experience in manufacturing the specific type of pipe in the specific sizes required for use on this project.

2.02 POLYVINYL CHLORIDE (PVC) GRAVITY FLOW

A. General: Gravity Sewer Pipe or as noted on Drawings.

B. Pipe and Fitting Material:
   1. Standard: ASTM D 1784.
   2. Type: Cell Classification as specified in ASTM D 3034, or ASTM F 679.

C. Pipe Standard:
   1. ASTM D 3034, SDR-26, sizes 4 inch through 21 inch diameter.
   2. ASTM F 679, PS-46, sizes 24 inch through 42 inch diameter.

D. Joints:
   1. Standard: ASTM D 3212.
   2. Type: Integral bell and spigot.
   3. Flexible seals: Elastomeric, conforming to ASTM F-477.
   4. Lubricant: As recommended by manufacturer.
   5. Gaskets shall be factory applied.

E. Fittings:
   1. Standard: ASTM D 3034 and F 679.
   2. Joint Standard: ASTM D 3212.

   3. Schedule: SDR-26, sizes 4 inch through 21 inch diameter
      PS-46, sizes 24 inch through 42 inch diameter.

F. Lateral Connectors:

1. Lateral connectors can be employed in the connection of service line to sewer trunk line.
2. Lateral connectors shall consist of a PVC hub, rubber sleeve, and stainless steel band.
3. PVC hub shall meet ASTM D 3034 and be SDR 26 and gasket in hub shall meet ASTM F 477. Rubber sleeve shall meet ASTM C 443. Band and housing shall be type 301 stainless steel and screw shall be type 305 stainless steel.
4. Model and Manufacturer:
   Inserta Tee by Inserta Fittings Company.
   Or equal.

2.03 CHLORINATED POLYVINYL CHLORIDE (CPVC) PIPING:

A. Pipe and Fitting Material:
   1. Standard: ASTM D 1784
   2. Type: Type IV, Grade 1, rigid (23447-B).

B. Pipe:
   1. Standard: ASTM F 441.
   2. Schedule: Schedule 80.

C. Joints:
   1. General: Connect joints by solvent cementing except where flanged or threaded fittings are required at expansion joints, valves, flowmeters, equipment connections or otherwise shown or directed.
   2. Flanged Joints:
      a. Use flanges joined to pipe by solvent cementing.
      b. Flange Drilling and Dimensions: Comply with ANSI B16.1.
      c. Flange Gaskets: Use Viton, full face unless other more durable material recommended by pipe manufacturer for service intended.
      d. Bolts and Nuts: Type 304 stainless steel.
   3. Threaded Joints:
      a. Taper pipe threads, ANSI B2.1.
      b. Joint Preparation: Teflon tape.
   4. Primer and Solvent Cement: Standard: ASTM F493.

D. Fittings:
   1. Socket Type:
      a. Standard ASTM F 439.
      b. Wall Thickness: Schedule 80.
      c. Designation: CPVC.
   2. Threaded Type:
      a. Standard: ASTM F 437.
      b. Wall Thickness: Schedule 80.
      c. Designation: CPVC.

2.04 POLYVINYL CHLORIDE (PVC) PIPING – (PRESSURE PIPE)

A. General Location: where shown on the drawings or pipe sizes less than 4".

B. Pipe and Fitting Material:
   1. Standard: ASTM D 1784
   2. Type: Type I, Grade 1, rigid (12454-B)

C. Pipe
   1. Standard ASTM D 1785
   2. Designation PVC 1120
   3. Schedule: 80

D. Joints
   1. General: Connect pipe by solvent cementing except where flanged or threaded fittings are required at expansion joints, valves, flow meters, equipment connections, or otherwise shown on the drawings or directed.
   2. Flanged Joints:
      a. Use flanges joined to pipe by solvent cementing
      b. Flange Drilling and Dimensions: Comply with ANSI B16.1
      c. Flange Gaskets: Use Viton, full face unless other more durable material recommended by the pipe manufacturer for the service intended.
      d. Bolts and Nuts: Type 304 Stainless Steel

E. Primer and Solvent Cement: Standard ASTM D 2564

F. Fittings:
   1. Socket Type
      a. Standard: ASTM D 2467
      b. Wall Thickness: Schedule 80
      c. Designation: PVC 1
   2. Threaded Type
      a. Standard: ASTM D 2464
      b. Wall Thickness: Schedule 80
      c. Designation: PVC 1

2.05 POLYVINYL CHLORIDE (PVC) TRANSMISSION MAINS – (PRESSURE PIPE)

A. General Location: Water and Sewer Transmission Mains for pipe sizes 4” and larger or as shown on the drawings.

B. Pipe and Fitting Material:
   1. Standard: ASTM D 1784.
   2. Type: Cell Classification as specified of 12454.
   3. AWWA C900 and C905, as required by pipe size.

C. Pipe Standard:
   1. DR-18, PC 235 (AWWA C900) – Sizes 4” through 12”
   2. DR-18, PC 235 (AWWA C905) – Sizes 14” through 30”

D. Joints:
   1. Standard: ASTM D 3139.

2. Type: Integral bell and spigot.
3. Flexible seals: Elastomeric, conforming to ASTM F-477.
4. Lubricant: As recommended by manufacturer.
5. Gaskets shall be factory applied.

E. Fittings:
Ductile Iron, Section 15068, Ductile Iron Pipe.

F. Restraining Devices:
1. Bell Restraint Harness: Series 1500 or 2800, EBAA Iron or equal, as required by size.
2. Mechanical Joint Restraint: Series 2000PV, EBAA Iron or equal.
3. Restraints shall be used as recommended by manufacturer and/or as determined by ENGINEER.

2.06 MARKING REQUIREMENTS

Intervals: Five feet maximum.

Designation:
Pipe nominal size.
Pipe stiffness or DR designation.
Designation Specification ASTM D 2241 and ASTM F 477.
PVC cell classification.
Manufacturer's name or trade name and code.
"NSF" National Sanitation Foundation Seal or mark for all potable water piping

PART 3 - EXECUTION

3.01 INSTALLATION

Comply with Section 15052.

****END OF SECTION****

SECTION 15100

WATER VALVES AND APPURTENANCES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope: The CONTRACTOR shall furnish all labor, materials, equipment and incidentals required to provide all water valves and appurtenances as shown and specified.

B. Coordination: Review Installation procedures under other sections and coordinate with the work which is related to this section including buried piping installation, exposed piping installation, site utilities, piping insulation, heating, ventilating, and air conditioning, plumbing, chemical feed equipment, etc.

C. Related Work Specified Elsewhere:
1. Section 09900 Painting
2. Division 11, Equipment
3. Division 15, Mechanical

1.02 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
1. Valves and appurtenances provided under this Section shall be the standard product in regular production by manufacturers whose products have proven reliable in similar service for at least two years.
2. Insofar as possible all valves of the same specific type shall be the product of one manufacturer.

B. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
1. AWWA C 500, Gate Valves 3” through 48” inch for Water or Other Liquids
2. AWWA C502, Dry Barrel Fire Hydrants.
3. AWWA C 504, Rubber Seated Butterfly Valves
4. AWWA C506, Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valve Types.
5. AWWA C507, Ball Valves, Shaft or Trunnion-Mounted, 6-Inch Through 48-Inch, For Water Pressure up to 300 PSIG.
6. AWWA C 508, Swing Check Valves for Ordinary Waterworks Service
7. AWWA C509, Gate Valves - 3 Inch through 12 Inch - For Water and Other Liquids
8. ANSI B16.1, Cast-Iron Pipe Flanges and Flanged Fittings.
9. ANSI B16.4, Cast-Iron Screwed Fittings.
10. ASTM A 307, Carbon Steel Externally and Internally Threaded Standard Fasteners.
11. ASTM A 354, Quenched and Tempered Alloy Steel Bolts, Studs and other Externally Threaded Fasteners.
12. ASTM D 1784, Rigid Polyvinyl Chloride Compounds and Chlorinated Polyvinyl Chloride Compounds.

13. ASTM D 2464, Threaded-Type Schedule 80 PVC Pressure Fittings.
14. ASTM D 2467, Socket-Type Schedule 80 PVC Pressure Fittings.
15. MSS SP-80, Bronze Gate, Globe, Angle, and Check Valves
16. Standards of the National Electrical Manufacturer's Association

1.03 SUBMITTALS

A. Shop Drawings:
1. Comply with the requirements of these Contract Documents
2. Submit for approval detailed drawings, data, and descriptive literature on all valves and appurtenances, including:
   a. Dimensions.
   b. Size.
   c. Materials of construction.
   d. Weight.
   e. Actuator and Calculations for torque
   f. Wiring Diagrams
   g. Protective coating.

B. Manufacturer's Certificates:
1. Comply with the requirements of these Contract Documents.
2. Submit manufacturer's certificates of compliance with ANSI, AWWA and other Standards listed herein.

C. Manufacturer's Service Report:
1. Comply with the requirements of these contract documents.
2. Certify that valves are properly installed except as noted.
3. Recommend corrective action for any deficiencies noted.

D. Operation and Maintenance Data:
1. Submit a detailed operation and maintenance manual for all valves and appurtenances provided under this Section including the following information:
   a. Product name and number.
   b. Name, address and telephone number of manufacturer and local distributor.
   c. Instruction bulletins for operation, maintenance and recalibration.
   d. Complete parts and recommended spare parts lists.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Handle all valves and appurtenances with care.

B. Valves and appurtenances which are cracked, chipped, distorted or otherwise damaged or dropped will not be acceptable.

C. Store all valves and appurtenances off the ground in enclosed shelter.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General:
   1. All valves shall have manufacturer's name and working pressure cast in raised letters on valve body.
   2. All manual valve operators shall turn right to close unless otherwise specified. Valves shall indicate the direction of operation.
   3. Unless otherwise specified all flanged valves shall have ends conforming to ANSI B16.1, Class 125.
   4. All buried valves shall be provided with adjustable three piece valve boxes, extension stems, operating nuts, and covers unless otherwise shown or specified.
   5. All bolts, nuts and studs on or required to connect buried valves, valves embedded in concrete, or submerged valves shall be stainless steel.
   6. All other bolts, nuts, and studs shall, unless otherwise approved, conform to ASTM A 307, Grade B cadmium plated, hot dipped galvanized or stainless steel.
   7. Bolts and nuts shall have hexagon heads and nuts.
   8. Gasket material and installation shall conform to manufacturer's recommendations.

B. Water Air Release Valves:
   1. Type: Float with compound lever.
   2. Size: As shown on the Drawings.
   3. Location: As shown on the Drawings. Buried Valves shall be installed in valve vault.
   4. Construction:
      a. Body and cover: Semi-steel or cast iron.
      b. Float: Stainless steel.
      c. Seat: BUNA-N.
      d. Lever Arms: Bronze or stainless steel.
   5. Manufacturer and Model:
      a. Valve and Primer Corp., APCO Model No. 200A.
      b. Val-Matic Model No. 38.
      c. G-A Industries, Fig. No. 2-AR.
      d. Or equal.

C. Pressure Gauges:
   1. Standard Pressure Gauge (liquid filled):
      a. Type: Bourdon Tube Pressure Element Type, Liquid Filled Gauges (for pressure ranges of 15 psi and greater and vacuum ranges to 30″ Hg):
      b. Performance Requirements:
         1) Accuracy: ±0.5 percent of span (ANSI B40.1 Grade 2A)
         2) Range: As specified in Schedule
      c. Construction Features:
         1) Case:
            1. Solid front design constructed of glass filled polyester
            2. Mounting: Stem mounting, bottom connection
            3. Type 304 stainless steel
         2) Ring: Threaded, glass filled polyester
         3) Full blowout back
         4) Window: Glass
         5) Dial: White with block marking.

6) Bourbon Tube and Socket: 316 Stainless Steel, heliarc welded
7) Movement: Cam and roller movement, 300 series stainless steel
8) Size: 4-½″
9) Connection: ¼ inch male NPT
10) Adjustable pointer
11) Externally accessible zero adjustment
12) Built-in overload and underload movement stops
13) Pressure Snubber: Sintered stainless steel snubber threaded into gauge socket or in external stainless steel housing with ¼ NPT male and female connections
14) Filled Liquid: Silicone oil
15) Gauge Cock: Provide ¼ NPT 316 stainless steel gauge cock for pressure gauges not assembled with diaphragm seals, unless otherwise indicated.

2. Digital Gauge
   a. General – Gauge shall register line pressure and send signal to SCADA system as to the pressure at that location.
   b. Type – Digital Weatherproof Gauge, with 4-20 ma output.
   c. Accuracy -+/-0.25%
   d. Range – 15 psi to 200 psi
   e. Construction:
      1) Case – Stainless Steel, diameter 4.5 inches
      2) Display – LCD with 5 digits, character height 0.75” minimum, Screen shall include a backlight.
      3) Keypad – Shall include an up and down arrow to scroll through menu options, menu key, on/off key, zero or clear key and enter key.
      4) Power – shall be capable of being powered with or without batteries.
      5) Connection – ¼ inch male NPT.
   f. Menu Modes:
      1) Unit Adjustments
      2) Configuration Mode
      3) Backlite options
      4) Auto Off (shall be capable of setting to never)
      5) Field Calibration
   g. Manufacturer and Model – Ashcroft 2174 Series, or equal.
   h. Locations – Metering Stations, Water Supply Wells or as shown on the drawings.
3. Accessories
   a. Diaphragm Seals:
      1) Description – Designed for use with pressure gauges and transmitters for process applications. Shall be designed for use with corrosive materials with which the seals and unit may come in contact with for the specific applications.
      2) Locations – use where process fluids are corrosive or could clog the pressure measuring element to separate the process fluids from the measuring element.
      3) Manufacturer – Ashcroft or equal.

   b. Instrument Connection System:

1) Description – A preassembled block and bleed valve to allow for the removal of the instruments for calibration, repair or replacement without interrupting process flow.
2) Manufacturer – Ashcroft or equal.

c. Manufacturer and Model:
1) Helicoid, Series 900
2) Or equal

4. Pressure Gauge Schedule:
a. Service: Digital: Water Supply Wells and Wholesale Meters
b. Range: 0-150 psig

D. Ball Valves:
2. No-Lead Red Brass:
a. Type: Standard circular port ball.
b. Construction:
1) Body and Ball: No-lead Red Brass
2) Inset: Stainless Steel for connection for water service pipe.
3) Seat, Stem Seal and Body Seal: TFE.

c. End Connections: Threaded unless otherwise shown.
d. Manufacturer and Model:
1) Ford Meter Box Company FB-1000, Mueller 300 series
2) Or equal.

3. PVC:
e. Type: Standard circular port ball.
f. Construction: Type 1, Grade 1 PVC
g. End Connections: Threaded Union End.

h. Manufacturer and Model:
1) ASHAI/American
2) Or equal.

E. Water meter:
1. The Contractor shall make arrangements for the water utility to provide water tap and install the water meter at Contractor's cost.

F. Electronic Actuated Rate of Flow and Pressure Reducing Valve:
2. Type: maintains a constant discharge flow rate, adjustable, regardless of fluctuations in line pressure. Flow over the seat so that valve will close when failure occurs.
3. Size: one nominal pipe size less than influent pipe diameter unless otherwise noted on the drawings.
4. Location: wholesale meter connections and other locations shown on drawings shall be housed in enclosure when above ground or valve vault below ground.
5. Body and Cover: Ductile Iron per ASTM A536
6. Seat: Stainless Steel per AISI 316
7. Stem: Stainless Steel per AISI 303
8. Spring: Stainless Steel per AISI 302
9. Elastomers: BUNA-N (Nitrile)
10. Control Tubing and Fittings: Stainless Steel
11. Working Pressure and Connections: Flanged 1500# for 250 PSIG

12. Manufacturer: Watts, Cla-val, or equal.

G. Strainer:

13. Type: Y pattern with removable strainer. Strainer shall be removable without requiring the entire body of the appurtenance to be removed from the line.
14. Pressure Rating: 150 psi operating pressure
15. Manufacturer: ASHAI or equal.

H. Fire Hydrants:

1. Standard: AWWA C502, except as modified herein.
2. Main Valve:
   a. Nominal Size: 5-1/4 inches.
   b. Type: Compression type closing with water pressure for positive sealing.
   c. Direction of Opening: Left.

3. Pumper Connection (Verify with Owner)
   a. Number and Size: One 4-1/2 inch hose connection with matching chained cap.
   b. Threads: All threads are to be National Standard Thread (NST) to match Owner equipment.
   c. Field replaceable.
4. Nozzle Connections (Verify with Owner)
   a. Number and Size: Two 2-1/2 inch hose connections with matching chained cap.
   b. Threads: All threads are to be National Standard Thread (NST) to match Owner equipment.
   c. Field replaceable.
5. Inlet Connection: Shoe inlet with six inch mechanical joint hub inlet, complete with accessories with hydrant bury being suitable for three to eight foot depth.
6. Operating Assembly:
   a. 1-1/2 inch (point to flat) pentagon operating nut.
   b. Operating threads sealed from water in an oil reservoir by two O-ring seals; one sealing the oil and one sealing the water.
   c. Protect by use of weather shield or nut.
7. Cover:
   a. Four foot minimum.
   b. Provide barrel and stem extension where cover exceeds 4 feet.
8. Materials of Construction:
   Hydrant barrels, bonnet, and shoe: ASTM A126, Class B.
9. Required Features:
   a. Provide ground line breakable component that will shear off upon impact at the ground line without damage to the barrel.
   b. Provide stainless steel safety stem coupling that will separate upon impact.
   c. Drain assembly: Two drain valves and at least two drain openings to insure quick and complete drainage.
   d. Hydrants shall incorporate no parts which require field adjustments.
   e. Hydrant design shall place nozzles at least 18 inches from ground line when measured not more than two inches below the mating of ground flange complying with NFPA handbook.
   f. Hydrant repair kits and extensions shall interchange with existing city

equipment.

10. Location: As shown on the drawings.
11. Paint: Hydrants shall be painted a color as determined by the local fire agency depending on whether system will be active or not after installation. Coordinate with the Authority as to whether or not system will be active after installation of hydrants. Paint type shall be as recommended by the hydrant manufacturer.
12. Reflectors:
    a. Street - Marker shall be a raised pavement marker in accordance with MDOT Standard Specification for Road and Bridge Design, Latest Edition, per Section 720. Marker shall be two-way reflective marker and be blue in color. Marker shall meet the requirements of Type B-G markers and be installed per MDOT Standard Specifications.
       Markers shall be provided with each fire hydrant assembly and installed in road adjacent to hydrant location. Contractor shall obtain approval from governing road agency for installation of markers.
    b. Hydrant - Fire Hydrant Assembly shall include two reflective collars per assembly. The top collar shall have a minimum width of 1 5/8" and the bottom collar shall have a minimum width of 2 5/8". Collar length shall be as required to completely wrap around the hydrant barrel. Collars shall be installed above and below the pumper and hose nozzles on the hydrant barrel. Collar shall incorporate 3M™ Scotchlite™ Reflective Sheeting, or equal into the construction. Reflective collar shall not interfere with the operation of the hydrant for its intended use. Reflective sheeting shall be laminated to a heavy gauge stainless steel strap using a polyethylene holder. The strap shall be attached with two aluminum push rivets per collar and a stainless steel domed cap nut. Color shall be as approved by the OWNER and Local Governing Fire Marshall.
13. Marking Tag: Fire Hydrant Assembly shall include a solid brass identification tagging system. Tag shall be rust and corrosion resistant. Tag shall attach to the bolts on the hydrant. Tag shall be installed at a location that does not interfere with the use of the hydrant for its intended purpose. Tag shall denote the OWNER's name and the hydrant's identification number according to the OWNER's identification system. Tag shall be at least 2.5" x 1" and designed to be attached to an 11/16" bolt hole.
14. Manufacturer and Model: Mueller Super Centurion 250 (A-423) or equal.

I. Gate Valve:
1. 2-1/2-inches Diameter and Smaller:
    a. Type: Rising stem with solid wedge and union bonnet.
    b. Construction:
        1) Body: Bronze.
        2) Packing: TFE impregnated asbestos.
        3) Trim: Bronze.
    c. End Connections: Threaded.
    d. Manufacturer and Model:
        1) Jenkins Brothers, Fig. 47-U.
        2) Walworth, Fig. 2.
        3) Or equal.
2. 3-inches Diameter and larger:
    a. Standard: AWWA C509 or C515 as applicable by size

b. Type: Non-Rising Stem.
c. Construction:
1) Body and Bonnet: Cast iron.
2) Wedges and Trim: Resilient Seat.
3) Packing: O-ring.
d. End Connections:
1) Exposed Valves: Flanged, conforming to ANSI B16.1, Class 125, unless otherwise shown.
2) Buried Valves: Mechanical joint, conforming to ANSI B21.11.
e. Manufacturer:
1) M&H Style 4067.
2) Or equal.

J. Butterfly Valves:
1. Standard: AWWA C504
2. Pressure Class: 150 PSI (minimum)
3. Construction:
a. Body: High Strength Cast iron.
b. Disc: High Strength Cast iron with stainless steel edge.
c. Shaft: Type 304 stainless steel.
d. Seats: Natural or synthetic rubber and full resistant seats retained in the body or on the disc edge in accordance with AWWA C504. Fasteners shall be type 316 stainless steel with a one piece stainless steel retaining ring.
e. End Connections: Flanged for exposed applications.
4. Design:
a. Valves and their operators shall be designed for a flow velocity meeting their class requirements.
b. All valves and operators shall be designed for bi-directional flow.
c. Valves 30-inch and larger shall have flow through type vane.
d. Replacement of seals, for all butterfly valves, shall not require removal of the valve from the line.
e. Replacement of seals on valves 30 inches or larger shall not require disturbing any part of the valve or operator assembly, except any packing follower glad.
5. Manufacturer:
a. Henry Pratt Company
b. DeZurik
a. Or equal.

K. Check Valve:
1. Swing Check Valve.
a. Type: Counter-weighted swing check.
b. Construction:
1) Body, Cover, Disc and Levers: Cast iron.
2) Counterweight Arm: Cast iron or manufacturer standard.
3) Shaft: 18-8 Stainless steel.
4) Body Seat: Bronze.
5) Seat Ring: Rubber.
6) Shaft Packing Gland: Compression type.
c. Manufacturer and Model:

1) Clow F-5382.
2) American Flow Control 50SC.
3) Or equal.

2. Double Door Disc for Fluid Service:
   a. Construction:
      1) Body: Cast iron
      2) Door: Ductile iron
      3) Hinge Shaft, Stop Shaft, and Spring: Type 316 stainless steel
      4) Seat: Buna-N.
      5) End Connections: Plain to fit between ANSI B16-1 Class 125 flanges unless otherwise specified in the Process Valve Schedule.
   b. Design:
      1) The check valve and doors shall be spring loaded, normally closed by means of one or more heavy duty stainless steel springs.
      2) Valve seating shall be resilient and water tight.
      3) The seating element shall be molded to the valve body.
   c. Manufacturer and Model:
      1) APCO
      2) Techno Corporation
      3) Or equal.

L. Insertion Valve.
   3. Standard: Shall meet the current requirements of AWWA C509 for permanent valve installation.
   4. Valve:
      a. Type: Non-Rising Stem.
      b. Construction:
         1) Wedge: Resilient Seat SBR Rubber.
         2) Stem: Heavy Duty Bronze.
      c. Insertion Valve shall be installed in the open position, under pressure and flow conditions without interruption of water service.
      d. Final assembly shall provide complete shutoff of the flow of water.
      e. All gate valves shall open left (counter-clockwise), unless otherwise specified.
   5. Sleeve:
      a. Shall be capable of installation on cast iron, ductile iron, asbestos cement, and C900/905 PVC pipe.
      b. Fabricated, two piece sleeve shall provide a 360 degree seal around the pipe under all working pressures of the system.
   6. Manufacturer and Model:
      a. Furmanite EZ Valve.
      b. Or equal.

M. Electronically Operated Soleniod Valve
   7. Description: Self-contained unit consisting of a diaphragm-operated packless main valve, a diaphragm high capacity auxiliary valve, and a packless three-way solenoid pilot valve. The valve shall operate either open wide or close drip-tight. The tree way pilot alternately applies pressure to or exhausts pressure from the diaphragm chamber of the high capacity auxiliary valve to cause the same action in the main valve.

8. Materials:
   a. Main Valve – hydraulically operated, singe diaphragm-actuated, globe pattern, diaphragm shall be the only moving part and shall form a sealed chamber in the upper portion of the valve.
   b. Valve Body – Body and cover shall be ductile iron.
   c. Diaphragm Assembly – non magnetic 303 stainless steel stem. Seat shall be a solid o-ring. A flexible, non wicking, FDA approved diaphragm shall consist of nylon fabric bonded with synthetic rubber compatible with the operating fluid. The main valve seat and stem bearing in the valve cover shall be fully removable.
   d. Pilot Control System – three-way solenoid valve controlled by an external power source. The system shall include strainers, shut off cocks and manual operator. Opening and closing speed control needle valves shall be utilized to prevent surge in the system when the valve opens and closes. The following features are required:
      1) Body: Brass
      2) Rubber Parts: Buna N
      3) 120 V, 60 Hz
      4) Enclosure: Nema 4
      5) C oil insulation: 6 watts
      6) AC Volt Amps inrush: 30
      7) AC Volt Amps Holding: 16
      8) Watts DC: 10.6

   e. Accessories: position indicator on the main valve to depict "open" or "closed", manual operator for the solenoid valve, provide one spare solenoid valve and manual operator per valve.
2. Manufacturer and Model: Cla-Val Co. Model No. 136-03 Solendiod Control Valve, or equal.

N. Joint Restraint
1. Description: Restraint shall be a mechanical restraint for connecting pipe to mechanical joint fittings.
2. Materials of Construction: Restraint shall be made of ductile iron in accordance with ASTM A536 with 304 stainless steel nuts and bolts and EPDM or Buna-N gaskets. Restraints shall be made with twist off nuts.
3. Manufacturer and Model:
   a. EBAA Iron, model Megalug
   b. Mueller, Aquagrip
   c. Or equal

O. Water Service Tubing:
1. Materials of Construction:
   a. Tubing shall be polyethylene tubing having copper tube O.D. sizes and complying with ASTM D2737, SDR 9, 200 psi. The use of metal inserts in the tubing will not be permitted.
2. Manufacturer:
   a. Driscopipe
   b. Or equal

P. Tapping Sleeve

1. Materials of Construction:

   a. Band, lugs, flange, bolts, and nuts shall be 304 Stainless Steel with flanged outlet for connection of tapping valve. Nuts shall be coated to prevent galling. Sleeve shall have a three quarter (¾") inch test plug to ensure proper sealing. Sleeve gasket shall be virgin SBR or Buna-N for water service and provide full coverage for the full length of the sleeve. Sleeve shall be rated for 150 psi working pressure.

2. Manufacturer and Model:

   a. Ford, FTSS
   b. Mueller, H-304
   c. Or equal

Q. Line Stopping.

1. Line stopping shall include all components of the type and size required to plug the existing water main to be tapped. This will be done to facilitate the tap without losing pressure along the existing water main that is to remain in place.

2. The line stop fitting shall be split mechanical bolt-on type, fabricated from stainless steel with 18-8 type 304 stainless steel nuts, bolts, and washers, and be complete with equalization fittings, blind flange with gaskets, nuts and bolts. Flanges are AWWA 207 Class D, ANSI 150# drilling. Gaskets are compounded for use with water, salt solutions, and mild acids.

3. Line Stop Procedure

   a. The contractor shall clean the exterior of the main to remove debris, corrosion deposits and other surface irregularities that might interfere with proper seating and sealing of the line stop fitting against the main.

   b. Line stop fittings installed on slip joints or mechanical joint pipe require at least three standard lengths of pipe remain buried from the point of the line stop to where the line will be cut open. An alternate method is to anchor the line stop fitting in concrete. Line stop fittings shall be installed and pressure tested at 150 psi for 15-30 minutes prior to tapping the main.

   c. Concrete support/anchor shall be installed after pressure test. Concrete support should extend to the "BEAM POINT or CENTER LINE" of the pipe main. This method should prevent movement laterally where the line is isolated and cut open.

   d. Temporary line stop valve shall be installed into the line stop fittings (flanged tee may be mounted to the valve for temporary bypass). Drilling machine shall then be mounted to line stop valve, and the wet tap should be performed.

   e. Once the coupon from the tap is retracted into the machine, the stop valve can be closed and the drilling machine can be de-pressurized and removed. Coupon shall be measured to verify pipe I.D. for sizing adjustments of the folding head stop sealing element.

f. Line stop machine shall then be mounted on stopping valve and line stop assembly, valve opened, and assembly entered into the pipe and the line stop performed.

g. Once the pipe main is de-pressurized, alterations can begin.

h. After alterations are completed, and the new line shall be sanitized. The line stop shall be re-pressurized, and the stopper head removed from the line stop and the valve closed.

i. Drilling machine with closure plug is mounted to stop valve. Valve is opened and the assembly is installed and locked into position inside the neck of the stop fitting.

j. The drilling machine shall then be removed, and blind flange shall be installed to the line stop fitting for completion of the job.

k. Installation by: T.D. Williamson, Hydra Stop or approved equal

R. Backflow Prevention Device:

1. Materials of Construction:

a. Valve shall be bronze body with minimum rating of 175 psi working pressure.

b. Device shall meet the requirements of all applicable ASSE Standards.

2. Manufacturer and Model:

a. High hazard connection shall be a reduced pressure principle assembly Watts Series 719 or 709 meeting the requirements of AWWA C511.

b. Low hazard connection shall be a double check valve assembly Watts Series 909 meeting the requirements of AWWA C510.

c. Or approved equal.

2.02 WATER SYSTEM APPURTENANCES

A. Extension Stems, Stem Guides, Wrenches and Keys:

1. Extensions shall be at least as large as the stem of the valve it operates.
2. Intermediate stem guides shall be installed for extensions more than 10 feet long.
3. Stem brackets and guides shall be made of cast iron and fully adjustable bronzed bushed guide block. Fasten brackets to walls with approved expansion bolts.
4. Operating nuts 2” square shall be included with extension stems
5. Provide operating key or wrench of suitable length and size for each valve that is not readily accessible to direct operation.

B. Valve Operators

1. Automated Valve Actuator:

a. Type: Weatherproof Electronic Motor Actuator according to NEMA 4 standards for Butterfly Valves, Gate Valves or Plug Valve installation.

b. All covers shall have O-ring seals and cover fasteners shall be stainless steel

c. Motor Type: totally enclosed, non-ventilated, induction type with cooling fins to dissipate the heat generated during operation. Motor shall be capable of operating in any position and shall be sealed from the gear case to allow

for removal without loss of lubricant. Motor shall be 120 VAC, single phase, 60 hz, and shall have sufficient horsepower to open and close the valve (minimum 1/5 hp).

d. Limit Switches: shall be provided to de-energize the motor control circuit when the actuator reached its travel limits in the open and closed directions. Switches shall be enclosed in their own NEMA 4 case and two shall be provided for each the normally closed and open positions per rotor.

e. Torque Switches: shall be provided to de-energize the motor control circuit should the valve encounter an obstruction during travel. One switch shall be provided for each the open and closed direction.

f. Gearing: all power gearing shall be made of hardened steel or bronze and operate in a greased lubricant.

g. Electrical Terminal Housing: terminals shall be isolated from the limit and torque switches. Terminals shall be the plug and socket design.

h. Mechanical Position Indicator: Shall be furnished to show the continuous valve position.

i. Handwheel: shall be permanently attached to the actuator for manual operation. Handwheel shall not rotate when motor is in operation.

j. Open/Close Controls: actuator shall be furnished with an integral control package which connects to the actuator by means of plug and socket terminals. Control enclosure shall be provided in accordance with NEMA 4 standards. Motor Controls shall consist of mechanical reversing contactors, open, stop, close control, local, off, remote selector switches and open/close lights.

k. Modulating Controls: controls shall be provided by a positioned board that accepts a 4-20ma DC control signal.

l. Manufacturer and Model: Henry Pratt Company Positron II or equal.

2. Manual Valve Actuator:

a. General:

(1) Conform with AWWA C504

(2) Designed to produce maximum required torque of 80 pounds.

(3) Designed to prevent over travel of valve at either full open or closed position.

(4) Maintain valve position in any intermediate position without creep or flutter.

(5) Gearing shall be totally enclosed if required for valve operation.

(6) Exposed actuators shall have a permanent indicator with raised or engraved marks to show the position of the valve.

b. Types: handwheel, lever, chainwell or operating nut per drawings.

c. Location:

(1) Handwell or Lever: Exposed valve unless otherwise noted on drawings

(2) Chainwell: Provide for valves more than 6 foot 6 inches above the operating floor level.

(3) Operating nut: Buried valves unless otherwise noted on drawings.

C. Above Ground Enclosure:

1. Type: Non-Insulated, concrete pad mounted Aluminum Enclosure

2. Location: As necessary to house valves and appurtenances above ground or as shown on drawings.

3. Size: As recommended by manufacturer with necessary spacing to allow access to valves or as shown on drawings.
4. Shall incorporate access doors to view, operate and maintain housed equipment without requiring entire enclosure to be removed.
5. Shall be removable for replacement of housed equipment.
6. Shall be lockable to provide security to equipment.
7. Manufacturer: Watts WattsBox Enclosure Series or equal.

D. Valve Boxes:
1. Location: Provide for all buried valves.
2. Construction:
   a. Heavy pattern cast iron box.
   b. Type: Three-piece adjustable, telescoping.
   c. Inside Diameter: 4-1/2 inches minimum.
   a. Cover: Cover: Heavy-duty cast iron with "JCUA WATER" cast in top.
   d. Direction to Open Arrow: Cast in cover.
3. Provide extension stem and operating nut.
4. Operating nut and stuffing box enclosed by lower section which rests on bonnet.

E. Meter Boxes:
Shall be NDS D1200 for automatic meter reading or approved equivalent. Box and cover must be polypropylene material with a minimum body and cover thickness of 0.25". Meter box shall house curb stop, straight style dual check valve, water meter and pressure reducing valve (where required). Cover shall be BLUE in color.

F. Valve Vaults:
1. Location: Provide for all buried Air Release Valves
2. Construction: Precast Concrete Sections with cast iron Cover and Frame, per Section 02722.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install all valves and appurtenances in accordance with manufacturer's instructions.

B. Install suitable corporation stops at all points shown and required where air binding of pipe lines might occur.

C. Unless otherwise approved install all valves plumb and level. Valves shall be installed free from distortion and strain caused by misaligned piping, equipment or other causes.

D. Install all valves so that operating handwheels or wrenches may be conveniently turned from operating floor but without interfering with access.

E. Valve boxes shall be set plumb, and centered with the bodies directly over the valves. Earth fill shall be carefully tamped around each valve box to a distance of four feet on all sides of the box, or to the undisturbed trench face, if less than four feet.

F. Hydrants and connecting pipe shall have at least the same depth of cover as the distributing

pipe. The hydrants shall be set upon a slab of concrete not less than 4 inches thick and 15 inches square. Where restrained hydrants are not used the side of hydrant opposite the pipe connections shall be firmly blocked against the vertical face of the trench with a concrete thrust block. Not less than 2 cubic yard of washed gravel shall be placed around the base of the hydrant at the location of the drain holes.

G. Contractor shall provide the services of a qualified factory-trained serviceman to check and approve the installation of butterfly valves, swing-check valves, surge relief valves, flow control valves, pressure reducing valves, all metering devices and automated valve actuators.

3.02 FIELD TEST AND ADJUSTMENTS

A. Adjust all parts and components as required correct operation.

B. Conduct functional field test of each valve in presence of the ENGINEER to demonstrate that each part and all components together function correctly. All testing equipment required shall be provided.

*** * END OF SECTION * ***

SECTION 16010

GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 Governing Clause

The phrase "CONTRACTOR shall furnish and install" unless specified or indicated otherwise, shall be omitted for the sake of brevity in these specifications. However, these phrases are implied. Any mention of material and/or operations in the specifications or drawings will require CONTRACTOR to furnish and install such materials and perform each and every operation required for a complete and operable system and to the complete satisfaction of the ENGINEER. The drawings are diagrammatic and may not necessarily show each and every wire, conduit, conduit routing, junction electrical box and/or final connection required for all pieces of equipment. However, the intent of this paragraph is to require that the CONTRACTOR furnish labor and materials to make all required final electrical power connections whether or not shown to all equipment shown on the drawings issued as bidding documents for this project.

1.02 General Conditions

A. General Conditions, Supplementary General Conditions, Information to Bidders, General Requirements, Special Conditions, Addenda, Wage Rates, and other pertinent documents issued under these specifications and shall be complied with in every respect as though fully written herein.

B. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and performance and shall not be construed as limiting competition; and in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the final judgment of the ENGINEER expressed in writing, is an approved equal to that specified.

1.03 Record Drawings and Operating and Maintenance Manuals

Furnish to the ENGINEER at job acceptance and completion, the following in compliance with Sections 01795 and 01970:

A. Record Drawings: One set of black line prints marked in red, showing an accurate location of all variations of the work actually installed related to the original drawings. The drawings shall include all approved and installed Change Orders, field condition changes, and other variations from the original plans and specifications.

B. Operation and Maintenance Manuals: Furnish three copies of an operation and maintenance manual for each electrical system and for each piece of equipment. Three copies of the complete manuals bound in a 3" 3-ring black binder with color coded tabs as directed by the ENGINEER labeling all shop drawings, approved manufacturers brochures, control diagrams, maintenance instructions and other data required by the contract documents

reflecting the record fabrication and installation of all systems or equipment installed. One manual shall be furnished prior to the time that the system or equipment tests are performed. The remaining two manuals shall be furnished to the ENGINEER before the contract is closed out.

C. The following identification shall be inscribed in minimum 3/4" high alphabet type letters on the outside front corner: The words "OPERATING AND MAINTENANCE MANUAL", the name and location of the project and the contract number. The manual shall include the names, addresses, and telephone number of each subcontractor installing equipment and systems, and the local manufacturers representative for each item of equipment and each system. This information shall be contained on the first page of the binder. Lettering shall be permanent signage and not stick-on type.

D. The manual shall have a typewritten table of contents with the tab sheets placed before instructions covering the subject. The instruction sheets shall be legible with large sheets of drawings folded in. The manual shall include a system layout showing circuits, devices, and controls; control diagrams with explanation of operation and control of each component; start-up control sequence, and operation; a detailed description of the function of each principal component of the system; the procedure for starting; the procedure for operating; shut-down instructions; installation instructions, maintenance and overhaul instructions; lubrication schedule including type, grade, illustrations; test procedures; performance data; and parts list. The parts list for equipment shall indicate the sources of supply, recommended spare parts, and the service organization which is reasonably convenient to the site. The manual shall be complete in all respects for all equipment, controls, and accessories provided.

1.04 Tests and Inspections

The complete job shall be, during actual construction, and for the warranty provision period, subject to the supervision of the ENGINEER and will have the following tests and inspections conducted without any additional cost to the contract.

A. By ENGINEER'S inspections and tests conducted by him or for him in his presence. Upon written notice, CONTRACTOR shall furnish not to exceed two men, one to include the job foreman and tools to assist and be directed by the ENGINEER for a reasonable amount of time to make such tests and inspections as are requested by the ENGINEER pertaining to the safety and operation of any device or system installed.

B. By complete insulation break-down tests with a megger of each and every branch circuit, and service entrance. All 600-volt conductors shall meet a minimum of resistance of 1,000,000 OHMS. Tests shall be performed prior to any connections to overcurrent devices, devices or equipment. All readings shall be made in the ENGINEER'S presence or his authorized representative and a type-written report of same submitted to him before the job is subject to his approval. The manufacturer, cat. no. and type or megger shall be noted on the report.

C. By any federal, state or local authority having jurisdiction of the project.

D. By the Mississippi State Rating Bureau. After inspection by this agency, corrections of any deficiencies shall be made which were found adversely affecting the insurance to be carried by the OWNER. Acceptance of the Rating Bureau's report or subsequent reports lie with the ENGINEER or OWNER. Electrical contractor/subcontractor shall pay all cost for this work.

E. Properly phase out the entire electrical system to balance all loads as close as possible.

F. Certified Test Reports: Before any equipment or materials are delivered to the project site, certified copies of all test reports specified in the individual sections of this specification shall be submitted to the ENGINEER for his approval.

1.05 Guarantee

A. Guarantee to the OWNER all work performed and all equipment installed under this contract shall be free from defects in workmanship and materials for a period of one year unless noted otherwise from date of final written acceptance by the ENGINEER and the OWNER.

B. Defects shall be corrected arising during this one-year period at the CONTRACTOR'S own expense, upon written notice of the OWNER or his authorized representative.

1.06 General Information

A. Plans are diagrammatic. Judgment and care shall be exercised to install all electrical work in a practical manner which shall function properly and fit the construction and finishes. Electrical devices not shown or specified which shall be required or any device or system to produce a complete and operative system shall be brought to the ENGINEER'S attention at least five days prior to the bid date in order for such devices to be noted or clarified in an addendum, otherwise furnished at his own expense.

B. Cooperate with others in laying out work so that the electrical phase of the work will properly fit the construction and finishes. Space requirements, etc. other than that shown on the plans required to facilitate the electrical construction, shall be brought to the ENGINEER'S attention prior to commencing any work so that proper action may be taken to remedy this.

C. Exact location of equipment shall be determined on the job. **Do not scale electrical drawings for exact location of any equipment**. All mounting heights shall be verified prior to rough-in.

D. ENGINEER reserves the right to change the location of any equipment improperly installed and to change the exact location of any equipment connection location up to twenty feet prior to rough-in with no additional cost to the contract.

E. Circuit grouping, conduit or cable runs are indicated diagrammatically with number of conductors shown in each raceway to clarify the operation and function of various systems. Provide the proper number of conductors and conduits or cables to produce an operative

system as specified herein. Where conductors are not shown, consult manufacturer's recommendations.

F. Branch circuit shall be indicated as 2 or 3 wire circuits unless otherwise noted. No two ungrounded conductors will be connected to the same ungrounded main in any panel. There shall be no splicing of branch circuit conductors in any panel, safety switch or non-automatic circuit breaker in separate enclosures.

G. All materials shall be new (unless otherwise noted on the drawings or specified herein) and of approved equal or superior quality to those specified. All equipment or materials shall conform to the latest requirements of Underwriter's Laboratories, National Electrical Code, National, State or local agency having jurisdiction, American National Standards Institute (ANSI), National Electrical Safety Code and National Fire Protection (NFPA) Codes.

H. All conductors shall be color coded as specified herein. All conductors not complying with the specified color code shall be removed and replaced solely at the electrical subcontractor's expense.

I. All materials, devices, equipment, etc. shall be installed, tested and connected in strict compliance with manufacturer's recommendations.

J. Install all materials, equipment, devices, etc. in a neat and workmanlike manner. Use only experienced labor or employ appropriate subcontractor to do all cutting and patching necessary for the installation of his materials.

K. Protect from damage all apparatus and equipment furnished on this project. Equipment and materials shall be properly stored and adequately protected and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored and protected in accordance with the manufacturer's recommendations and as approved by the ENGINEER. Electrical conduit shall be stored to provide protection from the weather and accidental damage. Plastic conduit shall be stored on even supports and in locations not subject to direct sun rays or excessive heat. Cables shall be sealed, stored and handled carefully to avoid damage to the outer covering or insulation and damage from moisture and weather. Any piece of equipment or material marred or damaged shall be repaired, repainted and/or replaced to the complete satisfaction of the ENGINEER.

L. Any piece of equipment, switch, device, etc. shown mounted on and/or adjacent to any installed equipment which, if installed, may impair the proper operation of that equipment, shall be removed by the electrical contractor/subcontractor as required in order that installed equipment shall function properly. ENGINEER shall be notified immediately if any such condition exists.

1.07 Removal of Salvage Material and Debris

It shall be the responsibility of the CONTRACTOR to have all trash, salvage material, etc. related to the electrical work completely removed from the project site at all times during construction.

1.08 Trenching and Backfilling

A. All trenching shall be done by mechanical means and all sides straight and vertical. Width of trenches shall not exceed eight inches on either side of placed equipment.

B. All backfill material and compaction shall meet requirements of Section 02315.

C. Where required by safety or recommended standards and where any excavated trench or hole is more than five feet deep, install shoring on all sides to protect against sides caving in. Shoring method and material shall be the CONTRACTOR'S responsibility.

1.09 Cutting, Patching, Finishing and Painting

A. The CONTRACTOR shall be responsible for all cutting required to install his work. All existing walls shall be carefully trenched, cut, etc. to depths required to completely recess conduit and boxes. Where masonry walls are encountered, blocks and/or brick shall be carefully saw cut to exact box dimensions and conduit shall be routed in cavities, air spaces, etc.

B. It shall be the responsibility of the CONTRACTOR to have all patching, finishing, painting, etc. done by qualified personnel related to his work.

C. It shall be the responsibility of the CONTRACTOR to have all exposed conduit, piping and wireways painted where exposed in any space or location.

1.10 Corrosion Protection

It is the intent of these specifications to have all joints, connections, etc. exposed to climatic conditions to be completely watertight using the following:

A. Nylon gland rings on all Liquid-tite conduit connectors.

B. Nylon gland rings on all locknuts installed in boxes subject to moisture.

C. Insulated throat connectors on all compression connectors.

D. Corrosion inhibitors shall be placed in all environmental, control panels, exposed to damp or wet locations. Inhibitors shall be an approved equal to "Hoffman" A-HCI-1, A-HCI-5 and A-CI-40 and shall be sized in accordance with volume content of the device to be protected.

E. Where equipment is exposed to severe conditions such as salts, acids, alkalis, sewer gases, etc., all equipment shall be sprayed inside and out with two coats of General Electrical Glyptal No. 1201-A or an approved equal.

1.11 Project Site Inspection

It shall be the responsibility of the CONTRACTOR to visit the proposed sites and make his own observation of the work to be done under the plans and specifications and same shall be contained

in his bid proposal. Failure to do so will not relieve him of any responsibility and will not be justification for requesting additional money from the OWNER.

1.12 Coordination of Existing Utilities

It shall be the responsibility of the CONTRACTOR to coordinate all existing utilities' locations, both overhead and underground, and verify the locations with the various utilities prior to commencing any work. CONTRACTOR shall call Mississippi One Call System, 811, and obtain a utility location request number and refer to this number each time a utility company is notified of diggings or trenching near their utilities. Failure to do this shall not relieve him of any responsibility and will not be justification for requesting additional money from the OWNER due to damage of any of these utility lines.

1.13 Construction Tools, Utilities and Buildings

The CONTRACTOR shall furnish all tools, utilities, job office and storage buildings required for his use and to protect all electrical equipment as directed by the ENGINEER.

1.14 Payment Items

Progress payments shall be made to the CONTRACTOR based on the percentage of work performed on various payment items. The electrical payment items shall be included with the preliminary schedule of values and payment requests submitted by the CONTRACTOR.

1.15 Manufacturer's Recommendations

Where installation procedures are specified to be in accordance with the recommendations of the manufacturer of the material or equipment being installed, printed copies of these recommendations shall be furnished to the ENGINEER by the CONTRACTOR prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

1.16 Submittals

Specific items requiring submittals shall be as specified herein. Shop drawings shall be submitted and approved before procurement, fabrication, or delivery of such items to the project site. Partial submittals are not acceptable; such submittals will be returned without review.

A. Manufacturer's Data: Submittals for each manufactured item shall be manufacturer's descriptive literature, equipment drawings, diagrams, performance and characteristic curves and catalog cuts. Each submittal shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, specification reference, applicable federal, military and industry specification references and all other information necessary to establish contract compliance.

B. Shop drawings shall show types, sizes, accessories, elevations, plans, sectional view, installation details, elementary diagrams and wiring diagrams. Wiring diagrams shall identify circuit terminals and shall indicate the internal wiring for each item of equipment and the interconnection between the items. Drawings shall also indicate adequate clearance

for operation, maintenance, and replacement of operating equipment devices. If any equipment is disapproved, the drawings shall be revised to show acceptable equipment and be resubmitted.

C. Standards Compliance: When materials or equipment must conform to the standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturer's Association (NEMA) and Underwriters' Laboratories (UL), proof of such conformance shall be submitted to the ENGINEER for approval. If any organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections. In lieu of the label or listing, the CONTRACTOR shall submit a certificate from an independent testing organization, which is competent to perform acceptable tests and is approved by the ENGINEER. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's standard. For materials and equipment whose compliance with organizational standards or specifications is not regulated by an organization using its own listing or label as proof of compliance, a certificate of compliance from the manufacturer shall be submitted for approval. The certificate shall identify the manufacturer, the product and the referenced standard and shall simply state that the manufacturer certifies that the product conforms to all requirements of the project specification and of the referenced standards listed.

PART 2 - PRODUCTS

2.01 Materials and Equipment

All materials, equipment and devices shall, as a minimum standard, meet the requirements of UL where UL standards are established for those items and the requirements of NFPA 70. All items shall be new unless specified or indicated otherwise.

2.02 Nameplates

Fed. Spec. L-P-387. Provide laminated plastic nameplates for each panel, motor control center, transformer, relay, contactor, starter, safety switch and device. Each nameplate inscription shall identify the equipment and serving panel, and when applicable, the location. Nameplates shall be melamine plastic, 0.125-inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the black core. Minimum size of nameplates shall be as follows:

A. Style No. 1: 1.0 inch by 2.5 inches for panelboard and terminal cabinet enclosures.

B. Style No. 2: 0.5 inch by 1.5 inches for safety switches, enclosed individually mounted circuit breakers, small junction/terminal boxes, etc.

2.03 Warning Signs

ANSI Z35.1. Provide warning signs for the power panel enclosures. Provide signs with the legend "DANGER HIGH VOLTAGE KEEP OUT" printed in three lines of nominal 3-inch-high letters.

PART 3 - EXECUTION

3.01 Nameplate Mounting

Provide number, location, and letter designation of nameplates. Fasten nameplates to the device or enclosure with a minimum of two oval head stainless steel screws.

3.02 Painting of Equipment

A. Factory Applied: Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test.

B. Field Applied: Paint electrical equipment as required to match finish or to meet safety criteria. Painting shall be a minimum of three coats consisting of primer and two finish coats. Touch-up paint of all equipment shall be required where equipment has become damaged as a result of handling, rusting, etc. Paint shall be applied in even three coats, consisting of prime coat and two finish coats. See plans for special PVC applications.

END OF SECTION

SECTION 16020

CODES AND STANDARDS

PART 1 - GENERAL

1.01 Description

The following codes and standards shall be complied with as though fully written herein in these specifications and shall be applicable to CONTRACTOR, supplier and manufacturer. Dates and amendments shall be the latest edition thereof in force at time of project bid date. Bidders shall be responsible for obtaining their own copies of these codes and standards and pay all cost thereof. Bidders may request addresses of codes and standards issuing agency from ENGINEER in writing in sufficient time to obtain required copies from issuing standards institute.

A. National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code (N.E.C.)
NFPA 70E	Standard for Electrical Safety in the Workplace
NFPA 78	Lightning Protection Code
NFPA 77	Recommended Practice on Static Electricity

B. American National Standards Institute (ANSI)

ANSI B16.11	Forged Steel Fittings, Socket Welding and Threaded
ANSI C57.12.01	General Requirements for Dry-Type Distribution and Power Transformers
ANSI C57.12.91	Test Code for Dry-Type Distribution and Power Transformers
ANSI Z35.1	Accident Prevention Signs
C80.1	Specification for Rigid Steel Conduit, Zinc-Coated

C. Occupational Safety and Health Act (OSHA) Requirements

D. Underwriters Laboratories (UL)

UL 6	Rigid Metallic Conduit
UL 50	Cabinets and Boxes
UL 360	Liquid-Tite Flexible Steel Conduit
UL 467	Grounding and Bonding Equipment
UL 486A	Wire Connectors and Soldering Lugs for Use with Copper Conductors
UL 468C	Splicing Wire Connectors
UL 489	Molded Case Circuit Breakers
UL 508	Enclosures
UL 510	Insulating Tape
UL 514A	Outlet Boxes and Fittings
UL 651	Schedule 40 and 80 Rigid PVC Conduit
UL 854	Service-Entrance Cables
UL 869	Service Equipment
UL 943	Ground-Fault Circuit Interrupters
UL 1059	Terminal Blocks
UL 1449	Transient Voltage Surge Suppressors

UL 1561	Dry-Type General Purpose and Power Transformers
UL 1581	Reference Standard for Electrical Wires, Cables and Flexible Cords
UL 2200	Stationary Engine Generator Assemblies

E. National Electrical Manufacturer's Association (NEMA)

WC3	Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
TC3	PVC Fittings for Use with Rigid PVC Conduit and Tubing
RN1	PVC Externally Coated Rigid Galvanized Steel Conduit and Electrical Metallic Tubing
ICS1	General Standards for Industrial Control and Systems
ICS2	Standards for Industrial Control Devices, Controllers and Assemblies
ICS6	Terminal Blocks for Industrial Control Equipment and Systems
TC2	Electrical Plastic Tubing (EPT) and Conduit EPC-40 and EPC-80
TR1	Transformers, Regulators and Reactors
WD1	General Purpose Wiring Devices
LA1	Surge Arrestors

F. Institute of Electrical and Electronic Engineers (IEEE): Standard Dictionary of Electrical and Electronics Terms

G. American Society for Testing and Materials (ASTM)

A53	Pipe, Steel, Black and Hot-Dipped Zinc-Coated
A123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
B8	Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard or Soft
A525	General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
A780	Repair of Damaged Hot-Dip Galvanized Coatings

PART 2 - PRODUCT (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 16030

ELECTRICAL SYSTEMS SCHEDULE

PART 1 - GENERAL

1.01 Description

A. CONTRACTOR to furnish all materials and labor and perform all operations, including, but not limited to, coordination with general construction shop and field drawings, manufacturer's recommendations, and installation instructions, to produce a complete and operative system. It is specifically noted that the plans are diagrammatic, and the specifications are descriptive and do not show every piece of equipment, conduit, wiring boxes, etc.; however, where any mention of a system or system operation is indicated in the contract documents, CONTRACTOR shall provide material and labor for that system to be fully operational to the satisfaction of the ENGINEER and OWNER.

B. The following operative systems shall be applicable to this project.

1. Secondary underground 480/277 three-phase circuits, and 120/240 VAC single-phase circuits, complete with conduit, conductors, termination lugs, trenching and backfill, and testing.
2. Building power system (600-volt and below) complete with final electrical connections to all motors, panels, auxiliary equipment controls, motor control center, distribution equipment, transformers, etc.
3. Lighting systems complete with fixtures, accessories, mounting hardware, lamps, etc.
4. Grounding protection system complete with wiring, connectors, ground rods, exothermic connections, compression connectors and certification from supplier.
5. Miscellaneous systems complete as shown on the drawings and as stated herein.
6. Controls and process instrumentation systems complete with components, conduit, wiring, final connections and control panel.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 16040

BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 Description

A. Equipment and materials specified by manufacturer's name and catalog number or an approved equal by the ENGINEER unless otherwise specifically stated herein.

B. CONTRACTOR shall submit to the ENGINEER in triplicate, typewritten copies of all electrical materials and equipment proposed for use on the project within ten (10) days after award of contract. If this list is not received prior to fifteen (15) days after award of contract, CONTRACTOR is required to furnish specified items by manufacturer and catalog number.

C. Verbal or written requests by sales agents, manufacturer's agents, CONTRACTOR'S or subcontractors for substitutions of specified equipment by manufacturer and catalog number prior to opening of bids will not be considered or approved. In no case will prior approval be given verbally or in writing of any equipment whether specified by manufacturer and catalog or not prior to opening of bids.

D. CONTRACTOR shall not place any orders or release shipment of any piece of equipment or materials until all formal submittals have been approved by ENGINEER including any supplemental submittal requirements requested by the ENGINEER.

E. Samples of any equipment or materials may be required at the ENGINEER's request. This shall apply to specified items and substituted items. Samples shall be made available to the ENGINEER at his designated location. Special equipment such as motor control centers, generators, automatic transfer switch, radio equipment, fire alarm or intrusion alarm systems would be required to be set up and inspections made available at the manufacturer's plant locations. All expenses for travel, per diem, etc. will be paid for by the CONTRACTOR. This expense may include an OWNER'S representative.

F. The ENGINEER's opinion shall be final and binding on the approved equal status for equality of any substituted item from that listed by manufacturer and/or manufacturer catalog number.

G. Submittals for approval by ENGINEER shall include shop drawings, manufacturer's brochures and data sheets, samples where required such as paint, waterproofing, marking tape, wiring and cable; test reports, testing procedures, finishes, etc. Refer to Section 01340.

H. Submittals shall be required, but not limited to, the following:
   1. Wire and cable.
   2. Conduit and fittings.
   3. Boxes, covers and plates.

4. Branch circuit compression connectors.
5. Marking and identification devices.
6. Grounding system.
7. Paint.
8. Lighting fixtures.
9. Panelboards.
10. Miscellaneous as shown on drawings.
11. Controls and instrumentation.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 16111

CONDUIT AND FITTINGS

PART 1 - GENERAL

1.01 Description

A. Metal conduit.

B. Flexible metal conduit.

C. Liquid-Tite flexible metal conduit.

D. Non-metal conduit.

E. PVC coated metal conduit.

F. Fittings and conduit bodies.

1.02 Related Sections

A. Section 16130, Boxes.

B. Section 16170, Grounding and Bonding.

C. Section 16190, Supporting Devices.

D. Section 16195, Electrical Identification.

1.03 References

A. ANSI C80.1 — Rigid Steel Conduit, Zinc Coated

B. ANSI/NEMA PB 1 - Fittings, Cast Metal Boxes and Conduit Bodies for Conduit and Cable Assemblies

C. ANSI/NFPA 70 - National Electrical Code

D. NECA "Standard of Installation"

E. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

F. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)

G. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing

1.04 Design Requirements

Conduit Size: ANSI/NFPA 70 (unless noted otherwise on the drawings and contained herein).

1.05 Submittals

A. Submit under provisions of Section 16010 and Section 01340, Shop Drawings, Project Data and Samples.

B. Product Data: Provide for metallic conduit, Liquid-tite flexible metal conduit, non-metallic conduit, conduit bodies and fittings.

1.06 Project Record Documents

A. Submit under provisions of Section 16010.

B. Accurately record actual routing of all underground conduits and mark on record drawings.

1.07 Field Samples

A. Provide under provisions of Section 16040.

B. Provide field sample of PVC coated steel conduit, one each at two feet long.

C. Provide field sample of connectors and fittings.

1.08 Delivery, Storage and Handling

A. Deliver, store, protect and handle products to site.

B. Accept conduit on site. CONTRACTOR shall, prior to acceptance, inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

D. Protect PVC conduit from sunlight.

1.09 Project Conditions

A. Verify all field measurements as required or shown on drawings.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required parallel and perpendicular to structures.

PART 2 - PRODUCTS

2.01 Conduit Requirements

A. All wiring shall be installed in conduit, including power, low voltage, sensor control, and instrumentation.

B. Minimum size conduit shall be as follows:
   1. 3/4-inch for power and branch circuit wiring, unless noted otherwise on the drawings.
   2. 1-inch for low voltage, sensor control and instrumentation, unless noted otherwise on the drawings.

C. Conduit shall be installed in accordance with the following schedule:
   1. Outside secondary service and feeder conduit risers above grade: Galvanized thick wall rigid steel (GRC).
   2. Conduit in earth (no encasement): Galvanized thick wall rigid steel (GRC) or Schedule 40 PVC as noted. Metallic conduit shall be coated with three (3) coats of polyvinyl polyethylene or hot asphalt application. When PVC is used, change to galvanized rigid and including elbow and rise up in GRC.
   3. In exposed locations outdoors: Galvanized thick wall rigid steel (GRC).
   4. All exposed conduit in building shall be electric metallic tubing (EMT).

2.02 Fittings

A. Where conduits, 1/2-inch through 1-inch conduits, enter junction boxes, pullboxes, panels, cabinets, gutters, etc. use insulated throat connectors, Raco Cat. #1003 and 1004, Locknuts #1133 and 1134, insulated throat bushing and #1222, 1223, and 1224, insulated throat ground bushings for rigid conduit, Raco Cat. #2912, 2913, 2914, for EMT. Raco Cat. #3302, 3303, 3304 for flexible metal conduit. Raco Cat. 3512, 3513 and 3514 for Liquid-Tite connectors. Conduits 1-1/4-inch and above entering junction boxes, pullboxes, panels, cabinets, gutters, etc. shall have insulated throat grounding bushings equal to Raco Cat. #1225, 1226, 1228, 1230, 1232, 1234 and 1236.

B. Only threaded joint connectors and malleable iron no thread compression box connectors shall be used on rigid conduit. No fittings requiring set screws or indentor type applications, including BM connectors, will be allowed.

2.03 Conduit Straps and Hangers

Two (2) hole push-on stamped straps Raco Cat. #2232, 2233, 2234, 2235, 2236 and 2238 for rigid conduit. These anchors shall be used on surface areas such as concrete, masonry, wide flange beams, columns and wood. All screws shall be stainless steel.

2.04 Expansion and Seal Off Fittings

Install seal-off fittings where required by code or shown on the drawings for the job. Fittings shall be Crouse-Hinds Type EYS for vertical runs, Type EZS for horizontal and vertical runs, or Type

EYS elbow seals, or approved equal in Killark or Appleton. All seals shall be properly installed using a non-hardening sealing compound and shall be sealed as soon as cable is installed.

2.05 Rigid Metal Conduit

A. Manufacturers:
   1. Allied
   2. Wheatland
   3. Republic
   4. Approved equal

B. Rigid Galvanized Steel Conduit (GRC): ANSI C801. UL 6.

2.06 PVC Coated Metal Conduit

A. Manufacturers:
   1. Robroy
   2. Approved equal

B. Description: NEMA RN1; rigid steel conduit with external and internal PVC coating, 20 mil, 0.05 mm thick.

C. Fittings and Conduit Bodies: ANSI/NEMA FB1; steel fittings with external and internal PVC coating to match conduit.

2.07 Liquid-Tight Flexible Metal Conduit

A. Manufacturers:
   1. Alflex
   2. Anamet
   3. AFC
   4. Approved equal

B. Description: Interlocked aluminum construction with PVC jacket.

C. Fittings: ANSI/NEMA FB1.

2.08 Electrical Metallic Tubing (EMT)

A. Manufacturers:
   1. Allied Tubing
   2. LTV Steel
   3. Wheatland
   4. Triangle
   5. Approved equal

B. Description: ANSI C80.3, UL 797 zinc-coated. Maximum size 2 inches.

2.09 Non-Metallic Conduit

A. Manufacturers:
   1. Carlon
   2. Approved equal

B. Description: NEMA TC2; Schedule 80 PVC.

C. Fittings and Conduit Bodies: NEMA TC3.

PART 3 - EXECUTION

3.01 Installation

A. Install conduit in accordance with NECA "Standard of Installation".

B. Install non-metallic conduit in accordance with manufacturer's instructions.

C. Arrange supports to prevent misalignment during wiring installation.

D. Support conduit using coated steel straps with stainless steel screws.

E. Fasten conduit supports to structures and surfaces under provisions of this section.

F. Do not support conduit with wire or perforated pipe straps in any type structure. Remove wire used for temporary supports.

G. Route all conduit, whether exposed or concealed, parallel and perpendicular to structures, etc.

H. Route conduit in and under slab from point-to-point.

I. Maintain 12-inch (300 mm) clearance between conduit and surfaces with temperatures exceeding 104° F. (40°C).

J. Bring conduit to shoulder of fittings, fasten securely.

K. Join non-metallic conduit using cement as recommended by manufacturer. Wipe non-metallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

L. Use conduit hubs for sealing locknuts to fasten conduit to cast boxes. All conduit entering top or sides of all junction boxes, pullboxes, wiring gutters, etc., exposed to weather shall have myers hub connectors.

M. Install no more than equivalent of four 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2-inch (50 mm) size. Radio telemetry system conduit bends shall not

exceed two (2) 90-degree turns. All bends shall be long radius. All field bends on conduit shall be made in accordance with tables in Article 346, NFPA 70.

N. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

O. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.

P. Provide suitable nylon pull string or No. 14 AWG steel wire in each conduit except sleeves and nipples.

Q. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

R. Ground and bond conduit under provision of Section 16170.

S. Identify conduit under provisions of Section 16195.

T. All conduit male threads shall be coated with "General Electric" RTV silicone sealer where conduit is installed outdoors, in contact with concrete or earth.

U. All feeders shall be run in galvanized thick wall rigid steel (GRC), no exceptions.

V. All conduits shall be sized as noted on the drawings and contained herein. Where size not shown, consult ENGINEER.

W. All upturned conduits shall be capped during construction rough-in to prevent moisture or debris from entering. Pull through each and every conduit a dry swab of sufficient size to remove any and all moisture. Seal all conduit terminations with GE Silicone or duct puddy prior to final acceptance of the project.

X. Maximum length of flexible liquid-tite conduit shall not exceed 5 feet.

Y. Assure ground continuity on all branch circuitry conduits with two locknuts, one inside and one outside of all boxes, cabinets, and gutters for rigid conduit.

Z. Conduit Curb:
   1. In concrete slabs or floors, provide a 2-inch-high curb extending 2-inches from the outer surface of the conduit penetrating the floor, to prevent corrosion.
   2. Terminate conduit stub-ups in couplings, slightly above the finished concrete curb.
   3. Paint the stub-up with Scotch-Clad Protective Coating #1706 or equal, a minimum of 6-inches above and below the finished surface of the concrete.

3.02 Conduit Supports

Support conduits as follows:

A. Galvanized rigid thick wall conduit (GRC), IMC and EMT, within three feet of all outlet boxes, junction boxes, cabinets, gutters or fittings. Horizontally anchored at 10'-0" maximum intervals. Other spacings are noted on the plans.

B. Liquid-tite flexible conduit (Sealtite), within 12 inches of all outlet boxes, junction boxes, cabinets, gutters or fittings and bends or turns. Horizontally anchored at 2-foot intervals. Minimum size permitted is 3/4-inch.

END OF SECTION

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SECTION 16120

WIRE AND CABLE

PART 1 - GENERAL

1.01 Description

A. Building wire.

B. Cable including instrumentation, control, etc.

C. Wiring connections and terminations.

1.02 References

A. NEMA WC 3 – Rubber-insulated wire and cable for the transmission and distribution of electrical energy.

B. NEMA WC 5 – Thermoplastic-insulated wire and cable for the transmission and distribution of electrical energy.

1.03 Submittals

A. Submit manufacturer's product data under the provisions of Section 16010, Shop Drawings Submittal.

B. Submit manufacturer's instructions.

PART 2 - PRODUCTS

2.01 Conductors

A. Thermoplastic-Insulated Building Wire: NEMA WC 5.

B. Rubber-Insulated Wire: NEMA WC 3.

C. Feeders and Branch Circuits: Copper, stranded conductor, 600-volt insulation, THWN.

D. Service Entrance Cable: Copper, stranded conductor, 600-volt insulation, THHN - THWN.

E. Control Circuits: Copper, stranded conductor, 600-volt insulation, THHN - THWN.

F. Electronic Sensor Cable: Per manufacturer's recommendations.

G. Instrumentation Cable: Per manufacturer's recommendations.

PART 3 - EXECUTION

3.01 General Wiring Methods

A. Use no wire smaller than #12 AWG for power circuits and no smaller than #14 AWG for control wiring.

B. Place an equal number of conductors for each phase of a circuit in same raceway or cable.

C. Splice only in junction or outlet boxes.

D. Neatly train and lace wiring inside boxes, equipment, and panelboards.

3.02 Wiring Installation in Raceways

A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricate for pulling #4 AWG and larger wires.

B. Completely and thoroughly swab raceway system before installing conductors.

3.03 Cable Installation

A. Provide protection for exposed cables where subject to damage.

3.04 Wiring Connections and Terminations

A. Splice only in accessible junction boxes.

B. Thoroughly clean wires before installing lugs and connectors.

C. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

D. Terminate spare conductors with electrical tape and wire nut.

E. Splices in all junction boxes shall be made by the compression method. Crimp connectors shall be "Buchanan" Cat. #2006S, #2008S or #2011S with #2007, #2014 or #3007B caps or approved equal.

3.05 Field Quality Control

A. Field inspection and testing will be performed under provisions of Section 16010.

B. Inspect wire and cable for physical damage and proper connection.

C. Torque test conductor connections and terminations to manufacturer's recommended values.

D. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

3.06 Wire and Cable Installation Schedule

A. Exterior Locations: Conductors in raceways.

B. Underground Locations: Conductors in raceways.

C. Color Coding (Power System): The following conductor color coding shall be used:

480/277-Volt System	208Y/120-Volt System
Phase A - Brown	Phase A - Black
Phase B - Orange	Phase A - Switch Leg - Gray
Phase C - Yellow	Phase B - Red
Neutral - Gray	Phase B - Switch Leg - Pink
Equipment Ground - Green	Phase C - Blue
	Phase C - Switch Leg - Purple
	Travelers - Yellow
	Neutral - White
	Equipment Ground - Green

END OF SECTION

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SECTION 16130

BOXES

PART 1 - GENERAL

1.01 Description

A. Wall and ceiling outlet boxes.

B. Pull and junction boxes.

1.02 Related Sections

A. Section 16111, Conduit and Fittings.

B. Section 16140, Wiring Devices.

C. Section 16160, Cabinets and Enclosures.

D. Section 16180, Equipment Wiring Systems.

1.03 References

A. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.

B. ANSI/NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

C. ANSI/NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.

D. ANSI/NFPA 70 - National Electrical Code.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.04 Submittals

A. Submit shop drawings and product data under provisions of Sections 16010 and 01340, Shop Drawings Submittal.

B. Submit manufacturer's data.

1.05 Project Record Documents

A. Submit under provisions of Section 01790.

B. Accurately record actual locations and mounting heights of outlet, pull, and junction boxes.

1.06 Regulatory Requirements

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.07 Project Conditions

A. Verify field measurements as shown on Drawings.

B. Verify locations of boxes and outlets in plant laboratory, offices and work areas prior to rough-in.

C. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose. Include installation within 20 feet of location shown.

PART 2 - PRODUCTS

2.01 Outlet Boxes

A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2-inch or 3/4-inch male fixture studs where required.
   2. Only 4-inch square boxes with raised gang covers will be allowed.

B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs as required.

2.02 Pull and Junction Boxes

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Surface-Mounted Cast Metal Box: NEMA 250, Type [4] [6]; flat-flanged, surface-mounted junction box.
   1. Material: Cast aluminum.
   2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

C. In-Ground or Concrete Cast Metal Box: NEMA 250, Type 6, inside flanged, recessed cover box for flush mounting.
   1. Material: Galvanized cast iron.
   2. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.
   3. Cover Legend: ELECTRIC, COMM.

PART 3 - EXECUTION

3.01 Installation

A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

B. Install electrical boxes to maintain headroom and to present neat mechanical appearance.

C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

D. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire.

E. Install boxes to preserve fire resistance rating of partitions and other elements.

F. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.

G. Use flush mounting outlet boxes in finished areas with raised gang covers.

H. Do not install flush mounting boxes back-to-back in walls; provide minimum 6 inch (150 mm) separation. Provide minimum 24 inches (600 mm) separation in acoustic rated walls.

I. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

J. Use stamped steel bridges to fasten flush mounting outlet box between studs. Span between studs.

K. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

L. Use adjustable steel channel fasteners for hung ceiling outlet box.

M. Do not fasten boxes to ceiling support wires.

N. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.

O. Use gang box where more than one device is mounted together. Do not use sectional box.

P. Use gang box with plaster ring for single device outlets.

Q. Use cast outlet box in exterior locations exposed to the weather and wet locations.

R. Large Pull Boxes: Boxes larger than 100 cubic inches (1600 cubic centimeters) in volume or 12 inches (300 mm) in any dimension.
   1. Interior Dry Locations: Use hinged enclosure under provisions of Section 16160.

2. Other Locations: Use surface-mounted cast metal box.

3.02 Interface with Other Products

A. Coordinate installation of outlet box for mechanical equipment furnished under Division 13.

B. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening. Use raised gang square covers.

C. Coordinate mounting heights and locations of outlets mounted above counters, benches and backsplashes.

D. Position outlet boxes to locate luminaires as shown on drawings.

3.03 Adjusting

A. Adjust flush-mounting outlets to make front flush with finished wall material. Maximum tolerance is 1/8-inch recess in finished wall.

B. Install knockout closure in unused box opening.

END OF SECTION

SECTION 16140

WIRING DEVICES

PART 1 - GENERAL

1.01 Description

Furnish and install wiring devices as shown or noted on plans, including all required mounting hardware, etc.

1.02 Submittals

A. Submit shop drawings and product data under provisions of Sections 16010 and 01340, Shop Drawings Submittal.

B. Submit manufacturer's data.

PART 2 - PRODUCTS

2.01 Safety Switches

A. Type: Horsepower rated, heavy-duty, single throw, three pole with visible blade and safety handle. Fused and/or unfused as specified elsewhere and/or designated on the Drawings and/or as required by NEC. Sized as required by NEC and/or as shown on the Drawings.

B. Each switch shall have indented plastic phenolic sign (minimum 1/8-inch lettering) identifying load served with voltage and horsepower attached to switch with stainless steel screws.

C. Enclosure: Stainless Steel NEMA 1 for dry, indoor locations and Stainless Steel NEMA 4X for outdoor and wet locations.

D. Manufacturers:
   1. Square D Co.
   2. General Electric Co.
   3. Westinghouse.
   4. Or equal.

2.02 Receptacle

A. Indoor Locations:
   1. Duplex grounding receptacle, two pole, three wire, 125 volt AC, 20 ampere, stainless steel cover plates. Products and Manufacturers:
      a. Cat. #5362-CR, by Arrow-Hart Inc.
      b. Cat. #53CM62, by Harvey Hubbell Inc.
      c. Or equal.

2. Single grounding receptacle, corrosion resistant, two pole, three wire, 125 volt AC, 20 ampere, stainless steel cover plates. Products and Manufacturers:
   a. Cat. #5361-CR, by Arrow-Hart Inc.
   b. Cat. #53CM61, by Harvey Hubbell In
   c. Or equal.

B. Ground Fault Receptacle Where Designated on the Drawings:
   1. Type: UL listed, 20 ampere, 125 volt AC, sensitivity of 5 mA, three wires, weatherproof cover plates.
   2. Manufacturer:
      a. Hubbell, No. 6F-5362-GY with a 5221 cover plate.
      b. Or equal.

C. Weatherproof Receptacle Where Designated on the Drawings: Type UL listed duplex grounding receptacle, corrosion resistant, two pole, three wire, 20 ampere, 125 volt AC, weatherproof cover plates.

2.03 Switches

A. Indoor Non-Hazardous Locations:
   1. Single pole AC toggle switch, quiet type, 120/277 volt AC, 20 ampere, Brown, specification grade with stainless steel cover, screws and grounding terminal. Products and Manufacturers:
      a. Cat. #20AC1 by Pass & Seymour, Inc.
      b. Cat. #CS 120 by Hubbell.
      c. Or equal.
   2. Toggle switches of the three-way type shall be quiet type, 120/277 volt AC, 20 ampere, specification grade with stainless steel cover, screws and grounding terminal. Products and Manufacturers:
      a. Cat. #20AC3 by Pass & Seymour, Inc.
      b. Cat. #CS 320 by Hubbell.
      c. Or equal.
   3. Toggle switches of the four-way type shall be of the same grade and manufacture as the single pole and three-way type.
   4. Toggle switches of the two-pole, single throw type shall be of the same grade and manufacturer as above.
   5. Dimming Switch:
      a. Coordinated with fluorescent fixture ballasts specified.
      b. Suitable for controlling light output from two of a four-lamp fluorescent fixture.
      c. Include integral snap switch on dimming dialer.
      d. Manufacturer:
         (1) Thyrocon Controls.
         (2) Hunt.
         (3) Or equal.
   6. Wall switch sensors shall be DW-100 dual technology wall switch sensor or approved equal.

B. Horsepower-Rated Switches:
   1. Type: Toggle operated, horsepower rated with thermal overload protection.
   2. Enclosure: NEMA 1 for dry, indoor locations and NEMA 4 for outdoor and damp or wet indoor locations.
   3. Products and Manufacturers: Provide one of the following:
      a. Type 609T by Allen-Bradley.
      b. Class 2510 by Square D Co.
      c. Or equal.

2.04 Fuses

A. Type: Dual-element, current-limiting, UL Class RK5, 600 volts, unless otherwise noted or specified.

B. Interrupting Capacities (UL Listed): 200,000 RMS amperes.

C. Coordination:
   1. Coordinated for installation in existing and new equipment.
   2. Properly coordinated for size, type and rating as required for equipment and circuits to be protected.

D. Repair Parts: One replacement fuse for each and every fuse installed under this Contract.

E. Manufacturers: Provide products from one of the following:
   1. Bussman Division, McGraw Edison Company.
   2. Gould Inc., Circuit Protection Division.
   3. Or equal.

PART 3 - EXECUTION

3.01 Mounting

A. Safety switches shall be mounted on structural frame with minimum of four points of attachment using stainless or galvanized steel hardware.

B. Install one spare set of fuses inside fused switch enclosure attached to side.

C. In non-hazardous locations, install wiring devices in outlet or device boxes.

D. Mount wall switches four feet, zero inches above finished floor unless otherwise noted.

END OF SECTION

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SECTION 16160

CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.01 Description

A. Hinged cover enclosures.

B. Cabinets.

C. Mounting panel.

D. Terminal blocks and accessories.

1.02 References

A. NEMA 250 - Enclosures for electrical equipment (1,000 volts maximum).

B. ANSI/NEMA ICS 1 - Industrial control and systems.

C. ANSI/NEMA ICS 4 - Terminal blocks for industrial control equipment and systems.

D. ANSI/NEMA ICS 6 - Enclosures for industrial control equipment and systems.

E. UL 50 - Enclosures.

1.03 Submittals

A. Submit shop drawings and product data under provisions of Sections 16010 and 01340, Shop Drawings Submittal.

B. Shop Drawings for Equipment and Enclosure Panels: Include wiring schematic diagram, wiring diagram, outline drawings and construction diagram as described in ANSI/NEMA ICS 1.

PART 2 - PRODUCTS

2.01 Hinged Cover Enclosures

A. Construction: NEMA 250; Type 3, steel.

B. Finish: Dark gray, rust inhibitor.

C. Covers: Continuous hinge, held closed by hasp and staple for padlock.

2.02 Cabinets

A. Construction:
   1. 14-gauge G-90 grade galvanized steel.
   2. Drip shield top and seam-free sides, front and back.
   3. 16-gauge galvanized steel continuous hinge with stainless steel pin.
   4. Cover fasteners with captive plated steel screws.
   5. Hasp and staple for padlocking.
   6. Knockouts in bottom.
   7. Collar studs with back mounting panel.
   8. Dark gray epoxy finish. Red finish on fire alarm terminal cabinet.
   9. Corrosion inhibitors.
   10. Electric heater with thermostat where located outdoors.
   11. Size: Verify size required with equipment to be housed or as noted on drawings.

B. Manufacturer and Catalog No.: Hoffman Cat. No. scheduled with back panel or approved equal (minimum size).

2.03 Terminal Blocks and Accessories

A. Terminal Blocks: ANSI/NEMA ICS 4; UL listed.

B. Power Terminals: Unit construction type, closed-back type, with tubular pressure screw connectors, rated 600 volts.

C. Signal and Control Terminals: Modular construction type, channel mounted; tubular pressure screw connectors, rated 300 volts.

PART 3 - EXECUTION

3.01 Installation

A. Install cabinets and enclosures plumb; anchor securely to structural supports at each corner with galvanized bolts, nuts and Belleville washers.

B. Install trim plumb.

END OF SECTION

SECTION 16170

GROUNDING AND BONDING SYSTEMS

PART 1 - GENERAL

1.01 Description

A. Power system grounding.

B. Communication and instrumentation system grounding.

C. Electrical equipment and raceway grounding and bonding.

D. Building ground grids.

1.02 System Description

A. Ground the electrical service system neutral at service entrance equipment to grounding electrode.

B. Provide communications system grounding conductor at point of service entrance and connect to grounding electrode.

C. Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground and connectors.

D. Ground building slab and metal structure as detailed on the drawings.

1.03 Submittals

A. Submit maintenance and grid layout data and shop drawings under provisions of Sections 16010 and 01340.

B. Indicate location of system grounding electrode connections and routing of grounding electrode conductor.

PART 2 - PRODUCTS

2.01 Materials

A. Ground Rods: Copper-encased steel, 3/4-inch diameter, minimum length 10 feet.

B. Ground Conductor Grid: 4/0 bare copper.

C. Ground Electrode Conductor: Size as noted on drawings with THWN insulation.

D. Exothermic welds shall be as scheduled on the drawings.

PART 3 - EXECUTION

3.01 Installation

A. Provide a separate, insulated equipment grounding conductor in branch circuits. Terminate each end on a grounding lug, bus or bushing.

B. Connect grounding electrode conductors to ground electrode by exothermic weld using cable to rod connection.

C. Grounding Electrode: Use driven ground rod as shown on plans.

D. Use minimum #6 AWG copper conductor for communications service grounding conductor. Leave six feet (3 m) slack conductor at terminal cabinet or backboard.

E. Provide grounding and bonding at utility company's metering equipment.

F. Bond all metal parts of, equipment support structures, tanks, etc. to ground grid.

G. Ground grid around each pad shall have rods spaced maximum of 20'-0" center to center with complete loop of 4/0 copper bare conductor with exothermic weld to each rod. Each column point around perimeter of building shall be bonded to grid, loop with 4/0 bare copper routed in slab in 12-inch Schedule 40 PVC sleeve. Bond ground bus to perimeter grid using 4/0 bare copper in 12-inch Schedule 40 PVC conduit.

H. Refer to drawings for schedule of exothermic connections.

3.02 Field Quality Control

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

B. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment. Resistance shall not exceed 5 ohms. Where resistance exceeds 5 ohms, additional ground rods shall be driven. Top of all rods shall be a minimum of 2'-0" below finish grade elevation.

C. Do not cover and ground grid or connections until inspected and approved by ENGINEER.

END OF SECTION

SECTION 16180

EQUIPMENT WIRING SYSTEMS

PART 1 - GENERAL

1.01 Description

A. Make all final electrical connections to all equipment shown on drawings or required for a complete and operable system.

B. All final electrical connections shall be made in strict compliance with NPFA-70 National Electrical Code latest edition.

1.02 Related Sections

A. Section 16010, General Requirements

B. Section 16020, Codes and Standards

C. Section 16111, Conduit and Fittings

D. Section 16120, Wire and Cable

E. Section 16130, Boxes

F. Section 16170, Grounding and Bonding Systems

1.03 Project Record Documents

Submit documents in accordance with provisions of Section 01790.

PART 2 - PRODUCTS

Products are listed under related sections of the specifications.

PART 3 - EXECUTION

3.01 Instructions

A. Shall be installed in conduit where and as shown on the drawings and in accordance with drawings and specifications.

B. Power connections shall be as follows:
   1. Set disconnect as shown on drawings.
   2. Run branch circuits as indicated on the drawings and make hardwired connections

to all devices.

3. Run all conduit and wiring for all control systems specified on this project.
4. Run circuits from panelboards to and make final electrical connections.

END OF SECTION

SECTION 16190

SUPPORTING DEVICES

PART 1 - GENERAL

1.01 Description

A. Conduit and equipment supports.

B. Fastening hardware.

C. Related Work: Division 3, Concrete.

1.02 Coordination

Coordinate size, shape and location of concrete pads with details on drawings and manufacturer's recommendations.

1.03 Quality Assurance

Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 - PRODUCTS

2.01 Material

A. Support Channel: Galvanized.

B. Hardware: Corrosion-resistant.

PART 3 - EXECUTION

3.01 Installation

A. Fasten hanger rods, conduit clamps and outlet and junction boxes to structure using stainless steel screws and galvanized bolts, nuts and Bellville washers. Do not use spring steel clips and clamps.

B. Do not fasten supports to conduit.

C. Fabricate supports from steel angle and steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with Bellville washers under all nuts.

D. Furnish and install additional steel framing as required to span between ceiling girts for support of lighting fixtures, electric heaters, etc.

END OF SECTION

SECTION 16195

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 Description

A. Nameplates

B. Wire and cable markers

1.02 Related Work

Section 16010, General Requirements

1.03 Submittals

A. Submit shop drawings under provisions of Sections 16010 and 01340.

B. Include schedule for nameplates.

PART 2 - PRODUCTS

2.01 Materials

A. Nameplates: Engraved three-layer laminated plastic, white letters on a black background.

B. Wire and Cable Markers: Cloth markers, split sleeve or tubing type.

PART 3 - EXECUTION

3.01 Installation

A. Degrease and clean surfaces to receive nameplates.

B. Install nameplates parallel to equipment lines.

C. Secure nameplates to equipment fronts and panels using stainless steel screws.

3.02 Wire Identification

Provide wire markers on each conductor in enclosures and at load connection. Identify with branch circuit number for power circuits and with control wire number as indicated on equipment manufacturer's shop drawings for control wiring.

3.03 Nameplate Engraving Schedule

Provide nameplates to identify all electrical distribution and control equipment and loads served. Letter Height: 1/8 inch (3 mm) for individual switches and loads served and 1/4 inch (6 mm) for control equipment panel identification unless noted otherwise.

END OF SECTION

SECTION 16470

LIGHTING AND POWER PANELBOARDS

PART 1 - GENERAL

1.01 Description

Lighting and power panelboards.

1.02 Related Sections

A. Section 16010, General Requirements.

B. Section 16170, Grounding and Bonding Systems.

C. Section 16195, Electrical Identification.

1.03 Submittals

A. Submit under provisions of Section 01340.

B. Submit manufacturer's data indicating bussing, enclosure, circuit numbering, sizes, etc.

PART 2 - PRODUCTS

2.01 Panelboards

A. Shall be dead-front construction with solderless pressure terminals.

B. Main and neutral busses shall be of capacity scheduled on drawings. Bussing shall be tin-plated, copper-based on maximum current density in accordance with UL Standard 891.

C. Complete typewritten directory with transparent plastic cover inside of door. All panels shall be identified as they are designated on the drawings by 3/4-inch plastic phenolic sign with 1/4-inch indented letters on front face of panel attached with minimum of two (2) screws.

D. Trim and door with lock and catch with two (2) keys. Keys shall be common to all panelboards.

E. Circuit Breakers:
   1. Circuit breakers shall be quickmake and quickbreak on manual or automatic operation, with minimum interrupting capacity of 10,000 amps RMS symmetrical.
   2. Breakers shall be trip-free. Each breaker shall have trip indication independent of the ON or OFF positions.
   3. All breakers shall be UL listed and meet NEMA Standards Publication No. AB1

and Federal Specification No. WOCO375a and any amendments to the above where applicable.

4. All breakers shall be calibrated for operation in an ambient temperature of 40° C.
5. All two- and three-pole breakers shall be common trip.
6. Automatic operation of the circuit breaker shall be obtained by means of thermal and/or magnetic tripping devices located in each pole. Thermal devices shall provide the time-delay tripping on overloads and the magnetic device shall provide instantaneous tripping on short circuits.
7. All breakers shall be bolt-on type.

PART 3 - EXECUTION

3.01 Installation

A. Panels shall be securely mounted with through bolts, anchors or other approved means.

B. Mount all panelboards with top breaker handle not more than 6'-6" above finish floor.

C. Connect the phase wires of three (and/or four) wire home runs to breakers connected to separate phase busses of the panelboard. Panelboard circuits shall be numbers in sequence vertically and all circuits shall appear in the panel exactly as they are shown on the drawings. All branch circuit neutral connections shall be identified by adhesive number tags to identify with their branch circuit phase conductors where neutral connections connect to the panel neutral bus.

D. Neutrals and equipment ground conductors shall not be connected together in any panel beyond service entrance main.

E. No two ungrounded conductors shall be connected to the same circuit breaker terminal.

F. There shall be no splicing of conductors in panelboards.

G. Panelboards shall be as scheduled on the drawings and as manufactured by Square D Company, Type NQOD.

END OF SECTION

SECTION 16480

MOTOR CONTROL CENTER MODIFICATION

PART 1 - GENERAL

1.01 Scope of Work

Furnish, install, and test new electrical components for the soda ash feeder, soda ash mixer, and chlorine system in the existing motor control center as shown on the Drawings and as specified herein.

1.02 Submittals

Submit shop drawings and product data, for the following:
New circuit breakers.

1.03 Quality Assurance

A. The motor control center components shall be the product of a manufacturer who shall also be the manufacturer of all the circuit breakers, fused switches and motor starters included in the motor control center and who has produced the same type of equipment for a period of at least 15 consecutive years.

B. All units and sections shall be UL labeled.

1.04 Field Modifications to Existing Motor Control Center (MCC)

A. Necessary modifications shall be made to the existing MCC to incorporate the changes and additions described below. Some of the required equipment may be existing and may be reused. It will be the responsibility of the Contractor to determine the condition and compatibility with the new equipment and to verify working condition of all equipment affected by the modifications described herein.

1. SODA ASH FEEDER: Provide a properly sized combination circuit breaker, contactor, and overload relay, as shown on drawings, for the Soda Ash Feeder. In addition, provide the following equipment and controls.

   Provide a Simplex Controller (SC-8), per Component Specifications. In the automatic mode and after a field adjustable time delay, the Soda Ash Feeder shall operate when the well operates.

2. SODA ASH MIXER: Provide a properly sized combination circuit breaker, contactor, and overload relay, as shown on drawings, for the Soda Ash Mixer. In addition, provide the following equipment and controls.

   Provide a Simplex Controller (SC-9), per Component Specifications. In the automatic mode and after a field adjustable time delay, the Soda Ash Mixer shall

operate when the well operates.

B. COMPATIBILITY: All equipment and controls shall be compatible with the existing equipment and controls as furnished by Control Systems, Inc. of Jackson, MS, 601-355-8594. Reference existing project number 46417.

C. COORDINATION: The system supplier shall be responsible for coordinating all work with the Owner and the project Engineer. All work shall be performed based on the standards of the National Electric Code (NEC) currently in force by the Authority Having Jurisdiction (AHJ).

PART 2 - PRODUCTS

2.01 Component Specification

SIMPLEX MOTOR CONTROLLER: Provide a Simplex Motor Controller including the following features.

A. Manual-Off-Automatic selector switch, green "Motor Running" pilot light, red "Motor Failure" pilot light, red "High Level or Auxiliary" pilot light and a red "Seal Failure or Auxiliary" pilot light.

B. Motor control inputs shall be optically isolated and their power limited to 24V DC with a maximum current of 16mA DC for intrinsic safety.

C. Provide a field adjustable time delay to start the motor after motor "Call For" signal is received. This time delay shall be field adjustable to occur each time the motor is called to operate for backspin protection. The timing period shall be adjustable from 13 to 165 seconds.

D. Provide Common Alarm controls, which include a dry-contact output and flashing exterior alarm light output. The controls shall activate the dry-contact output and flash the alarm light output during motor failure, motor seal failure/auxiliary or high-level/auxiliary conditions.

E. Provide a motor failure dry-contact output and flashing alarm indicator. The failure controls shall energize the dry-contact output, flash the motor failure alarm indicator and energize the common alarm circuitry if the motor fails to run when called for while in the Automatic mode of operation.

F. The Manual-Off-Automatic switch shall bypass all of the controls and energize the motor call-for dry-contact output when placed in the Manual position. In the Manual and Off positions the motor failure alarm shall be disabled.

G. The Manual-Off-Automatic switch shall be used to reset a motor failure alarm after the failure condition has been cleared, by manually switching the motor to the Off position and back to Automatic.

H. Provide a motor seal failure/auxiliary alarm and indicator that shall flash the indicator and

common alarm light output and close the seal failure dry-contact output and common alarm dry-contact output during a seal failure/auxiliary condition. The seal failure/auxiliary controls shall have a 3 to 9 second field adjustable time delay before activation. The seal failure/auxiliary alarm shall automatically reset when the condition clears.

I. Provide an input alarm to indicate high-level/auxiliary condition. Provide a red panel indicator and dry-contact output for the alarm. On alarm, flash the indicator, close the alarm dry-contact output and energize the Common Alarm circuitry.

J. Provide a field adjustable time delay to prevent motor failure signal from being activated until the controller has had time to receive a motor "Running" signal. The timing range shall be adjustable from 5 seconds to 5.25 minutes. During motor failure conditions, provide the following controls.
   1. Red "Motor Failure" pilot light on face of controller shall flash when activated.
   2. Activate the Common Alarm relay and exterior flashing light output.
   3. Provide a dry type contact closure for remote alarming that will activate during "Motor Failure" condition.

K. The Simplex Motor Controller shall be solid state and easily replaceable. Conventional relay and/or timer construction is not acceptable.

TAG	SERVICE
SC-8	Soda Ash Feeder Controller
SC-9	Soda Ash Mixer Controller

PART 3 - EXECUTION

3.01 Installation

A. In general, all conduit entering or leaving a motor control center shall be stubbed up into the bottom horizontal wireway directly below the vertical section in which the conductors are to be terminated or shall enter the motor control center from the top. Conduits shall not enter the motor control center from the side unless approved in writing by the ENGINEER.

B. Install the equipment in accordance with the manufacturer's instructions.

3.02 Field Testing

Confirm operation of all well components.

3.03 Cleaning

Remove all rubbish and debris from inside and around the control center. Remove dirt, dust, or concrete spatter from the interior and exterior of the equipment using brushes, vacuum cleaner, or clean, lint-free rags. Do not use compressed air.

END OF SECTION

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SECTION 16501

LAMPS

PART 1 - GENERAL

1.01 Description

Lighting fixture lamps.

1.02 Related Sections

A. Section 16010, General Requirements.

B. Section 16510, Interior and Exterior Lighting System.

1.03 Submittals

A. Submit under provisions of Section 01340.

B. Submit manufacturer's data sheets showing manufacturer, wattage, type, lumens and general characteristics of each type lamp.

PART 2 - PRODUCTS

2.01 Drivers For LED Fixtures

A. Electronic Driver for LED Fixtures: Comply with UL 1310 Class 2 requirements for dry and damp locations. Include the following features unless otherwise indicated:
   1. Rated for 50,000 hours of life, unless otherwise noted.
   2. Sound Rating: Class A.
   3. Total Harmonic Distortion Rating: 15 percent or less.
   4. Current Crest Factor: 1.5 or less.
   5. 0-10V Dimming Standard (Step Dimming does not qualify).

2.02 LED Fixtures

A. Except as otherwise indicated, provide LED luminaires, of types and sizes indicated on fixture schedules.

B. Include the following features unless otherwise indicated:
   1. Each Luminaire shall consist of an assembly that utilizes LEDs as the light source. In addition, a complete luminaire shall consist of a housing, LED array, and electronic driver (power supply).
   2. Each luminaire shall be rated for a minimum operational life of 50,000 hours utilizing a minimum ambient temperature of (25°C).
   3. Light Emitting Diodes tested under LM-80 Standards for a minimum of 12,000 hours.
   4. Color Rendering Index (CRI) of 82 at a minimum.
   5. Color temperature 3500 K, unless otherwise indicated.
   6. Rated lumen maintenance at 70% lumen output for 50,000 hours, unless otherwise indicated.

7. Fixture efficacy of 60 Lumens/Watt, minimum.
8. Five-year luminaire warranty, minimum.
9. Photometry must comply with IESNA LM-79.
10. The individual LEDs shall be constructed such that a catastrophic loss of the failure of one LED will not result in the loss of the entire luminaire.
11. Luminaire shall be constructed such that LED modules may be replaced or repaired without the replacement of the whole fixture.

C. Technical Requirements
1. Luminaire shall have a minimum efficacy of 60 lumens per watt. The luminaire shall not consume power in the off state.
2. Operation Voltage: The luminaire shall operate from a 50 HZ to 60 HZ AC line over a voltage ranging from 120 VAC to 277 VAC. The fluctuations of line voltage shall have no visible effect on the luminous output.
3. Power Factor: The luminaire shall have a power factor of 0.9 or greater.
4. THD: Total harmonic distortion (current and voltage) induced into an AC power line by a luminaire shall not exceed 15 percent.
5. Operational Performance: The LED circuitry shall prevent visible flicker to the unaided eye over the voltage range specified above.

D. Thermal Management
1. The thermal management (of the heat generated by the LEDs) shall be of sufficient capacity to assure proper operation of the luminaire over the expected useful life.
2. The LED manufacturer's maximum thermal pad temperature for the expected life shall not be exceeded.
3. Thermal management shall be passive by design. The use of fans or other mechanical devices shall not be allowed.
4. The luminaire shall have a minimum heat sink surface such that LED manufacturer's maximum junction temperature is not exceeded at maximum rated ambient temperature.

PART 3 - EXECUTION

3.01 Installation

A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

B. Comply with NFPA 70 for minimum fixture supports.

C. Suspended Lighting Fixture Support:
1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

END OF SECTION

SECTION 16510

INTERIOR AND EXTERIOR LIGHTING SYSTEM

PART 1 - GENERAL

1.01 Description

Interior and exterior building lighting fixtures and accessories.

1.02 Related Sections

A. Section 16010, General Requirements.

B. Section 16120, Wire and Cable.

C. Section 16130, Boxes.

D. Section 16170, Grounding and Bonding Systems.

E. Section 16190, Supporting Devices.

F. Section 16501, Lamps.

1.03 Submittals

A. Submit under provisions of Section 01340.

B. Submit manufacturer's data showing construction, lens, paint finishes, metal gauge, dimensions, etc.

PART 2 - PRODUCTS

2.01 Fixtures

A. Fixtures shall be completely factory prewired. Should internal wiring be required, use #14 Type AF wire.

B. Recessed fixtures shall be in accordance with NEC Article 410.

C. Fixtures shall be as scheduled in the lighting fixture schedule shown on the drawings. Fixtures shall be by manufacturer and catalog number or approved equal.

D. Ballast shall be of the proper size and type for the fixtures. Ballast in fluorescent fixtures shall be high power factor, ETL approved and CBM certified, rapid start, low heat type. Ballast shall be Class "P" rated equipped with an approved internal thermal protective device

responsive to ballast temperature which shall open the circuit before damage occurs to ballast.

E. Fluorescent lighting fixture lens specified by catalog number and/or by descriptive reference shall be acrylic plastic and shall equal or exceed IES-SPI-NEMA test for yellowing factor of not to exceed three after 2,000 hours exposure in a Fade-ometer for the standard test condition.

PART 3 - EXECUTION

3.01 Supports

All fixtures shall have the necessary studs, straps, fittings, etc., in accordance with manufacturer's installation recommendations, for a complete and safe installation to the proper mounting height required by job conditions. All lay-in fluorescent lighting fixtures shall have wire hanger on adjacent corners on each end (minimum of two hangers) attached to fixture housing and anchored to building structure. Minimum gauge wire shall be 12-gauge steel. In addition to the wire hangers, each lay-in fluorescent fixture shall have earthquake clips for attachments to ceiling grid system. Provide all auxiliary framing required to anchor fixtures to metal building structure in plant.

END OF SECTION

SECTION 16600

UNDERGROUND SYSTEM

PART 1 - GENERAL

1.01 Scope of Work

A. Furnish and install a complete underground system of raceways and pull boxes as shown on the Drawings and as specified herein.

B. All underground systems shall be direct buried conduit or encased duct bank unless indicated otherwise on the Drawings.

C. Where referred in this Section, raceways are underground conduits. Underground system is the collection of underground raceways and pull boxes.

D. Conduit depths vary. Coordinate with other utilities, yard piping, yard structures and field conditions to determine required depths and install raceways at that required depth at no additional cost to the OWNER.

E. Conduit routing and pullbox locations shown on the Drawings are diagrammatically depicted. Coordinate with other utilities, yard piping, yard structures and field conditions to determine required paths and depths at no additional cost to the OWNER.

1.02 Related Work

A. All trenching and surface restoration shall be as specified in Division 2, but the responsibility of furnishing and installing the material shall be that of this Section.

B. Groundwater control is included in Division 2.

1.03 Submittals

Submit, in accordance with Section 01340, Shop Drawings, Product Data and Samples, for the following:

1. Conduit.
2. Pull boxes.

PART 2 - PRODUCTS

2.01 Materials

A. Raceways shall be polyvinyl chloride conduit. Refer to Section 16111 for material requirements.

B. Ground rods and other grounding materials and methods shall be as specified in Section 16170.

C. Bell ends and plastic duct spacers shall be as manufactured by Carlon; Underground Devices Inc. or equal.

D. Pull line for spare conduits shall be 1/8 inch nylon rope.

E. Detectable Warning Tape
   1. Each conduit section shall be marked by means of a detectable warning tape (tracer tape) as shown on the Drawings. The detectable warning tape shall be capable of being detected or located by either conductive or inductive location techniques.
   2. The detectable warning tape shall consist of 5 mil (.005 inch) overall thickness; five-ply composition; ultra-high molecular weight; virgin polyethylene; acid; alkaline and corrosion resistant; with 150 lbs of tensile break strength minimum per six inch width.
   3. The top side of the tracer tape shall be color banded red for electrical and high voltage lines and orange for signal, communication, telephone and fire alarm lines. Tracer tape shall be four inch wide with four color bands. The tape shall be inscribed with the warning message for the utility such as "CAUTION – ELECTRICAL LINED BURIED BELOW". Tape shall be as manufactured by Mutual Industries, Inc.; Terra Tape, Div. of Reef Industries Inc. or equal.

F. Sidewalk boxes and boxes for concrete slabs shall be cast iron intended for outdoor use primarily to provide a degree of protection against falling rain, sleet and external ice formation (NEMA 3R). Boxes shall be manufactured by O-Z/Gedney; Appleton; Killark or equal.

PART 3 - EXECUTION

3.01 Installation

A. Install raceways to drain away from buildings. Raceway slopes shall not be less than three inches per 100 feet.

B. The minimum cover for raceway banks shall be 24 inches unless otherwise permitted by the ENGINEER.

C. Raceway terminations at manholes shall be with end bells for PVC conduit and insulated throat grounding bushings for steel conduit.

D. Where bends in raceways are required, use long radius elbows, sweeps and offsets.

E. Swab all raceways clean before installing cable.

F. Plug and seal spare raceways watertight at all buildings and structures.

G. Seal the ends of raceways and make watertight at all buildings and structures.

H. Rigid galvanized steel conduit shall be used for elbows and risers at the utility pole for electrical and telephone service conduits. Rigid galvanized steel conduit shall be used for all 90° elbows in the underground conduit duct bank system.

I. PVC coated rigid galvanized steel elbows shall be used for pad-mounted transformer stub-ups and all stub-ups through concrete floors, walls and slabs.

J. A pull line shall be installed and left in all spare raceways.

K. Install detectable warning tape in all trenches as shown on the Drawings. Where trench exceeds 24 inch width, provide additional detectable tape runs to mark each side of the trenches in addition to the one in the center.

3.02 Cleaning

A. All new pullboxes shall be thoroughly cleaned of all silt, debris and foreign matter prior to final inspection.

B. After removing old cables, clean out existing ducts to be reused with a duct rodder before installing new cables.

C. Remove all debris from manholes and handholes after the work is completed.

END OF SECTION

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